

in the world than Canada. We can unhesitatingly affirm that the normal waters of our lakes, streams and springs, our ground waters and our deep seated sources, are of the purest. It becomes our duty as communities and individuals, to preserve and protect them from pollution and to see to it that the water we drink is as irreproachable in quality as that with which Nature has supplied us.

THE IDENTITY OF THE BETTER KNOWN MIDGE GALLS.

BY E. P. FELT, ALBANY, N.Y.

(Continued from page 167).

TRIBE OLIGOTROPHIARIAE.

The third vein in this group is well separated from the anterior margin of the wing; the antennal segments are short, cylindric, usually stemmed in the male, and the claws are simple or at least rudimentary. This latter character serves to differentiate the species from the preceding tribe. The food habits, like those of the Dasyneuridae are somewhat general, though there is a much greater preponderance of bud galls.

PHYTOPHAGA ROND.

The antennal segments in this genus range from 12 to over 20, the flagellate ones being stemmed in the male and usually sessile in the female. The palpi are quadriarticulate. This genus is distinguished from the following by the third vein uniting with costa at the apex of the wing. Synonym: *Mayetiola* Kieff.

P. ulmi Beutm. The larvae live among the small, immature terminal leaves or inhabit leaf buds. Previously referred to *Cecidomyia* and *Mayetiola*.

P. violicola Coq. The pale yellowish larvae live in curled violet leaves. Previously referred to *Diplosis*, *Contarinia* and *Mayetiola*.

P. destructor Say. The yellowish larvae injure the stems of wheat and other grains under the leaf sheath. Widely known as the Hessian fly. Previously referred to *Cecidomyia* and *Mayetiola*.

P. rigidae O.S. Gall an apical or subapical enlargement on willow stems, fusiform in shape, about an inch long and tipped with a rather characteristic slender, curved beak. Previously referred to *Cecidomyia* and *Rhabdophaga*.

OLIGOTROPHUS Latr.

Antennal segments 13 to 20, the flagellate ones stemmed in the male, sessile in the female; palpi presumably triarticulate.

O. betulae Winn. The larva occurs in inflated seeds of white birch. An introduced species, previously referred to *Cecidomyia*.

RHOPALOMYIA Rûbs.

Antennal segments 12 to over 20, the flagellate ones stemmed in the male, usually subsessile in the female; palpi uni- or biarticulate. Members of this genus display a marked preference for flower or bud galls, a large proportion of the species occurring upon solidago.

R. hirtipes O.S. The orange larvae occur in somewhat nut-like apical galls on stunted solidago shoots, or more commonly as smooth, brownish, subterranean swellings evidently developing from root stock buds and varying in size from $\frac{1}{4}$ to $1\frac{1}{4}$ inches in diameter. Described as *Cecidomyia*.

R. solidaginis Loew. A large apical rosette gall on solidago. Described as *Cecidomyia*.

R. racemicola O.S. Gall a greenish or reddish, subglobular, bud-like enlargement about .1 of an inch in diameter on solidago. Described as *Cecidomyia*.

R. anthophila O.S. Gall nearly cylindric, green, densely pubescent, about $\frac{1}{8}$ of an inch long on solidago. Described as *Cecidomyia*.

R. antennariae Whlr. Gall a corm-shaped apical bud deformity about $\frac{1}{8}$ of an inch in diameter on *Antennaria*. Described as *Cecidomyia*.

R. tridentatae Rûbs. Produces an apical bud gall on *Artemisia tridentata*.

R. alticola Ckll. Gall a subglobular, grayish, woolly enlargement; diameter $\frac{1}{4}$ to $\frac{1}{2}$ inch, on *Artemisia*. Described as *Cecidomyia*.

R. gutierreziae Ckll. Gall a pale green, fusiform or suboval swelling in the flower heads of *Gutierrezia*. Length $\frac{1}{3}$ inch, diameter $\frac{1}{8}$ inch.

R. bigeloviae Ckll. Reared from a hollow stem gall on *Bigelovia*. Described as *Cecidomyia*.

R. chrysopsidis Lw. The gall is apical, light brown, irregular, woolly, about $\frac{3}{4}$ of an inch in diameter and occurs on *Chrysopsis mariana*. Described as *Cecidomyia*.

TRIBE ASPHONDYLIARIAE.

This tribe comprises mostly large, heavy-bodied insects easily recognized by the long, cylindric, sessile antennal segments

and the simple claws. The species breed largely in flower buds or fruits.

ASPHONDYLIA H. LW.

Antennal segments 14, flagellate sessile, cylindric, the distal ones in the female reduced; palpi uni- to triarticulate; terminal clasp segment of the male genitalia bidentate; ovipositor of the female with the distal portion aciculate.

A. globulus O.S. Stem gall, globular or spherical; diameter $\frac{1}{2}$ to 2 inches; on *Helianthus*.

A. betheli Ckll. The larvae occur in the swollen fruit of *Opuntia*.

A. monacha O.S. Produces a small apical rosette gall on *Solidago lanceolata*. It may also occur in an oval chamber between two adhering developing leaves, and has been reared from dwarfed aster heads. Synonyms: *A. recondita* O.S., *A. solidaginis* Beutm. and *A. patens* Beutm.

A. antennariae Whlr. Gall a corm-shaped bud gall $\frac{1}{3}$ to $\frac{1}{2}$ an inch in diameter on *Antennaria*. Described as *Asynapta*.

A. autumnalis Beutm. A globular, irregularly rounded bud gall on *Helenium*. Length $\frac{3}{4}$ to $1\frac{1}{4}$ inches, diameter about $\frac{1}{2}$ inch.

A. atriplicis Ckll. An irregular twig gall on *Atriplex*. Length $\frac{1}{2}$ inch, diameter $\frac{1}{4}$ inch. Described as *Cecidomyia*.

A. conspicua O.S. Gall an irregular, subglobular enlargement some 2 inches in diameter, of the flower head of *Rudbeckia*.

SCHIZOMYIA Kieff.

Antennal segments 14, sessile or subsessile, the flagellate ones in the male with remarkably stout, elevated circumfili; palpi quadriarticulate; the basal clasp segment of the male lobed distally, the terminal clasp segment irregular. Antennal segments of the female much as in *Asphondylia*, the apical portion of the ovipositor aciculate.

S. coryloides Walsh & Riley. Gall a roundish mass $1\frac{1}{4}$ to $2\frac{1}{2}$ inches in diameter of from 10 to 50 opaque, woolly-pubescent, fusiform or sometimes flattish-oval, green galls, each from $\frac{1}{2}$ to $\frac{3}{4}$ of an inch long; on grape. Described as *Cecidomyia vitis-coryloides*.

S. pomum Walsh & Riley. Gall depressed, subspherical or flattened. The young gall is green, succulent, credited with possessing a pleasant subacid flavor and covered with a fine pubescence. The fully developed gall has 8 or 9 longitudinal ribs somewhat like those of a muskmelon and within a number of longitudinal cells arranged in two tiers; on grape. Described as *Cecidomyia vitis-pomum*.

CINCTICORNIA Felt.

Antennal segments 14, sessile, the flagellate ones of the male with numerous low, regular circumfili, those of the female with two to six transverse, anastomosing circumfili; palpi quadriarticulate; terminal clasp segment of the male genitalia transversely and evenly serrate. Ovipositor stout, tapering to subacute, minute lobes. This genus appears to be confined very largely, if not exclusively to oak leaf galls.

C. pilulae Walsh. Gall reddish brown, coarsely reticulate, thick-walled, irregularly subglobose, about $\frac{1}{8}$ of an inch in diameter, depressed or fused to form lobulated masses on oak leaves. Described as *Cecidomyia quercus-pilulae*.

C. symmetrica O.S. is possibly identical with the above. It belongs, with very little question, to this genus. Described as *Cecidomyia*.

TRIBE ITONIDINARIAE.

The more characteristic members of this tribe are easily distinguished by the usually long, thickly haired antennae having 14, rarely 12 segments, the flagellate segments in the male usually binodose, and with two or three circumfili, the latter generally with greatly produced loops; palpi uni- to quadriarticulate; claws simple or toothed. This very large tribe includes many diverse forms.

GROUP BIFILI.

This subtribe is easily distinguished by the presence of but two circumfili on the flagellate antennal segments of the male; the nodes are equal or nearly so.

CONTARINIA Rond.

The third vein unites with the interrupted costa at the apex of the wing; the palpi are quadriarticulate; the lobes of the dorsal plate taper strongly and are subacute; the ovipositor is long and filiform.

C. johnsoni Sling. The small, yellowish larvae occur in deformed grape blossoms. Described as *Cecidomyia*.

C. virginianiae Felt. The yellowish larvae occur in deformed, bladder-like fruit of the chokecherry. Described as *Cecidomyia*.

C. rumicis Loew. The reddish larvae infest the seeds of *Rumex*. An introduced European species.

C. sorghicola Coq. The yellowish larvae occur in the seeds of *Sorghum* and related plants. Described as *Diplosis*.

C. pyrivora Riley. The yellowish larvae occur in young pears. Described as *Diplosis*.

C. setigera Lintn. Reared from small, irregular, subovate, downy galls on muskmelon. Described as *Diplosis*.

THECODIPLOSIS Kieff.

Separated from *Contarinia* by costa not being interrupted at its union with the third vein and by the long, broadly lobed dorsal and ventral plates in connection with the stout, usually very long ovipositor.

T. ananassi Riley. Reared from a brown gall with a length about $\frac{3}{4}$ of an inch on Cypress twigs. Described as *Cecidomyia cupressi-ananassi*.

T. liriodendri O.S. A circular blister on tulip leaves. It has a dark brown center surrounded by a light brown, irregular area; diameter $\frac{1}{4}$ inch. Referred to *Cecidomyia* and *Diplosis*.

GROUP TRIFILI.

This subtribe is easily recognized by the presence of three usually well developed circumfili on the flagellate antennal segments of the male. The nodes are generally unequal and in some extreme forms the distal enlargement is almost divided.

YOUNGOMYIA Felt.

Flagellate antennal segments of the male trinodose, the distal enlargement being distinctly divided and sometimes by an appreciable stem; palpi quadriarticulate; wings large, rather hairy, the third vein uniting with costa well beyond the apex of the wing; legs long, claws stout, unidentate, the pulvilli about half as long as the claws. The terminal clasp segment of the male is unusually long; the ovipositor of the female is short, the lobes large and orbicular.

Y. umbellicola O.S. The yellowish larvae occur in enlarged blossoms of elder. Described as *Cecidomyia*.

APHIDOLETES Kieff.

This genus is easily recognized by the greatly produced setae and circumfili on the dorsal surface of the flagellate antennal segments in the male. It is readily separated from the allied *Bremia* by the well developed middle circumfilum. Anterior claws unidentate.

A. cucumeris Lintn. Reared presumably from plantlice on cucumber. Described as *Diplosis*.

CLINODIPLOSIS Kieff.

Antennal segments 14, binodose, Palpi quadriarticulate. The terminal clasp segment is not abnormally produced or subfusiform. The ventral plate is produced, emarginate, the dorsal

plate deeply cleft and triangularly emarginate. The ovipositor is short. Anterior claws unidentate.

C. rosivora Coq. The larvae lie just under the sepals of rose buds, usually singly, though sometimes in clusters of five or six. Described as *Diplosis*.

C. caulicola Coq. The larvae are rather abundant in the basal portion of the stems of Iceland poppies. Described as *Diplosis*.

CARYOMYIA Felt.

Allied to *Hormomyia* but differing by the thorax not being greatly produced over the head and by the presence of but 14 antennal segments. The males may have the flagellate antennal segments binodose or cylindric and subsessile and invariably with three low, stout circumfili. The antennal segments of the female are cylindric and with two circumfili; palpi tri- or quadriarticulate; wings rather broad, the third vein joining costa at or near the wing apex; claws simple, the pulvilli well developed. The ovipositor of the female is short, triangular and with minute lobes apically. This genus appears to be confined to hickory leaf galls.

C. caryae O.S. Gall globose, thin-walled, yellowish green or brown; diameter .1 inch, on hickory leaf. Referred to *Diplosis*, *Cecidomyia* and *Hormomyia*.

C. holotricha O.S. Gall small, globular, fuzzy, rust red; diameter .1 to 1-5 inch, on hickory. Referred to *Cecidomyia* and *Hormomyia*.

C. sanguinolenta O.S. Gall conical, with a distinct nipple, greenish and variably tinged with purplish or blood red, on hickory leaves. Described as *Cecidomyia*.

C. tubicola O.S. Gall a green or blackish, hollow tube about 1-5 of an inch long, growing at right angles from a socket in hickory leaves. Referred to *Cecidomyia* and *Hormomyia*.

C. persicoides Beutm. Gall irregular, monothalamous, hairy, $\frac{1}{4}$ inch in diameter and usually clustered on the midrib of a hickory leaf. Described as *Cecidomyia*.

Most of the other hickory leaf galls described are probably made by a species of *Caryomyia*, though other midges have been reared from these deformities.

HORMOMYIA H. Lw.

Typical members of this genus may be most easily recognized by the mesonotum being greatly produced over the head. The antennal segments vary in number from 14 to over 20, the flagellate ones in the male binodose and with short circumfili; palpi uni- to tri- or quadriarticulate. The large forms probably live on sedges.

H. verruca Walsh. Gall a characteristic subconic enlargement arising in clusters from the midrib or some of the principal veins of willow leaves. It is about .1 of an inch in diameter, greenish yellow, monothalamous, subglobular and tapering to a truncate, frequently lipped, free extremity. Not a typical *Hormomyia*. Described as *Cecidomyia*.

LESTODIPLOSIS Kieff.

Usually yellowish, frail species with spotted wings, most easily recognized by the triangular lobe at the internal basal angle of the basal clasp segment of the male.

L. grassator Fyles. The pale orange larvae prey upon *Phylloxera*. Described as *Diplosis*.

PARALLELODIPLOSIS Rüb.

Mostly pale yellowish or orange species, distinguished by the long, narrowly rounded ventral plate of the male genitalia.

P. caryae Felt. Reared from several hickory leaf galls and probably an inquiline with various species of *Caryomyia*. Previously referred to *Cecidomyia* and *Clinodiplosis*.

OBOLODIPLOSIS Felt.

A large form remarkable for the greatly expanded orbicular dorsal plate of the male.

O. robiniae Hald. The larvae occur in marginal leaf rolls of *Robinia*. Described as *Cecidomyia*; also as *O. orbiculata*.

ITONIDA Meign.

Antennal segments 14, those of the male binodose, the nodes unequal; circumfili three. Palpi quadriarticulate. The third vein unites with the margin well beyond the apex of the wing. The pulvilli are longer than the simple claws, while the dorsal and ventral plates of the male genitalia are deeply bilobed. Ovipositor rather long, the lobes narrowly oval.

I. tritici Kirby. The orange larvae develop in the heads of wheat and some other grains. Widely known as the wheat midge. Previously referred to *Cecidomyia* and *Diplosis*.

I. verbenae Beutm. The larvae occur in terminal rolled leaves of white or nettle-leaved Vervain. Described as *Cecidomyia*.

I. catalpae Comst. The yellowish larvae attack the pods and frequently deform the young shoots of *Catalpa*. Previously referred to *Diplosis* and *Cecidomyia*.

I. tecomiae Felt. The pale yellowish larvae roll the leaves of the trumpet vine. Previously referred to *Bremia* and *Cecidomyia*.

I. resinicola O.S. The pale orange larvae occur in pitch exudations on hard pine. Previously referred to *Diplosis* and *Cecidomyia*.

I. resinicoloides Wlms. The larvae occur in resinous exudations on the Monterey pine. Described as *Cecidomyia*.

I. foliora Rssl. & Hkr. Gall the folded edge of oak leaves similar to that described for *Cecidomyia erubescens* by Osten Sacken. Described as *Cecidomyia*.

CECIDOMYIA.

This term is employed here in a general sense to include galls which can not be satisfactorily referred to any well defined genus, and also adults with inadequate descriptions.

C. caryae O.S. Probably an inquiline in the typical *Caryomyia caryae* O.S. gall on hickory. This species is not identical with our *Cliniodiplosis caryae* or *Mycodiplosis holotricha*, both probably inquilines in *Caryomyia* galls.

THE GRAY OR ARKANSAS KING BIRD, *TYRANNUS VERTICALIS*.

During a residence of now more than ten years in Pilot Mound, I do not remember seeing *Tyrannus verticalis* until May 21st, 1909, when I was visiting a patient just north of Crystal City. On the wire fence by the roadside sat a gray-backed bird whose tail was nearly black but whose belly and especially the lower belly was sulphur yellow, fading to a lighter shade breastwards. Again, on May 21st, 1910, and May 22nd, 1911, I have noted the first appearance of this bird. In 1910, however, a pair nested in Pilot Mound, while in 1911, not only did two pairs nest on the roadside trees in town, but I saw specimens in Crystal City and Clearwater. Prof. W. W. Cooke of the U.S.A. Biological Dept., to whom I send annual records of the spring migration of birds, tells me that S.W. Manitoba constitutes the far N.E. limit of the range of *T. verticalis*. It is a very charming bird, built on graceful lines and less truculent than the aggressive *T. tyrannus*, which will bully the robins and humming birds. While we were playing tennis in August at the close of the nesting season, both old and young birds wheeled about the space between our stop-netting and the public school roof. The Boy Scouts will protect these and our other birds from nest thieves.

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Felt, Ephraim Porter. 1912. "The Identity of the better known Midge Galls, continued." *The Ottawa naturalist* 25(12), 181–188.

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