

A THIRD REPORT UPON THE MEMBRACIDAE (TREE-HOPPERS) OF SOUTH DAKOTA

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INTRODUCTION

The Membracidae, commonly known as tree-hoppers, comprise a family of bugs which are included in the order Homoptera. The family is primarily a tropical and subtropical one, the home of the majority of the existing species being Central and South America, Africa and southern Asia. On the North American continent, Mexico is represented by the largest numbers of species.

The tropical and subtropical species of tree-hoppers are often considerably larger than the species in the temperate and boreal regions and in addition their body form is frequently very irregular. As one crosses over into the United States from Mexico and travels northward thru this country and penetrates Canada, the species of Membracidae become less in number, their size decreases and their form grows less grotesque.

Thru many years of collecting, the writer has taken 46 species of Membracidae in South Dakota, one species, *Acutalis tartarea* (Say) being represented by two varieties, *Acutalis tartarea tartarea* (Say) and *Acutalis tartarea semicrema* (Say). The total number of species reported in this paper undoubtedly does not constitute all that ultimately will be found in our commonwealth, for undoubtedly a small number of additional species will be taken in the future.

CHARACTERISTICS OF THE HOMOPTERA

The tree-hoppers belong to the order of insects known as the Homoptera. This order includes such families as the Cicadidae (cicadas), the Membracidae (tree-hoppers), the Cercopidae (spittle insects), the Cicadellidae (leaf-hoppers), the Fulgoridae (Lantern-flies), the Coccidae (scale-insects and mealy-bugs), the Chermidae (psyllids or jumping plant lice).

the Aleyrodidae (white flies), the Aphididae (typical aphids or plant lice) and the Phylloxeridae (adelgids and phylloxerids). Folsom* estimated the numbers of species of insects belonging to the Homoptera as approximately 6000. In size the Homoptera vary considerably. Some are minute, in fact, smaller than the head of an ordinary pin, while others are giants, comparatively, for these may measure one and three-quarters inches or more in body length and four inches or more across their outstretched wings. All of the Homoptera are plant feeders and obtain their nourishment by puncturing plant tissue with their mouth-parts and sucking the sap. The piercing parts of the sucking apparatus are to be found within the jointed beak that is attached to the under side of the head at its back end. This beak, when not in use, is held between the legs close up against the under surface of the body. The wings of the Homoptera are usually four in number, but the adult male Coccidae are provided with only two, while the adult females have none. The flying appendages are held roof-like over the body and they are usually of the same structure thruout, at least they do not have the basal part leathery and the distal part membranous. The metamorphosis in the Homoptera is usually incomplete.

CHARACTERISTICS OF THE MEMBRACIDAE

The species of Membracidae found in South Dakota are all less than one-half inch in length. The colors of the adults are yellow, green, brown or black, and with the exception of the green, are permanent even after death. The green, however, fades to yellow after the insects have been dead and stored in cabinets for a time.

The Membracidae may be distinguished from all other Homoptera thru the following characters: ability to move about in the nymphal and adult stages; tarsi 3-jointed, antennae short, with the distal end fine and bristle-like beak plainly attached to head; ocelli two in number and situated between the eyes on the front margin of the head; pronotum prolonged backward to extend over the entire thorax and

*Folsom, J. W. Entomology with Reference to its Biological and Economic Aspects. P. 16. 1922.

frequently over the entire abdomen. Strange, unexplainable processes, such as posterior prongs, anterior and lateral horns, dorsal crests, spines, etc., may ornament the pronotum.

GENERAL LIFE HISTORY AND HABITS

All membracids begin life in the egg stage. Most of our species of tree-hoppers lay their eggs in late summer and early fall, but the eggs do not hatch until the following spring. In the spring they give rise to nymphs and these ordinarily require about six weeks to attain their full growth. The nymphs then transform to adult membracids. The adults mate shortly after they appear and usually within a week after this has taken place, the females begin to lay their eggs. The adults are present ordinarily thru the summer and early fall. Most of our South Dakota membracids produce but one brood of tree-hoppers during a year.

The eggs of some of our species of membracids are shaped somewhat like a shortened cigar, while others are more or less club-like in form. All are whitish or yellowish in color. In size, the eggs of such species as *Ceresa bubalis* (Fabr.) and *Ceresa taurina* Fitch measure approximately one-sixteenth of an inch in length and about one-eightieth of an inch in diameter.

The manner in which the eggs are deposited, the place where they are laid and the plants that receive the eggs are usually the same for all members of the same species, but differ for members of another species. In a general way it may be said that our tree-hoppers lay their eggs in slits made thru the bark of one, two or three year old twigs of the egg-hosts, or in slits made in the bark and outer wood of such twigs, or in slits made in the mid-ribs of leaves, or in openings made in the axils of the leaf petioles and stems or between the bud scales. Some of our tree-hoppers are capable of laying 250 eggs or more, but all of these eggs are not deposited at one time.

The time when overwintering eggs hatch in the spring varies not only with the species of tree-hopper concerned, but the time of hatching also depends upon the prevailing climatic conditions of the spring. The eggs laid by one female tree-

hopper will not all hatch at the same time, in spite of the fact that they were exposed practically to the same environmental conditions.

The eggs hatch into nymphs and these must pass thru five instars before they can transform to adults. The length of time that a tree-hopper spends in each of the first four instars is about a week, but the duration of the fifth or last instar usually is prolonged to two weeks or more.

In most of our species of membracids, the thorax and abdomen of the nymphs are adorned on their dorsal side with spines and hair that are often considerably branched. In a nymph of the first instar, the head is large, the legs small and weak, the antennae, ocelli and wing pads not distinguishable and the pronotum not especially well developed. In the second instar, the insect has increased in size, the body has become firmer and darker and the head more normal in size as compared with the size of the remainder of the body. The ocelli and antennae are visible and while the prothorax is slightly swollen, the pronotum has not yet become permanently enlarged. No wing pads are visible in this instar. In the third nymphal stage the insect has grown in size, the pronotum has become enlarged and the wing pads have appeared. The dorsal spines, so prominent in the first and second instars, are frequently entirely missing on the head and thorax. In the fourth and fifth instars, the size of the insect increases and the pronotum and wing pads enlarge. The dorsal spines become less complex and frequently are mere stubs.

Some of our Membracidae use the same species of plant or plants as egg-hosts and feeding hosts. If such is the case, the plants frequently are herbaceous and the insect passes the winter in the adult state. The majority of our species of tree-hoppers, however, lay their eggs in trees, shrubs, or woody vines. Such species pass the winter in the egg stage. In the spring these eggs hatch into nymphs and these, in most species, leave the egg-host and seek some succulent plant upon which to feed. The nymphs remain upon the succulent plant during the first three instars at least and feed

upon its sap. They may now leave this host plant or they may wait until the adult state is reached before leaving. When they do leave, they seek the plants that are to serve as egg-hosts.

The adult membracids usually make their appearance during June or July and may be found from that time until cold weather sets in during the fall. They are sun-loving insects and are usually captured while they are feeding, mating, ovipositing or resting. Naturally they are most active during the heat of the day. When they are approached they often move around to the opposite side of the twig to hide, or they suddenly spring from the plants and fly away in a quick but erratic manner. The insects do not leap about from twig to twig or from leaf to leaf as one might expect them to do from their common name, tree-hopper. While some of our species are solitary, others seem to be gregarious and crowd together in astonishing numbers over a small area of a leaf or twig.

HOW, WHERE AND WHEN TO COLLECT MEMBRACIDAE

Membracidae may be collected thru sweeping, thru beating or by hand. At times it may be profitable to use all three of these methods and then again only one may yield good results. In sweeping we prefer to use a heavy insect net with a bag made of heavy muslin. Such a net may be used in sweeping grasses, weeds and thornless vines, bushes and trees. Only the smaller twigs of trees should be swept, the stroke of the net being from the bases to the tips or across the tips. Beating and collecting by hand may be resorted to when the insects are found on either thorny or thornless trees, bushes, vines or weeds. All of these methods have their advantages and disadvantages. The chief disadvantage of collecting by hand lies in the fact that the insects are small, and since they are frequently protectively colored and protectively shaped, they may be overlooked. Further, the specimen may suddenly jump and fly just as the collector is about to make the capture with his hands or fingers. The main objections to beating and sweeping arise from the fact that the tree-hoppers are not readily dislodged and when

beating alone is resorted to, the insects, even tho dislodged, may fly away instead of falling into an inverted umbrella or upon a sheet or other object placed beneath the host tree or shrub.

All deciduous trees, bushes, vines, herbaceous plants and grasses growing in sunny places should be looked upon as possible host plants of tree-hoppers. Young plants seem to be preferred over older ones and likewise young twigs are preferred to older branches. Water shoots will often yield tree-hoppers when the remainder of the tree will not. Whenever a species new to a collection is taken, it is advisable for the collector to work over that particular specimen of host plant thoroly, for frequently one plant may harbor numerous tree-hoppers while all surrounding plants may be uninfested with them.

ECONOMIC IMPORTANCE OF MEMBRACIDAE

The family, Membracidae, contains only a few species that are of any considerable economic importance in South Dakota. Of these few species, the buffalo tree-hopper (*Ceresa bubalis* Fabr.) is the most injurious. The life history of this insect, the injury done by it and the measures that can be used to control it, follow.

LIFE HISTORY, HABITS AND CONTROL OF THE BUFFALO TREE-HOPPER

(*Ceresa bubalis* Fabr.)

The buffalo tree-hopper is an injurious insect in South Dakota not because of its feeding habits but because of its egg-laying instincts. The eggs are deposited in short slits made by the female tree-hoppers in two and three year old twigs of the host plants. As a consequence these twigs later become rough and gnarly as shown in figure 1. The host plants that suffer the most severe harm are apple trees, but pears, plums, elms, poplars and willows may also be injured very seriously. And yet, practically all of this injury may be avoided thru proper orchard management.

Life history and habits: The adult tree-hoppers (Fig. 2, A, B,) are greenish four-winged bugs measuring about three-

eighths of an inch in length. They are roughly triangular in shape when viewed either from the side or from above and have their shoulders produced into two short, sharp, horn-like processes which extend to the sides. The head is covered by the body so that it cannot be seen from above but when the insect is examined from the side or from below or from in front, the head is clearly visible. The beak thru which the animal pierces plant tissue and sucks out the sap is held up against the under surface of the body when it is not in use. The wings are four in number, are well developed and are held folded against the side of the body except when the insect is flying. The legs are also well developed, and are adapted for walking and jumping. The abdomen is short and is covered on the side by the wings and above by a triangular extension of the prothorax. Attached to the under surface of the abdomen of the female tree-hopper is an instrument known as the ovipositor. With this structure she cuts

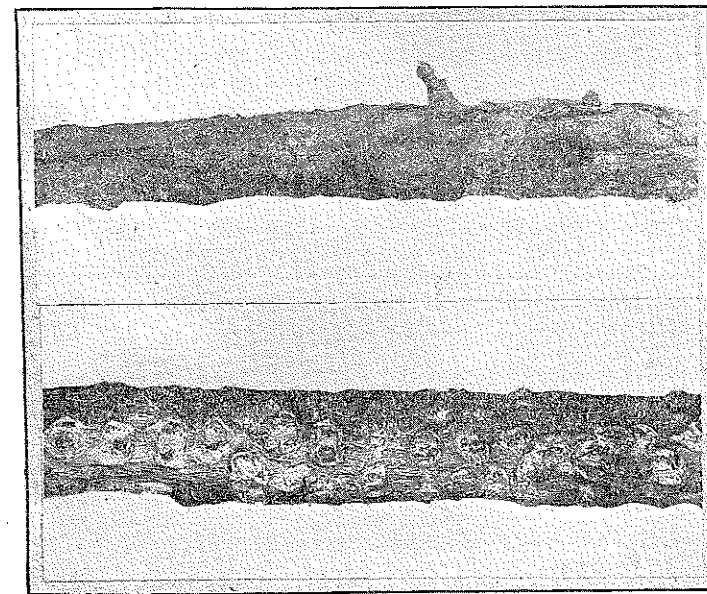


Fig. 1.—Apple twigs injured by buffalo tree-hopper. The upper twig shows injury one and two years old, while on the lower twig the injury is much older. Original.

slits thru the bark and into the sapwood of twigs of trees, and into these slits she inserts her eggs.

The adult bugs or tree-hoppers begin to make their appearance in small numbers early in July but by the end of July they have become abundant. They remain numerous until fall and disappear with the first heavy frost.

During their life the adult tree-hoppers fly about, feed, mate and lay their eggs. Altho the insects fly well for short distances, and while they are undoubtedly able to cover considerable ground, they are very reluctant to leave the neighborhood in which they developed. The adult insects usually come to rest upon twigs or stems of their food plants and here they remain for long periods of time, moving just enough to feed and keep within the rays of the sun. They are always ready, when disturbed, to spring into the air and take flight. Each flight is short, erratic and quick and is accompanied by a whirring sound.

The adult buffalo tree-hopper obtain their nourishment by sucking out the sap from such trees as apples, pears, plums, elms, poplars, willows, boxelders, etc. New tender twigs as well as twigs two years old or older may be attacked by the feeding insects but occasionally the petioles of the leaves may also be forced to give up the sap coursing thru them. Fortunately the injury which is done to the host plants by the feeding insects is negligible.

For egg-laying purposes, the female insects choose two or three year old twigs of such plants as also furnish them with food. They then assume a position so that the long axis of their body is parallel with the long axis of the twig and with their ovipositor they cut a series of paired slits thru the bark and into the sapwood of the twigs. The members of each pair of slits are usually separated by not more than one-quarter of an inch (Fig. 2, C) and they are so shaped and placed that the bark between them dies. As a result of the death of this bark, an oval or round scar is produced. This scar increases in size with each season's growth and as a result, the injured twig becomes gnarly and rough (Fig. 1). If the twig has received many egg-slits it becomes

dwarfed, deformed and weak. Such twigs are easily broken off by the wind and they are frequently attacked by fungus diseases and insects.

The eggs are elliptical in outline and measure about one-sixteenth of an inch in length and one sixty-fourth of an inch in diameter. The egg shell itself is tough and while it is somewhat translucent, it may be best described as having a dirty white appearance.

After a female tree-hopper has cut an egg-slit, it packs into this slit from 4 to 12 eggs (Fig. 2, D). These eggs are pushed into the wood of the twig for the greater part of their length, the remainder of the eggs, the tops, remaining

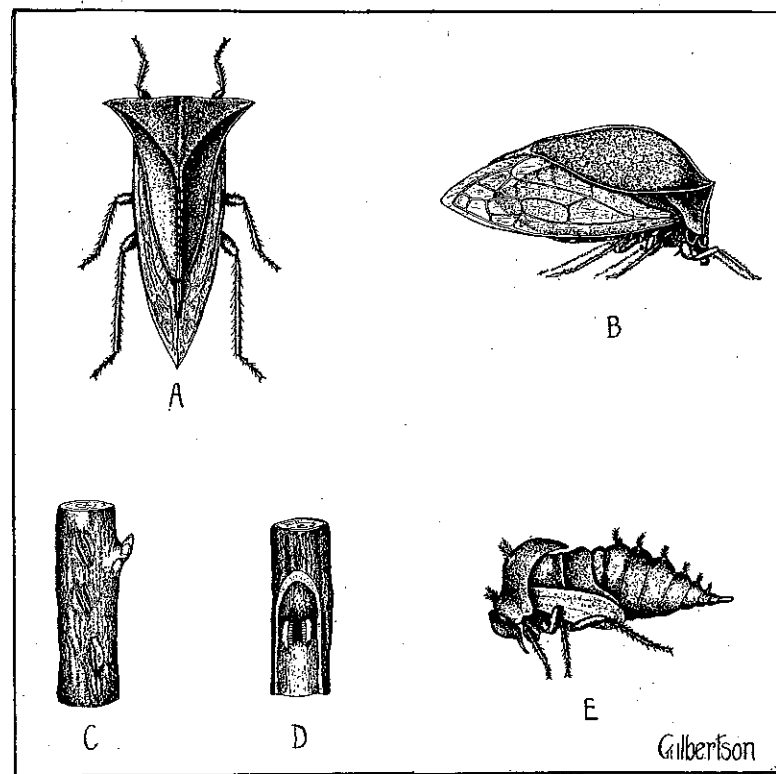


Fig. 2—Life history of buffalo tree-hopper; A, tree-hopper viewed from above; B, insect seen from the side; C, egg-slits in bark of apple twig; D, bark peeled away to show eggs in wood; E, nymph is fifth or last instar. Original.

in the bark. When one slit has been cut and filled with eggs, a second slit is cut usually within a quarter of an inch to one side of the first slit and then the second slit is filled with eggs (Fig. 2, C). The insect now moves along the twig a short distance and repeats the performance. As many as 4 or 5 pairs of egg slits may be made and filled by one female per day, and then a rest period of several days follows. At the end of this time, egg-laying is again resumed and then follows another rest period of several days. In this fashion 50 or more egg masses, including between 250 and 300 eggs may be laid.

The eggs remain unhatched over winter but in the latter part of May of the following year, the nymphs begin to emerge from the eggs. These do not all hatch from the eggs at the same time, and, as a consequence, newly emerged nymphs may make their appearance each day for a month or more. Such nymphs are extremely small, for they are not much larger than the egg from which they hatched.

The young insects do not remain very long upon the trees where they hatched but they must make their way to other host plants upon which to feed or they die. These new host plants are certain weeds which usually grow in an uncultivated orchard or around the edge of an improperly managed orchard. The duration of the nymphal stage is about 6 weeks under ideal circumstances but this period may be considerably lengthened thru unfavorable weather conditions. During its life, each nymph thru a molting process passes thru five stages or instars, each successive stage being slightly larger and different from the preceding. An idea of the general appearance of all of these instars may be had by referring to figure 2 and by examining the drawing of the nymph in the fifth instar (Fig. 2, E). The nymphs obtain their food by sucking out the sap from certain weeds which are their host plants. When the nymphs are full grown, they molt once again and transform into adults.

From the preceding discussion it is seen that but one generation of buffalo tree-hoppers is produced during a year. Further, the serious injury done to fruit and shade trees is

not caused by the feeding habits of the insect but by the egg-laying instincts of the females. And, finally, the winter is passed in the egg state in twigs two or three years old.

Control: The buffalo tree-hopper is absolutely dependent upon certain succulent weeds from which the nymphs must obtain their food. If such weeds are removed, the nymphs die. If, then, the orchard is kept well cultivated during June and July and if, in addition, the borders of the orchards are also cultivated, then no harm will be experienced from this pest. If it is found that the twigs of some trees contain many egg-slits of the tree-hoppers, then these trees should receive a severe pruning before the egg hatch in the spring (before May 1) and in addition they should be well fertilized. Such twigs as are cut off should be destroyed by burning before May 1.

SPECIES OF MEMBRACIDAE TAKEN IN S. D.

In the following pages the writer has enumerated the species of Membracidae which have been taken by him within the boundaries of South Dakota. The earliest date of capture of the adult tree-hopper of each species, the various localities where each species was taken and the host plants when known, are enumerated. Reference should be made here to two preliminary pages by the author on the Membracidae of South Dakota.²⁻³ Attention should also be called to Van Duzee's catalog⁴ in which five species of tree-hoppers are credited to "Dakota." Probably Dakota Territory was meant by Van Duzee, an area including both North and South Dakota. The five species which Van Duzee lists as occurring in Dakota are the following:

- Ceresa bubalis* (Fabr.)
- Stictocephalus inermis* (Fabr.)
- Glossonotus univittatus* (Harris)
- Cyrtolobus fenestratus* (Fitch)
- Pubilia modesta* Uhler

² Severin, H. C. A preliminary report upon the Membracidae of South Dakota, 12 Ann. Rept. of the State Entomologist of South Dakota, pp. 17-18. 1921.

³ Severin, H. C. Second Report Upon the Membracidae of South Dakota. 14 Ann. Rept. of the State Entomologist of South Dakota pp. 27-33. 1923.

⁴ Van Duzee, E. P. Catalog of the Hemiptera of America North of Mexico. Univ. of California Pub., Tech. Bul. Vol. 2, 1927.

All but two of these five species, *Glossontus univittatus* (Harris) and *Cyrtolobus fenestratus* (Fitch) have been taken in South Dakota by the writer.

Microcentrus perdita (Am. and Serv.) Canton; Yankton.
Earliest date of capture, Aug. 26.
Host: Buroak (*Quercus Macrocarpa*).

Enchenopa (Enchenopa) binotata (Say). Bigstone; Brookings; White.

Earliest date of capture, Aug. 27.

Host: dogwood (*Cornus*); locust (*Gleditsia*); *Viburnum (Viburnum lentago)*.

Enchenopa (Campylenchia) latipes (Say). Bigstone; Brookings; Buffalo; Capa; Colton; Custer; Fairfax; Interior; Lake Hendricks; Newell; Rapid City; Sisseton; Sylvan Lake; Vermilion; Waubay; Wentworth; White.

Earliest date of capture, June 25.

Hosts: Alfalfa (*Medicago*); sweet clover (*Melilotus*).

Ceresa basalis Walker. Custer; Deadwood; Englewood; State Game Park; Sylvan Lake.

Earliest date of capture, Aug. 20.

Hosts: dogwood (*Cornus*); raspberry (*Rubus*).

Ceresa borealis Fairm. Brookings.

Earliest date of capture, July 12.

Hosts: Buroak (*Quercus Macrocarpa*); willow (*Salix*).

Ceresa bubalus (Fabr.), Arlington; Big Stone; Brookings; Buffalo; Canton; Capa; Colton; Dell Rapids; Fairfax; Elk Point; Ft. Pierre; Interior; Lake Hendricks; Lake Oakwood; Lake Poinsett; Lake Preston; Lennox; Mitchell; Newell; Nisland; Phillip; Sioux Falls; Sisseton; Springfield; Vermilion; Volga; Wentworth; White; Yankton.

Earliest date of capture, July 2.

Hosts: Alfalfa (*Medicago*); apple (*Malus*); aster (*Aster*); elm (*Ulmus*); pear (*Pyrus*); plum (*Prunus*); poplar (*Populus*); potato (*Solanum*); willow (*Salix*).

Ceresa femorata Fairm. Bison Brookings; Buffalo; Mitchell; Springfield; Yankton.

Earliest date of capture, Aug. 13.

Hosts: Buroak (*Quercus macrocarpa*).

Ceresa diceros (Say). Bigstone; Bison; Brookings; Buffalo; Canton; Capa; Custer; Lake Hendricks; Mobridge; Volin; Yankton.

Earliest date of capture, July 12.

Hosts: Elder (*Sambucus*); goldenrods (*Solidago*); wild cherry (*Prunus pennsylvanica*).

Ceresa femorata Farim. Bison; Brookings; Buffalo; Canton; Capa; Deadwood; Hot Springs; Lake Hendricks; Lake Oakwood; Newell; Rapid City; Watertown; Wessington Springs; White; Whitewood.

Earliest date of capture, July 10.

Hosts: willow (*Salix*).

Ceresa stimulea Van D. Bigstone; Brookings.

Earliest date of capture, June 21.

Hosts: Unknown.

Ceresa taurina Fitch. Arlington; Brookings; Canton; Capa; Ipswich; Lake Hendricks; Newell; Yankton.

Earliest date of capture, June 28.

Hosts: apple (*Malus*); pear (*Pyrus*); alfalfa (*Medicago*); potato (*Solanum*).

Stictocephala festina (Say). Canton; Elk Point; Interior; Meckling; Oakwood; Phillip; Rapid City; Rosebud.

Earliest date of capture, June 13.

Hosts: Unknown.

Stictocephala inermis (Fabr.). Bison; Brookings; Bruce; Buffalo; Capa; Hot Springs; Lake Hendricks; Lake Oakwood; Newell; Rapid City; Watertown; White; Whitewood.

Earliest date of capture, July 8.

Hosts: alfalfa (*Medicago*); sweet clover (*Melilotus*).

Stictocephala substriata (Walk). Buffalo; Capa.

Earliest date of capture, Aug. 15.

Food plants: Unknown.

Vanduzea triguttata (Brum.), Canton; Capa; Deadwood; Interior; Martin; Philip; Rapid City; Springfield; Volin.

Earliest date of capture, June 25.

Hosts: Lead plant (*Amorpha*).

Enthylia concisa Walker. Bigstone.

Earliest date of capture, Aug. 27.

Hosts: goldenrods (*Solidago*); sunflower (*Helianthus*).

Pubilia concava (Say). Bigstone; Brookings; Canton; Elk Point; Hurley; Spearfish; Springfield; Volin; Waubay; White.

Earliest date of capture, June 25.

Hosts: goldenrods (*Solidago*).

Pubilia modesta Uhler. Capa; Deadwood; Game Lodge; Interior; Lead; Martin; Rapid City; Volin; Watertown.

Earliest date of capture, June 6.

Hosts: goldenrods (*Solidago*); sunflower (*Selianthus*); *Artemisia*.

Pubilia reticulata Van D. Brookings; Canton.

Earliest date of capture, May 28.

Hosts: Unknown.

Cyrtolobus (Cyrtolobus) cinereus (Emms.). Deadwood; Lake Hendricks; Lake Oakwood; Newell; Nisland; Rapid City; Whitewood.

Earliest date of capture, June 24.

Hosts: Bur oak (*Quercus macrocarpa*).

Cyrtolobus (Cyrtolobus) griseus Van D. Lake Hendricks; Lake Oakwood.

Earliest date of capture, June 14.

Hosts: Bur oak (*Quercus macrocarpa*).

Cyrtolobus (Cyrtolobus) inermis (Emms.). Lake Hendricks; Lake Oakwood.

Earliest date of capture, July 12.

Hosts: Bur oak (*Quercus macrocarpa*).

Cyrtolobus (Cyrtolobus) maculifrontis (Emms.). Canton; Lake Hendricks; Lake Oakwood; Springfield; White; Yankton.

Earliest date of capture, June 14.

Hosts: Bur oak (*Quercus macrocarpa*).

Cyrtolobus (Cyrtolobus) rufulus Woodruff. Lake Hendricks; Lake Oakwood; Newell; Rapid City; White; Whitewood; Yankton.

Earliest date of capture, June 10.

Hosts: Bur oak (*Quercus macrocarpa*).

Cyrtolobus (Atymna) querci (Fitch). Brookings; Lake Hendricks; Lake Oakwood; Nisland; Springfield; Waubay; Whitewood; Yankton.

Earliest date of capture, June 12.

Hosts: Bur oak (*Quercus macrocarpa*).

Cyrtolobus (Xantholobus) muticus (Fabr.). Garretson; Lake Oakwood.

Earliest date of capture, June 14.

Hosts: Bur oak (*Quercus macrocarpa*).

Telamona (Telamona) ampelopsidis (Harris). Brookings; White.

Earliest date of capture, June 15.

Hosts: Virginia creeper (*Psedera ampelopsidis*).

Telamona (Telamona) barbata Van D. Lake Hendricks.

Earliest date of capture, July 12.

Hosts: Unknown.

Telamona (Telamona) decorata Ball. Brookings; Newell.

Earliest date of capture, Aug. 5.

Hosts: Bur oak (*Quercus macrocarpa*).

Telamona (Telmona) monticola (Fabr.). TLake Oakwood; Newell; Nisland.

Earliest date of capture, June 14.

Hosts: Bur oak (*Quercus macrocarpa*); willow (*Salix*).

Telamona (Telamona) obsoleta Ball. Brookings; Lake Hendricks; Springfield.

Earliest date of capture, June 14.

Hosts: Unknown.

Telamona (Telamona) pruinosa Ball. Brookings; Lake Hendricks; Lake Oakwood.

Earliest date of capture, Aug. 14.

Hosts: Bur oak (*Quercus macrocarpa*).

Telamona (Telamona) pyramidata Uhler. Canton; Ipswich; Newell.

Earliest date of capture, June 28.

Hosts: Bur oak (*Quercus macrocarpa*).

Telamona (Telamona) reclinata Fitch. Deadwood; Newell; Nisland; Whitewood.

Earliest date of capture, June 26.

Hosts: Bur oak (*Quercus macrocarpa*).

Telamona (Telamona) tristis coryli Fitch. Whitewood.

Earliest date of capture, July 8.

Hosts: Bur oak (*Quercus macrocarpa*).

Telamona (Telamona) viridia Ball. Brookings; Newell.

Earliest date of capture, July 2.

Hosts: Willow (*Salix*); poplar (*Populus*).

Telamona (Glossonotus) crataegi (Fitch). Brookings.

Earliest date of capture, July 25.

Hosts: Hawthorne (*Crataegus*).

Telamona (Heliria) fagi Fitch. Brookings.

Earliest date of capture, July 15.

Hosts: Unknown.

Telamona (Heliria) scalaris (Fairm.). Brookings.

Earliest date of capture, June 5.

Hosts: Unknown.

Telamona (Heliria) strombergi Godg. Waubay.

Earliest date of capture, July 26.

Hosts: Unknown.

Archasia galeata (Fabr.). Yankton.

Earliest date of capture, Aug. 8.

Hosts: Bur oak (*Quercus macrocarpa*).

Acutalis tartarea tartarea (Say). Brookings; White.

Earliest date of capture, July 22.

Hosts: Ragweeds (*Ambrosia*).

Acutalis tartarea semicrema (Say). Brookings; White.

Earliest date of capture, July 23.

Food plants: Ragweeds (*Ambrosia*).

Micrutalis calva (Say). Vermillion; Yankton.

Earliest date of capture, June 6.

Hosts: Potato (*Solanum*).