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No. 2

THE COLLECTION OF PHYTOPTOCECIDIA, OR MITE GALLS, IN THE CAMBRIDGE MUSEUM.

BY DR. H. A. HAGEN, CAMBRIDGE, MASS.

The very extensive collection of galls from the U. S. presented to the Museum in 1870 by Baron von Osten Sacken, contains all his types. There are 138 different galls of Cynipidæ, gall flies 56 species, guest flies 23 species, parasites 66 species, and from Dr. Reinhard 38 types of European Cynipidæ. Further galls of other insects 121 species (Diptera 70, Hemiptera 30, etc.); the types of B. D. Walsh, galls of *Salix*, 13 species. To these were later added by the Baron his types of Colorado galls, 12 species, and those of California, 15 species. The permanent aim to enlarge this excellent collection has met with success. The prominent additions from Europe are 88 species from Mr. Brischke, in Danzig, Prussia, and 96 types of oak galls from Prof. G. Mayr, in Vienna, Austria, and 18 types of mite galls from Dr. Thomas. The additions of N. Am. galls are very numerous; prominent among them are large additions from California, Washington Terr., and Mexico.

There were among the galls of the Baron a small number of mite galls; fortunately, also, the types of the two species described by Mr. Walsh, and a number of fungi. As some deformations of plants by insects are very similar to the deformations by fungi, it was decided best to make also a collection of fungi. For the determination of these and of the mite galls, formerly considered to be fungi, I am deeply indebted to the untiring kindness of Prof. W. J. Farlow, who has also added to the collection a large number of specimens.

The advancement of the scientific knowledge of the mite galls is comparatively new and principally due to the numerous and incessant studies and publications of Dr. Fr. Thomas, in Ohrdruf, Gotha. His yearly Reports in Dr. L. Just's "Botanischer Jahresbericht" are indispensable to the student of mite galls.

The literature of the mite galls of the U. S., as far as known to me, is

small. Mr. B. D. Walsh, 1867, Proc. Ent. Soc. Phil., T. vi., p. 285-287, enumerates 20 species from Illinois, occurring on 14 different genera of woody plants. On *Ulmus*, 3 species; *Populus*, 1; *Carya*, 1; *Salix*, 2 (and probably several others); *Quercus*, many Acarideous semi-galls or mere woolly indented deformations of the leaf; *Fraxinus*, 2; *Betula*, 1; *Juglans*, 2; *Crataegus*, 1; *Prunus*, 1; *Cerasus*, 1; *Tilia*, 1; *Cephalanthus*, 1; *Acer*, 2; *Negundo*, 1. Only the two species on *Salix* are named and described.

Mr. H. Shimer, 1869, Trans. Amer. Ent. Soc., T. ii., p. 319, described from *Acer dasycarpum* a gall containing *Vasates quadripedes*, nov. gen. and sp. Mr. J. A. Ryder, 1879, Amer. Naturalist, T. xiii., p. 704, describes an Erineum on *Acer*.

Mr. W. H. Ashmead, 1879, CAN. ENT., T. xi., p. 159, describes *Thyphlodromus oliivorus** of oranges, as the cause of the rust of the fruit.

Mr. T. J. Burrill, 1880, Gardener's Monthly, January, and Am. Ent., T. iii., p. 26, describes *Typhlodromus pyri*, believed to be identical with the same species from Europe, in the pear-leaf blister.

There are in all known 24 species from the U. S., and 6 of them are described.

The following list of the species in the collection is arranged alphabetically after the plants, the species from Europe and those from America separately. The scientific description and the naming of the species will be the work of a monographer, and are not given here, because I believe this collection too small for such a purpose, the more as the mites are not represented.

I. From Europe. All except four by Mr. Brischke are from Dr. Fr. Thomas, to whom belong the notes given with each species. The often quoted paper on *Phytoptus* was first published in the "Programm der Realschule," etc., zu Ohrdruf, Gotha, 1869, 4th, pg. 29, pl. 1. Reprint, with additions to the paper, in *Zeitschrift, f. d. ges. Naturwiss.*, by Giebel Halle, 1869, T. 33, p. 313-366. Both are quoted as Progr., and as Add. Pl. means *Pleurocecidia* Thom., Acr. means *Acrocecidia* Thom.

1. *Acer campestre* L. Pl. Ohrdruf, Saxony; fall, 1879. Gall on leaves, *Cephaloneon myriadum* Bremi. Progr. p. 9, No. 9; Add. p. 335.
2. *Acer campestre* L. Pl. Ohrdruf, fall, 1879. *Cephaloneon solitarium* Bremi. Verhandl. d. St. Gallischen natur. Gesell., 1870-1871, p. 3.

* Corrected by Dr. Thomas in *oleivorus*.

3. *Acer campestre* L. Pl. (bark-gall on stems). Ohrdruf, 1879. Descr. Giebel's Zeitschr. 1879, T. 52, p. 740-745.
(*Achillea millefolium* L. Pl. Ohrdruf, fall, 1876.
Tyleuchus millefolii Tr. Loew. Verhand. Z. B. Gess. Wien., 1878.
Thomas, Giebel's Zeitschr. 1874, T. 42, p. 522 (separ. p. 12).
The tuberculous leaf-galls are made by *Anguillula*, and belong not to Phytotocecidia. I would not omit them, to draw the attention of students to this subject.)
4. *Alnus glutinosa* Gaertn. Pl. Ohrdruf, Sept. 1879; Danzig, Prussia, Brischke. Giebel's Zeitschr. 1869, T. 33, p. 337. Leaf-galls in the angles of the ribs, probably *Erineum axillare* Fée and *Xyloma alneum* Persoon. Mr. Brischke's specimen is labelled *Syncrista alni* Kirchner. This is published in Lotos, 1863, p. 46, a work not seen by me.
5. *Alnus glutinosa* Gaertn. Pl. Ohrdruf, 1879.
Erineum alneum Gaertn. on leaves.
6. *Alnus glutinosa* Gaertn. Pl. Danzig, Prussia, Brischke.
Bursifex alni Kirchner, Lotos 1863, p. 46. Thomas Progr. p 8, and Add. p. 334, as *Cephaloneon pustulatum* Bremi.
7. *Carpinus Betulus* L. Pl. Ohrdruf, fall, 1879. Frills and curled folds of the leaves; Steenstrup, quoted by Thomas, Addit. p. 324.
8. *Corylus avellana* L. Acr. Ohrdruf, 1878. Deformation of the buds. Thomas, Addit. p. 319; Dujardin, Ann. Sc. Nat., 1851.
9. *Fagus sylvatica* L. Pl. Ohrdruf, 1879.
Legnon circumscriptum Bremi. Thomas, Addit. p. 341. The margins of the leaves rolled up.
10. *Galium silvestre* Poll. Acr. Sudeten Mts., 1872, August. Thomas in Giebel's Zeitschr. 1877, T. 49, p. 384. (Vergruening, Thom.)
11. *Lonicera xylosteum* L. Pl. Ohrdruf, June, 1880. Deformation of the margins of leaves. Thomas, Nova Acta Lesp. Carol. 1876, T. 38, p. 277, fig. 25, 26. *Legnon confusum* Bremi.
12. *Orlaya grandiflora* Hoffm. Acr. Dolmar, near Meiningen, August, 1875. Thomas in Giebel's Zeitschr. 1877, F. 49, p. 382 (Vergruening, Thom.)
13. *Populus tremula* L. Pl. Ohrdruf, 1879. Thomas, Acta Nova l. c., p. 270, pl. x., f. 17-20. Galls on the basal glands of the leaves; the mite is named by Kirchner, Lotos, 1863, p. 45, *Heliazeus Populi*; it is a Phytoptus.

14. *Prunus domestica* L. Pl. Ohrdruf, fall, 1879.
Vulvulifex pruni Amerling. *Cephaloneon hypocrateriforme*
Bremi. Thomas, Giebel's Zeitschr. 1869, T. 33, p. 330, and 1872,
T. 39, p. 199. Leaf-galls.
15. *Pyrus communis* L. Pl. Ohrdruf, fall, 1879. Pox or pustules on the
leaves. Thomas in Giebel's Zeitschr. 1872, T. 39, p. 473, and
Sorauer Pflanzenkrankheiten, 1874, pl. I.
16. *Salix alba* L. Pl. Danzig, Prussia, Brischke. Leaf-galls. *Bursifex*
salicis Amerling. Thomas, Progr. p. 2.
17. *Sarothamnus scoparius* Koch. Acr. Baden-Baden, August, 1877.
Deformed axillar buds. Thomas in Giebel's Zeitschr. 1877, F. 49,
p. 375-377, pl. 6, f. 6. The deformation is considered identical
with Reaumur Min. 1737, T. iii., p. 423, pl. 35, f. 1,2.
18. *Sorbus aucuparia* L. Pl. Ohrdruf, 1879. Erineum, on the leaves.
19. *Thymus serpyllum* L. Acr. Ohrdruf, August, 1876. Deformation of
the tips of buds.
20. *Tilia Europaea* L. Pl. Danzig, Prussia, Brischke. *Botherimus*
Tiliæ, leaf-galls.

II. From North America.

21. *Acer rubrum* L. Pl. Washington, D. C. O. Sacken. *Cephaloneon*
spec., numerous galls on the upper side of the leaves.
22. *Acer rubrum* L. Pl. White Mts., N. H., Sept. 1869. H. Hagen.
Cephaloneon, on old leaves; galls in large numbers dispersed on
the leaves.
23. *Acer rubrum* L.? Pl. Lynfield, Mass., June 13, 1867. H. Hagen,
Cephaloneon; the upper side of very young leaves closely, almost
entirely, covered by the galls.
24. *Acer saccharinum* Wang. Pl. W. St., O. Sacken; Cambridge, Mass.,
H. Hagen. Erineum, on the ribs, rather elongated.
25. *Acer saccharinum* Wang. Pl. Shelburne, N. H., August, 1882. Prof.
Farlow. *Erineum roseum* Schult. (Farlow); small velvety patches
on the upper side of the leaves.
26. *Acer dasycarpum* Ehrh. Pl. Shelburne, N. H., August, 1882. Prof.
Farlow. *Erineum luteolum* Farl.; irregular velvety rusty patches
on the under side of the leaves.
27. *Acer* spec. Pl. Illinois, spring, 1869. H. Shimer. Not seen by me;

- Trans. Amer. Ent. Soc., T. ii., p. 319. Cephaloneon, perhaps the same as No. 23. The mite is *Vasates quadripedes* Shimer.
28. *Acer* spec. Pl. Prof. Barbeck. Not seen by me; Erineum. Mr. John A. Ryder, Amer. Naturalist, 1879, F. 13, p. 704-705. The mite is figured.
29. *Acer* spec. Pl. Bethlehem, N. H., August, 1870. Prof. L. Agassiz. "*Erineum purpurascens* (so called); not supposed to be a fungus, but a disease of the epidermis." Prof. Farlow. Large irregular black velvety patches upon the leaves.
30. *Alnus incana* Wied. Pl. Shelburne, N. H., Aug., 1882. Prof. Farlow. *Erineum alnigerum* Kze. (Farlow); small reddish or whitish flat woollen patches on the upper side of the leaves.
31. *Alnus serrulata* Ait. Pl. W. St., O. Sacken. Very small, widely scattered Cephaloneon galls on the upper side of the leaves.
32. *Alnus serrulata* Ait. Acr. ? W. St., O. Sacken. A hypertrophy of the female aments by a fungus. *Taphrina alnitorque* Tulasne = *Ascomyces Tarquinetii* Westendonk (Farlow). Baron O. Sacken believed it to be an Acarideous deformation; perhaps fungus and Acarus may be combined here. A hemipteron, *Cymus Resedæ* Pz., lives abundantly in the early spring in this deformation.
33. *Amelanchier Canadensis* Gray. Pl. Woods Holl, August, 1876. H. Hagen. Galls similar to a Phrygian cap, the tip rolled down, numerous on the upper side (rarely below) of the leaves; on the under side the Erineum opening. Mostly many galls on the same leaf.
34. *Amelanchier Canadensis* Gray. Pl. S. Truro, Mass., July 3-7, 1877. F. G. Sanborn. Similar to the foregoing, but a number of the galls larger, yellowish, the open tip woolly on the margin. Perhaps the ripe form of the foregoing.
35. *Aristolochia siphon* L. Herm. Pl. Harvard Arboretum, June 17, 1882. H. Hagen. Small woollen tuberculous galls on the under-side of leaves; above small rounded openings, with white woollen margins. I am not entirely sure that it belongs to Acarus.
36. *Artemisia* spec. Acr. N. England. Prof. Farlow. Deformation of the buds; black globes of densely crowded filaments.
37. *Betula* spec. Acr. Massachusetts, 1880, November. Prof. Farlow. Densely crowded irregular deformations of the buds.
38. *Carya tomentosa* Nutt. Pl. Washington, D. C., June 13, 1861. O.

- Sacken. Labeled as *Pemphigus caryæ venæ* by O. Sacken. The description of A. Fitch, Rep. iii., p. 444, for *Carya alba*, agrees; by B. D. Walsh, Pract. Entom., T. i., p. 3, it was declared to belong to Coccus, which is not accepted by Prof. Comstock. Perhaps it belongs to Phytoptus.
39. *Carya tomentosa* Nutt. Pl. U. S., O. Sacken. Deformation and folds on the leaves.
 40. *Clematis* spec. Pl. Yakima City, Wash. Terr., July 3, 1882. S. Henshaw. Small, short whitish tubes, open at the end, crowded in oblong convex patches on the leaves, but also on the stalks of the buds and on the buds, therefore it would belong to Pl. and Acroecidia.
 41. *Cornus Canadensis* L. Pl. Mount Monadnock, N. H., Sept. 1883. Prof. Farlow. Erineum spec. Small blackish spots on the upper side of the leaves.
 42. *Crataegus tomentosa* L. Pl. Rock Isl., Illinois, O. Sacken. Sent by B. D. Walsh as *Acarus crataegi vermiculus* Walsh. Leaf-curls. Proc. Ent. Soc. Phil. T. vi., p. 227.
 43. *Crataegus crus-galli* L. Pl. Rock Isl., Illinois. O. Sacken. The same as the foregoing.
 44. *Crataegus coccinea* L. Pl. Worcester, Mass., Sept. 7, 1879. Miss E. Sargent. Spinulose blackish galls on the upper side of the leaves.
 45. *Diospyros Virginiana* L. Pl. Washington, D. C., Oct. 26, 1860. O. Sacken. Erineum, on the upper side of the leaves; small rounded, slightly elevated patches in great numbers.
 46. *Elodes Virginica* Nutt. Pl. Illinois. Prof. Farlow. Very fine and very numerous black spots on the upper side of the leaves.
 47. *Fagus ferruginea* Ait. Pl. Shelburne, N. H., August, 1882. Prof. Farlow. *Erineum ferrugineum* P. (Farlow). Irregular velvety rusty patches on the under side of the leaves.
 48. *Fraxinus* spec. Pl. Massachusetts, 1880. Prof. Farlow. Cephaloneon, densely crowded, covering about the whole leaves above.
 49. *Gerardia flava* L. Pl. Martha's Vineyard, Mass., August, 1872. H. Hagen. Deformation of the leaves.
 50. *Juglans cinerea*. Pl. U. S. O. Sacken. *Erineum anomalum* Farl. It is the same mentioned by Walsh, Proc. Ent. Soc. Phil., T. vi., p. 227, "on the leaf stalk of the Black-Walnut gall. *Juglandis*

caulis Walsh, M.S., they reside among the brown external pubescence." The whole stalks are covered around by a thick brown velvet to the length of one inch. If I did not know the scrupulous accuracy of the Baron in labeling his specimens, I should believe that the specimens in the collection are types of Walsh sent to him, as they are indeed very similar to the preparation used by Walsh. I know nothing similar to this curious gall.

51. A leguminose plant. Pl. Santa Cruz, Cal., 1879. Prof. Farlow. The leaves are sprinkled above densely by very small black spots. The gall is very similar to those of *Elodes Virginica*.
52. *Plumbago* spec. Pl. Santa Cruz, Cal., 1879. Prof. Farlow. Galls similar to those of *Elodes Virginica*, but less numerous.
53. *Potentilla Pennsylvanica* L. Pl. Saskatchewan, Br. Amer., 1884. Prof. Farlow. Erineum, on the leaves; somewhat doubtful.
54. *Prunus maritima* Wang. Pl. Waquoit, Mass., June, 1871. L. Agassiz. Deformation of the leaves.
55. *Prunus maritima* Wang. Pl. Woods Holl., Mass., August, 1876. H. Hagen. Long pedunculated black galls on the upper side of the leaves.
56. *Prunus maritima* Wang. Pl. Mass. H. Hagen. Similar to the foregoing, but probably a different species. The galls are green, smaller and much shorter pedunculated.
57. *Prunus serotina* Ehrh. Pl. Maryland. O. Sacken. Galls similar to those on *Pr. maritima* from Waquoit, No. 54.
58. *Prunus serotina* Ehrh. Pl. Westpoint, N. Y. O. Sacken. Galls similar to those on *Pr. maritima* from Mass. No. 56.
59. *Prunus serotina* Ehrh. Pl. Plum Creek, Col., June 27, 1873. O. Sacken. Similar to the foregoing, but different by shorter and most densely crowded galls.
60. *Prunus?* spec. Pl. Massachusetts, 1876. F. G. Sanborn. A very large Erineum.
61. *Prunus serotina* Ehrh. Pl. Cambridge, Mass., 1874. Mr. Bassett. Galls similar to those from Maryland, No. 57.
62. *Prunus*, spec. Pl. Weenass Valley, Wash. Terr., July 7, 1882. S. Henshaw. Small yellow pedunculated galls; very crowded on the upper side of the leaves, and around some stalks.
63. *Pyrus coronaria* L. Pl. Rock Isl., Illinois. O. Sacken. Erineum, on the under side of the leaves. I find it not described.

64. *Quercus bicolor* Wilden. Pl. Conn., by Mr. Bassett. O. Sacken. Upper side of leaf crowded with very small Cephaloneon; labeled as Podosoma.
65. *Quercus obtusiloba* Mich. Pl. Washington, D. C., October, O. Sacken. Deformation of leaves on the margin.
66. *Quercus* spec. Pl. Saltillo Mts., Mexico, Aug., 1879. Dr. Palmer. Deformation of leaf on margins.
67. *Quercus* spec. Pl. Colorado, 1873. W. L. Carpenter. O. Sacken. The gall belongs not to the three species described by the Baron in Hayden's Report for 1873, p. 567. The galls were labeled "Russ (sic) galls," and are somewhat doubtful; oval, somewhat woolly, on the upper side of the leaves.
68. *Rhus toxicodendron* L. Pl. Malden, Mass., Sept. 1879. H. Hagen. Erineum, on the leaves.
69. *Salix nigra* Mars. Acr. Rock Isl., Illinois, Walsh. O. Sacken. The types of *Gall. Salicis Aenigma*. Walsh, Proc. Ent. Soc. Phil. T. iii., p. 608, and T. vi., p. 227. Deformation of the buds.
70. *Salix nigra* Mars. Pl. Rock Isl., Illinois, Walsh. O. Sacken. The types of *Gall. Salicis semen* Walsh, Proc. Ent. Soc. Phil., T. iii., p. 606, and T. vi., p. 227. Probably a Cephaloneon.
71. *Salix nigra* Mars. Pl. Wash. Terr., opposite Umatilla, June 27, 1882. S. Henshaw. Small and very crowded Cephaloneon galls upon the leaves.
72. *Spiraea* spec.? Pl. Cambridge, Mass., spring, 1877. H. Hagen. Probably Cephaloneon on the leaves.
73. *Tilia Americana* L. Pl. U. S. O. Sacken. Very shortly pedunculated galls on the upper side of the leaves.
74. *Thuja occidentalis* L. Pl. Mass., July, 1879. Prof. Farlow. Covered with eggs and skins; deformation of the leaves.
75. *Vaccinium* spec. Pl. Colville Valley, Wash. Terr., July 23, 1882. S. Henshaw. Small round galls on the leaves.

There are besides in the collection a number of specimens not yet sufficiently studied, as some cases of Phyllomania or Polyphyllia on pines and other plants, perhaps consequences of Phytoptus.

To the 51 American Phytoptus galls in the Collection of the Museum, must be added the four described, but not seen by me; by Mr. Shimer, on *Acer dasycarpum*; by Mr. Ryder, on *Acer*; by Mr. Ashmead, on oranges, and by Mr. Burrill, on pear leaves. Further, two shortly described

by Mr. Walsh (Proc. Ent. Soc. Phil., T. iii., p. 608, after the statements l. c., T. vi., p. 286) on *Betula nigra* and *Cephalanthus occidentalis*, both probably Cephaloneon. Further, after the list of Acarideous galls given by Mr. Walsh (l. c., T. vi., p. 285-286), 3 on *Ulmus*, 1 *Populus*, several on *Quercus*, 1 *Juglans*, 1 *Negundo*—in all 13 species not seen by me. Of these 68 galls, 56 are Pleurocecidia.

The 68 Phytoptus galls known from N. America belong to 42 species of plants, to 33 genera, and 23 families. *Prunus* has 7 different galls, *Acer* 5, *Quercus* at least 4; all other plants have less, mostly one gall.

It is obvious that this list is only a beginning of the knowledge of the Phytoptus galls in N. America, when we look on the large number of species discovered in Europe since more attention is given to them, principally by the untiring efforts of Dr. Fr. Thomas.

ENTOMOLOGICAL NOTES.

BY J. G. JACK, CHATEAUGUAY BASIN, QUEBEC.

The following notes on the habits of several insects are from a record of entomological observations kept during the past four years, and although imperfect, they may serve as a hint to others to pursue observations in the directions indicated.

During the past season few unusual specimens were taken and very few notes made. Diurnal Lepidoptera (with the single exception of *P. cardui*, which had been rare for some years) were unusually scarce. *Pieris rapæ* is becoming less numerous every year, owing, probably, to its many parasites. Moths were not so abundant as usual, and the only capture worthy of notice was the re-occurrence of *Aletia xyliana* Say (the cotton-worm moth), a single good fresh specimen of which was taken October 26th, in the woods, among leaves near a butternut tree. There had been severe frost the night before, but the moth was quite lively when found. Looking through my note book, I find the following entries regarding this insect:—

“October 1st–15th, 1881. Found *Aletia xyliana* Say quite common, especially in open barrels or heaps of decaying apples left in the orchard.”

“Sept. 21, 1882. *Aletia xyliana* Say taken at decaying fruit.”

"Oct. 12, 1883. *Aletia xyliana* Say taken at decaying apples. Not very common this year."

The decaying apples mentioned were windfalls that had been partly eaten by other insects before they were gathered, and put into heaps or old barrels to be fed to cattle. When these apples had stood in the sun a few days, the smell of ripe fruit from them became quite strong, and many moths, flies, etc., were attracted. It was here I found *Aletia xyliana* most common, resting quietly on the bitten apples, and easily taken with the hand. They are nearly always in good condition, and although they are not easily "rubbed" and have the power of long sustained flight, I find it hard to agree with Professor Riley's opinion that they fly here every autumn from the Southern cotton fields. I think we will yet find there is a Northern food plant.

Dec. 30th, 1881. Found more than one hundred pupæ of *Drasteria crechtea* Hub. in a hollow piece of wood. They must have been collected and placed here by some small animal, possibly a wood-mouse.

Jan. 9, 1882. Found several examples of hibernating *V. milberti* under stones in a stone fence. I thought it worth noting that two or more were almost always found under the same stone or near together, and a considerable distance might intervene between each lot of specimens.

July 25, 1882. Several specimens of *V. antiopa* taken hovering over bushes of choke cherry (*P. virginiana*), the leaves of which were much infested with aphides. The butterfly would alight on the curled leaves containing the aphides, and extending its tongue, insert it among them, and when engaged drinking the sweets furnished by the aphides, it could readily be taken with the hand. *Limenitis arthemis* and *L. disippus* were observed and taken similarly occupied. At a meeting of the Cambridge Ent. Club (Jan. 12th, 1883) I asked the members present if they had observed or known of such habits in these butterflies before, and received a negative reply. Also notice that *Phyciodes tharos* and other small red butterflies sometimes persistently follow *D. archippus* and other large butterflies of the same color. They alight when the large butterfly does, rising only when the larger insect takes to flight again. Is this for the sake of protection from some enemy?

The following note was made at the Experiment Grounds of the "Rural New-Yorker," River Edge, Bergen Co., N. J.:

"July 7, 1883. Found *Pronuba yuccasella* Riley in flowers of *Yucca filamentosa*. They are quiet during the day time, but become active in

the evening. Have not found them anywhere except in or upon flowers of this plant. Also observed a Humble-bee succeed in entering two or three of the flowers, and, clasping the stamens firmly with its legs, it reached the base of them with its tongue and usually went two or three times around. It had much difficulty in getting into the flowers. No other insects were observed about them. Could this bee fertilize *Yucca* flowers?

June 25, 1884. Found a young pear tree almost entirely defoliated by larvæ of *Vanessa antiopa*. I have never heard of the pear as a food plant of this insect.

Aug 24. I noticed an ichneumon fly (*Ophion*) attempting to deposit eggs in or upon a larva of *Notodonta concinna*. After finding the position of the caterpillar, the *Ophion* brought its head pretty close to it, and then brought its abdomen and ovipositor up under its thorax and between its legs, apparently using its mandibles as a sort of guide or brace for the ovipositor. The *Ophion* was seen to probe the thoracic legs of the caterpillar with its piercer, but for what purpose I could not make out. The caterpillar was very much excited. For want of time I was obliged to give up further observation, and killed the specimens.

Aug. 25, 1884. The Buffalo Tree-hopper (*Ceresa bubalus* Fab.) is very abundant on the branches and trunks of young apple and pear trees, depositing eggs beneath the bark. They are sometimes so numerous as to literally cover the limbs of the trees, and the cutting up of the bark must do considerable injury.

Sept. 22, 1884. Found a larva of *S. drupiferarum* which was infested with parasites, which could be plainly seen just below the skin. An hour after it was taken, I looked at it again, and found nearly all the parasites making holes in the skin, one of them already having its body half through the hole just made. I put the larva in a paper bag and did not look at it again for two days, when I found it still living, but weak, and with circular marks on its back showing where the parasites had made their exit. In the bag I found a bunch of small cocoons, set side by side, on end, like the cells in honeycomb, all being firmly cemented together by a tough brownish substance.

DESCRIPTION OF LARVA OF AGROTIS DECLARATA, Wlk.

BY THE EDITOR.

Several specimens of the larva of this insect were received on the 8th of July, 1884, from Mr. Acton Burrows, Deputy Minister of Agriculture, Winnipeg, Manitoba. They were reported as seriously injuring vegetables and field crops in that Province.

Length, one and one half to one and three quarter inches.

Head medium in size, yellowish brown, with a polished surface, dotted and streaked with dark brown.

Form nearly cylindrical, tapering a little towards the head.

Body above dull grayish brown, in some specimens tinged with reddish; skin semi-transparent, showing the movements of the internal organs; cervical shield on second segment similar in color to the head. A pale dorsal line, a subdorsal and a stigmatal line of the same color. Below the stigmata and close to the under surface is a whitish band. On each segment there are a few small shining black dots which are arranged in a single transverse row on third and fourth segments. On the segments behind these there are additional dots forming an imperfect second row, but less regular in their arrangement. On each side of the middle segments, near the spiracles, there is a cluster of two or three of these black dots. No hairs proceed from any of these dots, but there are a few very minute short hairs scattered over the surface of the body, not visible without a magnifying lens. Spiracles oval, black.

Under surface paler and greenish, with whitish streaks, semi-transparent.

One specimen buried itself under the earth soon after they were received; shortly it became a chrysalis, and produced the imago August 23rd. All the others died before completing their transformations. The moth was kindly determined by Mr. John B. Smith, of Brooklyn, N. Y.

EUMACARIA BRUNNEARIA, PACKARD.

BY D. S. KELLCOTT. BUFFALO. N. Y.

I have recently obtained this elegant Phalenid from its larva, which feeds on the wild red cherry (*Prunus Pennsylvanica*). July 8, several nearly mature caterpillars were discovered on the twigs of their food-

plant. They were an inch in length; color dull red, closely simulating the bark of the branches; and to more effectually conceal themselves by mimicry, they hold on, when at rest, by their pro-legs only, the body standing out like a short branch, or they hold to a leaf by their fore legs, making their bodies appear like a petiole.

The hemispherical head is red, with the edges along the fork of the epicranial suture white; the usual body stripes are represented by very faint, white lines; there are also faint whitish spots on the sides of the body. The spiracles are nearly round, situated on small black tubercles.

The pupæ formed under the leaves in the feeding cage, without cocoon. They were rather stout, front rounded and smooth; the last segment ends in a rather long spine with terminal hooklets. The surface of the abdominal rings with small alveoli. Pupa, July 12; moth, July 25.

A NEW PAMPHILA.

BY G. H. FRENCH, CARBONDALE, ILL.

Pamphila myus, n sp.

Male.—Expanse .95 of an inch. Upper surface dark olivaceous brown, with a slight vinous reflection, about the same shade as *cernes*, which it much resembles. The primaries have the discal cell and the area in front of the cell like *cernes*, heavily washed with yellow of a little darker shade than that species, the same color extending beyond the cell along the costal area three fourths the distance from the base to the outer margin (as the wings are spread); below the cell the same shade of yellow extends along the median vein the same distance, the area below this to the margin rather heavily sprinkled with yellow scales, except the space beyond the lower half of the stigma. This varies but little from the yellow of *cernes*. In *cernes* there is a quadrate sinus of the terminal dark brown of the wing dipping into the yellow beyond the cell, coming up to the cross vein. In this species the sinus is of the same width, but extends inward above the median vein, ending in a point half way to the base of the wing. The stigma is black, narrow, oblique, entire, though constricted below the middle, shorter than in *cernes*, does not reach the submedian below, and the upper end only reaches the second branch of the median, while in *cernes* it passes beyond this veinule, the lower third bent a little

towards the base, in width not more than half as wide as in *cernes*; below the stigma an oblong patch of blackish scales that are bronzy in certain lights. Secondaries sprinkled with yellow scales, the inner half with yellowish hairs that are less olivaceous than in *cernes*.

One specimen has on the primaries, marking what is above described as the outer boundary of the yellow, five small yellow spots that are paler than the yellow along the costa, three in a line back from the costa and two in the median interspaces; and the yellow washing does not quite reach to these spots, there being less yellow also at the base; varying in amount of yellow, as is sometimes seen in different specimens of *cernes*.

Under side of primaries much as above, the yellow orange-tinted, the row of slightly paler spots at the end of the yellow showing more distinctly than above, the apical half of terminal space sprinkled with yellow, the posterior half of wing blackish, the sinus beyond the cell heavily sprinkled over. Secondaries dark brown with the vinous reflection, sprinkled with pale yellow scales, a narrow discal band of small confluent whitish spots marking the outer third, much as in the species of *Amblyscirtes*, not very distinct.

Female.—This lacks the stigma of the male, is marked above much as the female of *cernes*, but is a darker and brighter yellow, the whole area in front of the cell and to the ante-apical spots nearly clear yellow, the rest of the basal two thirds sprinkled with yellow much as in the male. On the under side the obscure band on the secondaries is a little more distinct than in the male.

Body concolorous with the wings above, the thorax with olivaceous hairs, the abdomen sprinkled with yellow; beneath yellowish white, about the shade of *cernes*.

Described from four males and one female taken by H. K. Morrison in Florida.

NOTES ON APATELODES ANGELICA, GROTE.

BY J. ALSTON MOFFAT, HAMILTON, ONT.

Being on a visit to Ridgeway in July, 1882, when out one day with Mr. Kilman on a hunt, as I beat a high branch for beetles, a large moth new to me dropped into my umbrella. Having secured it in my poison bottle and remarked that I must now find its mate, another

stroke, and sure enough, I got it. I took a third at that time sitting on the trunk of a tree, which I left with Mr. Kilman. The following season he took one or two, and last spring he found some chrysalids under moss, from which he raised a pair. On visiting Prof. Kellicott, of Buffalo, Mr. Kilman left with him an example, that he might obtain its name. Mr. Kilman now writes to me that Prof. Kellicott has identified it as the *Apotelodes angelica* of Grote's Check List, with *hyalinopunctata* Pack. as a synonym, which latter name would have been more appropriate. Prof. Kellicott conveys the information that it is described and figured in the Proc. of the Ent. Soc. of Phil., iii., 322, plate iv., fig. 1. It is quite a fine moth. Of my pair the female measures $1\frac{7}{8}$ inches in expanse at the apex, and $2\frac{1}{8}$ at the sub-apical angle; the sub-apical is excavate. Edges of wings toothed, color of front wings lavender, with two light brown bands across them, the outer one continued on the hind wing; outside the latter are a row of brown dots on the nervules of the front wings. Near the apex are two transparent spots square in form, the one nearest the costa more than double the size of the one behind it. Color of hind wings light brownish-gray, with a heavy marginal band approaching the color of the front wing; an elevated longitudinal brown stripe in the middle of the thorax.

The male is but $1\frac{3}{8}$ at the apex, and $1\frac{1}{2}$ at the apical angle, in expanse of wing; it is the same in color as the female, but less distinct in its markings.

The attitude of the one I found sitting on the trunk of the tree reminded me very much of *Paonias excrucatus* when at rest. It stood high upon its legs, with its wings slightly spread and its abdomen elevated above their level.

I should mention that Mr. Johnston, of Hamilton, took a specimen in the season of 1881.

HIBERNATION OF COLEOPTERA.

BY JOHN HAMILTON, M. D., ALLEGHENY, PA.

The condition in which Coleoptera pass the winter is a subject on which there are in American literature but few recorded observations. That no species hibernates in the egg stage is highly probable, though in all the

others it occurs—some wintering in the perfect state alone, some 'in the larva and the imago condition, and others as larva and pupa.

Many of the species appear to make some preparation, retiring to situations that will more or less protect them from intense cold ; others seem to have power to survive without any practical protection, as *Lixus concavus* and *Megilla maculata*, to be mentioned further on.

The majority are apparently subject to conditions that correspond to what is observed in warm blooded animals in a state of complete torpidity, namely : the absence of all detectable respiration ; a temperature equal to that of the surrounding atmosphere till near the freezing point, and the power to survive a long entire deprivation of air, and even submersion in carbonic acid gas. There is no well substantiated case, that I have seen, of any of the above class reviving after a few hours submergence in water, except in that of certain swallows washed from their winter quarters in the low banks of streams by freshets ; and while some of these appear to have resumed the functions of life partially, none have been resuscitated completely.

Many, if not all Coleoptera in the hiemal state in whatever stage, possess this latter power in an eminent degree, as is very evident from observations on the effects of winter inundations, as in the instance following. In February, 1884, a section of bottom land over one mile in length and one quarter in width, was entirely overflowed by the Allegheny to an average depth of five feet, and remained totally submerged over seven days. This is famous ground for Cicindelidæ and Carabidæ. Thousands of *C. repanda* are on the shore from April till November. *Carabus vinctus*, *Platynus melanarius*, *picipennis*, *extensicollis* and *anchomenoides* ; *Pterostichus lucublandus*, *Sayi* and *luctuosus* ; *Anisodactylus discoideus*, *Baltimorensis*, &c., &c., abound.

To all appearance no terrestrial life could survive such a protracted submergence, which over a considerable portion of this area was even a week longer ; and yet, when the warm days of April came, here was *C. repanda* as numerous as ever ; later appeared the various species of Carabidæ, many with the elytra encrusted with mud ; and all kinds of insects seemed as abundant as in seasons in which no brumal overflow had occurred.

Lachnosterna futilis, which abounds in grassy places along the bank, was in no wise affected ; nor was *Saperda concolor*, which inhabits the canes of a dwarf willow.

In the active state the species mentioned are readily drowned. In some experiments made to determine this point I found that few survived submersion in water for half an hour, and none for over an hour.

The degree of cold that can be endured without death is probably variable according to the species, the more tender retiring on the approach of cold weather deep into the earth, or into substances that are poor conductors of heat, as leaves, moss and decaying wood. Others that can sustain low temperatures without injury seem rather indifferent about the matter, crawling under any covering that happens to be convenient.

Some of the European entomologists by experiments seem to have satisfied themselves that the larvæ of some Lepidoptera may be congealed into masses of ice and fractured as readily as glass, and yet revive and regain their full activity. Though hard to believe, the statement is as worthy of credence as any that depends on human testimony. However, all the observations I have made on Coleoptera and their larvæ go to show the contrary, having never succeeded in reviving any in which there was absolute certainty of the tissues being frozen.

The larvæ of *Urographis fasciatus* and *Dendroides Canadensis*, which live within or just beneath the bark of fallen timber, were examined recently with reference to determining this question. They were found in their shallow excavations, the most of them surrounded by glittering crystals of ice. Nearly all were flexible and the tissues unfrozen, and mostly revived. A few were frozen solid and broke readily, none of these giving evidence of life.

A large number of the larvæ of *Dectes spinosus*, inhabiting the stems of *Ambrosia artemisifolia* (rag-weed) at or just below the surface of the ground, were taken out of their quarters. In many instances the stems had been filled with water and the larvæ were enclosed in cylinders of ice. The greater number were flexible and mostly regained activity on a rise of temperature; such, however, as were evidently congealed could not be resuscitated.

In the torpid condition some species of Coleoptera certainly have the power of sustaining vitality while exposed for a long time to a temperature below, or but little above the 0 of Fahr. The first week of this month (February) I found a large collection of *Megilla maculata* in a field, near a tree; they had congregated on the ground under and around a small piece of shingle that did not cover the half of them, and were massed together on top of one another to a considerable depth—all apparently

dead. Several were examined when found, and about one third of these proved to be entirely congealed, the remainder being flexible and showing signs of life when enclosed in the hand for a short time. The temperature to which these had been exposed was several degrees below zero, and for a couple of weeks scarcely ever more than 16 degrees above. Such collections of this species are not uncommon. I gathered up the full of a half ounce collecting bottle, leaving fully as many behind. In the warmth of my office, in a couple of days, about one half of those collected became active, though none that I regarded as frozen ever gave evidence of the slightest vitality.

During the very cold weather of last winter I found five specimens of *Lixus concavus* embedded near one another in ice in a patch of *Rumex* on low ground. A couple taken out without thawing appeared to be dead; sections were made in these in different directions with a sharp knife without detecting any frozen tissue, or any frost in the cavities of the bodies. The others were allowed to thaw out gradually and then they were discovered to be alive. Their after history is somewhat curious.

The tenacity of life possessed by this species has often been the subject of remark, and appears, from the following, to be greatly intensified by the mysterious changes that accompany the condition of torpidity. These three were thrown into strong alcohol, and on the third day were taken out and pinned, the time they were in it being over sixty hours. Five days afterwards they were observed to be alive and wriggling, their limbs quite lively; then they were pinned to the inner end of the cork stopper of a bottle containing cyanide of potassium, and when examined four days afterwards appeared to be as lively as when first pinned. How long afterwards they lived is unknown, as a long interval occurred before the next observation, and then they were truly dead.

By the foregoing it must not be inferred that I maintain the freezing of the tissues of torpid Coleoptera to be incompatible with the resumption of the functions of life—an opinion that would be, to say the least, presumptuous in the face of the many opposite experiments and observations by distinguished men.

The subject is one full of mystery and deserves the most careful attention.

CORRESPONDENCE.

XYLORYCTES SATYRUS AND STRATEGUS ANTAEUS.

Dear Sir: It must be assumed that Dr. H. A. Hagen was caught napping when he penned the note published in the CAN. ENTOM., Dec., 1884, vol. xvi., p. 239-240, for otherwise, with his predilection for the "literature" of entomology, he would not have failed to note that the capture of *Xyloryctes satyrus* north of Pennsylvania had been several times recorded. Presumably the reference to that species in the Am. Entom., Nov., 1868, vol. i, p. 60, was to specimens taken on Long Island, N. Y. This species is included in Mr. J. Pettit's "List of Coleoptera taken at Grimsby, Ont.," (CAN. ENTOM., April, 1870, vol. ii., p. 86), and in Mr. W. H. Harrington's "List of Ottawa Coleoptera," (Trans. Ottawa Field Nat. Club, 1883-4, vol. ii., No. 1, p. 80), and further, Mr. John Hamilton (CAN. ENTOM., June, 1884, vol. xvi., p. 107), writes of this species: "This large beetle is widely distributed, being found in Arizona, New Mexico, Texas, Kansas to Canada, and southward, and probably occurring wherever the ash and liquidambar grow." My mention, in 1884, of *X. satyrus* and *Strategus antaeus*, in the chapter "Coleoptera," of vol. ii., of Cassino's Standard Natural History, might readily be overlooked, since that work is of a somewhat popular nature. I there wrote, p. 370, "*S. antaeus* . . . is found near the Atlantic coast of the United States as far north as Massachusetts. . . . *X. satyrus* is found in the same regions as is *Strategus antaeus*." These statements were based upon specimens in my own small collection, which includes ten specimens of *X. satyrus*, from localities north of Pennsylvania. These localities are Cambridge, Springfield and Amherst, Mass.; Suffield, Conn.; and Montauk Point (the extreme eastern end of Long Island), N. Y. I have seen specimens of this species in abundance on the sidewalks of Sag Harbor, eastern Long Island, and will take care that even a Cambridge representative of the species is deposited in the entomological collection of the Museum of Comparative Zoology, of which Dr. Hagen takes such excellent care. Of *Strategus antaeus*, my collection has only a small series, as follows: Several specimens from Springfield, Mass., one from Michigan, and one from Cumberland Gap, Kentucky.

GEORGE DIMMOCK.

Cambridge, Mass., 16 Feb., 1885.

Dear Sir: I was particularly interested by Dr. Horn's remarks on *labyrinthica* or *pnirsa* in his notes on *Chrysomela* in a recent number of the CAN. ENT. When on the 23rd of May, 1881, I captured my first specimen on the wing, I regarded it with great satisfaction. The pure white of a fresh specimen contrasted with the glossy greenish black of its peculiar markings, makes it an exceedingly attractive object to the eye when first seen. I secured thirteen that season. Being eager to obtain its name, I sent specimens where I thought it likely to be got; they in turn applied to others, and then informed me, to my no small disappointment, that it was *multiguttis*. We find it restricted here exclusively to one locality, and that not extensive. In 1882 I searched carefully for it, and secured nineteen. On one occasion I found one paired with a *scalaris*, but *scalaris* is rarely met with there. In 1883 I took over eighty *pnirsa* without any special effort, and did not see half a dozen *scalaris* that season in that locality. My first capture of *pnirsa* in 1883 is dated 12th June; on the 16th I took nineteen, on the 21st, twenty-one. The last noted is the 9th July, but they were seen after that. Being from home during their season in 1884, I saw nothing of them, but was informed they were quite scarce. I have inferred that it cannot be a very abundant form from the fact that when it was sent to collectors in Buffalo and New York who have extensive collections and much experience in exchange, it was unknown to them. I find it very liable to discolor when drying, the white becoming rusty, which detracts much from the beauty of its appearance.

J. ALSTON MOFFAT, Hamilton, Ont.

Dear Sir: In reply to the question of Dr. Hagen (CAN. ENT., v. 16, p. 239-240) concerning the distribution of *Xyloryctes satyrus*, it may be of interest to note that the species has been recorded from various parts of Canada by Bell, D'Urban, Hamilton, Harrington, Pettit, Reed, Ritchie and Saunders; from Mass. by Harris (specimens from Martha's Vineyard and New York are in his collection); from Long Island, N. Y., and Illinois, by Walsh; near Buffalo, N. Y. (Lesch & Reinecke); near Cincinnati, Ohio (Dury); Lower Michigan (Hubbard & Schwarz); Davenport, Iowa (Putnam); Kentucky (Siewers); Texas, Kansas, Neb., Ariz. (LeConte); N. Mex. (Hamilton); Eastern, Middle and Western States (Ulke). I have collected it in Western Massachusetts and Rhode Island, and have specimens from Pa., Md., Wisc. and Mich.

SAML. HENSHAW, Boston, Mass.