

# PSYCHE.

## AMERICAN PHYTOPTOCECIDII.

BY H. GARMAN, LEXINGTON, KY.

1. On the leaves of *Nyssa multiflora*. A nodular growth of the leaf substance, forming small, rounded prominences on both upper and under surfaces. Above, the cecidii are often lobed and with linear impressions. A three-lobed form with triradiate impression is common. On the under side, the surface of the galls is not impressed, and the shape is more conical, the round or slightly elongated opening being at the apex. They are scattered irregularly over the leaf, and may be very thickly placed. On fully grown leaves cecidii measure from 1 mm. to 2 mm. in diameter, and are about 1 mm. in height on both sides of the leaf, the projection above and below being about equal. On younger leaves cecidii often measure as little as 0.5 mm. in diameter. The walls are thickened, and send into the cavity large processes and ridges which occupy much of the space. There are no hairs inside or out.

This deformation was first collected in Virginia in the spring of 1882. Subsequently it was found in various localities in southern Illinois, and has recently been observed in Kentucky. It sometimes occurs on the same leaves as the next, but thus far has proved most abundant when not so associated.

2. On the leaves of *Nyssa multiflora*. This is a narrow upward and inward fold of the margin of the leaf, and measures from 0.5 mm. to 1 mm. in diameter. In dried specimens the color is dark brown. The leaf where folded is thickened, but is not otherwise greatly changed. The length of folds varies greatly, sometimes being only a few millimeters long, and again including the whole of the leaf margin. The fold ultimately causes the leaf to become scalloped, the scallops measuring from about 2.5 mm. to 3 mm. in length.

This cecidium has been collected in Virginia, Illinois, and Kentucky. Phytognomy from both of the preceding growths have been examined. As far as I know neither form of cecidium has been hitherto described.

3. On the leaves and petioles of *Potentilla canadensis*. This consists of whitish tufts of unicellular hairs, the tufts measuring when isolated and well grown about 0.5 mm. in diameter. The hairs themselves measure about 0.5 mm. in length, and large ones have a diameter at the base of about 0.02 mm. They taper regularly to a point, and under the microscope have the appearance of a tuft of grass blades. The tufts are often so numerous and so closely

placed as to cover much of the leaf surface. They develop on both surfaces but in the specimens examined are rather more common on the upper side.

This was collected at Blue Ridge, Virginia, July 22, 1891, by Professor A. B. Seymour.

4. On the leaves of *Acer spicatum*. Small felt-like patches of a whitish or pale yellow color scattered over the under side of the leaf. Growths on leaves before me measure from 1.5 mm. to 3 mm. in diameter. The growths consist of rather long, tangled and distorted hairs, being quite different from anything else described in this paper. The examples examined are probably all young. Some of the older ones are slightly brown rather than yellow, and probably when aged would have been decidedly brown in color.

Temple, N. H., June 18, 1888, (from Prof. A. B. Seymour).

5. On the leaves of *Acer glabrum*. An Erineum forming large patches chiefly at the tips of the lobes and on the upper side of the leaf. Growing upon the veins as well as elsewhere. On some young leaves before me, thickly sprinkled also over the under surface. This is the handsomest Erineum examined by me. The younger parts of growths are bright purple in color; older parts of growths become of a very dark purple. The deformed hairs are rather large, and are provided with long stalks. The color, manner of growth, and character of the deformed hairs will serve to distinguish this Erineum from the livid growth (No. 8) which appears

on the upper surface of leaves of *A. saccharinum*.

Glenwood Springs, Col., (collected by R. E. Blount; communicated by Prof. A. B. Seymour).

6. On the leaves of *Acer saccharinum*. A slender fusiform gall which projects from the upper surface of the leaf. Walls thin, and smooth inside and out. Length about 4.5 mm.; greatest diameter 1 mm. Opening as usual on the under side of the leaf.

Central Illinois, common; Temple, N. H., (from Prof. A. B. Seymour).

7. On the leaves of *Acer saccharinum*. An Erineum forming patches along veins on the under side of the leaf. The patches are made up of great numbers of minute mushroom-shaped hairs with very short pedicels; sometimes nearly sessile. The hairs and the patches which they form resemble those occurring on the under side of the leaves of *A. dasycarpum*, but the hairs on the latter, as far as examined, were provided with longer stalks, and were not so much inflated at the extremity. The patches in *A. saccharinum*, too, show a tendency to develop along the main ribs, whereas in *A. dasycarpum* they are more scattered, often occurring singly at the tips of lobes. They may notwithstanding these differences prove to be caused by the attacks of one and the same mite. All of the examples which I have seen were rather old and were of a deep brown color, in one case almost black. Individual patches measure as much as 10 mm. in diameter.

Urbana, Ill., common; Lexington, Ky., (received from Prof. W. B. Stark and also collected by myself).

8. On the leaves of *Acer saccharinum*. A fine Erineum forming patches of a livid color between the veins on the upper surface. The growths show a tendency to avoid the veins. They may be isolated in patches 2.5 mm. to 4 mm. in diameter and of very irregular shape, or they may where common combine and then occasionally occupy much of the surface. On badly infested trees scant growths sometimes appear on the under side of the leaves. The color of most of the dried specimens seen is livid. In very young growths but little of this color is apparent, these being mainly pale brown when dried, probably whitish when fresh; but some trace of the livid color can be made out in most young growths. A few of the growths seen were more nearly flesh color than livid.

A variety of this Erineum occurs in which the livid color is almost absent, the dried specimens being of a pale brown color in the largest and oldest growths. Even in this variety, however, close examination with a magnifier shows faint traces of the blue color. In manner of growth the two are alike.

The hairs are capitate, with short stalks, and excepting for their manner of growth and color, are not very different from those forming the brown patches on the under side of leaves.

Fort Mackinac, Mich., (from Prof. Wm. Trelease); Temple, N. H., (from Prof. A. B. Seymour).

9. On the leaves of *Acer dasycarpum*. This cecidium is a pouch-shaped gall which develops on the upper side of the leaves. The mite which inhabits it was many years ago described under the name *Vasates quadripes*, but is a true Phytoptus. The deformations were described by the present writer in the 12th Report of the Illinois State Entomologist (p. 135) as follows: "The form varies to some extent, some of the galls being discoid, or more or less spherical, while occasionally two galls have a common neck and opening. At first the color of the galls is like that of the unfolding leaf, dull purple or green; later they assume the light green color of the veins and veinlets; and still later change in many cases to purplish. Toward the end of summer they dry up and become black. The outer surface is smooth, but the walls are broadly and irregularly impressed making a very uneven outline. On the under side of the leaf the position of the gall is usually indicated by an impression with a tuft of white hairs in the center, which tuft covers the opening into the gall. Occasionally the opening and tuft are borne upon a slight elevation. The height of one of the largest galls seen, measured from the upper surface of the leaf, was 0.1 inch; its diameter was 0.13 inch."

This is one of the most abundant of the mite galls in the Middle states. I have received from both Professors Seymour and Trelease specimens collected at Madison, Wisconsin. It is abundant throughout Illinois and Kentucky.

10. On the leaves of *Acer dasycar-*

*pum.* An Erineum consisting of large patches of closely matted capitate hairs growing on the under side of the leaf. Patches generally elongated, from a tendency of the growths not to cross veinlets. Well defined, and varying from about 5 mm. to 10 mm. in diameter. When abundant several patches may unite, thus forming more extended ones. Leaves often bear a single patch. Sometimes occurring on leaves bearing also the pouch-shaped galls. Color pale yellowish at first, gradually changing to brown with age, at the last deep brown in color. This is probably the same as No. 26 of Dr. H. Hagen's list (Canadian entomologist, v. 17, p. 24), collected at Shelburne, N. H., by Prof. W. G. Farlow.

Urbana, Ill., not common; Cambridge, Mass. and Ithaca, Wis., (from Prof. Wm. Trelease); Madison, Wis., (from Prof. A. B. Seymour).

11. On the leaves of *Acer rubrum*. An Erineum forming elongated whitish or brown patches on the veins of the upper side of the leaf. This peculiarity of growing on the veins distinguishes this from any growth of the kind I have seen. Several others appear to avoid the veins even when covering most of the surface. The largest growths on leaves before me measure 11 mm. in length by about 4 mm. in diameter. The color varies from whitish in the younger growths through shades of pale yellow to brown. The hairs are mushroom-shaped, as in other similar growths. The only examples seen are from Temple, N. H., and were sent me by Prof. Seymour.

12. On the leaves of *Acer rubrum*. An Erineum growing in large patches scattered on the under side of the leaf. In color, manner of growth and character of the hairs it appears to be the same as No. 9 described as occurring on *Acer dasycarpum*. I have examined a single leaf bearing this deformation received from Prof. Wm. Trelease and collected at Wood's Holl, Mass.

13. On the leaves of *Acer rubrum*. This is a gall which does not differ in any important degree from the galls described as growing on the upper surface of the leaves of *A. dasycarpum*. I assume that it is made by the same Phytoptus, but have had no opportunity to make comparisons. It is moderately common in western Kentucky, and appears to be also common in the New England and other Eastern states. I take it that Dr. Hagen's Numbers 21, 22 and 23 (loc. cit.) are the same growth.

14. On the leaves of *Betula papyrifera*. A profusely growing Erineum forming extensive patches between the large veins diverging from the midrib on the under side of the leaf. The growths sometimes occupy the whole of the space between two veins. The color varies from whitish in the younger growths to pale brown in the older ones. The stalks of the capitate hairs are rather long.

Temple, N. H., (from Prof. A. B. Seymour).

15. On the leaves of *Betula papyrifera*. A small nodular gall which projects from both upper and under sur-

faces of the leaf. Clothed with a fine whitish, silken pubescence. Scattered somewhat irregularly, but with a tendency to be most abundant near the margin. The diameter of large examples is about 1 mm.; the depth is somewhat less in the dried and pressed examples. It is sometimes associated with the Erineum just described. The color of the upper part of the gall is in the dried specimens dull purple. Beneath, the color appears to have been like that of the under side of the leaf.

Temple, N. H., (from Prof. A. B. Seymour).

16. On the leaves of *Betula populi-folia*. This consists of bright, rust-colored growths of deformed hairs in hollows on the under side of the leaf. The corresponding convexity showing on the upper side is devoid of hairs, but is often of a yellowish color. The growths when isolated frequently have a circular outline and are from 2 mm. to 3 mm. in diameter. Large growths become elongated and may measure as much as 10 mm. in length, then occupying much of the space between two of the veins which diverge from the midrib. The number of growths on a single leaf varies in seventeen leaves before me from one to fourteen. In three of the seventeen there are imperfect growths on the upper side of the leaf. The hairs of the growth are capitate.

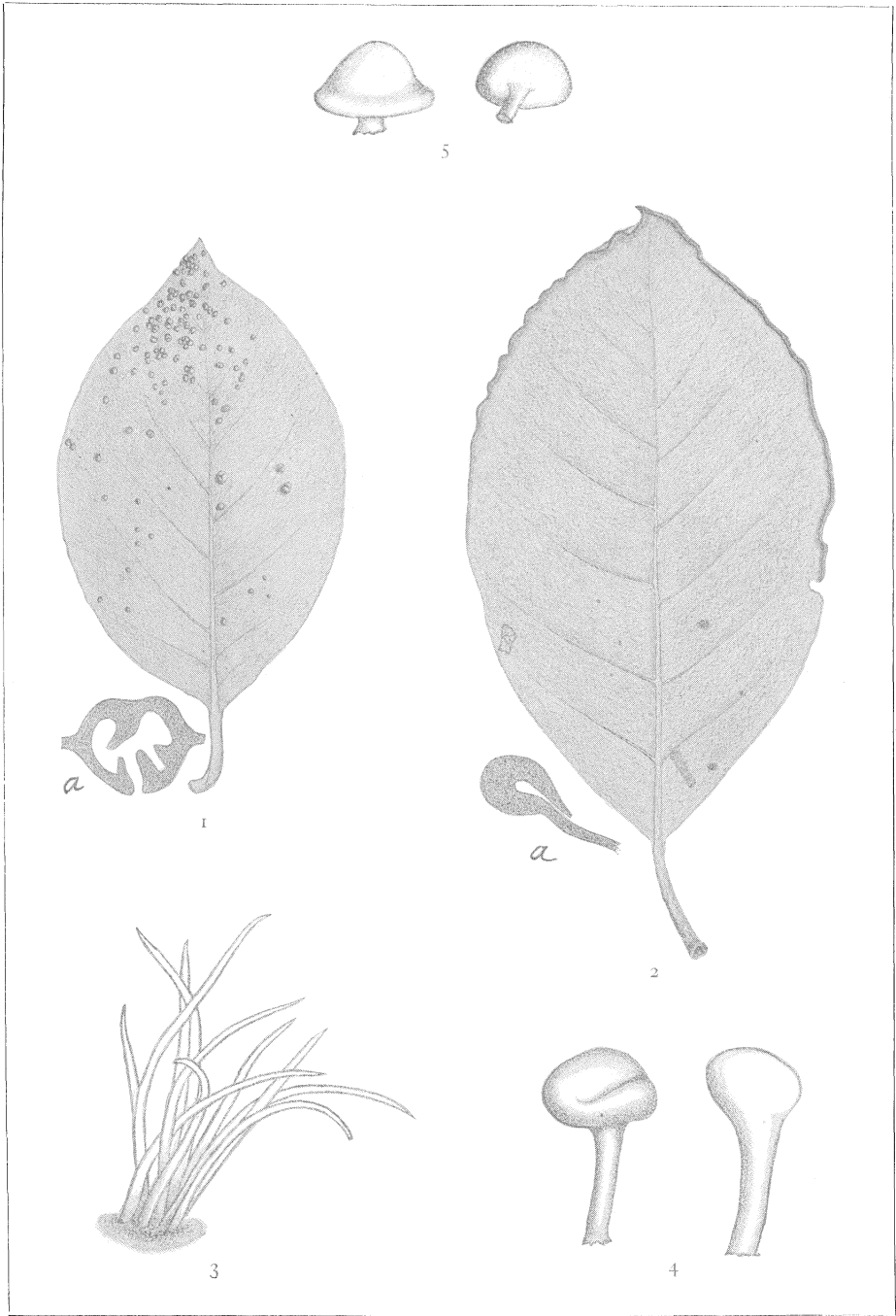
Temple, N. H., (from Prof. A. B. Seymour).

17. On the leaves of *Betula (lenta?)*. A profusely growing Erineum at first

forming straggling patches and lines on and along the veins on the upper surface of the leaf. Where abundant eventually forming continuous bands upon the veins which diverge from the midrib. The growths very rarely originate away from the veins on the upper surface, but imperfect growths appear sometimes on the under side, here between the veins, suggesting that it is the structure of the surface, which influences the disposition of the growths. The color of very young growths is whitish; on older leaves it is brown, while on several of the largest leaves examined there is an indication of purple on some parts of the bands. Hairs capitate, stalks rather long.

Described from specimens sent me from Temple, N. H., by Prof. A. B. Seymour. From the character of the leaves and the bark accompanying them I judge the species to be *B. lenta*.

18. On the leaves of *Juglans cinerea*. A button-shaped gall on the upper side of the leaf. The galls are green in color, sometimes a trifle lighter in shade than the leaf. They vary from 2 mm. to 3 mm. in diameter, and are about 2 mm. in height; the base is sometimes a trifle constricted. Beneath, the galls are open for almost the entire width, but the opening is occupied by a dense growth of whitish or brownish contorted hairs. On fifty-one leaves before me the number of galls on a single leaf varies from one to eighteen. Occasional galls occur with the opening on the upper side. The Phytopti are abundant in examples collected Aug. 15.



Jessamine Co., Ky., frequent.

19. On the leaves of *Fagus ferruginea*. An Erineum which grows on the upper side of the leaf where it follows the veins, forming bands or elongated patches of a brown color. When young, apparently of a whitish color. When abundant, causing the leaf to turn brown so that the position of growths can be recognized by examining the under side. Sometimes forming a close velvety covering on the upper surface. Never, as far as examined, very dark in color. Sometimes associated with the next, of which it may be a variety. Hairs capitate.

Temple, N. H., (from Prof. A. B. Seymour); Ft. Mackinac, Mich., (from Prof. Wm. Trelease).

20. On the leaves of *Fagus ferruginea*. An Erineum forming very dark brown patches on the under side of the leaf, between the veins. Patches varying in shape and extent, frequently elongated, sometimes forming a continuous band between veins. Color of all the specimens seen dark brown, but probably lighter when young. When occurring on the same leaf as the preceding,

and so presumably of the same age, always the darker in color. Hairs capitate, with rather long stalks, not noticeably different from hairs on the upper surface of a leaf received from Prof. Trelease, but with longer stalks than those from the upper side of leaves from Temple, N. H.

The growth is extremely common in western Kentucky, where most of the leaves of a tree may often be seen bearing it.

Western Kentucky; Ft. Mackinac, Mich., and Wood's Holl, Mass.. (from Prof. Wm. Trelease).

#### EXPLANATION OF PLATE 6.

Fig. 1. Leaf of *Nyssa multiflora*, showing cecidii described as No. 1; a, section of cecidium.

Fig. 2. Leaf of *Nyssa multiflora*, showing cecidii described as No. 2; a, section of folded leaf margin.

Fig. 3. Tuft of hairs from leaf of *Potentilla canadensis*.

Fig. 4. Capitate hairs from Erineum on under side of leaves of *Betula populifolia*.

Fig. 5. Capitate hairs from No. 19.

NOTES. — The Massachusetts legislature has granted another \$75,000 to stamp out the gypsy moth.

The attention of entomologists should be drawn to an interesting paper by Mr. L. O. Howard on the biology of the Chalcididae which appears in the current Proceedings of the U. S. national museum. A mass of details concerning insect-parasitism is there brought together in a highly instructive manner which merits at least the perusal of every

person engaged in any field work; problems requiring solution are suggested by the wholesale, and clues are given to others which are well worth following. The biological side of entomology is in no danger of suffocation at the national capital with such men as Riley, Howard, and Schwarz at the front.

In the last number of Psyche, fig. 3 on p. 237, showing the antenna of *Goniops* enlarged, is accidentally printed upside down.

