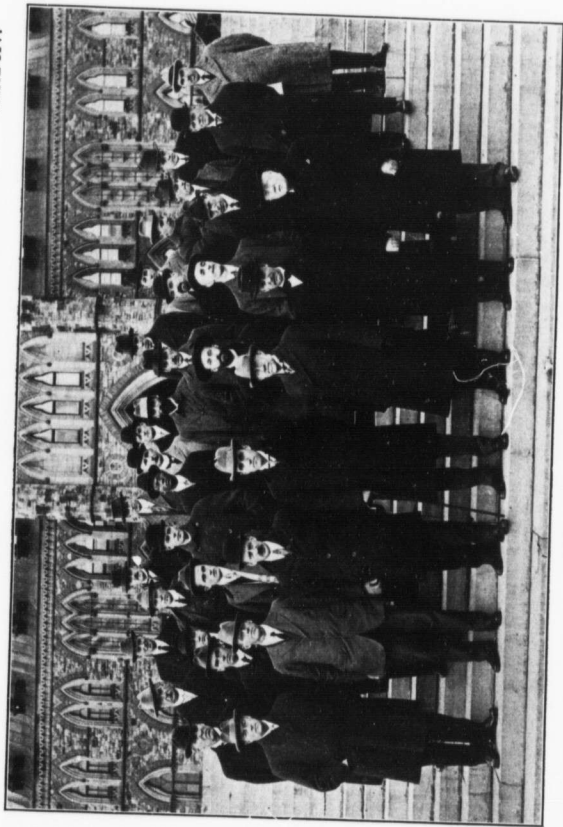


KEY TO PHOTOGRAPH OF ENTOMOLOGISTS ATTENDING THE
FIFTY-SECOND ANNUAL MEETING OF THE ENTO-
MOLOGICAL SOCIETY OF ONTARIO,
OTTAWA, NOVEMBER
4-5th, 1915.

1. G. E. Sanders, Annapolis Royal, N. S.
2. H. G. Crawford, Guelph, Ont.
3. H. G. Payne, Truro, N. S.
4. W. T. Macoun, Ottawa, Ont.
5. H. Glasgow, Geneva, N. Y.
6. N. Criddle, Treesbank, Man.
7. R. N. Chrystal, Vancouver, B. C.
8. C. E. Petch, Hemmingford, Que.
9. W. A. Ross, Vineland Station, Ont.
10. W. H. Brittain, Truro, N. S.
11. L. S. McLaine, Fredericton, N. B.
12. L. Caesar, Guelph, Ont.
13. J. D. Tothill, Fredericton, N. B.
14. F. W. L. Sladen, Ottawa, Ont.
15. E. H. Strickland, Lethbridge, Alta.
16. E. M. Du Porte, Macdonald College, Que.
17. J. M. Swaine, Ottawa, Ont.
18. R. C. Treherne, Agassiz, B. C.
19. T. Wilson, Vancouver, B. C.
20. W. Lochhead, Macdonald College, Que.
21. J. R. Gareau, Strathroy, Ont.
22. F. Letourneau, Oak, Que.
23. Rev. Father Leopold, Oka, Que.
24. A. Gibson, Ottawa, Ont.
25. A. W. Baker, Guelph, Ont.
26. J. C. Chapais, St. Denis en Bas, Que.
27. A. F. Burgess, Melrose Highlands, Mass.
28. H. T. Fernald, Amherst, Mass.
29. C. Gordon Hewitt, Ottawa, Ont.
30. A. F. Winn, Westmount, Que.
31. C. P. Lounsbury, Pretoria, South Africa.
32. T. Rankin, Macdonald College, Que.
33. F. J. A. Morris, Peterboro, Ont.



Entomologists attending the 52nd Annual Meeting of the Entomological Society of Ontario, Nov. 4-5, 1915

The Canadian Entomologist.

VOL. XLVII.

LONDON, DECEMBER, 1915

No. 12

FIFTY-SECOND ANNUAL MEETING OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

This was undoubtedly the most successful meeting of the Society that has ever taken place. It was held at Ottawa in the large laboratory of the Entomological Branch of the Department of Agriculture on Thursday and Friday, November 4 and 5, 1915, and the President, Dr. C. Gordon Hewitt, Dominion Entomologist, occupied the chair. Throughout the entire sessions the closest interest was evinced in the papers presented, most of which were of decided importance to farmers, horticulturists and others interested in agriculture and forestry. Valuable discussions followed the presentation of many of the papers. Entomologists from nearly every province in Canada were in attendance, as well as visitors from the United States. Among those who were present were Dr. H. T. Fernald, Amherst, Mass., who delivered the popular illustrated lecture on Thursday evening, November 4th, his subject being "Life Zones in Entomology and their Relation to Crops"; Mr. C. P. Lounsbury, Chief of the Division of Entomology of the Union Department of Agriculture, Pretoria, South Africa; Mr. A. F. Burgess, Melrose Highlands, Mass.; Rev. Thos. W. Fyles, Ottawa; Prof. W. Lochhead, and Mr. E. M. Du Porte, Macdonald College, Que.; Rev. Father Leopold, and Prof. F. Letourneau, La Trappe, Que.; Prof. L. Caesar, Provincial Entomologist of Ontario; Prof. E. J. Zavitz, Provincial Forester, and A. W. Baker, Ontario Agricultural College, Guelph, Ont.; A. F. Winn, Westmount, Que.; J. C. Chapais, St. Denis en Bas, Que.; H. G. Crawford, Wilton Grove, Ont.; F. J. A. Morris, Peterboro, Ont.; C. MacNamara, Arnprior, Ont.; Prof. W. H. Brittain, Provincial Entomologist of Nova Scotia, Truro, N. S.; Mr. H. G. Payne, Kentville, N. S.; Sir James Grant, Ottawa; Dr. F. T. Torrance, Veterinary-Director-General; Dr. F. T. Shutt, Dominion Chemist; W. T. Macoun, Dominion Horticulturist; Dr. C. H. Higgins, Pathologist; F. W. L. Sladen, Apiarist of Dominion Experimental Farms; R. H. Campbell,

Director of Forestry; H. T. Gussow, Dominion Botanist; W. Ide, Private Secretary to the Minister, Dept. of Agriculture; D. Johnson, Dominion Fruit Commissioner. The following members of the Entomological Branch were present: Dr. Hewitt; Arthur Gibson, Chief Assistant Entomologist; J. M. Swaine, Assistant Entomologist for Forest Insects. Field Officers: R. C. Treherne, Agassiz, B. C.; G. E. Sanders, Annapolis Royal, N. S.; E. H. Strickland, Lethbridge, Alta.; G. Beaulieu, Ottawa; J. D. Tothill and L. S. McLaine, Fredericton, N. B.; Norman Criddle, Treesbank, Man.; W. A. Ross, Vineland, Ont.; C. E. Petch, Hemmingford, Que.; R. N. Chrystal, Vancouver, B. C.; J. R. Gareau, Strathroy, Ont.; A. E. Kellett, Artist Assistant; J. I. Beaulne, Inspector.

The following papers were presented:

"Insects of the Season in Ontario."

"Willow and Poplar Curculio."

—L. CAESAR.

"Insects of St. Annes, Que., season of 1915."

"Occurrence of *Tychius picirostus* on clover at St. Anne's, Que."

—E. M. DU PORTE.

"The Home of *Gortyna stramentosa*."

—A. F. WINN.

"Observations upon some of the Predaceous and Parasitic Hymenoptera."

—REV. THOS. W. FYLES.

"The Leaf Weevil (*Polydrosus impressifrons* Gyll) in New York."

—P. J. PARROTT AND HUGH GLASGOW.

"Side Worm Injury by the Codling Moth."

—E. P. FELT.

"*Lygus invitus* and its Control in 1915."

—W. BRITAIN

"A Capsid Attacking Apples."

—H. G. CRAWFORD.

"The Founding of the Science of Cecidiology."

—A. COSENS.

- "The Army Cutworm in Southern Alberta."
—E. H. STRICKLAND.
- "Some Notes on Nose and other Bot Flies."
—W. LOCHHEAD.
- "Further Notes on the Warble Fly, *Hypoderma bovis*."
—S. HADWEN.
- "Forest Insect Investigations in Canada "
—J. M. SWAINE.
- "The Life History of *Chermes cooleyi* in Stanley Park, B. C."
R. N. CHRYSTAL.
- "The Cabbage Maggot (*Chortophila brassicae*) in British Columbia" (a) Natural Methods of Control; (b) Autumn development.
—R. C. TREHERNE.
- "Fresh Woods and Pastures New."
—F. J. A. MORRIS.
- "Some of the methods followed in Nova Scotia in Controlling the Brown-tail Moth."
—G. E. SANDERS.
- "Raising Brown-tail Moth Parasites at Melrose Laboratory for Distribution in Canada."
—L. S. McLAINE.
- "Locust Control Work with Poisoned Baits in Eastern Canada, 1915."
—ARTHUR GIBSON.
- "Apple Leaf Rollers In Ontario."
—L. CAESAR.

In addition to the above, brief addresses were given by Dr. Hewitt, by Mr. Charles MacNamara on the Habits of *Thalessa*, and by Mr. J. D. Tothill on the colonization of the parasites of the Gipsy and Brown-tail Moths in eastern Canada. All of the papers presented at the meeting, as well as a full account of the discussion, will be published early in 1916 as the Forty-sixth Annual Report of the Entomological Society of Ontario.

The following were elected officers of the Society for 1915-16:

PRESIDENT—A. F. Winn, Westmount, Que.

VICE-PRESIDENT—Prof. L. Caesar, Ontario Agricultural College, Guelph, Ont.

SECRETARY-TREASURER—Mr. A. W. Baker, B.S.A., Lecturer in Entomology, O. A. College, Guelph, Ont.

CURATOR—Mr. G. J. Spencer, B.S.A., Demonstrator in Entomology, O. A. College, Guelph.

LIBRARIAN—Rev. Prof. C. J. S. Bethune, M.A., D.C.L., F.R.S.C., Professor of Entomology and Zoology, O. A. College, Guelph, Ont.

DIRECTORS—Division No. 1, Mr. Arthur Gibson, Entomological Branch, Department of Agriculture, Ottawa; No. 2, Mr. C. E. Grant, Orillia; Division No. 3, Dr. A. Cosens, Parkdale Collegiate Institute, Toronto; Division No. 4, Mr. C. W. Nash, Provincial Biologist, East Toronto; Division No. 5, Mr. F. J. A. Morris, Peterboro; Division No. 6, Mr. J. W. Noble, Essex, Ont.; Division No. 7, Mr. W. A. Ross, Vineland Station, Ont.

On Friday evening, November 5th, a very enjoyable smoker was held. The Entomological Section of the Ottawa Field Naturalists' Club were the hosts, and brief speeches, reminiscent, anecdotal and felicitous, enlivened the proceedings.

A. G.

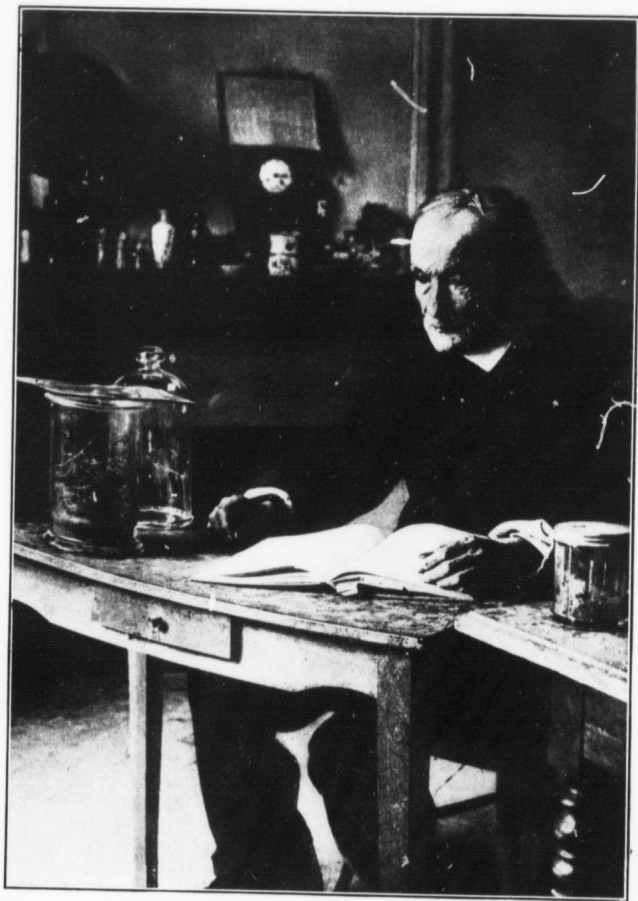
A NEW TABANUS

BY C. P. WHITNEY, MILFORD, N. H.

Tabanus wrighti, n. sp.

Female—Length 11 mm. Face, front and palpi black. Antennæ black, the slightest rufous tinge at base of third joint, which is narrow, the upper angle rounded and hardly raised. Frontal callus round, a short, tapering prolongation above.

Sub-callus denuded, shining (an uncertain character). A prominent ocelligerous tubercle. Eyes (revived) black, four narrow green bands, the interspaces twice as wide. Thorax shining black. Abdomen black, sparsely pilose, segments with narrow



JEAN HENRI FABRE.

In his room and seated at the table where he wrote his "Souvenirs Entomologiques."
(Illustration reproduced from "L'Illustration," to which paper grateful acknowledgments are made.)

posterior whitish bands. Second segment with a small dorso-lateral rufo-fulvous spot reaching posterior margin. Venter black, the whitish bands more distinct. Feet black. Wings dark fuliginous, fading at apex, hinder margin and root. First posterior cell widely open.

A paratype, slightly damaged, is a little larger and lacks the spots on second segment.

Taken in May, at West Palm Beach, Florida, by Dr. H. E. Wright, after whom the species is named.

JEAN-HENRI FABRE.

It is hard to believe as I write that Fabre is dead, for the great age to which he lived and the extraordinary character of the man had, as it were, dulled one's senses to the inexorable facts of life. The photograph before me of "that inimitable observer," as Darwin called him more than half a century ago, showing that keen old face wrinkled with years of the most intense and penetrating observation still intent on the movements of an insect, had instilled into one an idea of permanence. But on October 11th, at Orange, he finished a life of ninety-two years of hard and strenuous toil.

Born of humble parentage at Saint Léons, a little village in the Haute Rouergue, on December 22nd, 1823, he was destined to a life of poverty, through which he struggled with an indomitable perseverance, which was the outstanding characteristic of his entire life and the main cause of the imperishable fame that will be his. His early years were a perpetual struggle for education. Undeterred by disappointment, he laboured on as a teacher, now as a professor of mathematics and physics at Ajaccio in Corsica, where an acquaintance with that brilliant naturalist Moquin-Tandon was responsible for his determination to forswear mathematics for the study of living things, and later at Avignon, always careless of degrees and dignities. The chance discovery in 1854 of a volume of that famous entomologist, Léon Dufour, on the habits of a wasp, *Cerceris*, directed his steps into that path of patient entomological study from which, during the succeeding sixty years of incessant

labour, he never turned. In the following year there appeared in the *Annales des sciences naturelles* his memoir on *Cerceris*, which signalises the beginning of his entomological career. While at Avignon he met John Stuart Mill, whose love for botany furnished the basis of their remarkable friendship; incidentally he took his doctor's degree in Natural Sciences at Paris, and his discovery by Victor Drury, the Minister of Public Instruction, was responsible for his distinction as a Chevalier of the Legion of Honour. Little did these honours avail him, for during the twenty years during which he stayed at the University of Avignon his salary never changed from £64 per annum. Disappointed, but clinging more tenaciously than ever to his life's pursuit, he settled down near Orange, in the lower Rhone, and subsequently, "after forty years of desperate struggles," he found his Eden at Sérignan, a little village in Provence.

Here for the rest of his life he dwelt; his laboratory was a small tract of wild land "L'Harmas," a "living laboratory," where he studied "non l'insecte mort, macéré dans le trois-six, mais l'insecte vivant; un laboratoire ayant pour objet l'instinct, les moeurs, la manière de vivre, les travaux, les luttes, la propagation de ce petit monde, avec lequel l'agriculture et la philosophie doivent très serieusement compter."

The central feature of Fabre's work was that he studied the living insect and its behaviour, and in this fact lies the chief value of his contribution to entomological knowledge. Never since Réaumur has so wide a range of insects been studied so intensively as we find in the *Souvenirs entomologiques*; but while Réaumur described with the greatest precision the objects of his patient study, he did not enter into the lives of his insects and their instinctive behaviour to the extent that Fabre has accustomed us. And how different their respective lives: Fabre carrying on a perpetual struggle to raise a family in the face of poverty and Réaumur in ease and comfort. It is safe to say that no entomologist in the past has accomplished a work of so unique a character as that of Fabre, and it is unlikely that the future will hold another man who will equal his achievement. In 1878 he was able to assemble the results of about twenty-five years' labour in the form of the

first volume of the *Souvenirs*, and the ten volumes he has left us constitute his great contribution to our knowledge.

In an appreciation of this character it is impossible to refer individually to the two hundred and nineteen memoirs, as his chapters really are, in the *Souvenirs*, much less to select from the thousand and one inimitable word pictures he gives us, greatly as one is tempted to do so. As the years passed by, his literary style developed until it reached a beauty of description that cannot be excelled in any language, and to appreciate it fully one must go to the original memoirs, although the translations of the selected essays, which are gradually being published, will serve to bring his work to the attention of a wider audience than it has previously enjoyed.

Undoubtedly the outstanding feature of Fabre's work was his contribution to our knowledge of insect behaviour, as I have already stated. He was not content with mere observation, with anatomical or physiological studies, but searched deeply for the principles underlying the behaviour of the creatures with whom he lived hour by hour and day by day: endeavouring to obtain, as it were, the insect's point of view. He was constantly comparing insects with men, and this anthropocentric attitude, no doubt, was a source of danger. Nevertheless, the evidence he afforded as a result of his painstaking work of the "pervasive mentality and purposiveness," to use the words of a recent writer, is his main contribution to the interpretation of animal behaviour. His belief in instinct as a dominant and underivable factor fundamentally different from intelligence, his strong vitalistic conception of the organism, and his firm opposition to the ideas set forth by Darwin, with whom he corresponded and for whom he conceived a real affection, are leading characteristics of his work. Although he assailed the "vast and luminous balloon" of evolution, as he called it, his criticism lacked the constructive arguments one would have desired from a close observer, and his intense conviction of the fallacy of a mechanistic interpretation appears to have blinded him to the possibility of an alternative interpretation of facts consistent with the idea of evolution.

C. GORDON HEWITT.

POPULAR AND ECONOMIC ENTOMOLOGY.

THE CENTENARY OF KIRBY AND SPENCE'S

"An Introduction to Entomology."

BY F. J. A. MORRIS, PETERBOROUGH, ONT.

To fill the space, which has been kindly put at my service, may I remind our brother entomologists that the current year is the centenary of the first (and still the greatest) popular work in English on Insects? In 1815 was published the first volume of "AN INTRODUCTION TO ENTOMOLOGY," by William Kirby and William Spence.

It is no exaggeration to claim this work as effecting a revolution in Great Britain in the study of Natural History. As a science, Entomology had already had its foundations well and truly laid in the 17th century: in Europe, by masters like Malpighi, Swammerdam, Leeuwenhoek and Redi; in England, by Ray and Willughby. The bright examples of Reaumur and Linnaeus, Fabricius, Latreille and the Hubers, sufficed in the 18th century to keep the torch aflame, and reconcile a little band of devotees to labour unrewarded by public recognition, and often the butt of ridicule and obloquy. But no attempt was made, in English at least, to popularise the science.

The Rev. William Kirby, father of modern British Entomology, was a native of East Anglia. He began his work in Natural History as a botanist, and his name appears among the chartered members of the newly founded Linnean Society in 1788. He was at this time in his 30th year, but having one day found, in his rambles after plants, a very beautiful insect, he diverted his attention to this new branch of Natural History.

The first in the long list of his contributions to the Linnean Society is dated 1793; in 1802 appeared his important monograph on British Bees; in 1811 he established the Insect Order of *Strepsiptera*, which still holds good; and in 1812 (as a note in his commonplace book goes to show) he had identified what in his day was considered a bee-louse, the triungulin or young larva of the Oil-beetle.

December, 1915.

When 46, he met for the first time a young and enthusiastic collector of beetles, William Spence. The two became fast friends, and three years later was born the idea of a popular introduction to their favourite pursuit. This was in the year 1808, and it shows how great examples serve to

"inspire posterity,
Fathering their kind, from son to son;"

for it was in 1808 that news had come to them of the death of the great Fabricius.

The "Introduction" consists of a series of letters written in delightful style, the more remarkable that both authors were learned in every branch of the science and profoundly read. They brought to their task the ripe experience of years of active observation and collection, and during nearly 20 years of planning and publishing, they ransacked whole libraries of British and foreign literature.

The letters were originally in four volumes: Vol. I dealing largely with Injuries and Benefits due to Insects, but treating also such interesting topics as Metamorphoses, Care of Young, Food, and Homes; Vol. II chiefly taken up with Insect Societies, but including letters on Weapons, Movements, Emission of Sound and Light, Hibernation, and Instinct; Vols. III and IV were systematic and supplementary; these ceased to be reprinted after the sixth edition, and Vols. I and II came to constitute the now world-famed Introduction.

And what a transformation it effected! Just look before and after. A little over a century before, and the sanity of Lady Glanville had been hotly impugned by British lawyers and the great naturalist Ray dragged to court to testify that the lady, though indeed a collector of Lepidoptera, was not insane.

In the first decades of the 19th century ignorance was widespread and prejudice strong against entomology; but the "Introduction" changed all that, and in a preface to the sixth edition (1843) the authors (Kirby, now an octogenarian) could congratulate themselves on the removal of this public reproach. Moreover, a

number of other works now supplemented their popular Introduction.

In 1815 they had enlisted in their service the genius of a Government clerk, John Curtis, who drew and engraved five plates to illustrate their first two volumes. In 1824, when the "Introduction" was complete, he dedicated to William Kirby the first of his 16 immortal volumes of plates, illustrating British insects on their food plants; the letterpress is of no value now, but the coloured plates remain the *ne plus ultra* of artistic excellence. And the great systematist, J. O. Westwood, won the favour (his crowning ambition, he calls it) of having his magnificent "Introduction to the Classification of Insects" recognised as a sequel to Kirby and Spence; and so it became and is.

The authors of the "Introduction" claim as one of the advantages of their epistolary method that it lends itself to easy digressions. May I close my letter with a little aside in the shape of a personal incident? In 1904 I was visiting an uncle in Chislehurst (Kent, England), and, on the eve of my departure to Scotland on a botany trip, got word that an old family friend of my uncle's was coming to stay with him. I begged my uncle to ask his guest's advice in the choice of a good general treatise on Entomology. A week later I got a note saying that nothing in English had yet displaced Kirby and Spence's Introduction with J. O. Westwood's two volumes on Classification as a sequel. I still treasure the note with its signature—Avebury; for my uncle's friend was none other than the famous author of "Bees, Ants and Wasps," the late Sir John Lubbock.

AESHNA UMBROSA UMBROSA WALK. IN NEWFOUNDLAND.

In the 45th Annual Report Ent. Soc. of Ont., 1914, p. 149, I recorded the finding of the nymph of this dragonfly at Spruce Brook, Newfoundland, on July 27, 1914. Recently I received two male adults from Humbermouth, Bay of Islands, Nfd., taken on August 11, 1915, by Dr. A. G. Huntsman, of the Biological Dept., University of Toronto. They were captured while flying in the vicinity of a small creek flowing partly through dense spruce woods and partly through a natural meadow. These specimens resemble some which I have from Anticosti, being somewhat stouter and a little smaller than usual, this being a general characteristic of the species of *Aeshna* from Newfoundland and other localities having a cool summer climate.—E. M. WALKER.

NOTES ON STAUROPHLEBIA RETICULATA BURM.

BY E. M. WALKER, TORONTO.

Mr. E. B. Williamson, of Bluffton, Ind., recently placed in my hands for study a series of the large Aeshnine dragonfly, *Staurophlebia reticulata* Burm., taken by himself, his father (the late Mr. L. A. Williamson) and Mr. B. J. Rainey in four localities, viz., Los Amates, Guatemala; Baracon, Chaquamas, Trinidad; Rockstone, British Guiana, and Tumatumari, British Guiana.

On handing over the series to me, Mr. Williamson called my attention to the marked difference in coloration between the British Guiana specimens and those from the other localities, and stated that this difference was much more conspicuous in the living insects, being readily recognizable during flight. It seemed, therefore, desirable to make a careful study of the material in order to determine, if possible, the systematic status of the two colour-forms.

While pursuing this object, I have also taken the opportunity of studying the mutual adaptation between the peculiarly specialized structure of the male abdominal appendages and the correlated parts of the head and prothorax of the female, which are held by these appendages during copulation; especially in view of Mr. Williamson's observations on the habits of this species during the copulatory act (*vide inf.*)

Coloration.

On the envelope containing one of the males from Rockstone, British Guiana, is the following field-note: "Thorax and head bright grass green, segments 1 and 2 similar, shading into yellowish; 3-9 golden-brown, clearest on each segment anterior to transverse carina; posterior to transverse carina shaded into brown; 10 largely yellow."

With one of the Trinidad specimens is the following note:—

"Colours like British Guiana specimens, but abdomen distinctly bluish-green, very different from British Guiana specimens, so much so that colours in flight are very different."

The Guatemala specimen bears the following note:—

"Eyes bright green, face greenish-blue, thorax dull green, abdomen after transverse carina on 3 dull blue."

The colour-characters of the males as seen in the dried specimens may be tabulated as follows:—

BRITISH GUIANA	TRINIDAD	GUATEMALA
Face grass green.	Face grey-bluish green.	Face grayish olivaceous.
T-spot, with distinct narrow stem.	T-spot with distinct narrow stem.	T-spot reduced to a narrow streak along frontal margin, no stem.
A dark brown line on fronto-nasal suture and base of labrum.	A dark brown line on fronto-nasal suture, sometimes faint and base of labrum.	Such lines not distinctly present.
Thorax grass-green, a chocolate streak in front of antearial sinus and extending along base of mid-dorsal carina.	Thorax of a darker and colder or more bluish-green with similar markings.	Thorax dark reddish-brown, with a dull greenish bloom (dull green in life), scarcely darkened in front of antearial sinus and base of median carina.
Green colour of thorax extending on abdomen not beyond sides of seg. 1, shading into ochre yellow on 2 and base of 3, posterior to which abdomen is orange-brown, darker on each segment behind transverse carina (golden-brown in life).	Green colour of thorax extending on abdomen to transverse carina on 2, distal part of 2 and 3 front of transverse carina reddish-brown, shading into dark-greenish brown on the remaining segments (bluish-green in life).	Abd. segs. 1 and 2 apparently concolorous with thorax. Seg. 3 anterior to transverse carina clear reddish-brown, shading into dull dark greenish-brown in the remaining segs. (dull blue in life).

The females in the dried condition are similar in colour to the males from the same localities. In those from Trinidad the brown line on the fronto-nasal suture is faint, as it is in some of the males.

STRUCTURAL CHARACTERS.

A careful search was made for structural characters particularly in the genitalia of both sexes, the abdominal appendages of the male and the wing-venation. The results were entirely negative, except in the venation, and even here no constant differentials were found, nor anything approaching such characters. All that could be detected was the presence of slight differences in the average number of certain cross-veins, cells, etc., as shown in the table below. Only the males from British Guiana and Trinidad were in sufficiently large series to be used for this purpose.

In this analysis the following characters were specially noted and tabulated:—

1. Number of first antecubital veins.
2. Number of first postcubital veins.
3. Number of cubital cross-veins.
4. Number of cross-veins in the triangle.
5. Number of cross-veins in the supratriangle.
6. Number of marginal cells between Rs and Ms.

In this table B. G. = British Guiana (Rockstone) and Tr. = Trinidad (Baracon). Ten males from the former locality and six from the latter were studied, so that the total number of fore or hind wings was 20 from British Guiana and 12 from Trinidad.

It will be seen from the table that in nearly every case the prevalent number of veins or cells is slightly greater in the British Guiana specimens than in those from Trinidad. In the former, e.g., the number of antecubital veins most often noted is 31 in the fore wings and 21 in the hind wings, while in Trinidad specimens the corresponding numbers are 27 and 20. Similarly in the case of the postcubital veins, the prevalent numbers for the British Guiana specimens are 22 and 26 for the fore and hind wings, respectively, while for the Trinidad specimens they are 21 and 25. The difference is too slight to be conclusive for any one table, but when taken together the results seem to indicate fairly clearly a slightly greater average complexity of venation in the British Guiana specimens than in those from Trinidad.

The Guatemala specimen is well above the average in complexity of venation, but it is impossible to judge from a single specimen how this form compares with the other two in this regard.

In view of the apparent absence of distinctive structural characters, it is improbable that there is more than one species represented in this series. But there are at least two strikingly different types of coloration characteristic of different localities, and it, therefore, seems best to regard these as geographical races. The Guatemala specimen, not being identical with either of the South American forms may be considered for the present as the type of a third race.

The type locality of Burmeister's *Aeschna reticulata* is Surinam and the British Guiana form may therefore be considered the typical race. This is also suggested by the expression "viridi-flava," which occurs in Burmeister's description quoted below.

***Staurophlebia reticulata reticulata* (Burm.)**

Burmeister's description (Handb. der Ent., 1839, p. 837) is as follows:¹—

"5. *A. reticulata*; viridi-flava, post mortem sæpius fusca, tibiis intus nigris, alarum venis nigris, cellulis fusco-limbatis, Long. $3\frac{1}{4}$."

1. Kindly quoted for me by Mr .E. B. Williamson.

"♂. cercis foliaceis, in latere interno basi apiceque gibbiferis s. auritis.

"Aus Surinam, in Sommers Sammlung,"

Staurophlebia magnifica Brauer from Brazil is probably a synonym of this form.

The specimens in the series studied are labeled as follows:—

Rockstone, British Guiana, Feb. 2, 1912, 2 ♂'s; idem, Feb. 12, 1912, 7 ♂'s; idem, Feb. 14, 1912, 4 ♂'s, 2 ♀'s.

Tumatumari, British Guiana, Feb. 9, 1912, 1 ♂.

These specimens measure as follows:—

Males—Length of body, 94.5-100 mm.; of abdomen (including appendages) 73-78 mm.; of hind wing 62-65 mm.

Average measurements of 11 males—Body 96.6 mm.; abdomen 74.8 mm.; hind wing 63.2 mm.

Females (appendages broken in one specimen)—Length of body 92-94 mm.; length of abdomen (excluding appendages) 64-69 mm.; length of hind wing 63-64 mm.; length of appendages 6.5 mm.

***Staurophlebia reticulata obscura*, n. subsp.**

Under this name I include all the specimens in the series from Trinidad. They have been sufficiently characterized above.

These specimens consist of 7 ♂'s and 3 ♀'s from Baracon, Chaquanas, Trinidad, all dated March 7, 1912.

The 6 ♂'s and 2 ♀'s examined measure as follows:—

Males—Length of body, 92-98 mm.; of abdomen (including appendages) 71-76.5 mm.; of hind wing, 60-66.5 mm.

Average measurements of 6 ♂'s—body 94.4 mm.; abdomen 73.5 mm.; hind wing 63.5 mm.

Females—Length of body 88.5-97 mm.; of abdomen (excluding appendages) 63-68.5 mm.; hind wing 65.5-71 mm.; appendages 6.5-7 mm.

***Staurophlebia reticulata guatemalteca*, n. subsp.**

The single specimen of this form examined is a male from Los Amates, Guatemala, taken by Mr. Williamson, on June 21, 1909. It may not represent a valid race, but cannot properly be placed with either of the other two.

The specimen measures as follows:—

Length of body 99 mm.; of abdomen (including appendages) 76 mm.; of hind wing 67.5 mm.

MUTUAL ADAPTATION OF THE SEXES.

I have noted elsewhere* that in *Aeshna constricta* and its allies the abdominal appendages of the male are specialized for a firmer grasp of the head and prothorax of the female than in those species in which these structures have their usual form, and that these modifications are probably correlated with the more erratic nuptial flight of the species of this group. In *Staurophlebia* the general form of the male superior appendages recalls that of *Aeshna constricta*, but is still more highly specialized, having in addition to a very prominent subapical denticulate crest formed by the extreme elevation of the distal part of the superior carina, and the bending upwards of the margin at its termination, a process from the dorsal surface and supero-external margin, just before the middle, directed horizontally inwards and slightly decurved at apex (pl. XVII., fig. 1h). The inferior appendage is also complicated by the presence of a prominent elevation rising almost perpendicularly from the superior surface of the appendage at its extreme base (fig. 1, .b. inf.).

The appearance of these appendages suggests a very firm union between the two sexes during copulation, and it is therefore of interest to learn from Mr. Williamson's notes that the nuptial flight is very erratic.

I relaxed the separated abdomen of a male and the head and thorax of a female, and endeavoured to determine the exact nature of this union. This was an easy matter as far as the head of the female was concerned, but with regard to the prothorax, much careful manipulation was necessary. I think, however, the following account will prove substantially correct.

By applying the upper surface of the inferior appendage to the front of the head in the usual position for the Aeshninae the basal elevation was found to fit accurately in a depression on the rear surface of the female's head just below the occipital margin (fig. 1, .b. inf.). This feature alone must render the grasp of the male firmer than in those species which lack the prominence. The superior appendages also fell naturally into position at the rear of the head on the slope of the concavity surrounding the occipital foramen, from which their inner margins were but narrowly

*1912, Walker, E. M., Univ. Tor. Stud., Biol. Series 11, pp. 38-42.

separated. In this position they were divergent at an angle of about 35° . The laterally situated apices occupied a position adjacent to the inner surface of the base of the cardo, or first joint of the maxilla (fig. 1, *mx.*).

When the exact position of the prothorax in relation to the head is observed, it will be seen that the posterior margin of the pronotum approximately coincides with the position of the hook-like processes rising from the upper side of the male superior appendages, and there seems little reason to doubt that in copulation these processes hook over the pronotal margin as shown in figs. 1 and 2. The expanded part of the appendages enclose the pronotum, the crest-like elevations of the superior carinae, which are directed inward, passing beneath and completing the pair of claspers. They appear to fit in a deep depression on the side of the pro-epimerum.

Thus the grasp of the male appendages as compared with those of *Aeshna*, etc., is complicated and strengthened by the following specializations of structure:

- (a) The basal protuberance of the inferior appendages, serving to support the occipital region of the head.
- (b) The hook-like processes of the lateral margins, supporting the hind margin of the pronotum.
- (c) The unusual development of the subapical denticulate crest, serving to grasp the neck immediately in front of the pronotum.

NOTES BY E. B. WILLIAMSON.

The first *Stauròphlebia* I ever saw came sailing along the railroad track below Los Amates, Guatemala, one sunshiny morning (June 21, 1909) after a heavy night's rain. As he came towards me, I saw him at some distance, a gigantic fellow flying now within a few feet of the ground and now high up in the air, but following the lane or slash made by the railroad through the jungle. As he raised to pass me, the impression was of a dull, dark insect which might be brown or obscure blue or green. To our mutual surprise a despairing, straight backward high-reached sweep of the net overtook him. This was the only specimen I saw in Guatemala during two collecting trips.

On the morning of January 31, 1912, I followed the log-filled stream back of the rest house at Rockstone, British Guiana, for a mile or two. On two occasions I saw for an instant a large brilliant green and golden-brown *æschnine* which cut across the stream, with only a moment's hesitation above the water. About 1 p.m. my father and I were at the stream, when we saw it again, but this time flying a beat, possibly 75 or 100 feet long. It disappeared over the trees as I approached, and we decided it was some glorified *Anax* to be found at home possibly at some neighbouring pond. The next day father and Mr. Rainey made a search for such a pond, while I again collected on the creek. Their search for a pond was in vain, but they found the home of our shy acquaintance of the day before in a small shallow muddy creek bed, in the woods, and without running water, there being merely pools of greater or less extent.

They saw several specimens, got several fair strokes at the dragonflies and affirmed that in striking from the rear at the dragonflies they were unable to make the net overtake the insect. The next day I visited this creek bed just below the town on the same side of the river. Never have I seen a dragonfly apparently more out of place—the little muddy wet-weather creek, in some places with the jungle crowding it to a scant 2-foot width, with its obscure, leaf-filtered sunlight on dry or damp mud banks and isolated pools of dirty water—and back and forth in this narrow avenue, from shade into sunlight and back into shade again, a great green and golden *æschnine* which so clearly belonged to the sunny reaches of marsh or lake. After a few futile strokes I caught one, and then another, and *Staurophlebia* does not take its capture tamely or philosophically. They fought, tearing and biting, and attacked the fingers which drew them from the net.

Staurophlebias were seen only rarely elsewhere in British Guiana, and then only along smaller streams. None were seen the two days I collected in Dutch Guiana. On March 7, 1912, Mr. Rainey and I were accompanied by Mr. F. W. Urich to Baracon, Chaquanas, Trinidad. We found the woods near there very dry with the stream beds in many cases without any water. Along such a stream bed we found a dark bluish or greenish dragonfly flying. Till specimens were captured it never occurred to me that



FIG. 1

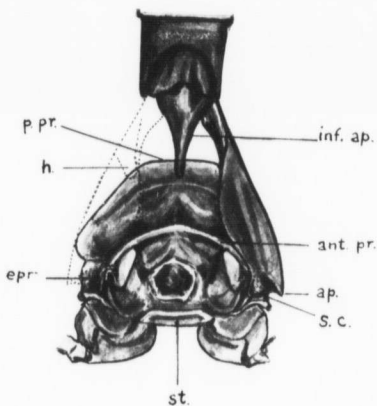


FIG. 2

STAUROPHLEBIA RETICULATA BURM.
 COPULATORY POSITION.

it was the same species we had recently seen in British Guiana. Its appearance was entirely different and the general colour and habits were in keeping with the surroundings which were not strikingly different from those of British Guiana.

On several occasions I saw the male seize an ovipositing female as she thrust her ovipositor in the damp but hard soil. So occupied, the male would find her as he came swiftly along the creek bed. Without hesitation he would plunge down on her, when the liveliest tussle would take place, the two tumbling over and over on the ground among leaves and other debris with a great rustling of wings and a general commotion that indicated a life and death struggle. When the male succeeded in fastening his appendages on the female's head a wild nuptial flight to a great height and distance immediately took place. Females, presumably the same, after a short time returned again to the same spot to oviposit. Such females were more or less stained and sticky, and we believed that in the pre-copulatory conflicts with the males the abdominal integument had been torn at a number of places with a resulting leakage of body fluids.

EXPLANATION OF PLATE XVII.

Fig. 1. *Staurophlebia reticulata* Burm., rear view of head of female, clasped by abdominal appendages of male; *hd.*, rear of head; *mx.*, maxilla (cardo); *lb.*, labium; *of.*, occipital foramen; *s. ap.*, superior appendage of male; *h.*, hook-like process on upper side of superior appendage; *s.c.*, elevated distal part of superior carina; *b. inf.*, basal prominence of inferior appendage; *p. pr.*, position of posterior margin of pronotum.

Fig. 2. *Staurophlebia reticulata* Burm., front view of prothorax of female, clasped by appendages of male; *st.*, prosternum; *epm.*, pro-epimerum, showing depression in which the superior appendage fits (this is slightly out of place on the right side); *ant. pr.*, anterior margin of pronotum; *p. pr.*, posterior margin of same; *ap.*, apex of superior appendage; *inf. ap.*, inferior appendage; other lettering as before.

AN EARLY REFERENCE TO THE RELATION OF INSECTS
TO DISEASE.

BY C. GORDON HEWITT, DOMINION ENTOMOLOGIST, OTTAWA, ONT.

In studying the evolution of ideas respecting the control of insect pests, I came across an early reference to the relation of insects to disease which is of interest more from an historical point of view than as a serious contribution to the development of the insect transmission theory of disease. Nevertheless, I believe it is worthy of a place among our entomological documents, and this is one of my reasons for calling attention to it. The other reason is the relation it has to the ideas advanced by Nott (1848) on the mosquito transmission of yellow fever by insects. Nott has been generally accorded the credit of having formulated the insect-transmission idea of yellow fever. Riley (1914)* however, has recently pointed out that when Nott's argument is studied in its entirety it does not support the conclusion usually claimed, but that the term "insect" was used to denominate micro-organisms in general. As the matter is fully discussed by Riley in his paper, I will not repeat his interesting statements here. In the quotations which I am about to give I do not think that there is any ambiguity about the meaning of the term "insect."

In an old volume entitled "New Improvements of Planting and Gardening, both Philosophical and Practical," by Richard Bradley, F.R.S., the fourth edition of which was published in London in 1724 (this is the edition from which the extracts which follow are made) the author quotes a letter from a "worthy Gentleman, Mr. Balle," which begins (page 254):

Upon discoursing with you some time since about Blights upon Trees, you seem'd to be of the opinion that they were the Effect of Insects brought in vast Armies by the Easterly Winds and by lodging upon the Plants proper for their Nourishment, they there produced that Distemper which is called a Blight or Blast.

You was then desirous of what Observations I had made concerning Pestilential Distempers subject to Mankind, which

*Journal of Parasitology, I, p. 37, 1914.
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I believ'd to proceed from the same Cause that produced Blights, i.e., from Insects; I have therefore, in answer to your Request endeavour'd to recollect what I have from time to time observ'd relating to that Case.

After five pages of miscellaneous discussion which concludes with the belief "that the most nauseous Vapour of itself will not cause any Distemper that is Epidemical," the letter continues:

It seems that the Plague proceeds from some other Cause, and that I suppose to be Insects of that extraordinary smallness that they are not to be discern'd by the naked Eyes; they are so light that they float in the Air, and so are suck'd in with the Breath. Such insects not being among us commonly, but only when they are either brought to us from some remote place by the Wind, or hatch'd or nourish'd by some Intemperance of Air or from poisonous Vapours rising from Boggs, Ponds, Ditches or some such unwholesome Funds of stagnating Water.

These Insects are various, according to the Nature of the Water or Air they are bred in; their Eggs being first laid by some flying Animals, which are then hatch'd, and passing through the several Changes common to Insects, at length take Wing; and being drawn in with the Breath, may perhaps be either kill'd in our Bodies and cause violent Ferment in the Juices, or else finding proper Nourishment, they breed in the Lungs, Stomach, or other parts within us, and probably may occasion those Biles and Breakings out in the tender parts of the Body that are called Plague-sores.

But these Insects, are some of them so extremely small, that they are only capable of being discern'd with good microscopes; and when they are winged, and so quite perfected, may perhaps in Swarms be carried from one Country to another by the Wind: It is Insects of several Kinds and Colours, which causes the Surface of Waters to appear sometimes Green, Red or Black; which last Colour in Water is observ'd by the Herdsmen to poison the Cattle that drink of it; and

they say causeth the Murrain, which is the Plague in Cattle, and it is very infectious.

It has been observ'd that Plagues, and the most contagious Distempers, have commonly happen'd in those Years when the Easterly Winds have more than ordinary prevail'd in the Spring and Summer Seasons; then the Air comes to be infected, and rarely or ever at other times. These Winds we see bring Caterpillars, and many differing Insects and Flies, which meeting with places fitly adapted to nourish them they are there brought to their winged state, which I conceive is the same in the invisible Animals as in the visible; nor indeed in any part of the Earth, or Waters.

The west winds he considered, carried back "the remainder of these Pestiferous Insects which yet survive, to the Country from whence they came." He continues:

I have not yet found that any Winds, except the East Winds, such as pass over Tartary, bring any Infection with them, nor have I ever heard of Pestilential Distempers in any part of the World, unless in such places only where the Tartarian Winds reach; Tartary being a country full of Woods, Boggs, and Fens it seems the most capable of producing these Creatures in abundance, which may be carry'd by the Wind to certain places in search after their Food, as are Locusts and some certain Birds, which are know to pass from one Country to another.

* * * * *

Experience shews us how much Insects delight in stinking Places, and that they increase much faster in uncleanly Cities, such as London was formerly, than in cleaner Places; but the city of London having been for the most Part burnt the year after the Pestilence, its streets were enlarg'd, many drains were made and good Laws were put in execution for keeping the City clean, and it has not had any Plague ever since.

* * * * *

His reference to the occurrence of "Epidemical Distemper" in Leghorn contains the following:

To the Northward of the Town, towards the Sea-shore, lay very boggy stinking Ground: These Marshes commonly about Autumn causes Agues and Fevers, which may be from vast Swarms of invisible unwholesome Insects, which rise from thence at that Season, but of a different Poison from those which cause the Plague: So the like Places about Civita Vecchia, Scandaroon, and I may mention the Isle of Sheppy likewise, seem to cause Agues. And it is observable, that from the Mouth of the River Magra, which divides Tuscany from Liguria, along the Sea-Coast of Italy, as far as Terracina, is very unhealthy, and subject to Agues and pestilential Fevers, being marshy Ground.

We may also observe that in Turkey, Egypt and Barbary, when the Plague rages, the Franks, the English, etc., are seldom infected with it, which seems to confirm my Opinion, that this Sickness proceeds from Insects, who having their certain natural Nourishments respectively appointed them, do not in those Places infect Strangers, who have differing ways of eating and living from the Natives, and are of a contrary Nature of Body. It would be well worth Enquiry, if the People of those Nations, that were in strange Countries in the Times of Pestilence were also free from Infection.

King Charles the II^d when he was told of the Sickness at Leghorne, said It must have been occasion'd by the new Fortifications which were then building in those marshy Places; And it is very rational to believe, that turning up those unwholesome Muds, and exposing them to the Sun, did much increase the distemper, by infecting the Air, and filling it with greater Supplies of poisonous Insects.

Enough has been quoted of this writer, whose observations cover nineteen pages, to indicate the trend of his ideas and also to show that he was using the term insect in a specific sense and not in the general sense evidently employed by Nott over a hundred years later.

NEW FOSSORIAL HYMENOPTERA.

BY NATHAN BANKS, EAST FALLS CHURCH, VA.

Included below are descriptions of several new species of fossorial wasps of the families *Psammocharidæ* and *Philanthidæ*.

PSAMMOCHARIDÆ.

Ageniella hestia, n. sp.

Similar to *A. apicipennis*; clypeus and basal joints of the antennæ yellow; posterior margin of the pronotum whitish; abdomen partly reddish yellow on sides of the second segment, and basal part of the venter; legs partly yellow, but on mid legs the tibiæ are brown and tarsi blackish, and on hind legs black on tip of femur, all of tibia and tarsus; spurs pale. Wings scarcely darker at tip, the third submarginal higher than long, a little narrowed above, receiving the second recurrent before the middle; thorax sericeous; abdomen sessile, slender.

One male from Falls Church, Va., Aug. 30, differs from *A. apicipennis* in pale margin of the pronotum, black on middle and hind legs, heavier venation, and slightly different shape of the third submarginal cell.

Ageniella cupidella, n. sp.

Female resembles *cupida*, but smaller, the first recurrent meeting second submarginal cell plainly before middle, and antennæ shorter, the second and third joints together hardly equal the vertex width. Head and thorax bluish green, abdomen blackish, shining, few long hairs on clypeus and vertex, and tip of the abdomen. Legs black, inner spur of hind tibia one-half the length of the metatarsus; fore wings blackish, third submarginal all long below, much shorter above, receiving the second recurrent at middle; second submarginal plainly shorter than the third, receiving the first recurrent plainly before middle.

Length 7 mm.

From Ridgeway, Ont., Can., July 9 (Van Duzee).

Ageniella tenella, n. sp.

Male black, slightly sericeous, spurs pale, anterior tibiæ and tarsi pale, and sometimes pale on mid and hind legs; abdomen rather

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brownish black, hind margins of segments faintly reddish. Body very slender, abdomen sessile; wings faintly dusky, basal transverse veins of fore wings disjointed; second submarginal longer than broad, receiving first recurrent at middle; third submarginal higher than long, narrowed above, receiving the second recurrent before middle, latter vein faintly bent out in middle; these cells nearly as in *atrata*, but in that species the second recurrent is received at middle and the discoidal is consequently longer.

Length 5.8 mm.

From Niagara Falls, July 31, and Boston, Aug. 1, both N. Y. (Van Duzee). Differs from *A. atrata* in white spurs, and more slender body.

***Priocnemis hesperus*, n. sp.**

Very similar to the Eastern *P. subopacus*, the marginal cell blunt at tip as in that species. It is separated by the coarsely striated metanotum. It is black, with few long hairs on vertex and mesonotum, none on the face, pronotum nor metanotum, but some on the venter and apex of the abdomen. The vertex and the ocellar triangle are broader than in *P. subopacus*, the eyes not being as much approximated as in that species; the abdomen is more shining than in *P. subopacus*. The wings are deep black, the venation like that of *subopacus*, but the outer side of marginal cell is more angulate rather than rounded; size the same.

From Stanford Univ., Calif. (Doane).

***Priocnemis fortella*, n. sp.**

This is close to *P. fortis*, but differs in pale wings, much smaller size, in the still shorter antennæ, and longer hind spurs. The body is black and densely hairy, the face and ocelli about as in *P. fortis*; the antennæ short and thick; the fourth and fifth joints hardly twice as long as broad (three times or more in *fortis*); metanotum striate as in *fortis*; the hind tibia, even in female, still less serrate than *fortis*, the serrations scarcely distinguishable; the inner spur of the hind tibia fully one-half the length of the metatarsus (in *fortis* scarcely one-half the length of the metatarsus). Venation about the same, the veins extending out to the margin; the fore wings are scarcely darkened (deep black in *fortis*).

Length 10 mm.

From Great Falls, Va., June 12, 29.

PHILANTHIDÆ.

Cerceris nigritulus, n. sp.

Male very similar to *C. nigrescens* Sm., but distinct by dark stigma. Markings as in *C. nigrescens*, rather more yellowish, but in only specimen seen no spots on pronotum, nor on basal segment of abdomen, and ventral marks nearly obsolete. The face broader, or rather not so long as in *C. nigrescens*, the clypeus broadly, evenly rounded below, and very strongly convex in the middle, so that when seen from the side it is plainly protuberant, hair lobes not as broad as in *C. nigrescens*, punctation and enclosure as in *C. nigrescens*; pygidial area not as long as in *C. nigrescens*, and with nearly parallel sides. A size smaller than that species.

From Colden, N. Y., July 3 (M. C. Van Duzee). In my table it runs to 24, and of the species there included it is nearest *C. nigrescens*, but differs from all in dark stigma.

Cerceris dakotensis, n. sp.

Female black; base of mandibles, spot on the clypeal process, large spot each side of face near the eyes, small spot each side on pronotum, tegulae, postscutellum, broad band on second abdominal segment (slightly narrowed in the middle), narrow bands on other segments (broader at sides), yellow. Legs rufous, or yellowish, front and middle femora dark at base; basal half of antennae yellowish, or rufous beneath, tip rufous behind. Body moderately coarsely sculptured, clypeal process longer than broad, narrowed toward tip, not horizontal, but very much deflected; enclosure rather strongly striate all over; abdomen slender, basal segment only a little more than one-half as wide as the second at tip; others not wider than the second; pygidial area very long, with subparallel sides. Wings plainly fumose, darker at costal tip, stigma yellowish.

Male similar in size to the female, and the abdomen also slender; face below antennae all yellow, other marks as in female, small lateral spots on venter yellow; and one specimen shows spots on the metanotum and first abdominal segment; large dark spot near tips of hind femora, and faint dark mark near tips of hind tibiae. Last joint of antennae slightly curved, third joint not as long as fourth and fifth together. Clypeus slightly convex in the middle, the anterior margin here black, and with three teeth; clypeal hair

lobes about one and one-half their breadth apart, pygidial area coarsely punctate, sides parallel, about one and a third times as long as broad; enclosure as in female.

Length 11 mm.

From Fargo, N. Dak., July 7 to Sept. 6 (Stevens coll.), on *Solidago serotina*. In Swenk's table it runs to *imitatoria*, but in that species the band on the second segment is no broader than the others.

***Cerceris floridensis*, n. sp.**

The male runs to *C. morata* in my table, but larger, the hair-lobes of clypeus much narrower, and the enclosure different. Head broad, face reddish, clothed with white hair; clypeus prolonged in middle, the hair lobes small, fully three times their width apart; antennae pale on base, and extreme tip; vertex and back of eyes reddish, pronotum, tegulae, spot beneath on side, scutellum, postscutellum, large spot on sides of metanotum, first and second segments of abdomen above and below, reddish or yellowish red; legs mostly yellowish red. Wings blackish, marginal cell black, stigma yellowish; second submarginal twice as long as high. Body very coarsely punctate, enclosure large, smooth, faint traces of striation. Abdomen broad, basal segment much broader than long, but little more than one-half as wide as the second. Pygidial area hardly one half as wide at tip as at base, once and a half as long as broad at base, coarsely punctate. Last joint of antenna longer than preceding, curved.

Length 14 mm.

From Gulfport, Fla. (Reynolds). In general it is related to *C. gnarina*.

***Cerceris carrizonensis*, n. sp.**

In the New Mexico table this runs to *C. convexus*; it differs in the marginal cell being not black, but hyaline, and in lacking a spot on pleura behind the tubercles.

Male small, black, face below antennae yellow, enclosing a black dot each side at angle of clypeus; basal joint of the antennae yellow, next black, beyond brown. Two spots on the pronotum, tegulae, two spots on the scutellum, the postscutellum, band across basal segment, rather narrow band at apex of each of the other segments.

Legs yellow, mid femur black on base, hind femora with large black spot near the tip, hind tibiae also with black spot near tip; hind tarsi dark. Wings infuscated, but not very dark, the stigma dark brown, marginal cell no darker than rest of the wing. Body not very coarsely punctate, face with dense white hair, clypeus slightly, evenly convex; hair lobes rather broad, hardly one and a half their breadth apart; antennae short, last joint short, not curved. Enclosure roughly punctate, no striation. Abdomen short, hardly longer than thorax, basal segment narrow, longer than broad, not one-half the width of the second segment; pygidial area not much wider at base than at tip, not one and a half times as long as broad; in the wings the first recurrent runs into second submarginal cell before middle. Body densely long haired, especially noticeable on the thorax, the hair here twice as long as in most species.

Length 6 mm.

From Walde, Texas.

Eucerceris apicata, n. sp.

Male reddish, face yellow up to the ocelli; the pronotum, scutellum, postscutellum, two oblique spots on the enclosure, tegulae, tubercles, two large spots on pleura below tegulae, large side spot on the metathorax, all yellow. On the anterior part of the mesonotum are four yellow streaks, and between them the surface is blackish. Abdomen yellow, the narrow basal part of each segment reddish to blackish; venter with yellow side spots on the basal segments. Legs reddish, with yellow on front of the femora and tibiae of anterior and middle pairs. Wings hyaline, a dark cloud from the second submarginal and marginal cell out to tip, this spot not extending basally. Body rather coarsely punctate, but the enclosure smooth; third and fourth ventral segments with erect row of yellow hairs. Related to *E. canaliculatus*; the second submarginal cell more quadrangular, and the smooth enclosure distinctive.

Length 11 mm.

From Yuma, Arizona.

Philanthus assimilis, n. sp.

Male close to *P. bilunatus*; thorax and abdomen smooth as in that species, enclosure with the pit as in *bilunatus*. Markings about

as in that species; the middle face-mark, however, is much larger and broader below, and at this point the head is more protuberant than in *P. bilunatus*; there is a spot behind eye, and below tegulae, yellow. Abdomen with the first segment showing two small spots, the second segment with a very broad band, almost divided in the middle; third and fourth bands narrow, and emarginate each side in front. Last segment more emarginate than in *P. bilunatus*. Legs with femora (except tip) black, rest of legs yellow. Wings infuscate, rather broader than *P. bilunatus*, the third submarginal as broad as long; vertex broader than in *P. bilunatus*.

Length 10 mm.

From Boston, N. Y. (Van Duzee).

***Philanthus subversus*, n. sp.**

Male—Face yellow, an oblique black streak up from the base of the antenna, connecting to the black vertex; malar space and the mandibles (except tip) yellow; basal three joints of antennae yellow, rest rufous, darker above, second joint with a black dot above; vertex with curved yellow band and long streak back of eye (as in *sublimis*), collar, tegulae, tubercles, most of pleura, four short streaks on anterior part of mesonotum, two spots on scutellum, and spot each side of it toward base of wing, postscutellum, two oblique spots at side of enclosure, large side stripes on mesonotum reaching down on pleura, all yellow. Abdomen with broad spot each side nearly meeting above; other segments with bands, very broad on the sides, triangular median incision in front of second, emarginations on other bands, last segment all yellow; venter almost all yellow, with two black bands. Wings faintly fumose, stigma yellow, veins brown; legs yellow, last joint of tarsus rufous. Head minutely punctate, the clypeus nearly smooth, acutely produced in the middle below; thorax sparsely punctate, collar and the postscutellum smooth, metathorax more densely punctate; enclosure finely, transversely striate; abdomen broad, rather coarsely punctate, last segment smooth. In wing the third submarginal cell no broader above than second, basal sides of the second submarginal cell subequal.

Length 8.5 mm.

From Palmerlee, Arizona (Biederman).

***Philanthus vertilabris* var. *completus*, n. var.**

Male similar in markings to type, but the bands of abdomen beyond that on the second segment are all much broader than in normal eastern form. Sculptured as in typical form; the upper yellow face mark much larger than *vertilabris*, and its upper edge not so much emarginate; in the wings the second submarginal cell has its upper basal side twice as long as the lower basal side. In the new Mexico table it runs to *P. cockerelli*, from which it is separated by different markings.

Length 12 mm.

From San Diego Co., California (Van Duzee).

FIELD NOTES AND QUESTIONS.

MIGRATING NOTES ON THE MILKWEED BUTTERFLY,
Anosia plexippus.

BY F. M. WEBSTER, WASHINGTON, D. C.

For a number of years the writer has been able to record the banding together of this butterfly as observed by him at various points in the United States. Supposedly these gatherings are preparatory to the annual southward autumnal migration of the species.

The present year, 1915, my son, R. L. Webster, observed one of these gatherings near Ames, Iowa, on August 30th; an exceptionally early record, as such assemblings together do not usually occur until September or October.

The writer observed a swarm of these butterflies near Waterman, DeKalb County, Illinois, on September 18, a little north of the latitude of Ames, but some two hundred and seventy-five miles farther east.

It would seem that there is no general uniformity in the dates of the congregating together of these detachments and it would be exceedingly interesting to learn just what laws, if any, regulate the collecting together and of the different swarms, and if they resemble in any way the systematic migrations of birds.

BOOK REVIEWS.

THE MOSQUITOES OF NEW JERSEY AND THEIR CONTROL. By Thomas J. Headlee, Ph.D. Bull. No. 276, New Jersey Agricultural Experiment Stations. Issued Jan. 30, 1915. 135 pp., 94 figures.

The notoriety of the New Jersey mosquito is known to all, and probably every American entomologist has some acquaintance with the extensive work that has been done by the New Jersey Agricultural Experiment Stations, under the direction of the late Dr. J. B. Smith towards the control of these really serious pests.

The present account is the outcome of a need that has been felt for a "popular, yet accurate and easily available, manual on the important mosquito life of New Jersey," the other publications on this subject issued by the New Jersey Agricultural Experiment Stations being now out of print or the supply practically exhausted.

The first pages contain a brief account of the habits, life-history, structure and classification of mosquitoes in general, in which the author lays emphasis on the importance to anyone who undertakes the control of these insects, of knowing exactly the species with which he has to deal. This is followed by tables, republished from the work of Messrs. H. B. Weiss and R. S. Paterson, for the determination of the forty species of mosquitoes, both in the adult and larval stages, that are known to occur in New Jersey.

Of these species sixteen are considered sufficiently important to be treated in some detail, while of the remainder brief notes on habits and distribution are given. The sixteen troublesome species, only six of which are regarded as first-class pests, are divided into four groups; the salt-marsh, house, swamp and woodland groups. The six members of the salt-marsh group are the species that are responsible for New Jersey's fame as a mosquito-infested state, and these species naturally receive first consideration.

The author describes at some length the methods of control of the salt-marsh mosquitoes, now in operation by the state, of draining the marshes or stocking the pools in localities where draining into the sea presents serious difficulties, with killifish (*Fundulus*), various species of which are most important natural factors in the control of these mosquitoes. Gratifying progress in

this work has already been attained, and it was found as the result of an investigation made during the summer of 1912-13 that the shore line property values between Jersey City and Rumson had increased by \$5,600,000. Incidentally the drainage operations have greatly increased the production of marsh hay on the lands treated.

Next in importance to the salt-marsh group is the house group, to which the House Mosquito (*Culex pipiens* L.) and the Malarial Mosquito (*Anopheles quadrimaculatus* Say) belong. The control of these forms is considered together with that of the woodland and swamp group, the problem in all such fresh-water forms consisting in finding the breeding-places and in one way or another, according to circumstances, rendering them uninhabitable for the larvæ, either by draining, filling, stocking with fish, or, if these methods cannot be carried out, by oiling the surface or using a substance (larvicide), which will mix with the water and kill the larvæ by contact.

This excellent report is copiously illustrated, the greater number of figures having been taken from Dr. J. B. Smith's elaborate work. In addition to the figures of the various species of mosquitoes and their larval characters, the methods employed in draining the salt-marshes, characteristic breeding-places and the kinds of fish useful in mosquito control are also well illustrated.

COLEOPTERA ILLUSTRATA. By Howard Notman, Vol. I, No. 1.
Carabidæ, 136 Joralemon Street, Brooklyn, N.Y. (Price \$1.00).

This is a very peculiar little book, consisting, as it does, of fifty outline drawings of beetles, forty-one belonging to the genus *Carabus*, and the remaining nine to *Calosoma*, *Damaster*, *Procerus* and *Procrustes*. None of the species figured are North American. There are no descriptions, but merely an index to genera and sub-genera, species and sub-species. The drawings are clear and well-executed, each species depicted occupying a single page. As there is no introduction, we are unable to form any conjecture as to the author's object in issuing this publication.

C. J. S. B

THE LONDON NATURAL HISTORY SOCIETY. From the Transactions of this Society for the year 1914, we learn that the organization has been formed by the amalgamation of the City of London Entomological and Natural History Society (founded in 1858) with the North London Natural History Society. The union has enabled the new organization to meet the war-time difficulties with a strength and resource which could not have been furnished by either of the old Societies by itself.

In addition to the official records of meetings and reports, the Transactions contain some very interesting papers. The President, Mr. L. B. Prout, in his address, discusses various theories respecting genera and species, with particular reference to Pierce's work on "The Genitalia of the Geometridæ." Mr. L. W. Newman describes his methods of collecting and breeding the Sesiidæ, which will be found useful in this country. Dr. E. A. Cockayne contributes a paper on "Gynandromorphism," in which he describes the various forms that are met with, and gives some remarkable examples. Other papers cover a wider range, such as "The Middle Ages in the Wey Valley;" "British-breeding Ducks," and a short history of "The City of London Society."

THE ENTOMOLOGICAL SOCIETY OF AMERICA.— TENTH ANNUAL MEETING.

The Tenth Annual Meeting of the Entomological Society of America will be held in Columbus, Ohio, Wednesday and Thursday, December 29 and 30, and if necessary to complete programme, on Friday, December 31st, in affiliation with the meetings of the American Association for the Advancement of Science and other affiliated societies. Meetings will begin at 2.00 p.m. on Wednesday. The meetings of the American Association of Economic Entomologists will begin Monday afternoon with other meetings on Tuesday and Wednesday and Thursday evenings.

The Annual Public Address will be given on Wednesday evening, December 29th, by Dr. C. Gordon Hewitt, Dominion Entomologist, Ottawa, Canada. His subject will be "A Review of Applied Entomology in the British Empire." The entomologists of Ohio are planning a smoker for visiting entomologists, which will be held on Wednesday evening after the address.—(From Announcement.)

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