On the genera of APHIDÆ found in the United States.

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The chief object of the following paper is to direct attention to the various generic forms of the APHIS family, which I know to occur within the limits of the United States either from observation or from books. I do not possess Koch's great work on this family, and unlike our more fortunate Eastern brethren, we Western naturalists have no Public Scientific Libraries to aid us in our investigations. In order therefore that no mistake may arise as to the generic limitation of species, and also for the sake of brevity, I have compiled, partly from such resources as are at my disposal and partly from my own investigations, the following Synoptical Table of U. S. Genera. Some of the old genera which are retained are ignored by Koch, as I have been kindly informed by A. Agassiz, Jr. Esq., who has obligingly forwarded to me such extracts from Koch's book as I asked of him; one genus (*Thelaxes*) has not hitherto been discovered in the United States, and another (*Calaphis*) is, so far as I am aware, entirely new. Subjoined will be found references to all the described U. S. species known to me, and brief descriptions of such as appear to be new, always from the dried specimens except it is otherwise stated, the food-plants being given whenever they are known. All the new species occurred near Rock Island, Illinois. Imperfect as they are, such descriptions may perhaps serve some useful purpose.

Linnæus long ago remarked on the difficulty of distinguishing the various species of *Aphidæ*. If we suppose, as some authors have done, that similar species of *Aphidæ* inhabiting distinct species of the same botanical family are therefore necessarily distinct, the number of Aphidian species will be enormously large. For example, a large and conspicuously marked red species described by Dr. Fitch as *Aphis rudbeckiæ* occurs, according to Dr. Fitch, on Rudbeckia laciniata, Solidago serotina and S. gigantea; and a species differing only in some minute details of coloring, and which I have little doubt is identical, occurs, as I have myself observed, on Silphium perfoliatum and an undetermined species of Cirsium—all five of the above plants belonging to the great Natural family *Compositæ*. Here, if difference of food-plant makes difference of species, we get from three to five species of *Aphis* in the place of one. But I am myself acquainted with many species, found on plants of distinct natural families, which are either entirely undistinguishable when the living insects are placed side

by side, or differ only by very slight characters, which would not be generally considered sufficient to separate two insects specifically. A case of this kind is noticed below under *Lachnus Caryæ*—a gigantic aphidian hitherto found only on the Hickory, but which I have found on the Hickory, the Bass-wood, and the Oak. Perhaps, however, a more careful study of these species in all their three states, might disclose distinctions, which, if constant, might be of specific value. If, on the other hand, experiment should prove, that a colony of one supposed species could be transferred without injury to their health and procreative powers to a plant of another family inhabited by another supposed species which closely resembled it, the proof of their specific identity would be nearly complete. The whole subject is obscure and requires further investigation.

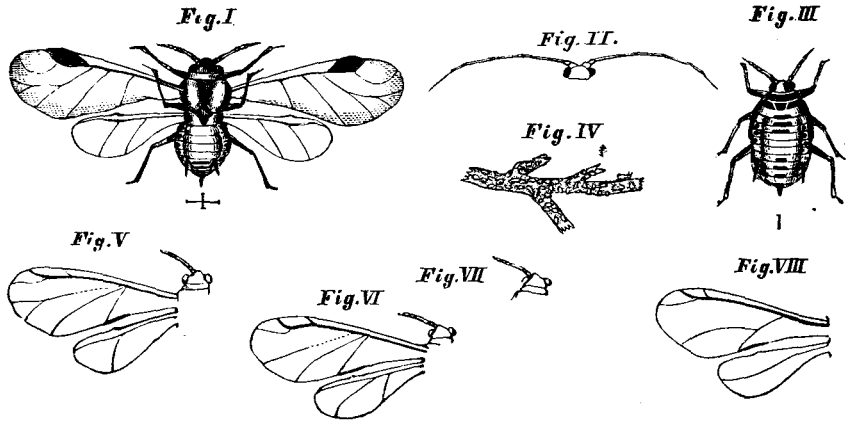
If we recur to the analogy of other families of Insects which have nearly the same habits as *Aphidæ*—for example *Tingidæ* among the *Heteroptera*—the difficulty is not lessened. As a general rule, so far as my own observation extends, each species of *Tingis* is confined to some particular plant. For instance, *T. ciliata* Say occurs only on the sycamore or buttonwood (platanus occidentalis), where I have noticed it in profusion on the under side of the leaves along with its larva both in North and South Illinois. But on the other hand, *T. juglandis* Fitch, which that author states to breed on the butternut and to be "sometimes met with on birch, on willows, and other trees," is undistinguishable, so far as the brief description of the imago goes, from a species which I found in profusion in South Illinois on what I took to be an ash. Again, a third species, which so far as I know is undescribed, occurs on the bass, the wild cherry, and the false indigo (amorpha fruticosa), or at all events the imagos found in great abundance on these three plants belonging to three distinct families, are undistinguishable when placed side by side. Perhaps part of the difficulty may arise from authors supposing that, because they found a species on a particular plant unaccompanied by its larva, it must necessarily have bred on that plant.

But even if a species of *Aphis* found in company with its larva on one plant differs obviously from another *Aphis* found in company with its larva on another plant belonging to a different botanical family, it does not necessarily follow, according to the general views of entomologists, that the two are specifically distinct. There is a remarkable example in *Lepidoptera* of a very considerable variation, correlated with variation in the food-plant, in an insect feeding on plants of distinct botanical families, not be-

ing considered of specific value. The larva of *Datana** *ministra*, Drury, is described both by Harris and by Fitch as being always vittate with yellow, and having the superior surface of the first segment yellow. All those that I have myself noticed on the oak, the apple, the wild-thorn, and some other trees were so marked; and so conspicuous is the yellow patch on the first thoracic segment, that Dr. Fitch has appropriately called this larva "the yellow-necked worm." In the year 1861 I found numerous mature specimens of this larva on the hickory, all of which varied from the normal type in being entirely black, with no vestige whatever of any yellow markings. One of these I preserved in alcohol, and from some of the others I obtained in 1862 2 ♂ 2 ♀ imagos, which differ only from Dr. Fitch's elaborate description of the imago (2nd N. Y. Report, p. 239), and from the colored figure in the new Edition of Harris's Injurious Insects, in being slightly smaller in expanse, (1.45—2.00 inch instead of 1.75—2.50 inch, Harris, and 2.00—2.40 inch, Fitch,) and in the fringe of the front wings not being "edged with whitish on the apex." All the larvæ that I noticed in 1862 on the hickory were similarly devoid of the yellow marking; and Abbott in his *Insects of Georgia*, (p. 161 quoted in the first edition of Harris's Inj. Ins. p. 313,) says that these larvæ "besides the leaves of a species of *Andromeda* also eat the leaves of several kinds of walnut and oak; *and that those which eat walnut leaves are always black with white hairs*, and when their food is of the oak that they are more yellow; but that he had not observed any material difference in the moths." For what reason I do not know, this quotation from Abbott is entirely omitted in the recent edition of Harris's Book, (A. D. 1862) and probably also from the edition of 1852 edited by Harris himself, of which the edition of 1862 is professedly a reprint with additions from the author's MSS.

In a family like *Aphidæ*, where specific distinctions rest upon so uncertain a basis, and are very generally evanescent in the dried specimen, it must be obvious that it is pre-eminently important to carefully search for available generic characters. My own investigations lead me to believe, that generic characters are here correlated with important variations in habits; and that species of the same genus do not sometimes live on the external surface of plants, and sometimes in closed galls or follicles.

* This insect is referred to *Phalæna* by Drury, to *Pygæra* by Harris, to *Petasia* (doubtingly) by Westwood, to *Datana* by Walker, and made the type of a new genus, *Eumetopona*, by Fitch, (N. Y. Reports, I, p. 241). *Eumetopona* should be *Eumetopa*, otherwise it means not "handsome-faced", as its author intended, but "handsome-faced ass".



[NOTE. The above wood-cut was kindly loaned by the Secretary of the Illinois State Agricultural Society.]

SYNOPTICAL TABLE OF THE U. S. GENERA.

Honey-tubes present. (Antennæ 7-jointed; front wings with 3 discoidals, the *third* two-branched; hind wings with 2 discoidals.)	Honey-tubes long. (Antennæ with joint 7 longer than 6.)	*Stigmal vein present.*	**Aphis.** (figs. 1 and 2) Foliage and roots.
		Stigmal vein absent.	**Calaphis,** n. g. Foliage.
	Honey tubes short, subobsolete. (Antennæ with joint 7 shorter than 6.)	Discoidals of the front wings of equal thickness. (Wings horizontally folded.)	**Callipterus.** Foliage.
		Front wings with the two first discoidals more robust. (Wings steeply roofed.)	**Lachnus.** Twigs.
Honey tubes obsolete. (Antennæ short, with not over six distinct joints, 7 being obsolete or represented by a very small unguiculus attached to 6.)	Front wings with 3 discoidals, the third 1-branched. (Antennæ 6-jointed, 6 longer than 5.)	Hind wings with two discoidals. (Wings roofed.)	**Eriosoma?** Twigs, limbs and roots.
		Hind wings with one discoidal. (Wings horizontal.)	**Thelaxes.** (fig. 5) Galls.
	Front wings with 3 *simple* discoidals. (Hind wings with 2 discoidals.)	Antennæ 6-jointed, 6 nearly as long as 4 and 5 together.	**Byrsocrypta.** (fig. 7) Galls.
		Antennæ 6-jointed, 4 –6 subequal, 5 a little the longest,	**Pemphigus.** (fig. 6) Roots.
	Front wings with two simple discoidals. (Hind wings with one discoidal; antennæ 4 or 5 jointed?)		**Chermes.** Foliage.
	Front wings with one one-branched discoidal. (Hind wings with no discoidal; antennæ 4 or 5 jointed?)		**Phylloxera.** (fig. 8) Galls.

APHIS Linn. (Figs. I, & II.)

Aphis avenæ Fabr. (Wheat, rye, oats and barley.) Rural New Yorker, Aug. 17, 1861 and July 12, 1862, with figures and description from Curtis. Cyrus Thomas of South Illinois, in Illinois Prairie Farmer, Jan. 18, 1862. Dr. Fitch's Address to N. Y. Agricultural Society, 1862, reprinted in Prairie Farmer, Nov. 8, 1862.—*A. mali* Fabr. (apple) Fitch, N. Y. Reports Inj. Insects, Vol. I. p. 54.—*A. malifoliæ* Fitch, (apple) ibid. p. 56.—*A. prunifoliæ* Fitch, (plum) ibid. p. 123.—*A. cerasi* Fabr. (cherry) ibid. p. 125.—*A. cerasifoliæ* Fitch, (choke-cherry) ibid. p. 131. —*A. cerasicolens* Fitch, (wild cherry) N. Y. Catal. Homopt. p. 65.—*A. maidis* Fitch, (maize) N. Y. Reports, I, p. 318.—*A. persicæ* Sulzer (peach) ibid. II, §63.—*A. ribis* Linn. (currant) ibid. §145.—*A. berberidis* Fitch, (berberry) N. Y. Cat. Hom. p. 65, winged insect unknown.—*A. brassicæ* Linn. (cabbage) ibid.—*A. asclepiadis* Fitch, (silk-weed) ibid.—*A. cornifoliæ* Fitch, (Cornus paniculata) ibid., winged insect unknown.—*A. cratægifoliæ* Fitch, (Cratægus punctata) ibid. p. 66.—*A. betulæcolens* Fitch, (birch) ibid.—*A. aceris* Linn. (Acer pensylvanicum) ibid.—*A. sambucifoliæ* Fitch, (elder) ibid.—*A. pinicolens* Fitch, (pine) ibid.—*A. populifoliæ* Fitch, (Populus grandidentata) ibid.—*A. rudbeckiæ* Fitch, (Rudbeckia laciniata and Solidago serotina and S. gigantea) ibid.—*A. rosæ* Auct? (rose-bushes) Harris, Inj. Ins. p. 190.—*A. salicti* Harris, (willow) ibid. p. 191.———23 species.

Aphis quercifoliæ n. sp.—Oak-leaves. *Larva* pale greenish. Incisures of the antennæ dusky. Upper surface of body, except the scutel, dusky. Honey-tubes long, robust, dusky at tip. Legs long, with the terminal ⅔ of femora, the extreme tips of the tibiæ, and the tarsi, obfuscated. *Imago*, blackish; prothorax and anterior part of thorax sometimes varied with greenish; scutellum pale greenish. Honey-tubes two-thirds as long as the femora. Legs very long; basal ½ of femora pale greenish. Wings hyaline; veins brown, third discoidal vein hyaline at its origin; stigma and subcostal veins pale yellowish-brown; extreme tip of the front wings slightly fumose. Length to tip of wings scarcely .2 inch.

One larva, two imagos, one of which was taken in company with the larva. The antennæ attain the extreme tips of the wings when the wings are expanded, and the stigma is four times as long as wide, and very acute at each end.

Aphis rudbeckiæ? Fitch.—Silphium perfoliatum and Cirsium———? From recent specimens. Red, fading to reddish-fuscous. Antennæ black, linear, joints rather indistinct, base of joint 3 more or less yellowish. Honey-tubes black, two-thirds as long as femora; anal style yellowish, more than half as long as honey-tubes, ensiform. Legs long, black, the basal half of femora yellowish-hyaline. Wings hyaline, costa very pale yellowish-brown, stigma pale fuscous-brown; veins brown, costals pale yellowish-brown. Length to tip of wings ♂ .20 ♀ .21 inch.

Seven specimens. The antennæ attain the tip of the stigma, and the stigma is four times as long as wide, and very acute at both extremities. Differs from Dr. Fitch's brief description in the antennæ not being entirely "black", in the honey-tubes being black, which are not specially referred to by Fitch, but should be "red" as he makes the ground-color "red", and in the stigma being pale fuscous-brown not "yellowish". The first of these differences generally becomes evanescent in the dried specimen; the second is probably a mere oversight. Dr. Fitch's insect occurred, as before stated, on Rudbeckia laciniata, Solidago serotina and S. gigantea.

Aphis bella n. sp.—Oak-leaves? Bright yellow. Eyes black; antennæ with the tip of joints 3—6 black. Prothorax as long as the head, with a lateral black vitta; thorax with a black vitta extending from its anterior angle to the base of the front wing. Honey-tubes scarcely as long as the tarsi, generally immaculate, sometimes tinged with fuscous. Legs long, black except the base of the femora and the coxæ. Wings hyaline; front wings with the entire costa as well as its nervures black to the tip of the stigma, whence there extends a marginal dusky vitta, as wide as the costa at base and middle but tapering at tip, nearly as far as the middle branch of the third discoidal vein; this vitta covers the entire length of the 4th or stigmal vein, which terminates half way between the tip of the stigma and the apex of the wing, is slightly and gradually curved, and encloses a marginal cell not wider than the costa; hind wings with a costal dusky vitta extending to the tip of the wing, the subcostal vein sometimes black; remaining veins of both wings slender and pale-dusky, narrowly bordered with subhyaline where they traverse the terminal dusky vitta of the front wing. Length to tip of wings .15 inch.

The antennæ attain the middle of the stigma when the wings are expanded, and the stigma is rather more than three times as long as wide, not very acute at each end. Three specimens beaten off oaks on two separate occasions. The marginal cell is one-half smaller than in any other species known to me. A yellow larva, with an irregular oval black spot enclosing a central yellow space on the abdomen, occurs rather abundantly on the oak, and probably belongs to this species; but I could never find any winged individual in company with it, and failed in an attempt to breed them.

Aphis vitis? Scopoli. n. U. S. sp.—Tame grape-vines. Blackish. Antennæ moderate, linear. Honey-tubes 2½—3 times as long as the tarsi. Legs moderate, pale greenish; knees, tips of tibiæ, and tarsi dusky. Wings hyaline, veins brown, the 3rd discoidal hyaline at its extreme origin; stigma dark dusky-brown. Length to tip of wings .11—.12 inch.

Sixteen specimens, found in company with many larvæ. The antennæ attain the middle of the stigma when the wings are expanded, and the stigma is three times as long as wide, not hunched externally, and moderately acute at each end. Not unlike *Aphis mali* when dried, but readily

distinguishable by its conspicuously dark stigma. I have received in bad condition from St. Louis specimens of what is probably the same insect attached to young vine leaves, and I have also noticed Aphides on tame vines in Central Illinois. Dr. Fitch states that in the Patent Office Report for 1854 (p. 79) "a plant-louse is reported as very destructive to the leaves and young shoots of the grape at the South, but as no description is given of it, we are unable to judge whether it possesses any resemblance to the foreign species." (N. Y. Rep. II, §116.)

Aphis carduella n. sp.—Tips of young thistle-shoots. Blackish. Antennæ with joint 6 short, somewhat obtrigonate, joint 7 as long as 5 and 6 put together. Honey-tubes as long as the tarsi. Legs rather short, pale greenish; knees, tips of tibiæ, and tarsi dusky. Wings hyaline, with the tips of the front wings slightly fumose; veins brown, yellowish on the costa; the 3rd discoidal hyaline at its origin; stigma pale dusky-brown. Length to tip of wings .09—.10 inch.

Two specimens on Cirsium altissimum, ten on an undetermined species of Cirsium in company with larvæ. The antennæ attain the origin of the 2nd discoidal vein when the wings are expanded, and the stigma is rather more than twice as long as wide and hunched on the exterior margin.

Aphis maidis? Fitch. (Wingless ♀ fig. 3, winged ♀ fig. 1.)

Roots of maize; fig. 4 showing a portion of an infested root. Described from recent specimens. The *larva* differs from Dr. Fitch's description in being always of a pale-greenish or watery-whitish color, never changing to "a pale obscure red color." The *pupæ*, from which I succeeded in breeding fifteen winged ♀ ♀, were pale green, except the tips of the rostrum, of the antennæ, and of the tibiæ, and the eyes, tarsi and honey-tubes, which are all dusky, and the anal style, the knees, and the wings, which are clouded with dusky; whereas Dr. Fitch's pupæ had the head dusky, and the wings dusky only at their tips. The honey-tubes were about the same length as the tarsi, and the anal style one-half that. Behind the thoracic segments, both laterally and dorsally, there was a considerable constriction. The *wingless females* were pale green, and had the head, the first thoracic segment except its anterior edge, and the second except its anterior edge and a diverging line on each side, dusky. At the dorsal tip of the third thoracic segment and of the abdominal segments 1, 2, and 6—9 was a transverse dusky line. Laterally on abdominal joints 2—4 was a medial dusky dot, and on joint 6 before the honey-tube a terminal dusky line. Dr. Fitch's wingless females were "dull blackish, faintly tinged with green;" the markings differed considerably, and were "smooth and black," not as in my specimens opaque-dusky.

My *winged females* differed from Dr. Fitch's description only in the shanks being dusky, not "whitish except at their tips." In one or two immature specimens, however, the whole leg was whitish. The four first abdominal joints were larger and subequal, the rest small. A solitary specimen has the stigmal vein of one wing distinctly bifurcate at tip, as in a specimen of *Pemphigus pyri* mentioned by Dr. Fitch. The wings are slightly fumose at tip, and the stigma hunched externally and pale dusky-brown.

Length to tip of wings .10 inch. Dr. Fitch's insect occurred only on the stems of roasting ears. Probably the normal location of this species is the root, and towards autumn, when the roots become dry and sapless, it betakes itself, to avoid starvation, to the stem of the ear. The differences in color may arise from one insect living underground and the other in the open air, and the differences in the markings from specimens having been observed in different states of maturity.* The antennæ in the living insect were half the length of the body, and in the dried specimens attain the origin of the first discoidal vein when the wings are expanded; joints 5 and 6 are obtrigonate, and joint 7 is equal to 5 and 6 put together. The stigma is scarcely more than twice as long as wide. This ♀ insect when dried resembles ♀ *A. cratægifoliæ* Fitch, of which I have found ♂ ♀ in company with the larva on wild thorn in October, but is distinguishable by the comparative shortness of its wings, its shorter stigma, and its somewhat shorter antennæ.

CALAPHIS n. g.

Antennæ long, linear, 7-jointed; 4 shorter than 3, 5 shorter than 4, 6 less than one-half as long as 5, 7 slender, twice as long as 6. Prothorax more than one-half as long as thorax. Honey-tubes moderate. Wings steeply roofed and differing from those of *Aphis* only in the total absence of the 4th or stigmal vein, and in the unusually robust discoidal veins.

Calaphis betulella n. sp.—Yellow. Antennæ attaining the extreme tips of the expanded wings, black, joints 1 and 2 yellowish with a black vitta half inside and half beneath; joints 3—6 each white at base; eyes black, with a black line from each to the insertion of the rostrum, which is black; head with a narrow black vitta above, acute in front, commencing between the antennæ and attaining the

* Dr. Fitch has recorded the very curious fact, that *Aphis avenæ* is green when it breeds on the leaves, and yellow or reddish-yellow when it is propagated on the ear, the females when they first shift their quarters producing at first green and afterwards yellow larvæ.

prothorax. Prothorax and thorax with a narrow lateral vitta commencing at the eyes, passing just inside the base of the wings, and converging on the scutel, and another dorsal one, black. Abdomen with about seven dorsal black fasciæ at the tips of the joints, the basal and several of the terminal ones often interrupted or obsolete, occasionally only three present. Honey-tubes fuscous, scarcely as long as the tarsi. Legs yellow, femora with an anterior black vitta, abbreviated at tip, and a terminal and subterminal black fascia above; tibiæ and tarsi black. Wings hyaline, stigma generally yellowish; subcostal and three discoidals coal-black, very robust, subequal, except at the origin of the third discoidal where the subcostal is fine and paler, and the third discoidal hyaline for a short space; costal vein black, less robust, tapering to the base of the stigma, whence it becomes subobsolete. Hind wings with all the veins slender, subhyaline. Length .07—.09 inch; to tip of wings .15—.17 inch, expanse .30—.35 inch.

The stigma is three times as long as wide, moderately acute at each end. Differs from *Aphis betulæcolens* Fitch not only generically, but in the two costal veins being black, not "sulphur-yellow", and from all aphidians known to me in the costals and 3 discoidals being subequal in robustness. In one wing of one specimen the 2nd discoidal has a short branch on its basal side. Described from 25 recent specimens. Occurred abundantly, in company with its larva, on the leaves of a species of birch (betula nigra) in August. The dried *larva* resembles the imago, except that the markings of the body are more or less obsolete, and is not gregarious.

CALLIPTERUS Koch.

Callipterus caryellus Fitch, (hickory) N. Y. Rep. I, p. 165 and II, §167. —*C. punctatellus* Fitch, (hickory) ibid., and II, §168.—*C. maculellus* Fitch, (hickory) ibid. I, p. 166 and II, §169.—*C. fumipennellus* Fitch, (hickory) ibid., and II, §170.—*C. marginellus* Fitch, (hickory) ibid., and II, §171.—*C. mucidus* Fitch, (apple) ibid. II, §20.—*C. castaneæ* Fitch, (chestnut) ibid. II, §199.———7 species.

LACHNUS Illiger.

Lachnus caryæ Harris, (pig-nut hickory) Inj. Ins. p. 190 and Fitch, N. Y. Rep. II, §162.—*L. strobi* Fitch, (pine) N. Y. Rep. §256 (=eriosoma strobi, N. Y. Cat. Homopt. p. 69.).—*L. laricifex* Fitch, (larch) N. Y. Rep. II, §288.—*L. abietis* Fitch, (abies nigra) N. Y. Cat. Hom. p. 67, winged insect unknown.—*L. quercifoliæ* Fitch, (white oak) ibid.—*L. salicellis* [ita] Fitch, (willow) ibid.—*L. alnifoliæ* Fitch, (alder) ibid.—*L. ulmi* Linn. (elm) ibid.—*L. populi* Linn. (populus grandidentata) ibid.—9 species.

Lachnus caryæ, Harris.

I possess a ♂ (?) specimen of this fine, large species taken some years since on the pig-nut hickory, and I have this autumn noticed numerous apterous ♀ ♀ on the same tree, which lived many days and laid their eggs in confinement, but died without assuming wings. The abdomen of all of them, when alive, was as Harris describes it, cinereous with four rows of transverse black spots; in the dried specimen these generally disappear, the whole abdomen becoming an obscure fuscous, and they are not noticed in Dr. Fitch's description. The eggs are .06—.08 long, nearly thrice as long as wide, cylindrical, rounded at the end, and of a shining mahogany color.

I have also this autumn noticed numerous apterous ♀ ♀, apparently of the same species, both on the oak and on the bass-wood; and from the oak I have obtained two winged ♂ ♂, and from the bass-wood four, all in company with apterous ♀ ♀. Singularly enough, the only specimen that varies from the description is the one found on the hickory, which has black not reddish-brown femora, except the anterior femur which is reddish-brown at base. Harris says that this species has no terminal stylet. The ♂ of course has none, but the apterous ♀ has a short one, which is sometimes visible even in the dried specimen. I suspect that the ♀ is normally apterous, as the specimens that I kept confined lived till after Oct. 9th.

ERIOSOMA Leach,=Myzoxylus *Blot*,=Schizoneura *Hartig*.

Eriosoma lanigera Hausmann (apple) Harris, Inj. Ins. p. 193, Fitch, N. Y. Rep. II, §17 and N. Y. Cat. Hom. p. 67.—*E. caryæ* Fitch, (hickory) N. Y. Rep. II, §161.—*E. querci* Fitch, (oak) ibid. §306.—*E. tessellata* Fitch, (alnus rubra) N. Y. Cat. Hom. p. 68.—*E. imbricator* Fitch, (beech) ibid.————5 species.

There is considerable confusion in authors as to the characters of this genus. Harris, quoting from Hausmann and Knapp, says that the adult *Eriosoma lanigera*, (apple-tree woolly-blight,) the type of the genus, never acquires wings; (Inj. Ins. p. 194.) Westwood, in his Synopsis and in his Introduction, assigns to it wings. Again, Westwood in his Synopsis says "fore wings with SIMPLE oblique discoidal nerves," whereas Fitch says that "Schizoneura" Hartig, or in English "FORKED-VEIN," is synonymous with Eriosoma, (N. Y. Rep. I, p. 7, note,) and in his description of *E. querci* he speaks of the FORK of the third discoidal. Mr. A. Agassiz in-

forms me that Koch ignores the genus entirely. In this state of uncertainty, I can only *guess* and *believe* that Westwood was in error in stating that the 3rd discoidal of Eriosoma is SIMPLE, not FORKED. But as *guessing* is not *knowing*, and *faith* is not *science*, and as I suspect, from the circumstances under which the following species were found, that they do not properly pertain to Eriosoma, I subjoin their leading generic characters.

Honey-tubes none; front wings with 3 discoidal veins, the first distant at its origin from the second about one-half the length of the tarsus, the third one-branched; hind wings with two simple discoidal veins. Antennæ short, 6-jointed, joint 3 as long as 4—6 put together, 4 and 5 somewhat obtrigonate, 6 lanceolate, nearly as long as 4 and 5 put together.

Eriosoma? fungicola n. sp. From recent specimens. Body black, with a plum-like bloom; basal half of abdomen and the whole of venter yellow. Antennæ and legs black. Wings hyaline with a dusky tinge; veins dusky, black on the basal half of the costa; third discoidal hyaline nearly to its fork; stigma palish brown. Numerous individuals, unaccompanied by larvæ, occurred on a large, moist fungus a hundred yards from the nearest trees which were all oaks. Beat solitary individuals unaccompanied by larvæ or wooly matter, on two separate occasions from oaks, which when dried differ only from the dried specimen of those found on fungus by the metathorax being varied with pale greenish, as well as the base of the abdomen. Length to tip of wings .12—.13 inch.

The antennæ do not quite attain the base of the first discoidal when the wings are expanded, and the stigma is rather more than twice as long as wide. Six specimens in all. *E. quercí* Fitch is larger (.16 inch) and is entirely black. Differs also from the other described U. S. species.

Eriosoma? cornicola n. sp.

Differs from the preceding only in the body being entirely black. Numerous individuals, unaccompanied by any flocculent matter and so far as I recollect by larvæ, occurred in September on the lower side of the leaves of the red osier dogwood. Ten specimens.

THELAXES Westwood. (Fig. 5.)

To this genus, which only differs from that to which the above two species appertain in the wings being carried flat in repose, as in *Callipterus* and *Phylloxera*, and in the hind wings having but one discoidal, belongs *Byrsocrypta ulmicola* Fitch. (elm) N. Y. Rep. II. § 257. Dr. Fitch had not seen the winged insect, of which I have obtained many specimens. No other N. A. species of this genus has hitherto been met with.

Thelaxes ulmicola Fitch. New imago.—Black, more or less pruinose. Legs with the base of the femora and of the tibiæ sometimes pale. Wings hyaline; costa to the base of the stigma very pale fuscous, the stigma a little darker; veins fuscous, the 3rd discoidal hyaline half-way from its base to the fork; hind wings with the veins subhyaline. Length to tip of wings .05—.07 inch.

Nine specimens. The antennæ do not quite attain the origin of the first discoidal when the wings are expanded, and the stigma is twice as long as wide and hunched both anteriorly and posteriorly, its tips moderately acute. Occurs in elm-leaf galls, which are well described by Fitch (loc. cit.)

BYRSOCRYPTA Haliday. (Fig. 7.)

Byrsocrypta? (*pemphigus*) *caryæcaulis* Fitch, (hickory) N. Y. Rep. I, p. 155, winged insect unknown.—*B?* (*pemphigus*) *vitifoliæ* Fitch, (grape vine) ibid. p. 158, winged insect unknown.—*B?* (*pemphigus*) *caryævenæ* Fitch, (hickory) ibid. II, §164, winged insect unknown.—*B.* (*pemphigus*) *populicaulis* Fitch, (poplars) ibid. §353.—*B?* (*pemphigus*) *popularia* Fitch, (poplar) ibid. §354.—*B?* (*pemphigus*) *populi-globuli* Fitch, (poplar) ibid. §355.—*B?* (*pemphigus*) *populivenæ* Fitch, (poplar) ibid. §356.—*B. hamamelidis* Fitch, (conical follicles on upper surface of witch-hazel leaves) N. Y. Cat. Homopt. p. 69.———8 species.

I have been unable to perceive that *P. populicaulis* Fitch, which I find very abundant on the leaves of the cotton-wood, (populus angulata) carries its wings horizontally folded before it leaves the gall, as stated by its describer. I carefully examined many dozen specimens in freshly opened galls, and they all had their wings steeply roofed. The galls on the cotton-wood are precisely similar to those figured and described by Fitch as found on other poplars.

Pemphigus, is defined by Koch as having antennal joints 4—6 "pretty equally long," which is the case with the species described below under that genus, joint 5 being a trifle the longest of the three, and apparently also with *P. pyri* Fitch; for Dr. Fitch says that in the larva of that species the penultimate is longer than the last joint. (3rd N. Y. Rep. p. 9.) On the contrary in *P. populicaulis* Fitch the last joint is as long as the two penultimate joints put together, which separates it generically from *P. pyri*, and forbids its being referred to *Pemphigus* as limited by Koch. In *Aphidæ* the comparative length of the joints of the antennæ seems to be of very high generic value, although the length of the whole antenna varies remarkably in species referred to the same genus. In *Aphis ribis*, for example, the antennæ nearly attain the tips of the expanded wings; in

A. maidis they only attain the origin of the 1st discoidal vein; yet in both, the proportions of the different joints are essentially the same.

Setting aside these structural differences, it seems unnatural to place in the same genus two insects whose habits are so totally distinct as those of *P. populicaulis* Fitch and *P. pyri* Fitch. The more natural our systems of classification become, the more are insects of dissimilar habits grouped under different genera.

Byrsocrypta pseudobyrsa n. sp.—Pale obscure greenish, pruinose. Antennæ sometimes obfuscated, always with the 6th joint unguiculate. Thorax blackish, pruinose. Joints of abdomen with obscure fuscous fasciæ. Legs with the tarsi, and sometimes the tips of the femora, obfuscated. Wings whitish, subopaque, costa and stigma yellowish; veins hyaline except the costals which are pale yellowish-brown, the subcostal generally blackish at base and black at the stigma but not thickened there. Hind wings with all the veins hyaline. Length to tip of wings .10—.13 inch.

Six specimens. The antennæ scarcely attain the base of the 1st discoidal of the expanded wing, and the stigma is about three times as long as wide and very acutely pointed at its basal end. Forms near the middle of the midrib of the leaf of the cotton-wood (populus angulata) what appears above as a smooth, green, semicircular, compressed gall, crowned by the midrib, and from one-quarter to two-fifths of an inch long, but which below is entirely open, the sides of the leaf bending down together so as to touch each other and conceal the opening. The insects often wander from this false gall and associate with *Aphis populifoliæ* Fitch. Comes very near *popularia* Fitch, (the gall of which is unknown,) but that species has the discoidals "blackish" and the "antennæ only $\frac{2}{3}$ the distance to the wing-sockets." Differs from *populi-globuli* and *populivenæ* Fitch in the subcostal not being thickened at the stigma, and also in the peculiar structure of its gall.

The recent larva is densely covered with white pruinescence, on removing which it is yellowish, with only the eyes and the tarsi blackish, and the disk of the abdomen freckled with reddish.

Byrsocrypta vagabunda n. sp.—Black, polished, with no appearance of pruinescence. Antennæ and legs dull fuscous. Abdomen and venter obscure opaque-yellowish, varied with fuscous or sometimes with brown. Wings subhyaline with a whitish tinge, costal and subcostal veins and one-third of the inner edge of the wing from the tip of the 1st discoidal to the base of the wing, conspicuously fuscous; the remaining veins in both wings whitish hyaline; costa slightly tinged with brown, stigma pale fuscous-brown, its interior vein thickened. Alar expanse .43—.51 inch.

Eleven specimens. The 6th joint of the antennæ is two-thirds as long

as 4 and 5 put together; and the stigma is 3½ times as long as wide, very acutely pointed at both ends. Three or four specimens have a little white pruinescence still attached to their wings. Occurred very abundantly on various forest trees in September. This is the largest known N. A. species either of this or the following genus, *P. pyri* expanding only .38 inch. That species is distinguished at once from *vagabunda* by its wing-veins being all black.

PEMPHIGUS Hartig. (Fig. 6.)

Pemphigus pyri Fitch, (apple-tree roots) N. Y. Rep. I, p. 9.———1 species.

The species described below under this genus differ from *Pemphigus* as limited by Koch, chiefly in the stigma being short or rather short, not "narrow and long." I do not consider this character of much generic value in *Aphidæ*. In *Aphis avenæ* the stigma is four times as long as wide; in *A. mali* only twice as long as wide; and the two extremes of length in that genus seem to be connected by an unbroken series of intermediate grades, as is partially exemplified in the few species described above.

I suspect that all the species properly referable to this genus live under ground and derive their nourishment from roots. Authors have long noticed that Aphidian insects are found in ants' nests, and Westwood states that all species found in such situations are apterous. (Introd. II, p. 441.) I have succeeded in breeding to the winged state one species found in the nest of a common yellow ant, described below as *Formica aphidicola*, and I have found numerous winged specimens of another species on various occasions in the nests of the same ant, in company with prodigious numbers of larvæ. Both species appertain to *Pemphigus*, with the exception of the above noticed differences in the stigma. I have also ascertained from repeated observations the very curious fact, that the ants fetch the larvæ of *Pemphigus formicetorum* mihi, home to their nests, from the roots on which they feed, and place them in little clusters of 50 or 60 individuals, where they soon elaborate such a dense mass of white cottony matter as to entirely conceal them. The proof of this rests upon the circumstance that I have often noticed clusters of these larvæ—some covered with flocculent matter, some naked—in nests located in honey-combed stumps more than a foot from the ground, where there are no roots for them to feed on. They are also found on the inferior surface of flat stones covering the nest; and in both cases they are generally placed close to

the chambers containing the larvæ of the ants, so that the consumers may be as near as possible to the producers. If the flat stone covering the nest, and studded with groups of the larvæ of these *pemphigi*, is carefully replaced, and the nest revisited some hours afterwards, it is found that they are generally most of them carried off. That this must be done by the ants is proved by the fact, that the *pemphigi* show no disposition to wander off, unless disturbed, and that if they are disturbed, the ants are just as eager to carry them off to a place of safety as to carry off their own larvæ. On one occasion when the root of a tree happened to cross one of the underground passage-ways constructed by the ants, I noticed upon it, some inches below the surface of the earth, a cluster of these larvæ; which proves that that species inhabits the roots of trees and not those of herbaceous plants.

Pemphigus formicarius n. sp.

Two kinds of *larvæ* occurred in company; the first, when recent, scarcely twice as long as wide and whitish; the second, when recent, three times as long as wide and cinereous. From the latter I bred five *winged* individuals, which differed as follows from the description of *P. pyri* Fitch:— The size is somewhat smaller; the prothorax and abdomen of the living insect are blue-black, pruinose, in the dried specimen pale yellowish-brown, the abdomen much varied with fuscous; the thorax and head, both in the living and dried insect, are opaque blue-black. Legs yellowish-fuscous. Wings hyaline, slightly fumose at tip; veins not margined with brown; the 2nd discoidal is not more robust than the 1st and does not taper; the costa and the anterior half of the stigma are very pale fuscous or cinereous, the latter a little darker; the posterior half of the stigma is black. In the hind wings the apex of the black rib-vein or subcostal is nearly twice as far from the apex of the 2nd discoidal as that is from the apex of the 1st discoidal.

Length to tip of wings .2 inch; expanse .33 inch. Five specimens. The stigma is much hunched posteriorly, more acute at the basal than the terminal end, and rather more than twice as long as wide. Bred Oct. 11th from larvæ found 8 or 10 days before in the nest of *Formica aphidicola* mihi, attached to the root of what appeared to be a perennial herbaceous plant.

Pemphigus formicetorum n. sp.

Differs from *P. pyri* as follows:—The size is much smaller; the 2nd discoidal is not more robust than the 1st, and is of uniform robustness

throughout; the 3rd discoidal is of equal robustness with the 1st; the 4th or stigmal vein is of equal robustness with the 1st and does not taper; in the hind wing the apex of the 2nd discoidal is nearly twice as far from the apex of the rib-vein as it is from the apex of the 1st discoidal.

Length to tip of wings .09—.12 inch; expanse .20—.25 inch. Fourteen specimens. The stigma is three times as long as wide, very acute at the basal end, and not materially wider than the costa. Found winged specimens May 25th in company with many larvæ and pupæ, and obtained others in the course of June, all in the nests of the same yellow ant before mentioned. A specimen of the woolly secretion of the larvæ which I have preserved appears under the lens like cotton wool, but at least ten times as fine and snowy-white. From the nests of the same ant I have obtained the rare *ceophyllus monilis* Lec., (pselaphidæ,) *hetærius brunnipennis* Randall, (histeridæ,) and an undetermined species of *Phthora*, (tenebrionidæ).

CHERMES Burm?

Chermes pinifoliæ Fitch, (pine) N. Y. Rep. II, §267.—*C. laricifoliæ* Fitch, (larch) ibid. §289.———2 species.

PHYLLOXERA Fonscolombe. (Fig. 8.)

Phylloxera caryæfoliæ Fitch, (hickory) N. Y. Rep. II, §166.—*P? (chermes) castaneæ* Hald. ibid. §203.———2 species.

Phylloxera caryæ-globuli n. sp.

Differs from *P. caryæfoliæ* Fitch as follows:—The size is larger; the abdomen is not pale but blackish; the whole costa is pale brown, the stigma with a yellowish tinge; the 3rd or stigmal vein is not abortive at its origin; the 2nd or middle vein is not parallel with the 3rd but each of the two is slightly convex towards the other, as is also the case in *P. caryæfoliæ*, although overlooked by Dr. Fitch; neither is the origin of this middle vein "abortive for a short distance," so far as I have observed, in either of these two species, as stated of *P. caryæfoliæ* by the same author. The hind wings have the same "angular point" or hook on their anterior margin, used to attach them to the thickened spot on the posterior edge of the front wing, which I have found in every Aphidian species known to me.

Length to tip of wings .07—.08 inch. Three specimens. The antennæ are scarcely longer than the head and I am unable to distinguish the joints. The stigma is about three times as long as wide, straight pos-

teriorly, slightly hunched anteriorly, and acute at both ends. Found in spherical galls generally located between the veins that branch from the midrib of the leaflet of the shag-bark hickory. I am acquainted with the similar galls of *Pemphigus caryæcaulis* Fitch, which grow on the leaf-stalks and twigs of the same tree, but like Dr. Fitch I have never yet met with the winged insect. From the similarity of its galls to that of the above and its occurring on the same tree, that insect may not improbably belong to *Phylloxera*. The gall of *P. caryæ-globuli* often occurs in company with that of *P. caryæfoliæ*, but it is very distinct. On June 8th I noticed a few imagos of a large *Thrips* in some galls of *P. caryæfoliæ* which were at that time full of their normal tenants; on June 22nd I noticed in galls of the same insect on the same trees many red pupæ, apparently of the same *Thrips*, which seem to have supplanted or exterminated the *Phylloxeræ;* for almost every gall contained 6 or 7 Thripide pupæ and but very few *Phylloxeræ*.

HYMENOPTERA.——FORMICIDÆ.

The yellow ant mentioned above under the genus *Pemphigus* is not described either by Say or by Fitch. It may probably be a Fabrician species; but as I possess the three sexes taken from the same nest it may be worth while to describe it. It belongs to Say's § B of *Formica* "1st cubital cellule with a recurrent nervure," and somewhat resembles *F. dislocata* Say, of which species also I have the sexes from the same nest, but is much smaller, and the ♀ ♀ of that species are not yellow but piceous.

Formica aphidicola n. sp.—♂. Piceous. Epistoma longitudinally carinate, the carina wide and quadrangular; tips of antennæ a little pale; eyes black and almost round. Abdominal scale slightly emarginate above, with no indentation opposite to it. Legs with the tips of tibiæ, and the tarsi ferruginous. Wings subhyaline, much clouded with brown on their basal half; nervures and stigma brown; the recurrent nervure forming the discoidal cell generally abbreviated, so as to leave the cell incomplete; anal nervure abruptly angulated in its middle, and interrupted before the angulation. The ♀ differs in being larger and paler, and in the legs and antennæ being ferruginous. The carina of the epistoma is absent. The ♀ differs from ♂ in being entirely yellow, except the eyes which are very small and black. When dried it assumes a slight rufous tint. The carina of the epistoma is absent. Length ♂ .15—.16 inch; ♀ .25 inch; ♀ .15 inch. Alar expanse ♂ .44 inch; ♀ .60 inch.

Described from 2 ♂, 2 ♀, 5 ♀.

Formica latipes n. sp.

We have another yellow ant, the ☿ of which is scarcely distinguishable from ☿ *F. aphidicola* but by its being a trifle smaller and paler. The ♂ is exactly alike, but the ♀ differs most remarkably, 1st in being ferruginous, with the thorax more or less piceous; 2nd in having short, robust antennæ, no longer than those of ☿, which has a body only half as long; 3rd in having femora and tibiæ so strongly and widely compressed as to be not much more than twice as long as wide, and truncate at tip, the femora deeply excavated at tip to receive the tibiæ; 4th in the whole body being covered with a long cinereous pubescence. This species is, so far as I am aware, undescribed.

Length ♂ .15—.17 inch; ♀ .35—.36 inch; ☿ .13—.15 inch. Expanse ♂ .39–.43 inch; ♀ .80–.88 inch. Described from 14 ♂, 2 ♀, 5 ☿ from the same nest. Of the 14 ♂, 8 had a recurrent nerve in both wings, 3 in one wing only, and 3 in neither wing, the nerve when present often abbreviated as in the preceding species. In both ♀ the recurrent nerve was present and unabbreviated. I have noticed a similar variation in another species of *Formica*, which shews that Say's subdivision of the genus is not natural nor practically reliable.

RECAPITULATION OF U. S. APHIDÆ.

	Described U. S. Species.	New U. S. Species.	Total U. S. Species.
Aphis	23	4	27
Calaphis n. g.	0	1	1
Callipterus	7	0	7
Lachnus	9	0	9
Eriosoma	5	2	7
Thelaxes	0	1	1
Byrsocrypta	8	2	10
Pemphigus	1	2	3
Chermes	2	0	2
Phylloxera	2	1	3
Total	57	13	70

Rock Island, Illinois; Nov. 5, 1862.