The Canadian Entomologist.

VOL. XXXVII. LONDON, NOVEMBER, 1905. No. 11

## ENTOMOLOGICAL SOCIETY OF ONTARIO.

The forty-second annual meeting of the Society was held, by kind invitation of President Creelman, at the Ontario Agricultural College, Guelph, on Wednesday and Thursday, October 18th and 19th. Owing to the unavoidable absence of Mr. John D. Evans, President of the Society, the chair was taken by the Vice-President, Dr. James Fletcher, Dominion Entomologist and Botanist, Ottawa. Among those present were: Rev. Dr. Fyles, Quebec; Mr. H. H. Lyman, Montreal; Mr. C. H. Young, Hurdman's Bridge; Mr. Arthur Gibson, Ottawa; Mr. C. C. James, Deputy Minister of Agriculture for Ontario, Messrs. J. B. Williams and C. W. Nash, Toronto; Mr. G. E. Fisher, Burlington; Rev. Dr. Bethune, London; President Creelman, Professors Lochhead, McCready, Sherman, Hutt, Reed, Messrs. Clew, Zavitz, Barlow, Jarvis, Hotson and others, Guelph. There were also present a large number of the young women students from the Macdonald Institute and of young men from the Agricultural College. At some of the meetings the attendance was over one hundred. The Society was also favoured with the presence of Prof. John B. Smith, State Entomologist of New Jersey, and a Professor in Rutger's College, one of our honorary members.

During the first morning a business meeting of the Council was held, at which the Treasurer's report was received and adopted. Application was made by a number of gentlemen belonging to the Agricultural College and the Wellington Field Naturalists' Club for the formation of a Guelph Branch of the Entomological Society of Ontario. The request was very heartily acceded to, and the Branch was inaugurated with an initial list of twenty-four members.

Professor T. D. A. Cockerell, of the University of Colorado, Boulder, Colo., an eminent entomologist, especially distinguished by his work in the Coccidæ and Hymenoptera, was unanimously elected an honorary member.

In the afternoon the reports of the Directors on the injurious insects of the year were read, and interesting discussions followed upon the

Tussock Moth, the Cottony Maple Scale, the Pea Weevil, the San José Scale and other insects of economic importance. A paper was also read by Prof. Sherman on "the Entomological Conditions in North Carolina."

In the evening a public meeting was held in the Massey Hall, and was largely attended by the members, students and visitors. President Creelman welcomed the Society to the Ontario Agricultural College, and gave an outline of the different departments of practical work in it and the affiliated Macdonald Institute. Mr. Barlow, of Guelph, also welcomed the Society on the part of the Wellington Field Naturalists' Club, of which he is President, and described the doings of the Club in the past and the investigations to be carried on in the future, the object being to make a complete survey of the fauna and flora of the County of Wellington. Dr. Fletcher, the Chairman, replied in happy terms, and then introduced Prof. John B. Smith, who gave an admirable and most interesting address on "What has been tried in New Jersey for the extermination of Mosquitoes." The lecture was illustrated with a large number of lantern slides, and in the course of it a very lucid explanation was given of the conveyance of malarial disease by the agency of mosquitoes. At the close a very hearty vote of thanks was given to Dr. Smith, proposed by Mr. C. C. James and seconded by Rev. Dr. Fyles.

During the second morning, Thursday, October 19th, papers were read on a variety of subjects by Dr. Fyles, Messrs. Gibson, Jarvis, Lyman, Stevenson and Zavitz, and were discussed by many of those present. In the afternoon the officers for the year 1905-6 were elected, and papers were read and addresses given by Mr. Evans, Prof. Sherman, Mr. Lyman, Dr. Fyles, Mr. J. B. Williams, Mr. Gibson, Dr. Fletcher, Mr. J. F. Smith, Prof. McCready, Prof. Lochhead, Dr. Bethune, Prof. Hutt, President Creelman, Mr. C. W. Nash, Mr. Clew. A cordial vote of thanks was given to President Creelman and the staff of the Agricultural College for their kindnsse and hospitality, and to the reporters of the Toronto *Globe* and the Guelph *Herald* and *Mercury* for their excellent accounts of the proceedings.

During the meetings a large number of rare and interesting specimens were exhibited by Prof. Sherman, Dr. Fletcher, Mr. Gibson, Dr. Fyles, Mr. Lyman, Mr. Jarvis, Mr. Zavitz, and a large case of most beautiful Micro-Lepidoptera, about 1,500 in number, by Mr. C. H. Young.

The following is the list of officers elected:

*President*—J. D. Evans, C. E., Trenton.
*Vice-President*—Dr. James Fletcher, Ottawa.
*Secretary*—W. E. Saunders, London.
*Treasurer*—J. A. Balkwill, London.
*Directors:* Division No. 1—C. H. Young, Hurdman's Bridge.
Division No. 2—C. E. Grant, Orillia.
Division No. 3—J. B. Williams, Toronto.
Division No. 4—G. E. Fisher, Burlington.
Division No. 5—Franklin Sherman, Guelph.
(The Ex-Presidents of the Society are Directors ex-officio.)
*Librarian and Curator*—Rev. C. J. S. Bethune, London.
*Auditors*—W. H. Hamilton and F. A. Stuart, London.
*Editor of The "Canadian Entomologist"*—Rev. Dr. Bethune, London.
*Editing Committee*—Dr. Fletcher, Ottawa; H. H. Lyman, Montreal; J. D. Evans, Trenton; Prof. Lochhead, Guelph; G. E. Fisher, Burlington; J. B. Williams and C. W. Nash, Toronto.
*Delegate to the Royal Society*—A. F. Winn, Montreal.
*Delegates to the Western Fair*—J. A. Balkwill and W. E. Saunders.
*Finance Committee*—J. Dearness, J. A. Balkwill and Dr. Bethune.
*Library and Rooms Committee*—Messrs. Balkwill, Bethune, Bowman, Dearness and Saunders, London.

## THE SPIDERS OF THE ROCHPORT CAVE, MO.

BY CYRUS R. CROSBY, COLUMBIA, MO.

On December 30th, 1904, I examined for spiders a small cave on the north bank of the Missouri River, three miles below Rochport, Mo. This cave is occupied by a small stream, which enters it by an opening some distance from the river, and leaves it in a narrow gorge cut back in the bluffs.

At the mouth of the cave *Meta menardi*, Latr., was abundant in webs on the rocks, and one empty egg-sac was found, accompanied by a number of young, which an adult female seemed to be guarding.

On the piles of bat excrement were numerous pocket-like webs of *Teginaria brevis*, Em. When disturbed they sought shelter under the stones at the edge of which the webs were placed. Several females and two males were taken. On some driftwood brought in by the stream two specimens of *Erigone (Tmeticus) tridenta*, Em., one male and one female, were taken.

November, 1905.

About an eighth of a mile from the entrance is a branch which extends only a hundred feet or so from the main cave. In this chamber the air was more moist, and the walls were sweaty. Here specimens of *Troglohyphantes cavernicolus*, Keys, were found hanging in little sheet webs on the underside of projecting portions of the walls. With them were found several small, loose egg-sacs attached to the rock. The female of this species was described from Renold's Cave, Ky. (Keyserling, Spinn. Am., Therid., II, p. 123). The male is undescribed.

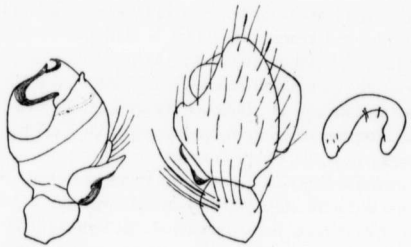

FIG. 20. FIG. 21. FIG. 22.

*Troglohyphantes cavernicolus*, Keys., male figures 20, 21 and 22. Length 1.82 mm.

| Legs. | I. | II. | III. | IV. |
|---|---|---|---|---|
| Tar. | .65 | .6 | .48 | .6 |
| Met. | .99 | .86 | .74 | .95 |
| Tib. | 1.04 | .91 | .74 | 1.04 |
| Pat. | .26 | .26 | .22 | .22 |
| Fem. | 1.08 | 1.04 | .86 | 1.12 |

Cephalothorax broadly ovate, head rather high, gradually declined behind, rounded in the eye region and on the sides in front. Clypeus about twice as wide as the ocular area plane, and slightly projecting. Cephalothorax nearly bare, back of the eyes five more or less distinct radiating rows of hairs directed forward. Eye region and clypeus clothed with abundant short stiff black hairs. Eyes very small and colourless. Posterior eyes in a very slightly procurved line (when seen from in front strongly procurved), equidistant and nearly equal in size; anterior eyes

in a recurved line, the median smaller than the lateral, and separated by less than one-half the distance to the lateral. Cheliceræ long, slender, and divaricate at the tip, light brownish yellow, clothed on the sides and in front with short black hairs, longer towards the tip; inner margin with a few long black setæ; upper margin of the furrow armed with three long teeth. Sternum smooth, nearly white; sparsely clothed with short stiff black hairs. Labium and endites light brown, the latter white at tip. Abdomen nearly white, with a slight tinge of gray, very sparsely clothed with stiff black hairs. Legs light orange yellow; femora of first and second legs armed with one spine each, the others unarmed, each patella with one long spine at tip, first and second tibiæ with two dorsal and two lateral spines, third with two dorsal spines, and fourth with one. Femur of palpus cylindrical, patella short, and bearing a long spine, tibia armed with long setæ, arranged more or less in transverse rows; tarsus with a distinct emargination on the middle of the outer edge, accessory branch of the tarsus slightly enlarged towards base, bent to form a horseshoe, with the outer arm the shorter, armed near the middle with three small setæ and near the base with four minute hairs. On the inner side of the bulb there arise two strongly chitinized projections, the dorsal one serving as a support to the slender, moderately long style, with which it is connected by a hyaline membrane. Just outside of the base of the style there is a short black process slightly bent at the tip, usually hidden by the other parts. The lower surface of the bulb terminates in a blunt, weakly chitinized tooth. (Fig. 20).

On the caudal surface of the anterior coxæ there is a series of oblique striæ which closely resemble the corrugations on the sides of the cheliceræ in *Linyphia*, and which have been considered by Cambridge as stridulating organs. In this species the sides of the cheliceræ are smooth.

---

EXPLANATION OF FIGURES.

Fig. 20, *Troglohyphantes cavernicolus*, Keys. Male palpus from below.

Fig. 21, *Troglohyphantes cavernicolus*, Keys. Male palpus from above.

Fig. 22, *Troglohyphantes cavernicolus*, Keys. Male palpus accessory branch of tarsus.

## NEW BEES OF THE GENERA OSMIA AND ANDRENA.

BY T. D. A. COCKERELL, BOULDER, COLO.

The bees now described not only appear to differ from any previously published; but they have been kindly examined by Messrs. Viereck and Titus, and found to differ from all of the numerous species which they have named in manuscript, and will shortly publish.

*Osmia Davidsoniella*, n. sp.

♂.—Length slightly over 8 mm., steel blue, the colour not especially bright, with dull white pubescence, which is long and erect on head and thorax; vertex and mesothorax closely and strongly punctured. Head larger, with the vertex broad; mandibles and antennæ black; flagellum slender, but not moniliform; mandibles strongly bidentate, the inner tooth broadly obliquely truncate; anterior edge of clypeus normal; tegulæ shining black; wings rather dusky, upper half of marginal cell strongly smoky, nervures black; legs black, hair on inner side of tarsi pale ferruginous; abdomen shining, with distinct but well-separated punctures; hind edge of sixth dorsal segment turned outwards, with a broad, very shallow emargination; seventh segment ending in two short spines, the interval between them being nearly twice the length of either.

*Hab.*—Los Angeles, California *(Davidson)*. A discussion of the relationship of this and the following species will be given by Mr. Titus in his revision of *Osmia*.

*Osmia Titusi*, n. sp.

♀.—Length about 8 mm, dark olive green, bluer on the abdomen, yellower on the face, the clypeus with about the anterior half black, and the part just above the black crimson. Legs dark chestnut red. Pubescence dull white, the ventral scopa white, but in the type specimen full of orange pollen. Head and thorax extremely densely punctured, abdomen with close minute punctures. Head broad; flagellum chestnut red beneath; mandibles dark reddish towards ends, bidentate, both teeth long and sharp; anterior margin of clypeus normal; tegulæ shining bright rufo-fulvous; wings slightly dusky, nervures piceous; hind spurs bright ferruginous; hind tibiæ stout, basal joint of their tarsi broad; abdomen subglobose. The marginal cell is comparatively short, and broadly rounded at end; in *O. Davidsoniella* it is much longer, and bluntly pointed.

*Hab.*—Los Angeles, California *(Davidson)*. Named after Mr. E. S. G. Titus, our best authority on the American species of *Osmia*.

November, 1905.

*Andrena Milwaukeensis berberidis*, n. subsp.

♀.—Smaller; hairs of metathorax all black; light hair on first two abdominal segments less conspicuous; hair of thorax above darker and redder; facial foveæ much narrower; hardly one third of the breadth from eye to middle line (in *Milwaukeensis* about half the breadth; clypeus more shining and closely punctured, without a median ridge).

*Hab.*—Boulder, Colorado, flying near *Berberis repens*, March 30, 1905 *(W. P. Cockerell)*. Also collected at Boulder by Mr. G. Weston. Mr. Viereck is disposed to regard this as a distinct species.

*Andrena griseonigra*, n. sp.

♂.—Length about 10 mm.; black, the head and thorax with abundant very long hair, black except on the dorsum of thorax, where it is dull white; cheeks not toothed; facial quadrangle very much broader than long; antennæ black, third joint conspicuously longer than fourth; flagellum stout; clypeus shining strongly and very closely punctured, without an impunctate line or ridge; process of labrum broad, faintly depressed in the middle, but not notched; mesothorax dull; area of metathorax coarsely but irregularly ridged, not bounded by a rim; tegulæ black; nervures and stigma piceous; legs with black hair, more or less pallid on outer side of tibiæ and hind tarsi; abdomen shining, with minute shallow punctures and black hair, that at apex becoming gray.

*Hab.*—Los Angeles, Calif. *(Davidson)*. Very close to *A. nigrihirta* (Ashm.), but larger, with dark spurs, dark stigma, etc.

*Andrena perimelas*, n. sp.

♀.—Length 16½ mm.; black, robust, with black pubescence, except that on thorax above, and a little on the vertex, which is a rather bright ochreous; wings strongly fuliginous, stigma and nervures ferruginous, the latter partly fuscous; process of labrum broadly rounded; clypeus very densely punctured, with an incomplete median smooth line; area of metathorax large, triangular, with a dull, minutely granular surface; abdomen distinctly but minutely punctured.

*Hab.*—Los Angeles, Calif. *(Davidson)*. This is a large, brightly-coloured offshoot from the northern series of *A. pluvialis* and its allies.

The abdomen is rougher, more hairy and duller than that of *A. pluvialis*. The form of the process of labrum at once separates it from *A. anograe*.

The two following species are entirely black, with black pubescence; they have the colour of *A. Porteræ*, but are larger and stouter, and have not the strongly produced clypeus of that insect. They are considerably larger than *A. nigerrima*, Casad.

*Andrena pertristis*, n. sp.

♀.—Length about 15 mm.; black, with black pubescence, that on sides of metathorax slightly brownish; wings deep fuliginous; clypeus ordinary in form, strongly and very densely punctured all over, except a shining median line; malar space practically obsolete; process of labrum narrowly truncate, with sloping sides; thorax above dull, with a dense velvety pubescence; enclosure of metathorax a nearly equilateral triangle, the sides of which are gently concave, the lateral ones bounded by an incised line, the surface of the area marked by an irregular rather coarse wrinkling, not forming distinct plicæ, and not confined to the basal portion; abdomen closely and very minutely punctured.

*Hab.*—Los Angeles, Calif. *(Davidson).*

*Andrena subtristis*, n. sp.

♀.—Length about 13 mm.; black, with black pubescence. Differs from *A. pertristis* by its smaller size; wings only slightly dusky; third submarginal cell much shorter; the densely punctured clypeus without a smooth line; last joint of flagellum reddish beneath; process of labrum with its apex thickened and having a slight pit; area of metathorax shorter (the angles of the triangle extremely acute), and rather more coarsely sculptured.

*Hab.*—Los Angeles, Calif., two *(Davidson).* Others are in the collection of the American Entomological Society. Long ago named as new in MS. by Mr. Davis, of Cambridge, but the name he used is not available.

---

ERRATUM.—Page 362, line 5 from top, for *Cinophanus* read *Cirrophanus*

# THE INFLUENCE OF THE APIDÆ UPON THE GEOGRAPHICAL DISTRIBUTION OF CERTAIN FLORAL TYPES.

BY J. ARTHUR HARRIS, ST. LOUIS, MO.

(Continued from page 357.)

In the three types to be considered in this place, then, the conspicuous portion of the perianth is almost always campanulate or more generally widely patent and sometimes reflexed. The anthers are regularly elongate in form, linear or subulate, and basifixed on filaments of greater or lesser length. The pistil is usually simple, with filiform style and punctiform stigma, but to this there are rare exceptions. The Dilleniaceous type is distinguished by its numerous, generally free, stamens with long or short filaments, and sometimes several pistils free almost to the base. In the Solanum-Cassia type the stamens are few, generally five or ten, and the pistil is one, with filiform style and simple punctiform stigma. The Melastomataceous type is distinguished from the Solanum-Cassia type by the elongate filaments.

In the systematic groups to which these forms have been assigned by taxonomists, they are for the most part aberrant, having, for instance, a patent perianth, while the type of the family may be campanulate or tubular, and elongate, basifixed anthers, while the type form in the family may be a short, versatile anther. This deviation from the type of the group to which they systematically belong renders their structural peculiarities more conspicuous, and leads us to seek for an explanation of their form in some special internal or external factor.

The explanation of floral peculiarities is usually sought in the method of their pollination, since it has been very generally assumed that flowers are adaptations. The floral ecology of the forms under consideration is by no means thoroughly known, but data are sufficient to be highly suggestive.

Concerning the Dilleniaceous type, the smallest of the three, no general statement can be made. Some of the forms seem to be ornithophilous, some may be anemophilous, and still others appear to be adapted to bees.

There can be little doubt that the Solanum-Cassia type represents an adaptation to the larger pollen-collecting bees. The class is practically coextensive with Delpino's Borago type, but includes also zygomorphic forms, which he treats elsewhere. *Solanum* and *Cassia* have been conclusively shown to be dependent for pollination upon the larger Apidæ, as

*Bombus*, *Xylocopa*, *Ceratina*, *Euglossa*, *Centris*, and other genera. These collect only pollen, since nectar is wanting. Of forms other than *Solanum* and *Cassia* we know little. One species of *Dichorisandra* examined in the living condition seems to show no secretion of free nectar. Several members of the family are known to be adapted to pollen-collecting Apidæ, and it is probable that the apically dehiscent forms are too. Analogy leads us to the same conclusion for *Monochoria* of the Pontederiaceæ, and for representatives of the Liliaceæ, Amaryllidaceæ, Pittosphoraceæ, Tremandraceæ, Ochnaceæ, Dipterocarpaceæ, Myrsinaceæ, Loganiaceæ and Rubiaceæ, while for *Ouratea* of the Ochnaceæ, *Begonia* of the Begoniaceæ and *Exacum* of the Gentianaceæ we have observations which indicate the validity of such an assumption. In this place space cannot be devoted to the structural and ecological comparisons which evidence strongly in favor of regarding all these forms as adapted to pollination by the larger pollen-collecting bees.

Our direct knowledge of the ecology of members of the Melastomataceous type is not extensive, and some of the more detailed studies have been made on forms which are anomalous rather than typical. It may be stated with much confidence, however, that the type is primarily as truly adapted to the larger Apidæ as is the Solanum-Cassia type.

We may now turn our attention to the only phase of the problem to be especially considered here.

It is evident that if certain plants are closely dependent upon special groups of insects for their pollination they will be limited in their geographical range by the distribution of these insects. This is exactly the condition which we seem to have in the present case. As has just been suggested, these forms are apparently adapted to pollination by the Apidæ, and the Apidæ are represented in the faunas of the several main divisions of the earth's surface in very different numbers, and this seems to determine the proportionate representation of these apically dehiscent types. Our knowledge of the Apidæ and their geographical distribution is still very incomplete, but such data as we have indicate that the bees occur in much greater abundance in tropical and extra-tropical South America, the Indian and the Australian regions than in many other portions of the globe. Because of the incompleteness of our data concerning the insects, the geographical distribution of the plants will be taken up first.

The impression of the greater abundance of these apically dehiscent forms in certain of the major divisions of the earth's surface seemed to be established by a consideration of the distribution of the forms themselves. Thus, of the monocotyledonous genera of the Solanum-Cassia type, 11 of the 19 were found to be endemic in South America, while another has 8 of its 10 species there. Of the Dicotyledons, 11 of the 40 genera are endemic in South America, and 7 others occur there, in five of the cases represented by the most of their species. Thus 57.8 per cent. of the monocotyledonous genera are endemic in South America, and 63.1 per cent. occur there, while of the dicotyledonous genera 27.5 per cent. are endemic and 45 per cent. occur there. Altogether 30 of the 59 genera, or 50.5 per cent., occur in South America. This type is also strongly represented in the Indian and Australian region, while elsewhere it occurs but sparingly.

The Dilleniaceous type shows a very similar distribution, but is found most abundantly in the Indian instead of the tropical American region. The Melastomataceous type is almost exclusively South American and Indian.

These facts certainly seem to indicate the greater abundance of these floral forms in the South American, Indian and Australian regions. It early became evident, however, that the problem of the geographical distribution of these forms is one very difficult of approach. The apically dehiscent types clearly showed a more or less localized distribution, but it was also seen that in the region where the apically dehiscent genera are most abundant the flora as a whole also appears richer, and it became clear that any valid conclusions concerning distribution must be based on statistical comparisons, not merely of the apically dehiscent forms, but of all genera as well. It seemed most advisable to make the comparison by genera, and to take the data for the purpose from Engler and Prantl's Die Natürlichen Pflanzenfamilien.

The earth was divided into fourteen floristic regions patterned after those of Drude, but of necessity limited more arbitrarily, as follows:

I. Tropical Regions.

1. Tropical African Region.
2. East African Island Region.
3. Indian Region.
4. Tropical American Region.

II. Austral Regions.
5. South African Region.
6. Australian Region.
7. Austral American Region.
8. New Zealand Region.
9. Antarctic Region.

III. Boreal Regions.
10. Mediterranean-Oriental Region.
11 Central Asian Region.
12. East Asian Region.
13. Central North American Region.
14. Northern Region.

The distribution of the 8,541 genera of flowering plants, both in actual numbers and in per cents. of the total number of plants, is represented in Table A.

TABLE A.
All Genera of Flowering Plants.

| Region. | Endemic. | Others. | Total. |
|---|---|---|---|
| 1 | 542 = 6.34% | 1116 | 1658 = 19.41% |
| 2 | 259 = 3.03% | 579 | 838 = 9.81% |
| 3 | 1126 = 13.18% | 1344 | 2470 = 28.91% |
| 4 | 1968 = 23.04% | 1160 | 3128 = 36.62% |
| 5 | 394 = 4.61% | 468 | 862 = 10.09% |
| 6 | 444 = 5.19% | 712 | 1156 = 13.53% |
| 7 | 175 = 2.04% | 506 | 681 = 7.97% |
| 8 | 23 = .27% | 187 | 210 = 2.45% |
| 9 | 4 = .04% | 21 | 25 = .29% |
| 10 | 455 = 5.32% | 819 | 1274 = 14.91% |
| 11 | 68 = .79% | 549 | 617 = 7.22% |
| 12 | 171 = 2.00% | 846 | 1017 = 11.90% |
| 13 | 335 = 3.92% | 871 | 1206 = 14.12% |
| 14 | 73 = .85% | 654 | 727 = 8.51% |

An examination of the figures presented in this table reveals the fact that 6,037 occur in only a single one of the fourteen regions, while the other 2,504 are of more general distribution. Of the 6,037 endemic genera 3,713, or 61.4 per cent. of the endemic forms are found only in the Tropical American, Indian, Australian or extra-tropical South American regions. Expressing the relationship somewhat differently, we find that the 3,713 found exclusively in regions 3, 4, 6 or 7 are 43.4 per cent. of the total 8,541 genera of flowering plants. In the Indian region occur exclusively 13.1 per cent. of all genera of flowering plants, in the tropical American region 23 per cent., in the Australian region 5.1 per cent., and in the extra-tropical South American region 2 per cent. Altogether about 70 per cent. of all genera of flowering plants occur exclusively in one or the other of the fourteen regions recognized—an average of 5 per cent. per region. The average for the four regions, 3, 4, 6 and 7, which particularly interest us in the present problem, is 10.8, while for the other ten regions it is 2.6 per cent. Turning now to the total number of genera of plants occurring in these several regions, we find that in the Indian region occur 28.9 per cent. of all genera, in the Tropical American region 36.6 per cent., in the Australian region 13.5 per cent., and in the extra-tropical South American region 7.9 per cent. The average for these four regions is 21.7 per cent., while for the other ten regions it is 9.8 per cent.

It is clear that in the regions which have been indicated as those in which apically dehiscent genera are most abundant, the whole flora is also much richer, both as a whole and in endemic forms. This renders necessary the greatest care in comparison.

The Solanum-Cassia type seems to be the one best adapted for a first examination of the hypothesis of specialized distribution; in numbers it is next to the largest type, it is the one of the widest geographical range, and it is made up of representatives from several widely-separated families, so that its uniformity of structure and localized distribution cannot so readily be accounted for on the supposition of community of descent. The distribution of the genera is shown in table B.

TABLE B.

Genera of the Solanum-Cassia Type. Distribution.

| Region. | Endemic. | Others. | Total. |
|---|---|---|---|
| 1 | 2 = 3.38% | 8 | 10 = 16.94% |
| 2 | 1 = 1.69% | 7 | 8 = 13.55% |
| 3 | 7 = 11.86% | 9 | 16 = 27.11% |
| 4 | 17 = 28.81% | 9 | 26 = 44.06% |
| 5 | 2 = 3.38% | 3 | 5 = 8.47% |
| 6 | 12 = 20.33% | 6 | 18 = 30.50% |
| 7 | 4 = 6.77% | 4 | 8 = 13.55% |
| 8 | ..... | 2 | 2 = 3.38% |
| 9 | ..... | .. | ..... ..... |
| 10 | ..... | 2 | 2 = 3.38% |
| 11 | ..... | 2 | 2 = 3.38% |
| 12 | 1 = 1.69% | 4 | 5 = 8.47% |
| 13 | ..... ..... | 4 | 4 = 6.77% |
| 14 | ..... | 1 | 1 = 1.69% |

We find that the Indian region has 11.8 per cent., the South American 28.8 per cent., the Australian region 20 3 per cent., and the extra-tropical South American region 6.7 per cent. of the members of this type confined exclusively to their limits. The average for these four regions is 16.9 per cent., while the average for the other ten regions is .9 per cent., six of the regions having no endemic representatives of this type at all. Considering all representatives of the Solanum-Cassia type occurring in the several regions, whether endemic there or not, we find that the Indian region contains representatives of 27.1 per cent. of the 59 genera, the tropical South American region 44 per cent., the Australian region 30.5 per cent., and the extra-tropical South American 13.5 per cent. The average for

the four regions is 28.8 per cent., while for the other ten regions, all but one of which contain at least one genus of this class, average 6.5 per cent. These numbers are easily compared with those for all plants. It will be observed that while the average per cent. of endemic apically dehiscent genera is 16.9 for the four regions, and .9 for the ten others, for all endemic genera the average is 10.8 and 2.6 per cent. respectively. Thus, in regions 3, 4, 6 and 7 the relative abundance of the Solanum-Cassia type may be expressed as +5.6 and for the other ten as —1.7. Comparing the relative abundance of all genera occurring, we find that for the four regions it may be represented by +4.5, while for the other ten regions it is —3.3. While the Solanum-Cassia type is abundantly represented in the Indian region, the per cent. of endemic forms and all forms of this type occurring there is something more than one less than the per cents of all the genera of flowering plants which are found in the flora. Next to the tropical American region the flora of the Indian region is the richest of the fourteen regions recognized, and the abundance of the Solanum-Cassia type there seems to be due rather to the richness of the whole flora than to any special conditions favouring its development. Considering only the three regions, 4, 6 and 7, we find that the average per cent. of genera of the Solanum-Cassia type endemic is 18.6, while for the other eleven regions it is 1.9. For all genera of the Solanum-Cassia type occurring, the three regions average 29.3 per cent.. while the other eleven regions average 8.4 per cent. Comparing these figures with those obtained for all genera of plants, we find that in the tropical American, Australian and extra-tropical South-American regions the per cent. of apically dehiscent genera endemic in the several regions is 8.3 more than that for all genera, while in the other eleven regions it is 1.7 less, and for all apically dehiscent genera of the Solanum-Cassia type occurring the per cent. for the three regions averages 10 more than that of all forms, while for the other regions it averages 3.1 less.

The present work is essentially a comparison of the distribution of floral structures, but these floral structures are thought to be adaptations to a factor in the environment, which so differs in potency in the several regions under consideration as to bring about a difference in the frequency of occurrence of these floral types.

In a problem of biogeography which involves taxonomic, morphological and ecological considerations,it is difficult to decide just what shall be the basis for comparison. The characteristics of genera probably furnish most satisfactorily the morphological units which we seek, but ecologically the importance of the genus in the flora may be vastly increased by specific differentiation.

Without attempting any comparison with the number of species of the whole flora, we may examine the distribution of the species of the Solanum-Cassia type. The differentiation of Solanum and Cassia in tropical South America first called attention to the distributional phase of

the problem in hand, and since the species of these genera are so numerous as to obscure any contradictory evidence afforded by other genera, the distribution by percents of the 970 species of *Solanum*, the 412 of *Cassia* and the 445 of all other genera may be indicated separately as in the accompanying table C.

TABLE C.

Species of Solanum and Cassia compared with others of same type.

| Region. | Solanum. | Cassia. | Others. |
|---|---|---|---|
| 1 | 5.98% | 6.55% | 22 = 4.94% |
| 2 | 1.34% | 2.43% | 19 = 4.26% |
| 3 | 7.22% | 8.49% | 59 = 13.25% |
| 4 | 64.85% | 70.39% | 223 = 50.11% |
| 5 | 2.68% | .73% | 8 = 1.79% |
| 6 | 5.36% | 8.01% | 101 = 22.69% |
| 7 | 7.53% | 4.13% | 12 = 2.69% |
| 8 | .10% | ..... | 1 = .22% |
| 9 | ..... | ..... | ..... |
| 10 | 2.66% | 3.39% | ..... |
| 11 | ..... | .31% | 1 = .22% |
| 12 | .82% | .49% | 3 = .67% |
| 13 | 1.44% | 2.67% | 4 = .89% |
| 14 | .52% | ..... | ..... |

It is evident from these figures that *Solanum* and *Cassia* have a very similar distribution, with which the species of the 47 other genera of this type are also in close agreement.

Summarizing the data presented in this table, it is found that tropical America has 62.5 per cent. of all the 1,827 species of the Solanum-Cassia type, the Indian region 8.9 per cent, the Australian region 10.1 per cent., and the extra-tropical South American region 5.4 per cent. The average for the remaining ten regions is 1.5 per cent.

(To be continued.)

# A SKELETON OF A NEW ARRANGEMENT OF THE FAMILIES, SUBFAMILIES, TRIBES AND GENERA OF THE ANTS, OR THE SUPERFAMILY FORMICOIDEA.

BY WILLIAM H. ASHMEAD, M. A., D. SC.

Of the *ten* superfamilies recognized in my classification of the Hymenoptera, all have been classified down to genera except the Ants, or superfamily IV, Formicoidea, a very large and most difficult complex, and rendered even more difficult by the extraordinary number and diversity of the sexes, there being sometimes several different forms to a single species.

It has now been several years since I began working on this great complex to bring it in harmony with the other superfamilies classified, and my labours are nearly completed, as I only await the arrival of certain exotic genera to perfect some of the generic tables. The work fills several hundred pages of manuscript, and will make a large volume in itself, too large to be published in any entomological journal or magazine, and as the completed work cannot be published before next year, I desire to put on record a skeletonized epitome of the arrangement, selecting for that purpose the CANADIAN ENTOMOLOGIST, in which the classification of other of the superfamilies were published.

It will be noticed that I recognize as valid genera nearly all of the subgenera of Mayr, Forel and Emery, and that I restore the genera *Monacis*, Roger, and *Hypoclinea*, Mayr, suppressed by Emery and Forel as synonyms of *Dolichoderus*, Lund. All three are good genera. *Dolichoderus*, Lund, is not found in the United States, and our species so-called belong to *Hypoclinea*, Mayr. *Monacis*, Roger, I know only from Mexico.

Superfamily IV.—FORMICOIDEA.

Family XLIII.—*Dorylidæ*.

Subfamily I.—Ecitoninæ.

Tribe I.—Ecitonini. Genera: Eciton, Latr.; Acamatus, Emery; and Mayromyrmex, Ashm., n. g. (Type *Labidus Fargeaui*, Shuck., So. Am.); also *L. morosus*, Smith, Mex.

Tribe II.—Ænictini. Genera: Ænictus, Shuck., and Ooceraea, Roger.

Subfamily II.—Dorylinæ.

Tribe I.—Ænictogitonini. Genus Ænictogiton, Emery.

Tribe II.—Dorylini. Genera: Alaopone, Emery; Rhogmus, Shuck.; Dichthadia, Gerst.; Typhlapone, Westw.; Dorylus, Fabr.; ? Sphinctomyrmex, Mayr; Shuckardia, Emery; Probolomyrmex, Mayr; Cheliomyrmex, Mayr.

November, 1905.

Subfamily III.—Acanthostichinæ.

Genera: Acanthostichus, Mayr, and Ctenopyga, Ashm., new genus; type C. Townsendi, Ashm., from Mexico.

Family XLIV.—*Poneridæ.*

Subfamily I.—Ponerinæ.

Tribe I.—Onychomyrmicini. Genus Onychomyrmex, Emery.

Tribe II.—Ceropachyini. Genera: Phyracaces, Emery; Cerapachys, Smith; Parasycia, Emery; Sycia, Roger; Cystias, Emery.

Tribe III.—Proceratiini. Genera: Discothyrea, Roger; Sysphincta, Roger; Proceratium, Roger; Prionopelta, Mayr.

Tribe IV.—Ponerini. Genera: Centromyrmex, Mayr; Trapeziopelta, Mayr; Myopias, Mayr; Cryptopone, Emery; Rhopalopone, Emery; and Ponera, Latr.

Tribe V.—Leptogenyini. Genera: Prionogenys, Emery; Leptogenys, Roger; Lobopelta, Mayr; and Simopone, Forel.

Subfamiiy II.—Pachycondylinæ.

Tribe I.—Lioponerini. Genus Lioponera, Mayr.

Tribe II.—Amblyoponini. Genera: Myopopone, Roger; Mystrium, Roger; Emeryella, Forel; Stigmatomma, Roger; Amblyopone, Erichson.

Tribe III.—Cylindromyrmicini. Genera: Cylindromyrmex, Mayr, and Thaumatomyrmex, Mayr.

Tribe IV.—Pachycondylini. Genera: Psalidomyrmex, André; Plectroctena, Smith; Odontoponera, Mayr; Diacamma, Mayr; Bothroponera, Mayr; Ectomomyrmex, Mayr; ? Heteroponera, Mayr; Belonopelta, Mayr; Pseudoponera, Emery; Pergandea, Ashm., n. g. (So. Am.); Brachyponera, Emery; Mesoponera, Emery; Pachycondyla, Smith; Neoponera, Emery; Ophthalmoponera, Mayr; and Titusia, Ashm., n. g. (So. Am.).

Tribe V.—Ectatommini. Genera: Platythyrea, Mayr; Alfaria, Emery; (? = Mictoponera, Forel); Stictoponera, Mayr; Ectatomma, Smith; Gnamptogenys, Roger; Acanthoponera, Mayr; Paraponera, Smith; Holcoponera, Mayr; Rhytidoponera, Mayr; Chalcoponera, Emery; Streblognathus, Mayr; Dinoponera, Roger; Paltothyreus, Mayr; and Megaponera, Mayr.

Tribe VI.—Drepanognathini. Genus Drepanognathus, Smith.

Subfamily III.—Myrmeciinæ.

Genus Myrmecia Fabricius.

Family XLV.—*Odontomachidæ.*

Genera: Odontomachus, Latr.; Champomyrmex, Emery; Anochetus, Mayr; and Stenomyrmex, Mayr.

Family XLVI.—*Myrmicidæ.*

Subfamily I.—Pseudomyrminæ.

Genera: Sima, Roger, and Pseudomyrma, Lund.

Subfamily II.—Myrmicinæ.

Tribe I.—Myrmicini. Genera: Acanthonyrmex, Emery; Pogonomyrmex, Mayr; Cratomyrmex, Emery; Janetia, Forel; Ephebomyrmex, Wheeler; Myrmica, Latreille; Megalomyrmex, Forel; Holcomyrmex, Mayr; Ischnomyrmex, Mayr; Xiphomyrmex, Mayr; Messor, Forel; Goniomyrmex, Emery; Pheidole, Westw.; Dichothorax, Emery; Hypopheidole, Ashm., n. g.; Trigonogaster, Forel; Oxyopomyrmex, André; Lophomyrmex, Emery; and Pristomyrmex, Mayr.

Tribe II.—Tetramoriini. Genera: Triglyphothrix, Forel; Rogeria, Emery; Eutetramorium, Emery; Tetramorium, Mayr; Strongylognathus, Mayr; Dacryon, Forel; Monomorium, Mayr; and Ochetomyrmex, Mayr.

Tribe III.—Cremactogasterini. Genera: Cremastogaster, Lund, and Oxygyne, Forel.

Tribe IV.—Solenopsidini. Genera: Pheidologeton, Smith; Solenopsis, Westwood; and Æromyrmex, Forel.

Tribe V.—Myrmecariini. Genera: Carebara, Westwood, and Myrmecaria, Saunders.

Tribe VI.—Melissotarsini. Genus Melissotarsus, Emery.

Tribe VII.—Myrmecinini. Genera: Myrmecina, Curtis, and Podomyrma, Smith.

Tribe VIII.—Stenammini. Genera: Atoponyrmex, André; Cardiocondyla, Emery; Epœcus, Emery; Adelomyrmex, Emery; Phacota, Roger; Erebomyrmex, Wheeler; Diplomorium, Mayr; Allomerus, Mayr; Oligomyrmex, Mayr; Macromischa, Roger; Rhoptromyrmex, Mayr; Tranopelta, Mayr; Vollenchovia, Mayr; Xenomyrmex, Mayr; Harpagoxenus, Forel (= Tomognathus, Mayr); Symmyrmica, Wheeler; Formicoxenus, Mayr; Stereomyrmex, Mayr; Stenamma, Westw.; Leptothorox, Mayr; Wasmannia, Forel; ? Liomyrmex, Mayr; Leptanilla, Emery; Epipheidole, Wheeler; Sympheidole, Wheeler; and Huberia, Forel.

Family XLVII.—*Cryptoceridæ.*

Subfamily I.—Attinæ.

Genera: Atta, Fabr.; Acromyrmex, Mayr; Trachymyrmex, Mayr; Sericomyrmex, Mayr; Myrmicocryptus, Smith (= Glyptemyrmex, Forel); and Apterostigma, Mayr.

Subfamily II.—Dacetonini.

Genera: Daceton, Perty; Acanthognathus, Mayr; Mycocepurus, Forel; Orectognathus, Smith; Epitritus, Emery; Strumigenys, Smith; Epopostrum, Forel; Rhopalothrix, Mayr; Cyphomyrmex, Mayr; and Ceratobasis, Smith.

Subfamily III.—Cryptocerinæ.

Genera: Procryptocerus, Emery; Cryptocerus, Latr.; and Zacryptocerus, Ashm., n. g. (type Cryptocerus multistrigus, Sm.)

Subfamily IV.—Cataulacinæ.

Genera: Otomyrmex, Forel; Cataulacus, Smith; Calyptomyrmex, Emery; and Meranoplus, Smith.

Family XLVIII.—*Dolichoderidæ.*

Genera: Monacis, Roger; Hypoclinea, Roger; Aneuretus, Emery; Dolichoderus, Lund; Leptomyrmex, Mayr; Turneria, Forel; Bothriomyrmex, Mayr; Forelius, Emery; Tapinomma, Forster; Dorymyrmex, Mayr; Iridomyrmex, Mayr; Liometopum, Mayr; Linepithema, Mayr; and Azteca, Forel.

Family XLIX.—*Formicidæ.*

Subfamily I.—Gesomyrmicinæ.

Tribe I.—Myrmoteratini. Genus Myrmoteras, Forel.

Tribe II.—Gigantiopini. Genus Gigantiops, Roger.

Tribe III.—Gesomyrmicini. Genera: Gesomyrmex, Mayr, and Dimorphomyrmex, André.

Subfamily II.—Camponotinæ.

Tribe I.—Œcophyllini. Genus Œcophylla, Smith.

Tribe II.—Polyrhachidini. Genera: Echinopla, Smith; Hemioptica, Roger; and Polyrhachis, Smith.

Tribe III.—Camponotini. Genera: Opisthopsis, Emery; Tanæmyrmex, Ashm., n. g. (type Formica longipes, Gerst.); Mayria, Forel; Calobopsis, Mayr; Camponotus, Mayr; Dinomyrmex, Ashm., n. g. (type Formica gigas, Latr.); Rhinomyrmex, Forel; Orthonotus, Ashm., n. g. (type Formica sericea, Fabr.); Calomyrmex, Emery; and Dendromyrmex, Emery.

Subfamily III.—Formicinæ.

Tribe I.—Plagiolepidini. Genera: Notoncus, Emery; Prenolepis, Mayr; ? Mesoxena, Smith; Acantholepis, Mayr; Acropyga, Roger; Plagrolepis, Mayr; Myrmelachista, Roger; Brachymyrmex, Mayr; Aphomyrmex, Emery.

Tribe II.—Lasiini. Genera: Proformica, Ruszky; Melophorus, Lubbock; Lasius, Fabricius; and Acanthomyrmex, Mayr.

Tribe III.—Formicini. Genera: Myrmecocystus, Wesmael; Formica, Linné; and Polyergus, Latreille.

## MOSQUITO NOTES—No. 4.

BY C. S. LUDLOW, M. SC.,
Laboratory of the Office of the Surgeon-General, U. S. A., Washington, D. C.

Among the mosquitoes lately sent from the various Army Stations are the following, of interest mostly because of their apparent close relation to already known forms :

*Uranotænia cæruleocephala*, Theob., var. *lateralis*, n. var.—♀. Head covered with flat blue scales, becoming white around the eyes, a couple of brown bristles between, and a few around, the eyes, no fork scales; the scales on the occiput change from a dark indigo or violet to a light blue, according to the direction of the light, and when viewed from the side may even seem brown with a wide white border around the eyes, but in other positions are some shade of blue ; antennæ brown, verticels and pubescence brown, basal joint light testaceous, with a few thin flat scales; palpi also light brown, very short, hardly longer than the depth of the clypeus, the last joint reduced to a knob ; proboscis dark brown, swollen at the tip ; clypeus testaceous ; eyes brown and silver.

Thorax brown, prothoracic lobes covered with flat scales, which change from white to bright blue ; mesothorax covered with long slender brown scales, slightly if at all curved, suggesting lateral wing scales in their general appearance, a median row of long brown bristles, and clusters of them near the wing joint and scutellum, a small bunch of flat changeable (bright blue to white) scales just cephalad of the wing joint; scutellum brown, covered with brown flat scales, with green iridescence, and a few border bristles ; pleura brown, with one large bunch of flat changeable (bright blue to white) scales on the mesopleura ; metanotum brown.

Abdomen brown, heavily covered with brown flat scales, with green iridescence, unbanded, but with well marked lateral, apical white spots on each segment ; venter almost entirely light scaled.

Legs : coxæ and trochanters light, and white scaled, femora all light ventrally, but brown dorsally, the tibiæ much darker, and the remainder of the legs brown ; ungues very small, simple and equal.

Wings brown, covered with brown scales, the median broad, rather short, and often truncate, the lateral broadly lanceolate, and much longer than the median ; 1st submarginal cell much (¼) shorter and somewhat narrower than the 2nd posterior, the stem nearly three times as long as the cell, and a third longer than that of the 2nd posterior ; posterior cross-

vein is about the same length as the mid cross-vein, and distant about its own length; halteres white, a few dark scales on the knob.

Length 2.5 mm. Taken June 25, 1905. Habitat, Cottabatto, Mindanao, P. I.

Described from four females sent by Lieut. E. B. Vedder, Asst. Surgeon, U. S. A. The distinctive variation lies in the well-marked lateral spots, and if it should happen that Theobald described from rubbed specimens, that variation may disappear.

*Culex Portoricensis*, n. sp.—♀. Head dark, with a narrow median line of ochraceous curved scales, light forked scales upon the occiput, and reaching well up toward the vertex; the median curved scales followed by light flat scales and a narrow stripe of dark flat scales on the side; antennæ dark brown, verticels and pubescence brown, basal joint brown, with a few flat lighter brown scales; palpi dark brown, a few white scales at the tips; proboscis very long, dark brown, with a minute white band, at times merely a trace, near the middle; clypeus dark brown; eyes brown and garnet.

Thorax dark brown; prothoracic lobes with light spindle-shaped scales; mesonotum sparsely covered with small, slender curved golden brown scales on the sides, the median portion partly denuded, but some dark brown spindle-shaped scales remaining; scutellum dark, with light, slender curved scales; pleura dark brown, with numerous small patches of flat, white scales; metanotum dark brown.

Abdomen dark, covered with dark brown scales; very narrow basal white bands, and small basal white lateral spots; venter mostly white scaled.

Legs: coxæ and trochanters dark, with light scales; femora dark brown dorsally, almost white ventrally, more markedly so on the hind legs; tibiæ brown, as are all the remaining joints, but on the hind legs the metatarsi, the first, second, third and sometimes the fourth tarsal joints have minute basal white spots, not amounting to bands; on the mid legs the spots appear on the metatarsi, first and second tarsal joints, and on the fore legs there are minute yellowish spots at the tips of the tibiæ, and base and apex of the metatarsi, the remaining joints being brown. Fore and mid ungues uniserrate.

Wings brown, with brown scales; cells rather short; the first submarginal a little longer and narrower than the 2nd posterior cell, the stem of each about two-thirds as long as the cells, the bases nearly in a line; the cross veins are all nearly the same length, mid and supernumerary meet, and the posterior cross-vein is distant about its own length from the mid; halteres have light stem and fuscous knob.

The male greatly resembles the female; the palpi are long, with golden brown plumes, and four narrow white bands; fore and mid ungues biserrate.

Length 3.5–4 mm. Taken Aug. 15, 1905. Habitat, San Juan, Porto Rico.

Described from several specimens sent by Dr. L. G. de Queveda, Cont. Surg. U. S. A., which were taken at the Quarantine Station, Yellow Fever Hospital and Quarters; it at first glance suggests *C. tæniorhynchus* minus the hind legs, and probably lies near that, but is evidently distinct.

*Finlaya? nigra*, n. sp.—♀. Head black, densely covered with ochraceous, almost white, scales, broad spindle-shaped and forked scales on the occiput, extending up to the vertex, spindle-shaped scales around the eyes, flat scales on the sides, a few light bristles extending forward between the eyes, and dark ones around the eyes; antennæ very dark brown, almost black, apparently fourteen-jointed, verticels brown, pubescence white, a few scales on the first joint, basal joint testaceous, with fine light erect hairs, and a few small flat scales; proboscis very dark brown, with violaceous reflections; palpi very dark brown, not unusually heavily scaled, a few hairs at the tip; clypeus dark brown, eyes dark brown.

Thorax black; prothoracic lobes clothed with flat white scales; mesothorax with dark brown curved scales, except the sides and "shoulders," the former heavily covered with broad spindle-shaped white scales, the latter with white broad-ended flat scales, a line of broad curved white scales around the "bare space," some light bristles projecting forward at the nape, a short line of them near the "bare space," and a heavy bunch over the wing joint; scutellum partly denuded, but the basal row of scales is *curved*, the remainder flat. The scales on the mid lobe white, those on the lateral lobes a very dark brown, long light bristles, probably six, on the mid lobe; pleura very dark, with a few large patches of white flat scales; metanotum dark brown.

Abdomen dark, heavily scaled with dark brown flat scales (with violaceous reflections), and small white, basal, lateral spots, apical hairs

light; venter mostly white-scaled, but dark apical bands on some of the distal segments. There is some suggestion of tufts on the ventral side, but not well marked, and may be due to the position in which the specimen dried.

Legs: coxæ and trochanters light and sparsely light scaled; ventrally the femora are all light scaled, and in the hind legs are dorsally light scaled about one half (basal) their length, and are rather heavily bristled. The remainder of the legs is brown, with the exception of a rather brilliant knee spot on the hind legs, a smaller one on the mid legs, and in some lights a light line the length of the fore tibiæ on the caudal side; ungues rather large and heavy, equal and uniserrate.

Wings clear, brown veined, rather heavily scaled with dark, broad, truncated brown scales, suggesting typical *Tæniorhynchus* scales, and having violaceous reflections. Fork cells very long; 1st submarginal about a fifth longer and somewhat narrower than the 2nd posterior cell, stem not half the length of the cell, and the same length as that of the 2nd posterior; the supernumerary cross vein a little interior of the mid, and about the same length, the posterior nearly twice as long as the mid cross-vein, and more than double its own length interior; halteres light. The third vein extension is more marked than often found, but not so decided as in *Desvoidea fusca*, Theob.

Length 5.5 mm. Taken Aug. 3, 1905. Habitat, Rock Island Arsenal, Ill.

Described from one specimen sent by Dr. G. G. Craig, Cont. Surg. U. S. A., in some very interesting collections from Rock Island Arsenal. While the characteristics do not agree fully with Theobald's definition of *Finlaya*, they correspond more closely to those of this than to those of any other existing genus, and I have therefore referred it, provisionally at least, to *Finlaya*. The species is extremely interesting, because it is, so far as I can ascertain, the first having this peculiar grouping of scales to be reported from the United States.

Another instance of small variation occurs in the *Culex confirmatus*, Arribalzaga, sent me by Lieut. R. Boyd Miller, Asst. Surg. U. S. A., from Fort Screven, Tybee Island, Ga., which agrees perfectly with the description given by Theobald (Monograph, Vol. II, pg. 42), except that the femora are white nearly to the apex *dorsally* as well as ventrally, and *all* the ungues are uniserrate; the latter is, of course, the important variation.

(To be continued.)

# THE HEMIPTERA HETEROPTERA IN "AMERICAN INSECTS."

BY J. R. DE LA TORRE BUENO, NEW YORK.

When I saw Professor Vernon L. Kellogg's new "American Insects" advertised, I determined to possess a copy, which I thought would very naturally give a little more space than "Comstock's Manual" to the Heteroptera, and, being a much more recent publication, would be free, with regard to the Waterbugs, from the misstatements and errors of fact of its predecessors and therefore serviceable as a book of reference. Very fortunately (from my point of view), a friendly bookseller allowed me to examine the volume and in consequence I was able to spare myself a useless expense. To the Heteroptera, Professor Comstock devoted twenty-eight pages when he wrote in 1894; in spite of the great mass of publications since, Professor Kellogg devotes no more than twenty-three pages to the same families. The classification he employs is the same as in Comstock, although the far more scientific one of Schiödte was put forth in 1870 in English and has since been extensively adopted by Hemipterists of repute and by the authors of such general works as "The Cambridge Natural History, Insects" by Dr. Sharp, who is without doubt a competent entomologist. Moreover, in the Waterstriders, the obsolete and wrong Burmeisterian nomenclature is followed closely in the families and genera. We find there "*Family Hydrobatidæ*" instead of the correct "*Gerridæ*," and Genus "*Hygrotrechus*" in place of "*Gerris*." The familiar (and *wrong*) "*Limnobatidæ*" appears for "*Hydrometridæ*," and, of course, "*Limnobates*" for "*Hydrometra*." But I will say this: Professor Kellogg sins in good company in this respect. Of course, his arrangement of the families is frankly and avowedly conventional, and in the rather unsettled condition of the phylogenetic relations of the Heteroptera is less misleading than the average attempt to express them in a linear order.

Some few statements and figures call for correction. The entire name "*Limnobates lineata*" is obsolete since 1900, when it was definitely shown to be preoccupied specifically and wrong generically, in *The Entomologist* for that year. On page 198 of his book, Professor Kellogg states "... . this species is the only representative of the family found in this country." It might have been better to qualify this statement, since it is likely not only that some Mexican forms occur in the South-west, but also that new ones may be discovered on both our seaboards. I noted in

the CANADIAN ENTOMOLOGIST early this year the occurrence of Say's *Hydrometra australis* in Georgia and Florida. He also fails to mention its life-history, which was worked out by Martin in 1900 and confirmed by myself in 1904 (and again this year).

Referring to *Corixidæ* and *Notonectidæ*, he remarks on page 199: "The complete life-history of no member of either of these families is yet known, but it ought not to be a difficult matter for some patient observer to add this knowledge to entomological science. In this statement he echoes Dr. Howard in "The Insect Book." Nevertheless, Kirkcaldy, who is an expert entomologist, tried two years in succession to breed *Notonecta glauca*, and did not succeed; while I have had ova and two or three nymphal stages the last four summers, and have not been able to bring them beyond the second or third moult. What the condition is that stands in the way is as yet obscure. On the same page he states with reference to the *Naucoridæ*: "The life history of no member of this family is known." Had he consulted the Journal of the New York Entomological Society, Vol. XI., pp. 166 to 173, he would at once have eliminated this sentence. There is a fairly detailed life-history of *Pelocoris femorata* in those pages. His statement with regard to the *Belostomatidæ*, that "The two largest species of this family, both common in this country, are *Belostoma Americanum* and *Benacus griseus* . . . ," is misleading, for the reason that in Texas and Arizona, at least, *Amorgius* (*Belostoma*, Olim.) *annulipes* must occur and that in our South-eastern States we find *Amorgius Uhleri*, Montandon, which is very near in size and appearance to *A. Americanum*. The figure of "A Water Scorpion, *Ranatra fusca*" (fig. 275, p. 201), is, unfortunately, a nymph in the last instar and *not* an adult. *Ranatra* has never, to my knowledge, been found with aborted or rudimentary hemelytra in the adult. In addition, the anterior femora are too broad for *Ranatra fusca*, and the figure in all likelihood represents one of the undescribed Western forms in the U. S. National Museum collection.

"*Galgulus*" is employed on page 202, instead of the correct *Gelastocoris*, which was used by Champion in the Heteroptera part (Vol. II) of Biologia Centrali Americana, because it, unfortunately, has been preoccupied in *Aves* for 145 years. With regard to this family, Professor Kellogg says on this page, "A species of toad-bug, *Galgulus oculatus* (figs. 279 and 280), is common all over the country." His figures do not represent *oculatus*, which is very fairly delineated in its salient features by Professor Uhler in the "Standard Natural History." The

species figured in "American Insects" is too cleanly and clearly marked an insect, and is possibly *Gelastocoris variegatus* or one of the several undescribed Western and Southern forms I am acquainted with. These are the principal points worthy of comment in the section devoted to the Waterbugs, wherein my familiarity with the subject enables me to appreciate more keenly any slip.

The landbugs, with which my acquaintance is not very profound, are naturally much better treated, as those referred to are of economic importance and therefore much more studied. Here, however, I would call attention to a printer's error on page 214, where *Jalysus spinosus* is written "*Zalysus*" *spinosus*. The distinction between *Aradids* and the bedbug is thus brought out on page 208, "But all adult flatbugs have wings, while all the bedbugs are wingless." Unfortunately for the accuracy of this statement, *Aradus cinnamoneus*, which in colour and size very much resembles the uninvited midnight guest, is, at least in this vicinity, normally wingless in the adult.

It is to be regretted that a recent work in a field where great steps forward are being taken constantly, should have its generally high standard lowered by inaccuracies which might easily have been avoided. Why are not particular Orders or portions of Orders submitted to authorities in the groups of which they treat before the MS. goes to the printer? There is much room for disagreement in matters of opinion, but none in matters of proven fact. The book is typographically excellent, and the figures, at least in the Heteroptera, very finely drawn, engraved and printed. In this respect it is superior to its predecessors, and save for these corrections and notes, the text is very suitable for general students and very entertainingly written.

## A GALL ON BEARBERRY (ARCTOSTAPHYLOS).

BY T. D. A. COCKERELL, BOULDER, COLO.

In the case of any circumpolar plant, it is of much interest to learn whether the insects and fungi attacking it are the same in Europe, Asia and America. The Bearberry (*Arctostaphylos uva-ursi*) is already known to have a coccid (*Targionia Dearnessi*, Ckll.) infesting it, which is only known to occur in America. This *T. Dearnessi*, however, is not confined to the *Arctostaphylos*, for Professor L. Bruner sent me specimens which he collected Oct. 24, 1900, at Weeping Water, Nebraska, on *Ceanothus Americanus*.

At Ward, Colorado, July 19, 1905, at an altitude of about 9,000 feet, I found the *Arctostaphylos uva-ursi* badly infested by an aphid which produced bright red galls about 10 mm. long and 4 broad upon

the leaves. These resulted from the folding over of the edge of the leaf, or sometimes both edges, forming a pocket in which were many aphides; wingless forms, pupæ with wing-pads, and young. No such gall has ever been found in Europe or Asia, and it is highly probable that we have an endemic American form confined to the bearberry.

The wingless forms (♀) are broad pyriform, subtruncate behind, about 1,350 $\mu$ long and about 900 broad; appearing black, but really dark olivaceous, obscurely marked on the back with black; body, antennæ and legs very sparsely hairy; beak not reaching middle coxæ; cauda broadly rounded; antennæ 4-jointed, 3 and 4 annulate; 3 much the longest.

The pupæ are about 1,200 $\mu$ long, deep olive-green; beak not reaching middle coxæ; antennæ six-jointed, 3 much longest, then 6 (the last two-fifths of which is narrowed); 4 and 5 cylindrical, about equal, together hardly as long as 3; 2 about as broad as long, its sides bulging. Larvæ greenish-yellow.

This insect may be called *Pemphigus Coweni*, in remembrance of Mr. J. H. Cowen's work on Colorado Aphididæ.

Cowen (Hemiptera of Colorado, p. 125) reports an aphid, which he describes but does not name, in galls on bearberry. I supposed that it must be the same as mine, but his description mentions honey-tubes, which are absent in my insect. His statement that the antennæ of the pupa are 7-jointed may possibly be due to the custom of counting the last joint as two.

## CALIGRAPHA (CHRYSOMELA) PNIRSA.

It may be of interest to Coleopterists to know that the beautiful Chrysomelid, *Caligrapha pnirsa*, has been taken in considerable numbers at Rochester, Minnesota. One specimen was captured on May 30th, 1902, and another one seen, but not until the present year were more found. At the suggestion of Mr. Frederick Knab, of Urbana, Ill., who determined the species for me, I made careful search about basswood trees, and on May 30th, 1905, under the leaf-mould beneath these trees I unearthed a number of fine examples. A few weeks later others were taken as they were ascending basswood trunks about dusk, emerging from the ground apparently only under cover of darkness. I have been unable to find larvæ, nor has there been a trace of the species here since June.

If I have been correctly informed, this is the first authentic discovery of the species within the limits of the United States, although it is reported from several localities well north in Canada. It seems singular that a colony of a tree-inhabiting species so large and so well marked as *C. pnirsa* should be discovered here in the midst of a prairie country, unless, as may appear later, it exists in neighbouring States but has been overlooked.—CHAS. N. AINSLIE, Rochester, Minnesota

Mailed November 1st, 1905.