ENTOMOLOGICAL NEWS

VOLUME LXII, 1951

CALVERT ANNIVERSARY VOLUME

on the occasion of

Dr. Philip P. Calvert's Eightieth Birthday

PUBLISHED BY
THE AMERICAN ENTOMOLOGICAL SOCIETY
THE ACADEMY OF NATURAL SCIENCES
PHILADELPHIA, PENNSYLVANIA, U. S. A.
1951

The numbers of ENTOMOLOGICAL NEWS for 1951 were mailed at the Post Office at Lancaster, Pa., as follows:

No. 1—January ..... January 17, 1951
No. 2—February ..... March 2, 1951
No. 3—March ..... March 27, 1951
No. 4—April ..... April 30, 1951
No. 5—May ..... June 1, 1951
No. 6—June ..... June 19, 1951
No. 7—July ..... July 23, 1951
No. 8—October ..... September 27, 1951
No. 9—November ..... November 9, 1951

The date of mailing the December, 1950, number will be announced on the last page of the issue for January, 1952.

ENTOMOLOGICAL NEWS

JANUARY 1951

Vol. LXII No. 1

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PUBLISHED MONTHLY, EXCEPT AUGUST AND SEPTEMBER, BY
THE AMERICAN ENTOMOLOGICAL SOCIETY
PRINCE AND LEMON STS., LANCASTER, PA.
AND
1900 RACE STREET, PHILADELPHIA 3, PA.

Subscription, per yearly volume of ten numbers: $4.00 domestic; $4.30 foreign; $4.15 Canada. Entered as second-class matter April 19, 1943, at the post office at Lancaster, Pa., under the Act of March 3, 1879. Acceptance for mailing at the special rate of postage provided for in paragraphs (d-2), Section 34.40, P. L. & R. of 1948, authorized April 19, 1943.

ENTOMOLOGICAL NEWS

ENTOMOLOGICAL NEWS is published monthly, excepting August and September, by The American Entomological Society at Prince and Lemon Sts., Lancaster, Pa., and the Academy of Natural Sciences, 1900 Race Street, Philadelphia 3, Pa., U. S. A.

PHILIP P. CALVERT, Editor Emeritus. R. G. SCHMIEDER, Editor. Editorial Staff: E. J. F. MARX, M. E. PHILLIPS, J. A. G. REHN, and A. G. RICHARDS.

Subscription price, per yearly volume of 10 numbers: Domestic, $4.00; Foreign, $4.30; Canada, $4.15—U. S. Currency.

SUBSCRIPTIONS, ADVERTISEMENTS: All communications and remittances to be addressed to **ENTOMOLOGICAL NEWS, 1900 Race Street, Philadelphia 3, Pa.**

ADVERTISING RATES: Full width of page. Payments in advance.

	1 Inch	2 Inches	3 Inches	6 Inches
One Issue	$ 2.50	$ 4.50	$ 6.50	$10.00
Five Issues	9.00	17.00	24.00	42.00
Ten Issues	16.00	30.00	42.00	72.00

MANUSCRIPTS and all communications concerning same should be addressed to **R. G. Schmieder, Zoological Laboratory, University of Pennsylvania, Philadelphia 4, Pa.**

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Plate 1

Philip P. Calvert

ENTOMOLOGICAL NEWS

VOL. LXII JANUARY, 1951 No. 1

DEDICATION

Dedicated to DR. PHILIP POWELL CALVERT, Professor Emeritus of Zoology at the University of Pennsylvania and Editor Emeritus of ENTOMOLOGICAL NEWS, this volume celebrates the 80th anniversary of his birth. Many of our more recent readers will perhaps not understand the importance that we attach to this anniversary. Indeed it makes us feel definitely unseasoned to reflect upon the fact that here is a man who was associated with the Advisory Committee which helped plot the course of this publication at its founding over 60 years ago.

From 1893 to 1910 Dr. Calvert was Associate Editor of the NEWS, and its Editor from 1910 to 1943, a total of 51 years. It will thus become at once apparent that no other individual can have had so much to do with the long success that this journal has enjoyed. At the University of Pennsylvania Dr. Calvert was an instructor from 1892 to 1907 and professor from 1907 until his retirement from active teaching in 1939, and at the Academy of Natural Sciences of Philadelphia he has been actively associated with publication and other affairs for half a century.

Last July, with the permission of Dr. Calvert, invitations were sent to odonatologists, correspondents of his over the world, to contribute short scientific papers to this Anniversary Volume. These letters brought warm expressions of regard for Dr. Calvert, together with a number of manuscripts for publication. Consequently this volume will be well and appropriately seasoned with papers on a subject to which he devoted so much of his time and labor.

TO

DOCTOR PHILIP POWELL CALVERT

Editor Emeritus of ENTOMOLOGICAL NEWS

OCTOGENARIAN ODONATOLOGIST

GENEROUS COLLEAGUE COUNSELOR AND FRIEND

We, your co-workers on Odonata salute you and, at the opening of your 8th Decade, tender you our warmest congratulations.

For most of us your "Catalogue of the Odonata of the Vicinity of Philadelphia, with an Introduction to the Study of this Group of Insects" was our first textbook of the Order. It still is one of our most dependable reference works, and a model for conciseness of statement, and firm biological background.

You have been the largest contributor to precise knowledge of the species of North American Dragonflies (as is well shown by the list of your publications hereinafter presented); and our present knowledge of the Neotropical Odonate fauna has grown directly from your Odonate Section in "Biologia Centrali-Americana" and your companion South American contributions in the "Annals of the Carnegie Museum." This taxonomic work you broadened and enriched in the book (jointly prepared by your talented wife, Amelia Smith Calvert and yourself), "A Year of Costa-Rican Natural History"; also by your subsequent life-history papers on particular Costa-Rican species. No one else has done so much or so well.

For 33 years you edited our most eagerly awaited entomological periodical. You have made the pages of the "NEWS" serve our needs, helping us to keep abreast of the progress of our chosen science; helping also other entomologists the world around. Your editorial criticisms have been keen, constructive and helpful, and always kindly administered.

Your contributions to the science of entomology have come in a steady stream that still is strongly flowing. Wherefore, we greet you with great respect and with affectionate regard; and we hope that you may long continue with us as Co-laborer, Counselor and Friend.—JAMES G. NEEDHAM.

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Compiled by RUDOLF G. SCHMIEDER and MAURICE E. PHILLIPS

EN = Entomological News, Philadelphia.
[ ], Brackets are used: 1) After a title, to enclose words that state the nature of an article; 2) to enclose a description of the contents of an article or note that was published originally without a title; 3) for book reviews.

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1910a A plant-dwelling odonate larva. EN 21: 264, June.

——b [Account of researches in Costa Rica.] EN 21: 334–337, July.

——c Plant-dwelling odonate larvae. EN 21: 365–366, Oct.

——d [*Neurocordulia yamaskanensis* Provancher new for Pennsylvania.] EN 21: 429, Nov.

——e Zoological researches in Costa Rica. Old Penn Weekly Rev. Univ. Penna. 9 (6): 165–170, Nov. 12.

——f Order Odonata, New Jersey list. Ann. Rpt. N. J. State Mus. for 1909 : 73–82.

1911a [Changes in the staff of the News, (editorial).] EN 22: 40, Jan.

——b Studies on Costa Rican Odonata. I—The larva of *Cora*. EN 22: 49–64, ill., Feb.; 138–139, Mar.

——c [Priority of *Negomphus* and *Cyclophylla*.] EN 22: 81, Feb.

——d [On the versatility of insects as a medium for study (editorial).] EN 22: 83, Feb.

——e Newly found odonate larvae of special interest from Costa Rica. Science (n.s.) 23: 388, Mar.

——f [The nomenclature question (editorial).] EN 22: 130–131, Mar.

——g The periodical cicada in 1911 [editorial]. EN 22: 177–178, April.

——h [Editorial footnote on *Gomphus naevius* (Odonata).] EN 22: 223, May.

——i [On naming of new species from too small a number of specimens (editorial).] EN 22: 325, July.

——j [Nature sketches in Temperate America, by Joseph L. Hancock (review).] EN 22: 334–335, July.

——k [*Aeshna mutata* Hagen new for Pennsylvania.] EN 22: 336, July.

——l [On the preparation of papers for publication (editorial).] EN 22: 369, Oct.

——m [*Erebus odora* in Connecticut.] EN 22: 370, Oct.

——n [Remarks on high altitude Odonata.] EN 22: 380–81, Oct.

——o Studies on Costa Rican Odonata. II.—The habits of the plant-dwelling larva of *Mecistogaster modestus*. EN 22: 402–411, Nov.

——p [On suggested procedure at the annual meetings of the Entomological Society of America, editorial.] EN 22: 417–418, Nov.

——q [Editorial note on migrating *Anax junius*.] EN 22: 420, Nov.

——r Henry Christopher McCook [obituary with portrait]. EN 22: 433–438, Dec.

——s Studies on Costa Rican Odonata. III. Structure and transformation of the larva of *Mecistogaster modestus*. EN 22: 449–460, ill., Dec.

——t [On the necessity of full and accurate specimen labels (editorial).] EN 22: 465–466, Dec.

——u [On the fossil dragonfly genus *Phenacolestes*.] EN 22: 479, Dec.

1912a Professor S. S. Haldeman [sketch and portrait]. EN 23: 1, Jan.

——b James H. B. Bland [obituary, portrait]. EN 23: 47, Jan.

——c [I^er^ Congres International d'Entomologie, Vol. II (review).] EN 23: 88, Feb.

——d [Priority rule and nomina conservanda (editorial).] EN 23: 128–129, Mar.

——e [On the pairing of *Anax*.] EN 23: 138–139, Mar.

——f [On *Enallagma civile* in Newfoundland.] EN 23: 140, Mar.

——g [Vitality in the 17 year cicada.] EN 23: 143–144, Mar.

——h Strict priority in nomenclature—or not [editorial]? EN 23: 224–225, May.

——i [The North American dragonflies of the genus *Aeshna*, by E. M. Walker (review).] EN 23: 283–286, June.

——j Dr. Nettie M. Stevens [obituary]. EN 23: 288, June.

——k Studies on Costa Rican Odonata. IV. *Erpetogomphus* in Costa Rica, with descriptions of a new species having complex structural mating adaptations. EN 23: 289–295, ill., July.

——l The vote on priority in nomenclature [editorial]. EN 23: 300–304, July.

——m [On strict priority in nomenclature (editorial).] EN 23: 324, July.

——n The Second International Congress of Entomology. EN 23: 373–382, Oct.

——o [On *Erpetogomphus tristani*.] EN 23: 384, Oct.

——p [On the venation of *Erythrodiplax berenice* and on some Enallagmas.] EN 23: 387–388, Oct.

——q [Put collector's name on label (editorial).] EN 23: 421, Nov.

——r [Elementary entomology by E. Dwight Sanderson and C. F. Jackson (review).] EN 23: 432–433, Nov.

——s [On the forthcoming meeting at Cleveland (editorial).] EN 23: 468, Dec.

——t [On a living specimen of *Mecistogaster* in Germany.] EN 23: 483, Dec.

——u [On *Libellula exusta deplanata* and *Enallagma traviatum* in New Jersey and *E. aspersum* at Phila.] EN 23: 484, Dec.

1913a Titian Ramsey Peale [sketch and portrait]. EN 24: 1–3, Jan.

——b [On opportunities for work in experimental evolution (editorial).] EN 24: 28–29, Jan.

——c The meetings at Cleveland [editorial and report]. EN 24: 77–81, Feb.

——d William Forsell Kirby (with H. Skinner and J. A. G. Rehn) [obituary, portrait]. EN 24: 93–96, Feb.

——e Peter Cameron [obituary] EN 24: 96, Feb.

——f [Difficulty in ascertaining exact structure and functions of animals (editorial).] EN 24: 131–132, Mar.

——g Bromeliadicolous insects [note on recent works]. EN 24: 133–134, Mar.

——**h** [On habits of *Thaumatoneura*, and difficulty of distinguishing ♀♀ of *T. pellucida* and *T. inopinata*.] EN 24: 141, Mar.

——**i** An entomologist in Costa Rica. [Abstract of address before the Entomological Society of America, Cleveland, Ohio, Jan. 1, 1913] Ann. Ent. Soc. Amer. 6: 1–4, Mar.

——**j** [On entomological literature and the need of abstracting (editorial).] EN 24: 178–179, Apr.

——**k** [A contribution to the morphology and biology of insect galls, by A. Cosens (review).] EN 24: 187–189, Apr.

——**l** [On honorary memberships, editorial.] EN 24: 227, May.

——**m** The fossil odonate *Phenacolestes*, with a discussion of the venation of the legion *Podagrion* Selys. Proc. Acad. Nat. Sci. Phila. 65: 225–272, ill., May.

——**n** [On a collecting trip in Scotland.] EN 24: 286–287, June.

——**o** Sir John Lubbock, Lord Avebury [obituary, with portrait]. EN 24: 289–293, July.

——**p** The species of *Nehalennia* (Odonata), including one from the eastern United States hitherto undescribed. EN 24: 310–316, ill., July.

——**q** [Importance of entomological research, editorial.] EN 24: 325, July.

——**r** [Mimikry und verwandte Erscheinungen, von Dr. Arnold Jacobi (review).] EN 24: 334–335, July.

——**s** A utilitarian use for entomology [editorial]. EN 24: 369–370, Oct.

——**t** The true male of *Nehalennia integricollis* and *N. pallidula*, n. sp. (Odon.). EN 24: 373–374, ill., Oct.

——**u** Dr. Horace Jayne [obituary, with portrait]. EN 24: 383–384, Oct.

——**v** Progress in our knowledge of the Odonata from 1895 to 1912. Trans. Second Ent. Congress, 1912. 2: 140–157, Oct.

——**w** [Entomology with special reference to its biological and economic aspects, by Justus Watson Folsom, 2nd ed. (review).] EN 24: 423–424, Nov.

——**x** [Fauna Hawaiiensis. Vol. 1, pt. iv (review).] EN 24: 424–427, Nov.

——**y** [A specimen of *Tetragoneuria* arrested in transformation.] EN 24: 431–432, Nov.

——z A naturalist in Costa Rica. Old Penn Weekly Mag., Univ. Pa., Phila. 12: 357–358, Dec.

——aa The annual entomological meetings [editorial.] EN 24: 466, Dec.

——bb [On *Nchalennia* species.] EN 24: 477–478, Dec.

——cc [On the two laminae of an odonate wing and the blood in the wings.] EN 24: 478–479, Dec.

1914a Alfred Russel Wallace [editorial]. EN 25: 34–37, Jan.

——b The influence of insects on civilization [editorial]. EN 25: 74, Feb.

——c Two books on animal ecology. [Animal communities in temperate America, by Victor E. Shelford; and, Guide to the study of animal ecology, by Charles C. Adams (reviews).] EN 25: 82–86, Feb.

——d [Les Bromeliacées épiphytes, by C. Picado (review).] EN 25: 87–88, Feb.

——e [*Erythrodiplax berenice* from Philadelphia.] EN 25: 141, Mar.

——f [Exhibit of lantern slides showing a possible antenna-cleaner in a carabid *Pachyteles seriatoporus* from Costa Rica.] EN 25: 141–142, Mar.

——g Localities in Costa Rica where Diptera were collected. Trans. Amer. Ent. Soc. 40: 1–8, Mar.

——h The ethics of publication [editorial]. EN 25: 179, Apr.

——i Charles S. Welles [obituary]. EN 25: 192, Apr.

——j The desirability of a bibliographical dictionary of entomologists. EN 25: 227–229, May.

——k [Evolution of the color pattern in the microlepidopterous genus *Lithocolletis*, by Annette Frances Braun (review).] EN 25: 236–237, May.

——l Ernest Olivier [obituary]. EN 25: 240, May.

——m E. A. Popenoe; A. G. Hammar [obituaries]. EN 25: 240, May.

——n Prevention of insect borne diseases in the army in Mexico [editorial]. EN 25: 283, June.

——o What is a species [editorial]? EN 25: 322–323, July.

——p Studies on Costa Rican Odonata. V. The waterfall-dwellers: *Thaumatoneura* imagos and possible male dimorphism. EN 25: 337–348, ill., Oct.

——q Aids to scientific work [editorial]. EN 25: 372, Oct.

——r [On *Anomalagrion hastatum*.] EN 25: 428, Nov.

——s Notes on a gomphine exuvia from Williams Lake, Matagorda Co., Texas. EN 25: 454–455, Dec.

——t The annual entomological meetings [editorial]. EN 25: 467, Dec.

——u The first quarter-century of the News [editorial]. EN 25: 467–468, Dec.

——v Local arrangements for the annual meetings. EN 25: 470–471, Dec.

——w [Water reptiles of the past and present, by Samuel Wendell Williston (review).] EN 25: 477, Dec.

——x [Exhibit of drawings of *Anisagrion allopterum* illustrating change of color with age.] EN 25: 478, Dec.

——y [Functions of horns in Scarabaeidae.] EN 25: 478, Dec.

——z [On eye-size and habits in certain Odonata and Lepidoptera.] EN 25: 479–480, Dec.

1915a August Weismann [obituary]. EN 26: 44–47, Jan.

——b Charles Sedgwick Minot [obituary]. EN 26: 47–48, Jan.

——c The dimorphism or dichromatism of the females of *Ischnura verticalis*. EN 26: 62–68, Feb.

——d Selection of papers for scientific meetings [editorial]. EN 26: 84, Feb.

——e William Webster; Daniel Elmer Salmon [obituaries]. EN 26: 96, Feb.

——f The intensive study of species [editorial]. EN 26: 182, Apr.

——g Henri Achard de Bonvouloir. Jean Perez. Pierre Emile Gounelle. Leon Vibert. Albert Cheux. [Obituary notices]. EN 26: 191–192, Apr.

——h A naturalist in Costa Rica [public lecture]. Univ. of Penna. Bull. 15, No. 3, Pt. 5: 63–75, Apr.

——i [Key to the families of North American insects, by Charles T. Brues and A. L. Melander (review).] EN 26: 233–234, May.

——j [Handbook of medical entomology, by Wm. A. Riley and O. A. Johannsen (review).] EN 26: 234–236, May.

——k [*Williamsonia* (*Cordulia*) *lintneri* in Massachusetts.] EN 26: 238–239, May.

——l [Notes on *Telagrion daeckii*, *Protoneura amatoria*, *Psaironeura remissa*.] Proc. U. S. Nat. Mus. 48: 613, 616, 624, 629, May.

——m Incomplete titles [editorial]. EN 26: 280, June.

——n Studies on Costa Rican Odonata. VI. The waterfall-dwellers: The transformation, external features and attached diatoms of *Thaumatoneura* larva. EN 26: 295–305, ill., July.

——o A contrast and a hope [editorial]. EN 26: 326, July.

——p [*Anax longipes* ♀ recorded from Clementon, N. Jersey.] EN 26: 334, July.

——q [On respiratory organs of *Calopteryx* and on diatoms on legs of *Thaumatoneura*.] EN 26: 376, Oct.

——r Covington Few Seiss [obituary]. EN 26: 383–384, Oct.

——s Studies on Costa Rican Odonata. VII. The waterfall-dwellers: The internal organs of *Thaumatoneura* larva and the respiration and rectal tracheation of Zygopterous larvae in general. EN 26: 385–395, ill., Nov.; 435–447, Dec.

——t Jean Henri Fabre [editorial]. EN 26: 423–424, Nov.

1916a Remarks on labelling [editorial]. EN 27: 36, Jan.

——b [The embryology of the honey bee, by James Allen Nelson (review).] EN 27: 41–43, Jan.

——c Raphael Meldola [obituary]. EN 27: 46–47, Jan.

——d Francis Marion Webster [obituary]. EN 27: 96, Feb.

——e Discontinue the Fahrenheit thermometric scale [editorial]. EN 27: 134–135, Mar.

——f How many languages must an entomologist know [editorial]? EN 27: 177, Apr

——g Adele Marion Fielde [obituary]. EN 27: 191–192, Apr.

——h The completion of a great work, Biologia Centrali-Americana. EN 27: 193–197, with portraits of Frederick Ducane Godman and Osbert Salvin. Pls. X, XI, May.

——i The Biologia Centrali-Americana [editorial]. EN 27: 235–236, May.

——j A duty of specialists [editorial]. EN 27: 278, June.

——k The need of carefulness in identification [editorial]. EN 27: 332, July.

——l [The life of inland waters by James G. Needham and J. T. Lloyd (review).] EN 27: 336, July.

——m A new department in the News [editorial]. EN 27: 371, Oct.

——n [On the food habits of dragonflies.] EN 27: 378–379, Oct.

——o [Fragments of insects on silk larval cases of lepidopterous insect in Costa Rica]. EN 27: 379–380, Oct.

——p [On *Gomphus amnicola* and *quadricolor* from Penna.] EN 27: 380, Oct.

——q How knowledge of insects grows [editorial] EN 27: 425, Nov.

——r The convocation week meetings [editorial]. EN 27: 465, Dec.

1917a [Note on *Megalagrion deceptor* McLach.?] EN 28: 13, footnote, Jan.

——b The News for 1917 [editorial]. EN 28: 39–40, Jan.

——c The convocation week meetings—a retrospect [editorial]. EN 28: 77–78, Feb.

——d A year of Costa Rican natural history (with Amelia Smith Calvert). New York, The Macmillan Co., pp. xxii + 577, maps and illus., Feb. 21.

——e Specialization in entomology [editorial]. EN 28: 140–141, Mar.

——f Ants vs. men [editorial]. EN 28: 185–186, Apr.

——g On *Hagenius brevistylus*. Proc. Acad. Nat. Sci. Phila. 69: 205, June 12.

——h Beltian bodies on Acacia. Proc. Acad. Nat. Sci. Phila. 69: 205–206, June 12.

——i Studies on Costa Rican Odonata. VIII. A new genus allied to *Cora*. EN 28: 259–263, June.

——j *Calopteryx dimidiata apicalis* (Odon.). EN 28: 266, June.

——k The national defense against and by insects [editorial]. EN 28: 283–284, June.

——l [Description of living colors of *Neoneura esthera* Williamson, n. sp., pp. 235–236, and of *N. amelia* Calvert, pp. 240–241, both from Costa Rica], in Williamson, E. B.: The genus *Neoneura* (Odonata). Trans. Amer. Ent. Soc. 43: 211–246, ill., June.

——m Charles Owen Waterhouse, J. Platt Barrett, Charles Adolphus Briggs [obituaries]. EN 28: 337, July.

——n Arthur E. Gibbs, Bertil Poppius, Roland Trimen, Orson Bennett Johnson [obituaries]. EN 28: 338, July.

——o The lack of entomologists [editorial]. EN 28: 373, Oct.

——p Helen Grier LeConte [obituary]. EN 28: 384, Oct.

——q The News for 1918 [editorial]. EN 28: 424, Nov.

——r The convocation week meetings [editorial]. EN 28: 468–469, Dec.

——s [The biology of dragonflies, by R. J. Tillyard (review).] EN 28: 475–479, Dec.

——t [*Miocora peraltica* and *Hagenius brevistylus* (exhibit, remarks).] EN 28: 480, Dec.

——u Insects and human mortality in war. [public lecture]. Old Penn Weekly Review, Univ. of Pa., Phila. 16: 297–302, Dec. Also in: Univ. of Pa. Bull. (18) No. 6, pt. 1: 131–149, Aug. 1918.

1918a The present crisis [editorial]. EN 29: 33, Jan.

——b Odonata [on the value of larval exuviae in the study of distribution]. EN 29: 37–38, Jan.

——c Entomology at the convocation week meetings [editorial]. EN 29: 71–72, Feb.

——d [Exhibit of Bibionid fly larvae from soil.] EN 29: 79, Feb.

——e An appeal for cooperation [editorial]. EN 29: 112, Mar.

——f [Field book of insects, by Frank E. Lutz (review).] EN 29: 155–156, Apr.

——g The forms of generic and of specific names [editorial]. EN 29: 192–193, May.

——h [Exhibit of Odonata from central Pennsylvania.] EN 29: 198, May.

——i Making the editorial of greater use to entomology [editorial]. EN 29: 232–233, June.

——j Eruptions of the Costa Rivan volcano Irazú in 1917–18. Proc. Acad. Nat. Sci. Phila. 70: 73, June.

——k Central High School zoologists. The Mirror, Central High School of Phila. 42: 53–56, June.

——l "Making the editorial of greater use to entomology" [editorial]. EN 29: 270, July.

——m No simple life for insects [editorial]. EN 29: 313, Oct.

——n Entomology in central Europe [editorial]. EN 29: 353, Nov.

——o Rules and suggestions for our contributors [editorial]. EN 29: 389–391, Dec.

1919a The News for 1919 [editorial]. EN 30: 23, Jan.

——b Botanical Abstracts [notice]. EN 30: 25, Jan.

——c Odonata Anisoptera from Guatemala. Collected by Messrs. William Schaus and John T. Barnes. EN 30: 31–38, 72–78, ill., Feb., Mar.

——d Entomology at the convocation week meetings [editorial]. EN 30: 49, Feb.

——e Victor Arthur Erich Daecke [obituary]. EN 30: 58–60, Feb.

——f An appeal from Belgium [for Selys catalogue]. EN 30: 84–85 and Science 49: 264–265, Mar.

——g (With Witmer Stone) Benjamin Hayes Smith [obituary]. EN 30: 90, Mar.

——h Zoological Laboratory receives collection of beetles. Penna. Gazette, Univ. Penna. 17: 649, Apr. Also in Alumni Register, U. of Pa. 21: 610–611, May.

——i Frederic DuCane Godman [obituary, portrait]. EN 30: 121–123, May.

——j Entomologia resurgens Belgica [editorial]. EN 30: 144, May.

——k Odonata Zygoptera from Guatemala. Collected by Messrs. William Schaus and John T. Barnes. EN 30: 160–165, June.

——l A League of Nations means the metric system [editorial]. EN 30: 175, June.

——m International relations of entomological societies after the war [editorial]. EN 30: 204–205, July.

——n [Report of the Imperial Entomologist, 1917–1918, by T. Bainbridge Fletcher (review).] EN 30: 237, Oct.

——o The use of the term larva [editorial]. EN 30: 265–266, Nov.

——p [An investigation of the louse problem, by Moore and Hirschfelder (review).] EN 30: 270, Nov.

——q [Seventeenth report of the State Entomologist of Minnesota, by A. G. Ruggles (review).] EN 30: 270, Nov.

——r After thirty years [editorial]. EN 30: 299, Dec.

——s Gundlach's work on the Odonata of Cuba; a critical study. Trans. Amer. Ent. Soc. 45: 335–396, Pls. XXXIII–XXXV, Dec.

1920a Some New Year's resolutions for the entomologist [editorial]. EN 31: 22, Jan.

——b [Libellulinen monographisch bearbeitet, von Dr. F. Ris (review).] EN 31: 26–28, Jan.

——c George Bringhurst Cresson [obituary]. EN 31: 29–30, Jan.

——d Entomology at the convocation week meetings [editorial]. EN 31: 56–57, Feb.

——e A bust of the late Professor E. D. Cope. Penna. Gazette 18: 487–488, Feb.; Science 51: 264–265, Mar.; Alumni Register, Univ. Pa. 22: 381–382, Mar.

——f A fifty years' editorship and arthropods [editorial on Sir Ray Lancaster]. EN 31: 83–84, Mar.

——g George Macloskie [obituary]. EN 31: 89–90, Mar.

——h Oliver Spink Westcott [obituary]. EN 31: 119–120, Apr.

——i Remember the veterans [editorial]. EN 31: 137, May.

——j [Philippine wasp studies, Part I, by S. A. Rohwer (review).] EN 31: 145–147, May.

——k Lord Walsingham [obituary]. EN 31: 148–149, May.

——l Entomology in the United States National Museum [editorial]. EN 31: 174, June.

——m [An introduction to entomology, by John Henry Comstock (review).] EN 31: 208–209, July.

——n [A little gateway to science. Hexapod stories, by Edith M. Patch (review).] EN 31: 209–210, July.

——o Shall the subscription price of the News be increased [editorial]? EN 31: 226, Oct.

——p Studies in Costa Rican Odonata. IX. *Sympetrum*, with description of a new species. EN 31: 253–259, ill., Nov.

——q Mental attitude toward insects [editorial]. EN 31: 263, Nov.

——r Program and price of the News for 1921 [editorial]. EN 31: 295, Dec.

——s The Costa Rican species of *Epigomphus* and their mutual mating adaptations (Odonata). Trans. Amer. Ent. Soc. 46: 323–354, ill., Dec.

1921a Another New Year's resolution [editorial]. EN 32: 25, Jan.

——b [On Gundlach's work and on *Enallagma pollutum*.] EN 32: 32, Jan.

——c The role of insects and rodents in the transmission of disease. (Abstract.) Dept. Publ. Health, Phila., Mo. Bull. 6: 2–5, Jan.

——d Entomology at the convocation week meetings of 1920–21 [editorial]. EN 32: 55–56, Feb.

——e [*Sympetrum atripes*.] EN 32: 82, Mar.

——f The influence of insects on human history [editorial]. EN 32: 90, Mar.

——g [On copulation in *Epigomphus*.] EN 32: 96, Mar.

——h Thomas Bellerby Wilson [editorial]. EN 32: 119–120, Apr.

——i [Insects and human welfare, by Charles Thomas Brues (review).] EN 32: 125–126, Apr.

——j This means you [editorial]. EN 32: 152, May.

——k [Report upon a collection of Coccidae from Lower California, by Gordon Floyd Ferris (review).] EN 32: 158, May.

——l Dr. H. H. Field and the Concilium Bibliographicum [editorial]. EN 32: 182–183, June.

——m A new entomological journal—and in Austria [note]! EN 32: 184–185, June.

——n Louis Compton Miall [obituary]. EN 32: 191–192, June.

——o The importance of collecting [editorial]. EN 32: 214–215, July.

——p [Insect pests of farm, garden and orchard, by E. Dwight Sanderson. Second edition revised by Leonard Marion Peairs (review).] EN 32: 220–221, July.

——q [Report of the proceedings of the Third Entomological Meeting held at Pusa (review).] EN 32: 221–222, July.

——r [Human parasitology by Damaso Rivas; and Parasites and parasitosis of the domestic animals, by B. M. Underhill (review).] EN 32: 222–223, July.

——s That he who runs may read—[editorial]. EN 32: 242, Oct.

——t [Eighteenth report, State Entomologist of Minnesota, by A. G. Ruggles (review).] EN 32: 254–255, Oct.

——u The abstracting of scientific papers [editorial]. EN 32: 278, Nov.

——v [Applied entomology, by H. T. Fernald (review).] EN 32: 285–286, Nov.

——w The insects in the United States National Museum [editorial]. EN 32: 313.

——x [An abstract of the legislation in force in the British Empire dealing with plant pests and diseases up to the year 1920, compiled by E. Marguerite Ralfs (review).] EN 32: 320, Dec.

——y *Gomphus dilatatus, vastus* and a new species, *lineatifrons* (Odonata). Trans. Amer. Ent. Soc. 47: 221–232, ill., Dec.

1922a The boundless field of entomology [editorial]. EN 33: 29, Jan.

——b Entomology at the convocation week meetings, December, 1921 [editorial]. EN 33: 53–55, Feb.

——c Caroline Burling Thompson [obituary]. EN 33: 62–64, Feb.

——d Those incomplete titles again [editorial]. EN 33: 89, Mar.

——e Zoological bibliographies [editorial]. EN 33: 119–120, Apr.

——f Thomas Algernon Chapman [obituary]. EN 33: 127–128, Apr.

——g Georg von Seidlitz, George Blundell Longstaff, Frederick William Lambert Sladen, Thomas W. Fyles [obituaries]. EN 33: 128, Apr.

——h Methods for expressing the association of different species. Ecology 3: 163–165, Apr.

——i The conservation of natural conditions [editorial]. EN 33: 150, May.

——j [On *Palaemnema* species.] EN 33: 156, May.

——k Ernest Rousseau [obituary]. EN 33: 158–159, May.

——l Sir Patrick Manson [obituary]. EN 33: 159, May.

——m Collect data first, specimens second [editorial]. EN 33: 185, June.

——n [*Gomphus dilatatus, lineatafrons* and *vastus* (exhibit, remarks).] EN 33: 191, June.

——o On firing shot [editorial]. EN 33: 217, July.

——p [The psychic life of insects, by E. L. Bouvier (review).] EN 33: 222–223, July.

——q [Report of the proceedings of the fourth entomological meeting held at Pusa (review).] EN 33: 223–224, July.

——r The need of greater precision in taxonomic literature [editorial]. EN 33: 241, Oct.

——s [Nomenclator coleopterologicus, by Sigm. Schenkling and R. Schmidt (review).] EN 33: 252–253, Oct.

——t [University of Iowa Studies (Nat. Hist.) X, I. (Stoner on Scutelleroidea of Barbados, Antigua and Douglas Lake, Mich., Caudell on Orthoptera and Dermaptera of Barbados and Antigua. (review).] EN 33: 253, Oct.

——u [Report of the Imperial Entomologist 1920–21, by T. Bainbrigge Fletcher (review).] EN 33: 254, Oct.

——v William Lucas Distant, Henry Rowland-Brown [obituaries]. EN 33: 254–256, Oct.

——w Insect surveys [editorial]. EN 33: 279–280, Nov.

——x "He helped me when no others volunteered" [editorial in re Charles A. Blake]. EN 33: 311, Dec.

——y [Ectoparasites, edited by K. Jordan and N. Charles Rothschild (review).] EN 33: 316–317, Dec.

——z Dr. David Sharp [obituary]. EN 33: 318–320, Dec.

1923a Entomology at the convocation week meetings, December, 1922 [editorial]. EN 34: 55–56, Feb.

——b A possible service to entomologists [editorial]. EN 34: 86, Mar.

——c A supplementary note on *Gomphus dilatatus* (Odon.: Aeshnidae). EN 34: 87–88, Mar.

——d *Leucorhinia proxima* at high altitude in Colorado (Odon.: Libellulidae). EN 34: 88, Mar.

——e [Catalogo Sistematico y sinonimico de los odonatos del Ecuador, por el Prof. Francisco Campos R. (review).] EN 34: 94, Mar.

——f [On *Gomphus dilatatus;* on *Mecistogaster* and *Megaloprepus* capturing spiders.] EN 34: 95, Mar.

——g The number of living insects [editorial]. EN 34: 122, Apr.

——h [Entomology with special reference to its ecological aspects, by Justus Watson Folsom (review).] EN 34: 127–128, Apr.

——i Studies on Costa Rican Odonata. X. *Megaloprepus,* its distribution, variation, habits and food. EN 34: 129–135, 168–174, ill., May, June.

——j Those unlabelled figures [editorial]. EN 34: 153–154, May.

——k [A naturalist on Lake Victoria with an account of sleeping sickness and the tse-tse fly, by G. D. Hale Carpenter (review).] EN 34: 159–160, May.

——l The worthy flea [editorial]. EN 34: 187, June.

——m The geographical distribution of insects and the age and area hypothesis of Dr. J. C. Willis. Amer. Naturalist 57: 218–229, May-June.

——n The Zoological Record [editorial]. EN 34: 216–217, July.

——o [Historia de la influencia extranjera en el desenvolvimiento educacional y cientifico de Costa Rica, por Luis Felipe Gonzalez (review).] Science 58: 71–73, July.

——p William Evans, A. L. Montandon, William Weeks Fowler, Paul Mabille, Eugene Boullet, Ed Blanc [obituaries]. EN 34: 255–256, Oct.

——q Give! [editorial re Aldrich's gift to U. S. Nat. Mus.]. EN 34: 280, Nov.

——r Again, Give! [editorial re Zool. Record]. EN 34: 314, Dec.

1924a Entomology at the convocation week meetings, December 27, 1923 to January 2, 1924 [editorial]. EN 35: 66–68, Feb.

——b [Nineteenth report, State Entomologist of Minnesota, by A. G. Ruggles (review).] EN 35: 75, Feb.

——c [Reports on certain arthropods . . . of the Barbados-Antigua Expedition of 1918. Univ. Iowa Stud. Nat. Hist., X, No. 3, (review).] EN 35: 75–76, Feb.

——d Flying men and insects [editorial]. EN 35: 101–102, Mar.

——e Professor Jaques Loeb [editorial]. EN 35: 142–143, Apr.

——f Charles Swinhoe, Theodore Wood [obituaries]. EN 35: 152, Apr.

——g Charles Meredith Burk, M.D. [obituary]. Science 59: 316, Apr.; Penna. Gazette 22: 588, Apr.; Alumni Register, Univ. Pa. 26: 568, May.

——h The generic characters and the species of *Philogenia* Selys (Odonata: Agrionidae). Trans. Amer. Ent. Soc. 50: 1–56, ill., May.

——i [On *Philogenia* species and the type of *Enallagma pallidum* Root.] EN 35: 189, May.

——j The ages of some existing entomological journals [editorial]. EN 35: 216–217, June.

——k Louis Albert Peringuey [obituary]. EN 35: 262, July.

——l Francis William Cragg, Arthur Hugh Jones, Thomas Nelson Annandale [obituaries]. EN 35: 263–264, July.

——m Herbert Campion [obituary]. EN 35: 265–266, July.

——n The supposed male of *Ophiogomphus howei* Bromley (Odon.: Aeshnidae). EN 35: 345–347, ill., Dec.

——o George H. Horn and Ezra T. Cresson [editorial]. EN 35: 368–369, Dec.

——p Clara Southmayd Ludlow [obituary]. EN 35: 379–380, Dec.

——q William Albert Locy [obituary]. EN 35: 380, Dec.

1925a An international congress of entomology in 1925? [editorial]. EN 36: 27, Jan.

——b How to meet the rising cost of publication [editorial]. EN 36: 27–28, Jan.

——c Entomology at the convocation week meetings, December 29, 1924 to January 3, 1925 [editorial]. EN 36: 55–57, Feb.

——d [Report of the Proceedings of the fifth entomological meeting held at Pusa (review).] EN 36: 63–64, Feb.

——e [An introduction to entomology, by John Henry Comstock (review).] EN 36: 94–95, Mar.

——f Hope [editorial]. EN 36: 122, Apr.

——g [Exhibit of female *Papilo turnus* intermediate in coloring between black and yellow forms of this sex, also the moth *Galasa rubidana* in coitu.] EN 36: 128, Apr.

——h Give us entomological news [editorial]. EN 36: 147–148, May.

——i [The Revista Chilena de Historia Natural, Vol. 27 (review).] EN 36: 157–158, May.

——j Fiji-New Zealand expedition, by C. C. Nutting, R. B. Wylie, A. O. Thomas and Dayton Stoner, 1924 (review).] EN 36: 158–159, May.

——k "Our financial column" [editorial]. EN 36: 184, June.

——l Paul Revere Myers [obituary]. EN 36: 192, June.

——m A reminder for collectors of insects [editorial]. EN 36: 208, July.

——n [A bibliography of American natural history, by Max Meisel (review).] EN 36: 219, July.

——o Eugene Simon [obituary]. EN 36: 222–224, July.

——p Evolutionary entomology [editorial]. EN 36: 244, Oct.

——q [On the type of *Enallagma dubium* Root.] EN 36: 254, Oct.

——r [On *Sympetrum vicinum*.] EN 36: 255, Oct.

——s [A monograph of the Plecoptera or stoneflies of America north of Mexico, by J. G. Needham and P. W. Claasen (review).] EN 36: 314–315, Dec.

——t [A bibliography of the North American Hemiptera-Heteroptera, by Howard Madison Parshley (review).] EN 36: 315–316, Dec.

——u [Exhibit of supposed ♀ *Phengodes laticollis* from Corning, Penna.] EN 36: 317, Dec.

——v The earlier larval instars of the Odonata. Anat. Record 31: 327, Dec.

1926a A suggestion for subject indexes [editorial]. EN 37: 17–18, Jan.

——b Franz Friedrich Kohl [obituary]. EN 37: 31, Jan.

——c Walter David Hunter [obituary]. EN 37: 32, Jan.

——d Entomology at the "convocation week" meetings, December 28, 1925, to January 2, 1926 [editorial]. EN 37: 54–56, Feb.

——e Harry Arthur Gossard [obituary]. EN 37: 64, Feb.

——f Proof-reading and the News [editorial]. EN 37: 82, Mar.

——g [The North American Dragonflies of the genus *Somatochlora*, by E. M. Walker (review).] EN 37: 90–92, Mar.

——h Harold Maxwell Lefroy [obituary]. EN 37: 94–95, Mar.

——i The need for systematic entomologists [editorial]. EN 37: 116–117, Apr.

——j [Concerning the habits of insects, by F. Balfour-Browne (review).] EN 37: 124–126, Apr.

——k Edward Albert Butler, Sigmund Exner, G. B. Grassi [obituaries]. EN 37: 126–128, Apr.

——l Relations of a late autumnal dragonfly to temperature. Ecology 7: 185–190, Apr.

——m Anniversary congratulations to Vienna [editorial]. EN 37: 153, May.

——n [Estudios entomologicos lepidopteros, by R. Torres Rojas (review).] EN 37: 160, May.

——o Louis Bartholomew Woodruff [obituary]. EN 37: 160, May.

——p Ezra Townsend Cresson [obituary, portrait]. EN 37: 161–163, June.

——q Benjamin Pickman Mann [obituary]. EN 37: 192, June.

——r Henry Skinner [editorial]. EN 37: 215, July.

——s Ezra Townsend Cresson [obituary]. Science 64: 8–9, July.

——t The entomological work of Henry Skinner. EN 37: 225–233, portrait, Oct.

——u Abbé Jean Jaques Kieffer [obituary]. EN 37: 280, Oct.

——v Fernand Meunier [obituary]. EN 37: 312, Nov.

——w Welcome to Philadelphia [editorial]. EN 37: 333, Dec.

——x [Two recent text-books on ecology. Animal ecology, by A. S. Pearse; and Animal ecology with especial reference to insects, by Royal N. Chapman (reviews).] EN 37: 343–344, Dec.

1927a Francis David Morice, Tasushi Nawa, Ermanno Giglio-Tos [obituaries]. EN 38: 32, Jan.

——b Entomology at the "convocation week" meetings, December 27, 1926, to January 1, 1927 [editorial]. EN 38: 55–57, Feb.

——c John Coney Moulton [obituary]. EN 38: 64, Feb.

——d [First lessons in nature study, by Edith M. Patch (review).] EN 38: 93, Mar.

——e [Zoologie im Grundriss, von Walter Stempell (review).] EN 38: 93, Mar.

——f New characteristics in identifying dragonfly larvae. EN 38: 95, Mar.

——g Cyril Luckes Withycombe, J. C. Huguenin, George Lewis, Francis David Morice [obituaries]. EN 38: 96, Mar.

——h The tendency to social life. Being a review of Les Sociétés d'insectes, leur origine—leur évolution, by William Morton Wheeler. Quart. Rev. Biol. 11: 119–124, Mar.

——i The situation of systematic entomology [editorial]. EN 38: 119–120, Apr.

——j Annie Trumbull Slossen [obituary]. EN 38: 128, Apr.

——k Does familiarity breed contempt? [editorial on *Calopteryx* vs. *Agrion*]. EN 38: 185–186, June.

——l William Lochhead, Frank R. Mason [obituaries]. EN 38: 196, June.

——m René Martin [obituary, portrait and autograph]. EN 38: 197–205, July.

——n [A guide to the study of fresh-water biology, by James G. Needham and Paul R. Needham (review).] EN 38: 252–253, Oct.

——o [General catalogue of the Hemiptera, Fas. I. Membracidae, by W. D. Funkhauser (review).] EN 38: 254–255, Oct.

——p [Biological survey of the Mount Desert region, conducted, by William Procter; Part 1. The insect fauna, by Charles Willison Johnson (review).] EN 38: 255–256, Oct.

——q [Morphology and mechanism of the insect thorax, by R. E. Snodgrass (review).] EN 38: 256–257, Oct.

——r [Economic biology for students of social science, by Philip C. Esdaile (review).] EN 38: 257, Oct.

——s [Exhibit of *Calopteryx maculata floridana*, and Bergmann's rule.] EN 38: 258–259, Oct.

——t Oliver Erichson Janson, George Taylor Porritt, Julius Seelhorst Meves, Leon Diguet, Charles Fuller Baker, Alfred Möller, Karl Baldus, M. L. Gedoelst [obituaries]. EN 38: 260–262, Oct.

——u [Guide to the insects of Connecticut, Part V. The Odonata or dragonflies of Connecticut, by Philip Garman (review).] EN 38: 294–296, Nov.

——v Changes in the News for 1928 [editorial]. EN 38: 316–317, Dec.

——w George Charles Champion [obituary]. EN 38: 326–328, Dec.

1928a The labelling of plates [editorial]. EN 39: 21, Jan.

——b Frederick Leonard Washburn [obituary]. EN 39: 32, Jan.

——c Antonio Berlese [obituary]. EN 39: 32, Jan.

——d Order Odonata, in: A list of insects of New York (with James G. Needham, E. M. Walker and W. T. Davis). Cornell Univ. Exp. Sta. Memoir 101: 45–56, Jan.

——e Entomology at the "convocation week" meetings, December 26 to 31, 1927 [editorial]. EN 39: 60–61, Feb.

——f Ezra Townsend Cresson. A contribution to the history of entomology in North America. Trans. Amer. Ent. Soc. 52, Suppl.: i-lxiii, ill.

——g [Zoology of Colorado, by Theodore D. A. Cockerell (review).] EN 39: 101–102, Mar.

——h Report on Odonata, including notes on some internal organs of the larvae, collected by the Barbados-Antigua Expedition from the University of Iowa in 1918. Univ. Iowa Studies Nat. Hist. 12 (2): 1–44, ill., Mar.

——i [List of insects of New York (review).] EN 39: 135–136, Apr.

——j A graduate student I ? General Mag. and Hist. Chron. Univ. Penna. 20: 328–336, Apr.

——k The Fourth International Congress of Entomology [editorial]. EN 39: 252, Oct.

——l The Fourth International Congress of Entomology. EN 39: 252–256, Oct.

——m Enrico Brunetti, John Hartley Durant, J. W. Yerbury, Gervaise F. Matthew, Henri du Buysson, Eugene Amandus Schwartz, Jean Brethes [obituaries]. EN 39: 295–296, Nov.

1929a Must "Konowia" be discontinued? EN 40: 24, Jan.

——b [Elementary lessons on insects, by James G. Needham (review).] EN 40: 28–29, Jan.

——c Entomology at the "convocation week" meetings, December 27, 1928, to January 2, 1929 [editorial]. EN 40: 57–59, Feb.

——d Edwin Eddy Calder [obituary]. EN 40: 99–100, Mar.

——e Harrison Gray Dyar [obituary]. EN 40: 100, Mar.

——f William Rhodes Reinicke [obituary]. EN 40: 134, Apr.

——g [A popular guide to the study of insects by E. Porter Felt (review).] EN 40: 163–164, May.

——h Colonel Wirt Robinson [obituary]. EN 40: 168, May.

——i Notice to contributors to the News. EN 40: 233, July.

——j Different rates of growth among animals with special reference to the Odonata. Proc. Amer. Phil. Soc. 68: 227–274, Nov.

——k The significance of odonate larvae for insect phylogeny. Trans. IV. Intern. Congr. Ent. 2: 918–925, Dec.

1930a [Insects their structure and life, by George H. Carpenter (review).] EN 41: 24–25, Jan.

——b [Insects, ticks, mites and venomous animals of medical and veterinary importance, by Walter Scott Patton and Alwen M. Evans (review).] EN 41: 25–28, Jan.

——c Entomology at the convocation week meetings, December 27, 1929, to January 2, 1930 [editorial]. EN 41: 56–58, Feb.

——d Alfred Edwin Eaton, Frank Hurlburt Chittenden, James Walker McColloch, George F. Gaumer [obituaries]. EN 41: 63–64, Feb.

——e [General catalogue of the Hemiptera. Fasc. II, Mesovelidae par Géza Horváth; Fasc. III, Pyrrhocoridae by Roland F. Hussey (reviews).] EN 41: 144–145, Apr.

——f [Die Weberknechte Ungarns, von Gabriel von Kolosváry (review).] EN 41: 146, Apr.

——g William Barnes [obituary]. EN 41: 214, June.

——h *Dynastes tityus* (Scarabaeid) in Pennsylvania and the Rathvon and Auxer collections of Coleoptera. EN 41: 195–201, 234–237, June, July.

——i [A manual for the study of insects, Revised edition, by John Henry Comstock et al (review).] EN 41: 273–274, Oct.

——j George Dimmock [obituary] EN 41: 280, Oct.

——k James Waterston [obituary]. EN 41: 280, Oct.

——l Odonata collected in Liberia and the Belgian Congo. In: The African Republic of Liberia and the Belgian Congo. Edited by Richard P. Strong. Harvard Univ. Press, Vol. 2: 1039–1044, ill.

——m [Insects their ways and means of living, by Robert Evans Snodgrass (review).] EN 41: 341–343, Dec.

——n [The morphology and evolution of the insect head and its appendages, by R. E. Snodgrass (review).] EN 41: 343–344, Dec.

——o [The thoracic mechanism of a grasshopper and its antecedents, by R. E. Snodgrass (review).] EN 41: 344, Dec.

1931a Entomology at the Convocation week meetings, December 29, 1930, to January 3, 1931 [editorial]. EN 42: 56–58, Feb.

——b [Thomas Say, early American naturalist, by Harry B. Weiss and Grace M. Ziegler (review).] EN 42: 90–93, Mar.

——c [The African republic of Liberia and the Belgian Congo, edited by Richard P. Strong (review).] EN 42: 93–94, Mar.

——d James H. Emerton [obituary]. EN 42: 95, Mar.

——e The generic characters and the species of *Palaemnema* (Odonata: Agrionidae). Trans. Amer. Ent. Soc. 57: 1–110, Pls. I–XXI, Mar.

——f [Demons of the dust, by William Morton Wheeler (review).] EN 42: 123–124, Apr.

——g Dr. Friederich Ris [obituary, portrait and autograph]. EN 42: 96, Mar.; 181–191, July.

——h The life of Thomas Say, the father of American zoology [a review]. The Phila. Inquirer, Apr. 18, p. 7.

——i [A laboratory guide to the study of the wings of insects; Suggestions for the instructor; The venation of insect wings; The teaching of the principle of homologies to elementary classes in biology, and the use of the phylogenetic series in the laboratory; all by J. Chester Bradley (reviews).] EN 42: 238–239, Oct.

1932a Andrew Gray Weeks [obituary]. EN 43: 28, Jan.

——b Entomology at the convocation week meetings, December 28, 1931, to January 2, 1932 [editorial]. EN 43: 46–47, Feb.

——c Frederick Arthur Godfrey Muir [obituary]. EN 43: 56, Feb.

——d Professor J. Fidel Tristan [obituary, portrait]. EN 43: 197–200, Oct.

——e Insect racketeers. EN 43: 206, Oct.

——f *Vespa crabro* L. in Pennsylvania (Hymen.: Vespidae). EN 43: 215, Oct.

——g [A textbook of agricultural entomology, by Kenneth M. Smith (review).] EN 43: 221, Oct.

——h [Classification of insects, by Charles T. Brues and A. L. Melander (review).] EN 43: 222, Oct.

——i [Fundamentals of insect life, by C. L. Metcalf and W. P. Flint (review).] EN 43: 223, Oct.

——j [General catalogue of the Hemiptera. Fasc. IV Fulgoridae Part 1 Tettigometridae, by Z. P. Metcalf (review).] EN 43: 224, Oct.

——k [Jobs for the college graduate in science by Edward J. v. K. Menge (review).] EN 43: 224, Oct.

——l Sir Ronald Ross [obituary]. EN 43: 252, Nov.

1933a Entomology at the convocation week meetings, December 27 to 31, 1932 [editorial]. EN 44: 46–47, Feb.

——b [In days agone, by W. S. Blatchley (review).] EN 44: 84, Mar.

——c Request for bibliographies. EN 44: 107, Apr.

——d [Bibliographia Odonatologica by Erich Schmidt (review).] EN 44: 163, June.

——e [A naturalist in the Guiana forest by Major R. W. G. Hingston (review).] EN 44: 193–194, July.

——f [A text-book of practical entomology, by F. Balfour-Browne; and Methods for the study of the internal anatomy of insects, by C. H. Kennedy (reviews).] EN 44: 195–196, July.

——g Frederic W. Goding [obituary]. EN 44: 196, July.

——h [Medical entomology, by William A. Riley and Oskar A. Johannsen. Medical entomology, by Robert Matheson (reviews).] EN 44: 224–225, Oct.

——i The rates of growth, larval development and seasonal distribution of the genus *Anax* (Odonata: Aeshnidae). Proc. Amer. Phil. Soc. 73: 1–70, Pls. I–IV, Nov.

1934a Two Mexican species of *Palaemnema* (Odonata: Agrionidae). Trans. Amer. Ent. Soc. 59: 377–381, Jan.

——b Entomology at the convocation week meetings, December 27, 1933, to January 2, 1934 [editorial]. EN 45: 47–49, Feb.

——c Henry Frederick Wickham [obituary]. EN 45: 83–84, Mar.

——d William Morris Davis [obituary]. EN 45: 84, Mar.

——e [The problems of insect study, by Paul Knight (review).] EN 45: 110–111, Apr.

——f William Beutenmüller, Robert H. Wolcott [obituaries]. EN 45: 112, Apr.

——g Howard Austin Snyder [obituary]. EN 45: 140, May.

——h M. C. Van Duzee, F. S. Carr, Henry Wormsbacher [obituaries]. EN 45: 202, July.

——i [Entomology with special reference to its ecological aspects, by Justus Watson Folsom, revised by R. A. Wardle (review).] EN 45: 227–229, Oct.

——j [A general textbook of entomology, by A. D. Imms (3rd ed.) (review).] EN 45: 230, Oct.

——k Francis Metcalf Root [obituary]. EN 45: 285–286, Dec.

1935a Edward Bruce Williamson [obituary, portrait]. EN 46: 1–13, Jan., EN 44: 84, Mar., 1933.

——b Theobald Smith [obituary]. EN 46: 34, Jan.

——c Entomology at the convocation week meetings, December 27, 1934, to January 2, 1935. EN 46: 55–57, Feb.

——d [Entomologische Beihefte aus Berlin-Dahlem (review).] EN 46: 117–118, Apr.

——e Biological Abstracts [editorial]. EN 46: 168. Science 81: 591–592, June.

——f (With Ezra T. Cresson, Jr.) Paul C. Stockhausen [obituary, portrait]. EN 46: 203–204, Pl. II, Oct.

——g Colony-founding among ants, by William Morton Wheeler [review]. EN 46: 225, Oct.

——h [Insects as material for study, by G. D. Hale Carpenter (review).] EN 46: 225–226, Oct.

——i [Entoma. A directory of insect pest control (review).] EN 46: 226–227, Oct.

——j [Principles of insect morphology, by R. E. Snodgrass (review).] EN 46: 227–229, Oct.

——k Brief directions in histological technique by Elery R. Becker and R. L. Rondabush [review]. EN 46: 257, Nov.

1936a Entomological News: a statement and an appeal [editorial]. EN 47: 43–44, Feb.

——b Entomology at the convocation week meetings. December 30, 1935, to January 4, 1936 [editorial]. EN 47: 76–77, Mar.

——c [Insect enemies of shade trees, by Glenn W. Herrick (review).] EN 47: 134–135, May.

——d Prof. Anton Handlirsch [obituary]. EN 47: 168–169, June.

——e [The pioneer century of American entomology, by Harry B. Weiss (review).] EN 47: 196–197, July.

——f [Zur Kenntniss der Odonatenparasiten, von Paul Münchberg (review).] EN 47: 197–198, July.

——g The tent caterpillar. Morris Arboretum Univ. Penna. Bull. 1: 43–45, July.

——h Neotropical Aeshnas wanted (Odonata). EN 47: 213–214, Oct.

——i [A monograph of the British Neuroptera, by Frederick James Killington (review).] EN 47: 226–227, Oct.

——j Albert Pitts Morse [obituary]. EN 47: 228, Oct.

——k Charles Robertson [obituary]. EN 47: 228, Oct.

——l [General catalogue of the Hemiptera. Fasc. IV Fulgoroidea Part 2 Cixiidae, by Z. P. Metcalf (review).] EN 47: 255, Nov.

——m Justus Watson Folsom [obituary]. EN 47: 256, Nov.

——n [The more important insect enemies of books, by Harry B. Weiss and Ralph H. Carruthers (review).] EN 47: 284, Jan., 1937.

1937a Methods of rearing Odonata, in: Culture methods for invertebrate animals, by Galtsoff, Lutz, Welch and Needham. Ithaca, N. Y., 1937, pp. 270–273.

——b Financial statement of Entomological News for 1936 [editorial]. EN 48: 18–19, Jan.

——c Carroll Fox [obituary]. EN 48: 30, Jan.

——d Cyrus R. Crosby, Robin J. Tillyard [obituaries]. EN 48: 42, Feb.

——e Lawrence Bruner [obituary]. EN 48: 83, Mar.

——f Entomology at the convocation week meetings December 28, 1936, to January 2, 1937 [editorial]. EN 48: 113–114, Apr.

——g [Atlas of the scale insects of North America, by G. F. Ferris (review).] EN 48: 150, May.

——h The Japanese beetle. Arboretum Bulletin of the Associates, Morris Arboretum, Univ. Penna. 1: 109–116, July.

——i [Fragments of entomological history including some personal recollections of men and events, by Herbert Osborn (review).] EN 48: 211–212, July.

——j [The biological control of insects, by Harvey L. Sweetman (review).] EN 48: 239–240, Oct.

——k [How to know insects, by H. E. Jaques (review).] EN 48: 240–241, Oct.

——l [Animal communities in temperate America, by Victor E. Shelford (review).] EN 48: 241, Oct.

——m [A monograph of the British Neuroptera, by Frederick James Killington, Vol. II (review).] EN 48: 241–242, Oct.

1938a [A glossary of entomology, by J. R. de la Torre-Bueno (review).] EN 49: 59–60, Feb.

——b George Henry Falkiner Nuttall [obituary]. EN 49: 80, Mar.

——c [The male genitalia of orthopteroid insects, by R. E. Snodgrass (review).] EN 49: 90, Mar.

——d The larval development of dragonflies of the genus *Aeshna*. Science 87: 393–394, Apr.

——e [Recent advances in entomology, by A. D. Imms (review).] EN 49: 209–210, July.

——f Fernando Nevermann [obituary]. EN 49: 239–240, Oct.

——g New records of Odonata for southeastern Pennsylvania. EN 49: 251, Nov.

——h Biological Abstracts. EN 49: 262, Nov.

1939a Guillaume Severin [obituary]. EN 50: 58–60, Feb.

——b "Lines written for a dinner on May 31, 1939." 4 pp. privately published, no date. Distributed Oct. 7.

——c [Our shade trees, by Ephraim Porter Felt (review).] EN 50: 234, Oct.

——d [Insects of citrus and other subtropical fruits, by Henry J. Quayle (review).] EN 50: 237–238, Oct.

——e [The insects of North America, by C. S. Brimley (review).] EN 50: 238, Oct.

——f [Atlas of the scale insects of North America, by Gordon Floyd Ferris, ser. II (review).] EN 50: 238–239, Oct.

——g [The Fulgorina of Barro Colorado and other parts of Panama, by Z. P. Metcalf (review).] EN 50: 239–240, Oct.

——h [Bats, by Glover Morrill Allen (review).] EN 50: 299, Dec.

1940a Royal N. Chapman [obituary]. EN 51: 3, Jan.

——b W. E. Britten [tribute]. EN 51: 9, Jan.

——c Walther Horn [obituary]. EN 51: 11, Jan.

——d The Entomological Society of India. EN 51: 20, Jan.

——e [Meadow and pasture insects, by Herbert Osborn assisted by Dorothy J. Knull (review).] EN 51: 28–30, Jan.

——f Henry McElderry Knower [obituary]. EN 51: 51, Feb.

——g [Fleas of eastern United States, by Irving Fox (review).] EN 51: 119–120, Apr.

——h [Fernald Club Yearbook for 1939 (review).] EN 51: 166, June.

——i [Compendium of entomological methods. Part I, Collecting mayflies, by Jay R. Traver (review).] EN 51: 178, June.

——j Invasion from Africa (Diptera: Culicidae). EN 51: 168, June.

——k [Studies in the Mecoptera, by L. R. Setty and Kenneth W. Cooper (review).] EN 51: 179, June.

——l [The chemistry and toxicology of insecticides, by Harold H. Shepard (review).] EN 51: 179–180, June.

——m [Living Light, by E. Newton Harvey (review).] EN 51: 208–210, July.

——n Willis Stanley Blatchley, Ralph Voris [obituaries]. EN 51: 210, July.

——o Kenneth J. Morton [obituary]. EN 51: 237–240, Oct.

——p Edward Payson Van Duzee [obituary]. EN 51: 240, Oct.

——q How we play when the boss is away. Bios 11: 150–151, Oct. [Address at dinner to Prof. C. E. McClung.]

——r [An introduction to entomology, by John Henry Comstock, 9th edition revised (review).] EN 51: 269–270, Nov.

——s [The biology and control of wireworms, by C. A. Thomas (review).] EN 51: 300, Dec.

——t Adolfo Lutz, Gustavus August Eisen [obituaries]. EN 51: 300, Dec.

1941a Katherine Mayo [obituary]. EN 52: 29–30, Jan.

——b Otto Emil Plath, Grace Adelbert Sandhouse, John Patillo Turner, F. W. Edwards, Charles William Woodworth [obituaries]. EN 52: 30, Jan.

——c Catalogues of current scientific literature. Science, 93: 209–210, Feb.

——d Charles Wardell Stiles, Charles William Leng, Levi W Mengel, Samuel Henshaw [obituaries]. EN 52: 90, Mar.

——e [Plant galls and gall makers, by Ephraim Porter Felt (review).] EN 52: 117–118, Apr.

——f [The embryology of insects and myriapods, by Oskar A. Johannsen and Ferdinand H. Butt (review).] EN 52: 148–150, May.

——g Hugo Kahl [obituary]. EN 52: 150, May.

——h [How to make an insect collection, by Ward's Entomological Staff (review).] EN 52: 154, June.

——i *Aeshna* (*Coryphaeschna*) *luteipennis* and its subspecies (Odonata: Aeshnidae). Ann. Ent. Soc. Amer. 34: 389–396, June.

——j [Insects and their stories by Harry Hoogstraal (review).] EN 52: 210, July.

——k [Atlas of scale insects, by Gordon Floyd Ferris, ser III (review).] EN 52: 238, Oct.

——l Myron Harmon Swenk [obituary]. EN 52: 240, Oct.

——m Samuel Henshaw, 1852–1941, An appreciation. EN 52: 241–242, Nov.

——n Alexandre Arséne Girault [obituary]. EN 52: 268–269, Nov.

——o Charles Branch Wilson [obituary]. EN 52: 269–270, Nov.

——p Ellison Adger Smyth, Jr. [obituary]. EN 52: 270, Nov.

1942a H. Eltringham [obituary]. EN 53: 60, Feb.

——b [A lot of insects, by Frank E. Lutz (review).] EN 53: 119–120, Apr.

——c [College entomology, by E. O. Essig (review).] EN 53: 178–180, June.

——d Memorial tablet to Dr. Levi W. Mengel. EN 53: 155, June.

——e [Fernald Club yearbook (review).] EN 53: 180, June.

——f Increase in knowledge of the Odonate fauna of Mexico, Central America, and the West Indies since 1908. Proc. Eighth Amer. Sci. Congr., Biol. Sci. : Zool. pp. 323–331, Aug.

——g Entomology, scientific and human aspects. Proc. Amer. Phil. Soc. 86: 123–129, Sept.

——h [Atlas of scale insects of North America, by G. F. Ferris, ser. IV (review).] EN 53: 237, Oct.

——i (With Roswell C. Williams.) William Schaus [obituary]. EN 53: 239–240, Oct.

——j Anton von Schulthess-Schindler [obituary]. EN 53: 246, Nov.

——k An appreciation [of Charles O. Weber, of P. C. Stockhausen, printers of the News]. EN 53: 271, Dec.

1943a Richard Anthony Muttkowsky [obituary]. EN 54: 173–174, July.

——b Wesley Pillsbury Flint [obituary]. EN 54: 174, July.

1945a Harrison Garman [obituary]. EN 56: 19–21, Jan.

——b Supplemental notes on the ecology of odonate larvae. EN 56: 113–117, May.

1946 A new species of Brazilian Libellulinae (Odonata) and their [its] nearest allies. Bol. Mus. Nac. Rio Jan., n.s., Zool. N. 69: 1–4, Pl., Aug.

1947a *Aeshna psilus,* a new species of the group *Ae. cornigera* Brauer (Odonata: Aeshnidae). Notulae Nat., Acad. Nat. Sci. Phila. No. 194: 1–11, May.

——b How many mosquito larvae and pupae are required to make one dragonfly (Diptera: Culicidae; Odonata: Aeschnidae)? Proc. Ent. Soc. Wash. 49: 171–172, June.

——c Charles Liebeck [obituary]. EN 58: 167–168. [Following Katherine F. Richmond, pp. 165–167, July.]

——d The odonate collections of the California Academy of Sciences from Baja California and Tepic, Mexico, of 1889–1894. Proc. Cal. Acad. Sci., 4th ser., 23: 603–609, Sept.

——e Samuel Francis Aaron [obituary]. EN 58: 137–140, June.

——f Odonata of the voyages under the auspices of the New York Zoological Society. EN 58: 227–230, Nov.

——g How far can a fly fly? EN 58: 237, Nov.

1948a The autobiography of a dragonfly. Turtox News, Chicago 26: 214–217, Sept.; Frontiers 13: 119–122, 125, Apr. 1949.

——b Odonata (dragonflies) of Kartabo, Bartica District, British Guiana. Zoologica: New York Zool. Soc. 33 (2): 47–87, ill., July.

——c [Note "no article 'Entomology' by William Leach in Rees' Cyclopedia in spite of references to it. . . ."] EN 59: 201, Oct.

——d Odonata from Pirassununga (Emas), State of São Paulo, Brazil: Ecological and Taxonomic data. Bol. Mus. Nac. Rio Jan., n.s. Zoologia. N. 87: 1–34, Oct.

1949a [Catalogue of the Odonata of Canada, Newfoundland and Alaska, by Francis C. Whitehouse (review).] EN 60: 53–54, Feb.

——b Ezra Townsend Cresson, Junior [obituary, portrait]. EN 60: 85–90, Apr.

——c Entomological bibliography of Ezra T. Cresson, Jr., from his own manuscript records and other sources. EN 60: 91–99, Apr.

——d [A century of entomology in the Pacific northwest by Melville H. Hatch (review).] EN 60: 110–111, Apr.

——e Theodore Dru Alison Cockerell [Biographical Memoir, see p. 242]. Year Book Amer. Phil. Soc. 1948: 247–252, Apr.

——f *Agrion* versus *Calopteryx* [portion of letter to Miss Longfield]. EN 60: 149–151, June.

——g D.D.T. as a contributing factor to the increase of trematode diseases in man and other animals. EN 60: 183, July.

1950 [Stadien und Darmkanal der Odonaten in Metamorphose und Häutung, sowie die Bedeutung des Schlupfaktes für die systematische Biologie, by Eberhard Straub (review).] EN 61: 115–118, July.

A New Species of Ophiogomphus (Odonata)

By James G. Needham

While I was reviewing the North American species of *Ophiogomphus* for a new Manual, Dr. Calvert sent me for study a pair of undetermined specimens from the collection of the Academy of Natural Sciences of Philadelphia. When I reported to him that they represent a new species, he told me to describe them, and that I now do herewith. This generous aid enables me to make my coverage of the New World species more complete.

Ophiogomphus edmundo n. sp.

This is a greenish species, distinctly striped with brown on the thorax, and with a blackish abdomen. The face is pale greenish or yellowish-green, with a narrow line of pale cinnamon brown on the hair-fringed front margin of the labrum. The top of the head is black, darkest across the preocellar crossband, becoming paler brown behind the postocellar ridge. The antennae are black, the stout basal segment tipped with a narrow ring of white. The occiput is yellowish, its crest fringed with rather long blackish hair.

The middorsal stripe of the synthorax is well defined, divided full length by the yellow of the carina. In front it is widened a little at the yellow collar, and at the rear it divides and spreads over the crest. Humeral and ante-humeral stripes are well separated by a narrow pale line, except at their ends. The midlateral stripe is present below the level of the spiracle; the third lateral, narrow, complete and well developed.

The legs are pale basally, becoming black toward the knees, and all black beyond. There is no yellow line on the tibiae externally. The wings are hyaline with brown veins, a white costa and a tawny stigma. In the hind wing there are seven or eight antenodal crossveins and there are five cells in the basal anal triangle of the male.

The abdomen is slender along the middle segments. Beyond the paler and hairy basal segments it is smooth, blackish and

shining, and it has the usual middorsal and lateral markings of yellow. The middorsal stripe broadly covers segments 1 and 2, becomes narrowed to a line on 3, does not reach the apex on 4 to 7, broadens again and is reduced to half-length on 8, and to a round basal spot on 9. Segment 10 is mostly yellow; appendages yellow.

The superior appendages of the male viewed from above are broadly widened at the base by a pair of opposed conical teeth that almost meet on the middle line under a slight prolongation of the dorsum of segment 10. Beyond these teeth the appendages taper smoothly to rather sharp diverging apices. Viewed from the side they are swollen at the base, then narrowed to cylindric form, and then obliquely truncated upward to their sharp tips. There are minute rugulosities on the upward slope near the end. The inferior appendage is about equal in length to the superiors. Viewed from the side it is angulated at mid-length and slopes downward beyond the angle to its up-turned tips. Viewed from beneath, its broad end is cleft by a U-shaped notch that is deeper than it is wide. Its up-turned outermost angles are outspread just a little more widely than the tips of the superior appendages, so that they are hardly visible from above. The hamules of the single male available are not fully visible, but their tips are black and shining, and enough of the posterior one is seen to show that on its front margin there is no angulation, but only a long convex slope.

The female associated with the male is similar in coloration and somewhat larger. The brown middorsal stripe of the thorax is less widely divided by the yellow of the carina, but the other markings are much as in the male. There are no horns on the top of the occiput, but there is a pair on the rear side, wide apart and close to the margin of the eye. They are very small, black, blunt and crumpled in appearance.

Length: ♂ 45 mm., ♀ 48; abdomen ♂ 31, ♀ 34; hind wing ♂ 24, ♀ 29.

This species is nearest *aspersus* Morse, from which it differs in having better defined stripings of the thorax. The male superior appendages are not swollen in the middle as in that spe-

cies, nor are they so deeply rugose on their beveled end. The two opposed teeth, close-set under the middorsal tip of segment 10, are much sharper and better exposed to view; in *aspersus* they are blunt; hitherto they seem to have been overlooked. The inferior appendage is longer and much more deeply and narrowly cleft than in *aspersus*, and its tips are more widely outspread. The subgenital plate of the female is similar to that in *aspersus,* but perhaps a little longer. In the color pattern of the abdomen the two species appear almost alike.

Holotype ♂. "N. C." [Academy of Natural Sciences of Philadelphia No. 9282].

Allotype ♀. Inglenook, Pennsylvania, June 3d 1892 [Academy of Natural Sciences of Philadelphia, No. 9282].

Two New South American Aeshnidae (Odonata)

By D. E. Kimmins, Department of Entomology, British Museum (Natural History)

Examples of the genus *Neuraeschna* Selys are infrequent in collections. During examination of some unidentified material in the McLachlan collection, five specimens of this genus were found. Four of these appear to belong to an undescribed species, which I have great pleasure in naming after Dr. Philip P. Calvert, in honour of his eightieth birthday. I am also including a description of a second new species, based on a single male collected in British Guiana by Mr. C. A. Hudson.

Neuraeschna calverti sp. n.

♂. Labrum, anteclypeus and postclypeus yellowish, shading to yellowish-brown on frons in front; frons above dark brown anteriorly, pale yellowish-brown behind, so that the T-spot has no stem. Vertex and occiput dark brown.

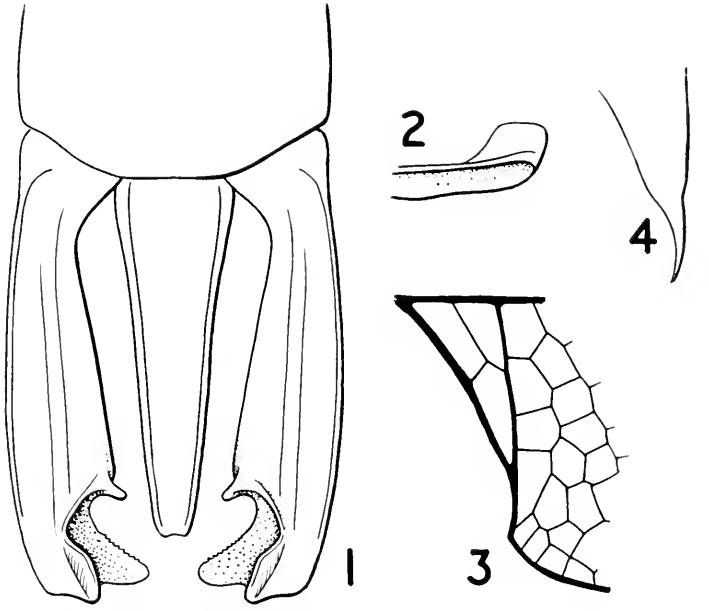
Thorax dark brown, with a blue or green dorsal spot on each side narrowed at its upper end and not reaching the antealar carina. Other thoracic markings pale yellowish-green (rather faded) as follows: The antealar sinus except near the carina;

the meso- and meta-postnota, metanotum and spots on and between the bases of the wings; two lateral stripes, narrower than the dorsal spot, one on each mes- and metepimeron, the posterior one tapering to its lower end. Femora and tibiae reddish-brown, blackish at knees, tarsi also blackish.

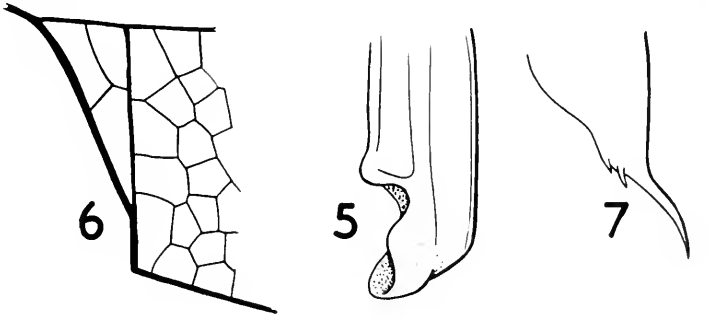
Abdomen brownish, tergite 1 pale, probably blue, auricles and an apical dorsal spot on 2 pale, remainder of abdomen rather discoloured. Abdomen slightly constricted at third segment and thence very gradually dilating to the eighth segment. Anal appendages reddish-brown. Superior appendages from above with outer margin slightly convex, apex somewhat truncate. Inner margin concave near base and then straight and slightly divergent for about three-quarters of its length; it then turns inward and at the bend carries a small peg-like projection. From this projection the lower inner margin runs in a concave, finely-serrate sweep to the lower apical angle, which is triangularly produced and rounded. There is a rounded median keel on the upper surface, and near the apex there is an elevated, rhomboidal, plate-like ridge, curving over inwards and forming the upper, inner, apical angle of the appendage. Inferior appendage almost as long as superior, narrow, tapered from base to apex, hollowed and trough-like, with a truncate apex, curving upward between the superior appendages.

Wings hyaline, faintly obscured with brownish, particularly along the posterior margins and costal areas. Pterostigma brown, bordered with black veins. Costa dark brown, other veins black. Membranule dirty white, short. Anal angle of hind wing obtuse, the posterior margin somewhat curved for a short distance.

♀. The three females before me are slightly larger than the ♂ and much discoloured. There are traces of a dorsal green thoracic spot but the lateral stripes (if present) are lost in the discolouration. Anal appendages broken in two examples, segments 5–10 missing in the third. Fork of tenth sternite from side slightly curved, not forming an angle with posterior margin of sternite. Wings of two as in ♂, the third with a trace of brownish suffusion along the costal margin of anterior wing, wings otherwise hyaline.



Neuraeschna calverti



N. producta

Neuraeschna calverti sp. n. Figs. 1–3 ♂, 4 ♀. 1, anal appendages, dorsal; 2, apex of superior appendage, profile; 3, anal angle of hind wing; 4, fork of 10th sternite, profile.

Neuraeschna producta Kim. Figs. 5–6 ♂, 7 ♀. 5, apex of superior appendage, dorsal; 6, anal angle of hind wing; 7, fork of 10th sternite, profile.

	♂ F.W.	♂ H.W.	♀ F.W.	♀ H.W.
Antenodals	32–35	23	33–41	25–27
Postnodals	22–24	27	24–30	27–33
Cross-veins in 2nd series basal to 1st thickened antenodal	2–3	2–3	3–4	3–4
Sc produced beyond nodus	2–3 cells	3 cells	2–3 cells	3 cells
Cells in triangle	9	9	9–10	8–10
Cross-veins in supra-triangular space	10–11	9	10–12	8–10
Cross-veins in median space	6	5	6–7	4–5
Length in mm.	56	55	59	59

Length (excluding appendages): ♂ 78 mm., ♀ 81 mm.

Length of ♂ superior appendages: 5 mm.

E. Peru, ex McLachlan Collection, now in B.M. (N.H.), ♂ *holotype*, ♀ *allotype*, 2 ♀ *paratypes*.

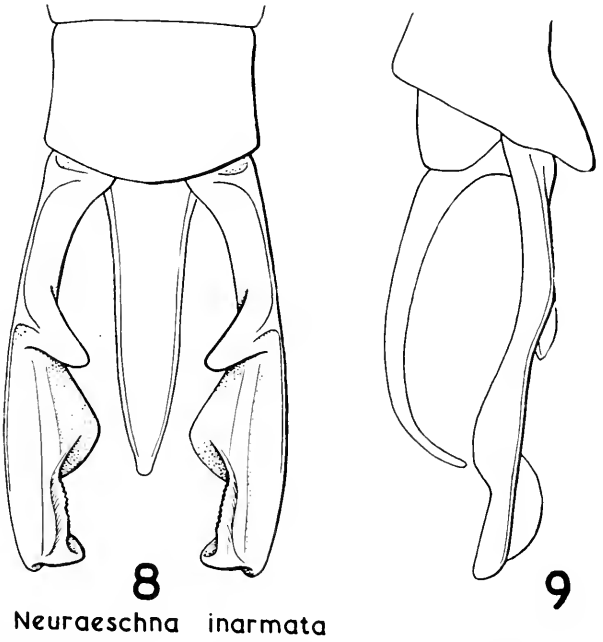
This species is related to *N. producta* Kim., also from Eastern Peru but differs in the form of the ♂ anal appendages, particularly in the small peg-like projection on the inner margin of the superior appendages and in the apical dorsal ridge. In the ♂ the anal angle of the hindwing is obtuse (right-angled in *producta*), and the posterior margin convex for a short distance (straight in *producta*). In the ♀ the fork of the tenth sternite in side view is slightly curved but continuing the line of the posterior margin of the sternite (angled caudad in *producta*).

Neuraeschna inarmata sp. n.

♂. Labrum, anteclypeus and postclypeus light reddish-brown, frons shining piceous in front; above shining piceous in front, reddish-brown near vertex and on sides, no marked T-spot.

Thorax very dark brown, paler ventrally, marked with dirty fulvous (? green in life) as follows: a large dorsal stripe on each side, not reaching the antealar carina, upper end somewhat widened on its inner side; two nearly straight, parallel-sided lateral stripes on the epimera, each about as wide as the dorsal stripe; a roughly semi-circular spot on the mesepisternum, its straight side against the lateroalar carina; spots between and on the wing-bases. Legs reddish-brown, anterior femur paler on outer surface.

Abdomen slender, constricted at the third segment, then gradually dilating to the eighth. Abdominal pattern discoloured and obscure. Segment 1 brownish, 2 with a narrow, pointed, anterodorsal spot, mid-dorsal spots small, posterodorsal divided on median line, auricular and posterolateral spots small. Segments 3–9 piceous, no visible markings, segment 10 reddish-brown. Superior appendages dark reddish-fuscous, apical half with an orange-brown dorsal carina. In dorsal view, the outer



Neuraeschna inarmata sp. n. Figs. 8–9 ♂. 8, anal appendages, dorsal; 9, anal appendages, profile.

edge of the appendage is very slightly convex from base to apex; the inner edge is more definitely concave, curving from the widened base to the rounded subapical dilatation at about two-thirds of the length of the appendage, and then roundly excised to the apex. Shortly before midway, the upper surface is produced in a large tooth with rounded apex, directed inwardly and posteriorly. In the apical third the upper surface is elevated

in a longitudinal, plate-like ridge, concave on its inner surface, its crest turned inward and serrate. Apex of the appendage with outer angle small, rounded, inner bluntly triangular. From side, the appendage is slender and sinuous, the sub-basal tooth visible above. The sub-apical dilation appears as a rounded lobe beneath the appendage and the apical ridge as a semi-circular plate above. Inferior appendage slender, tapering, and trough-like above, curved in profile, the curve being more pronounced apically.

Wings somewhat irregularly suffused with rich brown, darker between C and R. Venation piceous or dark brown; stigma brown, membranule pale brownish, extending along anal triangle to about mid-length of basal cell.

	♂ F.W.	♂ H.W.
Antenodals	26	18–20
Postnodals	17–18	21–22
Cross-veins in 2nd series before 1st thickened antenodal	1	1
Sc produced beyond nodus	1 cell	2 cells
Cells in triangle	7–8	8–9
Cross-veins in median space	6	4
Length in mm.	45	44

Length of body (excluding appendages): 63 mm.

Length of superior appendages: 4.5 mm.

British Guiana: New River, 750 ft., 20.i–23.iii.1938, C. A. Hudson, 1 ♂. *Holotype* in B.M.N.H.

This species is closely related to *N. dentigera* Martin from Surinam, but (unless his figure is very inaccurate) it should be readily separable by the form of the ♂ superior appendages. The second tooth-like projection on the inner margin in *dentigera* is here replaced by a broad rounded lobe; The apical dorsal ridge is larger than in *dentigera* and there is no acute tooth on the outer apical angle. The inferior appendage is less curved in profile. The presence or absence of the small acute tooth on the outer apical angle of the superior appendage may not be a specific character. There is in the B.M.N.H. an example which agrees in other respects with Martin's figure of *N. harpya,* but which has a small tooth on the outer angle. The figure shows this angle as rounded in dorsal aspect but slightly pointed in profile.

The Lepidopterist's Society

According to Frederick H. Rindge, Secretary, the Lepidopterist's Society is now officially organizing with a constitution, by-laws and a full set of officers. The latter include Dr. J. H. McDunnough as President, Mr. A. H. Clark, Senior Vice-President, Mr. J. B. Ziegler as Treasurer and Dr. Rindge of The American Museum of Natural History, New York City, as Secretary. The first Annual Meeting was announced for December 29th and 30th.

Current Entomological Literature

COMPILED BY R. G. SCHMIEDER.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia and the University of Pennsylvania, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the year 1950 unless otherwise noted. Continued papers, with few exceptions, are recorded only at their first installment.

For other records of general literature and for economic literature, see the Bibliography of Agriculture, Washington, and the Review of Applied Entomology, Series A, London. For records of papers on medical entomology see Review of Applied Entomology, Series B.

NOTE: The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the List of periodicals and serials published in our January and June issues. The number of the volume, and in some cases, the part, heft, &c. is followed by a colon (:). References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to Neotropical species, and not so indicated in the title, have the symbol (S).

Papers published in ENTOMOLOGICAL NEWS are not listed.

GENERAL—Bairstow, L.—Dr. S. Maulik (obituary). [28] 86: 225–26. **Blackwelder, R. E.**—Bibliography of Herbert S. Barber. [Coleop. Bull.] 4: 55–59. **Calman, W. T.**—The classification of animals. An introduction to zoological taxonomy. Methuen's Monographs on Biological Subjects. Methuen & Co., London, John Wiley & Sons, New York. 1949. pp. 1–54, $1.25. **Caullery, M.**—Notice sur la vie et les travaux de Louis-Félix Henneguy (1850–1928). [Notices et Discours, Acad. Sci.] 2: 360–77 (portrait), 1949. **Colless, D. H.**—An improved method of mounting mosquito larvae. [53] 166: 486–87. **Da Cunha, B. H. Burla and Th. Dobzhansky**—Adaptive chromosomal polymorphism in Drosophila willistoni. [Evolution] 4: 212–35. **Elton, C.**—The ecology of animals, 3rd ed. Methuen's Monographs on Biological Subjects. Methuen & Co., London, John Wiley & Sons, New York, 1950, pp. 1–54. $1.25. **Fage, L.**—Notice sur la vie et l'oeuvre de Paul Marchal (1862–1942). [No-

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ANATOMY, PHYSIOLOGY, MEDICAL—Anderson, J. M.—A cytological and cytochemical study of the testicular cyst-cells in the Japanese beetle. [Physiol. Zool.] 23: 308–16, ill. **Anon.**—The scientific aspects of silk production [Current Sci., Bangalore] 18: 321–22. **Beck, S. D.**—Nutrition of the European corn borer, Pyrausta nubilalis (Hbn.). II. Some effects of diet on larval growth characteristics. [Physiol. Zool.] 23: 353–66. **Caspari, E.**—On the selective value of the alleles Rt and rt in Ephestia kühniella. [3] 84: 367–80. **Demerec, M. (editor)**—Biology of Drosophila. John Wiley & Sons, New York. 1950. Pp. x, 632, ill. Price $10.00. **Dent, J. N. and R. L. Amy**—Developmental effects observed in Habrobracon after exposure to Beta radiation (Hym. Braconidae). [Growth] 14: 113–21. **Dreux, P.**—Influence des ions K et Ca sur l'automatisme du vaisseau dorsal de la chenille de Galleria mellonella L. [C. R. Soc. Biol.] 144: 803–04. Action de la concentration totale des solutions sur l'automatisme du vaisseau dorsal de la chenille de Galleria mellonella L. *Ibid.* 804–06. **Dreux, P. et Fiszer, J.**—Action du baryum sur l'automatisme cardiaque de la chenille de Galleria mellonella L. et de Gryllus domesticus L. [C. R. Soc. Biol.] 144: 818–19. **Dreyfus, A. e M. E. Breuer**—O sexo nos himenópteros arrenótocos. Biologia, determinacao do sexo ciclo cromossomico do microhymenóptero parasito Telenomus fariai Lima. [Bol. Facul. Fil.,

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1. American Midland Naturalist. Notre Dame, Indiana.
2. American Museum Novitates. New York, N. Y.
3. American Naturalist. Garrison-on-Hudson, New York.
4. Annals of Applied Biology. London.
5. Annals of the Entomological Society of America. Columbus, Ohio.
6. Annals and Magazine of Natural History. London.
7. Annales Academia Brasileira Sciencias. Rio de Janeiro.
8. Anales del Instituto de Biologia Mexico. Mexico City.
9. Anatomical Record. Philadelphia.
10. Arkiv för Zoologie. K. Svenska Vetenkapsakademien i. Stockholm.
11. Arquivos de Higiene e Saude Publica. São Paulo.
12. Biological Bulletin. Woods Hole, Massachusetts.
13. Bios, Rivista Biol. Geneva.
14. Boletin de Entomologia Venezolana. Caracas.
15. Boletin del Museo de Historia Natural "Javier Prado." Lima, Peru.
16. Boletin do Museu Nacional do Rio de Janeiro. Brasil.
17. Bull. Acad. Sci. (Izvestia Akad. nauk) U S S R (S. biol.).
18. Bulletin of the Brooklyn Entomological Society. New York.
19. Bulletin of Entomological Research. London.
20. Bulletin of the Museum of Comparative Zoology. Cambridge, Mass.
21. Bulletin of the Southern California Acad. of Sciences. Los Angeles.
22. C. r. Acad. Sci. (Doklady Akad. nauk) U S S R. Leningrad.
23. Canadian Entomologist. Guelph, Canada.
24. Canadian Journal of Research. Ottawa, Canada.
25. Ecological Monographs. Durham, North Carolina.
26. Ecology. Durham, North Carolina.
27. Entomologica Americana. Brooklyn Ent. Society, New York.
28. Entomologist's Monthly Magazine. London.
29. Entomological Record and Journal of Variations. London.
30. The Entomologist. London.
31. Florida Entomologist. Gainesville, Florida.
32. Frontiers. Philadelphia, Pennsylvania.
33. Great Basin Naturalist. Provo, Utah.
34. Iowa State College Journal of Science. Ames, Iowa.
35. Journal of Agricultural Research. Washington, D. C.
36. Journal of Animal Ecology. London.
37. Journal of Economic Entomology. Geneva, New York.
38. Journal of the Elisha Mitchell Science Society. Chapel Hill, N. C.
39. Journal of Entomology and Zoology. Claremont, California.
40. Journal of Experimental Biology. London.
41. Journal of Experimental Zoology. Philadelphia, Pennsylvania.
42. Journal of Heredity. Baltimore, Maryland.
43. Journal of the Kansas Entomological Society. Lawrence, Kansas.
44. Journal of Morphology. Philadelphia, Pennsylvania.
45. Journal of the New York Entomological Society. New York.
46. Journal of Parasitology. New York.
47. Journal of the Tennessee Academy of Sciences. Nashville, Tenn.
48. Journal of the Washington Academy of Sciences. Washington, D. C.
49. Memorias do Instituto Oswaldo Cruz. Rio de Janeiro.
50. Microentomology. Stanford University, California.
51. The Microscope. London.
52. Mosquito News. Albany, New York.
53. Nature. London.
54. Nature. Washington, D. C.
55. Le Naturaliste Canadien. Quebec.

56. Natural History. New York.
57. Occasional Papers, Mus. of Zool., Univ. of Michigan, Ann Arbor.
58. Ohio Journal of Science. Columbus, Ohio.
59. Opinions and Declarations. Intern. Com. Zool. Nomencl. London.
60. Pan-Pacific Entomologist. San Francisco, California.
61. Parasitology. London.
62. Proceedings of the Academy of Natural Sciences. Philadelphia.
63. Proceedings of the Biological Society of Washington. Wash., D. C.
64. Proceedings of the California Academy of Science. San Francisco.
65. Proceedings of the Entom. Soc. of Washington. Washington, D. C.
66. Proceedings of the Hawaiian Entomological Society. Honolulu.
67. Proceedings of the National Acad. of Sciences. Washington, D. C.
68. Proceedings of the Royal Entomological Society of London. Ser. A.
69. Proceedings of the Royal Entomological Society of London. Ser. B.
70. Proceedings of the Royal Entomological Society of London. Ser. C.
71. Proceedings of the U. S. National Museum. Washington, D. C.
72. Proceedings of the Zoological Society of London. London.
73. Psyche, A Journal of Entomology. Boston, Massachusetts.
74. Quarterly Journal of Microscopical Science. London.
75. Quarterly Review of Biology. Baltimore, Maryland.
76. Revista Academia Columbiana de Cien. Exact. Fis. y Nat. Bogotá.
77. Revista Chilena de Historia Natural. Valparaiso, Chile.
78. Revista Instituto Salubridad y Enfermedades Tropicales. Mexico.
79. Revista Sociedad Mexicana de Historia Natural. Mexico City.
80. Science. Washington, D. C.
81. Scientific Monthly. New York.
82. Smithsonian Miscellaneous Collections. Washington, D. C.
83. Transactions of the American Entomological Society. Philadelphia.
84. Transactions of the Amer. Micros. Soc. Menasha, Wisconsin.
85. Transactions of the Illinois State Academy of Sciences. Springfield.
86. Transactions of the Kansas Acad. of Sci. Manhattan, Kansas.
87. Transactions of the Royal Canadian Institute. Toronto.
88. Transactions of the Royal Entomological Society. London.
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90. U. S. Dept. of Agric., Technical Bulletins. Washington, D. C.
91. University of California Publications in Entomology. Berkeley.
92. University of California Publications in Zoology. Berkeley.
93. University of Kansas, Science Bulletins. Lawrence, Kansas.
94. Ward's Natural Science Bulletin. Rochester, New York.
95. Zoologica. New York.
96. American Journal of Public Health. Boston.
97. American Journal of Tropical Medicine. Baltimore.
98. Annals of Tropical Medicine and Parasitology. Liverpool.
99. Canadian Journal of Research. Section E, Medical Sciences, Ottawa.
100. Evolution. New York.
101. Mitteilungen der schweitzerischen entomologischen Gesellschaft, Bern.
102. Revista de Entomologia. Rio de Janeiro, Brasil.
103. Proceedings of the Royal Society of London.
104. Anales de la Escuela Nacional de Ciencias Biologicas. Mexico.
105. Journal of Cellular and Comparative Physiology. Philadelphia.
106. Redia. Florence, Italy.
107. Annales de la Société Entomologique de France. Paris.
108. Bulletin de la Société Entomologique de France. Paris.
109. Notulae Naturae. Philadelphia.
110. L'Entomologiste. Paris.
111. Revista Brasiliera de Biologia. Rio de Janeiro.
112. Eos, Revista Española de Entomologia. Madrid.
113. Minist. de Agri. de la Nación, Inst. Sanidad Vegetal, Buenos Aires.

Review

BIOLOGY OF DROSOPHILA. Edited by M. Demerec. John Wiley and Sons, Inc., New York. 1950. Pp. x + 632. Price, $10.00.

Drosophila, first used as an experimental animal in 1906, has rapidly become one of foremost importance not only in genetics but also in other kinds of fundamental research. This comprehensive account of its structure and development and the valuable references cited will serve to provide easy access to the information available on this insect.

In Chap. 1, K. W. Cooper describes the cytology of spermatogenesis. He includes some practical help on how to distinguish the sexes in living larvae, detailed cytological data, and extended theoretical discussion on such matters as the basis for the absence of genetic crossing-over in the male, correlating the absence of pachytene stage with the formation of non-crossover "bivalents" in place of typical tetrads.

In Chap. 2, B. P. Sonnenblick gives an account of the early embryology. He tells how to obtain embryos of known age and goes on to describe fertilization, meiosis, cleavage, germ-layer formation, and other early processes. Sixty-eight figures, mostly photographic, are presented and two time-tables of events are given.

D. F. Poulson (Chap. 3) treats of later embryonic development. Of the 83 figures, most are photomicrographs and should be helpful to persons who must recognize and deal with these stages in their experimental work. For the theoretical student they are less convenient and more diagrams would have facilitated the reading of this chapter. An "atlas" of stages is included and consists of a sagittal, a frontal and two transverse sections each, of embryos taken at intervals of ca. 2 hours, up to hatching.

Chap. 4, by D. Bodenstein, covers the three larval stages and the metamorphosis. It describes and locates the various organs and rudiments at timed intervals during development and illustrates them by drawings and photographs. Included also are directions for the transplantation of organs and 8 pages of detailed chronological tables of events in development. Much of the story is not as complete as one would like it, and for students unfamiliar with dipteran metamorphosis it must be difficult to visualize some of the events (such as the development and evagination of the optic and antennal discs) in the absence of diagrams to accompany the photos. In places, the careless use of terms will also confuse the inexperienced. Thus, on page

313, both *hypoderm* and *epidermis* are used in one sentence. In the next, we find *hypoderm*, and *epidermis cells* used in referring to one and the same structure.

G. F. Ferris states that he began work on Chap. 5 (on the external morphology of the adult) ten years ago but found that he could not proceed without first investigating the lower Diptera, which led him back to the ancestral conditions in the Mecoptera, thence to the Neuroptera and finally to the Crustacea and even the annelids. These researches have appeared in the journal *Microentomology*. Here, Dr. Ferris gives us, in his usual direct and concise style, only a brief account of some of his conclusions that differ radically from those heretofore prevalent. For example, the labrum and the clypeus represent the first two of the six head segments, the thoracic segment is developed from a tergite and a pair of limb bases (no sternal plates, typically), the hypopharynx does not exist in these flies.

Chap. 6, by A. Miller, gives a very comprehensive account of the gross internal anatomy and the microscopic anatomy of the imago. Anatomical descriptions are illustrated by drawings while photomicrographs illustrate the histological account. The photos will help a person identify elements in sections but do not themselves impart as much information as drawings.

In the last chapter (Chap. 7), W. F. Spencer describes the methods in use for trapping and for the laboratory culture of Drosophila. Relations to temperature, humidity and other ecological field data are included.

This book calls to mind another monograph, the two volume work (1827 pages) on *Dytiscus marginalis* by Korschelt and his students, published in 1924 (see ENT. NEWS 37: 24–29). Considered as a treatise on the biology of a single species of insect, the older work is far more complete. Yet, in many respects, the present volume is more detailed, and the difference between the two reflects well the change that has taken place in biological research in the intervening years. Quite definitely, this book presents, mainly, data that were worked out because needed in recent investigations and often by people not much interested in the insect for its own sake but only as material convenient to use for researches on various aspects of the physiology of ontogeny and other fundamental biological problems. Presumably, much of the information presented will in the future continue to be useful to persons engaged in such work, or so it is hoped. In any event, it is a fine thing to have the data on record as a contribution to entomology.—R. G. Schmieder.

NOTICE. The December 1950 issue of ENTOMOLOGICAL NEWS was mailed at the Post Office at Lancaster, Pa., on November 30, 1950.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Miridae (Capsidae)—American species wanted, with locality labels, in exchange for British species. D. Leston, F.R.E.S., 6 Frognal Rise, London N. W. 3, England.

Wanted—Entomological microscope in good condition; Spencer, Bausch & Lomb, or other standard make. David G. Shappirio, 4811 17th St., N.W., Washington 11, D. C.

Coleoptera—Large quantities of Cicindelidae, Buprestidae, Lucanidae, Cerambycidae wanted in exchange for all families of Coleoptera from Ill., Ind. and Mo. Joseph B. Hayes, 1905 N. Pulaski Rd., Chicago 39, Ill.

American Sarcophagidae—wanted for identification. H. R. Dodge, 291 Peachtree Street, Atlanta 3, Georgia.

German lepidopterist wishes to correspond and receive live material (eggs and pupae) in exchange for dried imagoes. Johannes Reichel, Koenigsberg, Krs. Wetzlar 16, Germany.

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ENTOMOLOGICAL NEWS

FEBRUARY 1951

Vol. LXII **No. 2**

CALVERT ANNIVERSARY VOLUME

on the occasion of

Dr. Philip P. Calvert's Eightieth Birthday

CONTENTS

PUBLISHED MONTHLY, EXCEPT AUGUST AND SEPTEMBER, BY
THE AMERICAN ENTOMOLOGICAL SOCIETY
PRINCE AND LEMON STS., LANCASTER, PA.
AND
1900 RACE STREET, PHILADELPHIA 3, PA.

Subscription, per yearly volume of ten numbers: $4.00 domestic; $4.30 foreign; $4.15 Canada
Entered as second-class matter April 19, 1943, at the post office at Lancaster, Pa., under the Act of March 3, 1879. Acceptance for mailing at the special rate of postage provided for in paragraphs (d-2), Section 34.40, P. L. & R. of 1948, authorized April 19, 1943.

ENTOMOLOGICAL NEWS

ENTOMOLOGICAL NEWS is published monthly, excepting August and September, by The American Entomological Society at Prince and Lemon Sts., Lancaster, Pa., and the Academy of Natural Sciences, 1900 Race Street, Philadelphia 3, Pa., U. S. A.

PHILIP P. CALVERT, Editor Emeritus. R. G. SCHMIEDER, Editor. Editorial Staff: E. J. F. MARX, M. E. PHILLIPS, J. A. G. REHN, and A. G. RICHARDS.

Subscription price, per yearly volume of 10 numbers: Domestic, $4.00; Foreign, $4.30; Canada, $4.15—U. S. Currency.

SUBSCRIPTIONS, ADVERTISEMENTS: All communications and remittances to be addressed to **ENTOMOLOGICAL NEWS, 1900 Race Street, Philadelphia 3, Pa.**

ADVERTISING RATES: Full width of page. Payments in advance.

	1 Inch	2 Inches	3 Inches	6 Inches
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ENTOMOLOGICAL NEWS

VOL. LXII FEBRUARY, 1951 No. 2

Outline of a New Classification for the Legion Lestes Selys (Order Odonata)

By Lt. Col. F. C. FRASER, I.M.S., Retd., Winton, Bournemouth, Hants, England

Selys, in 1862, published the first and the only monograph of the Legion *Lestes* which has appeared; later the Legion became known as the family *Lestidae*, belonging to the suborder Zygoptera within the order Odonata. In that monograph, Selys included five genera and 50 species but excluded three other genera which are now known to be true *Lestes*, viz., *Perilestes* Hagen, *Chlorolestes* Selys and *Synlestes* Selys; these he placed in the Legion *Podagrion*, now known as the family *Megapodagriidae*. Since 1862 a large number of new genera has been created and a still larger number of species has been discovered, so that the number of the former has more than quadrupled and the number of species trebled. Moreover, the family as a whole has acquired a new significance from a taxonomic point of view, since there is good reason to believe that the stem of the suborder Anisoptera and the whole of the recent Zygoptera (*Agriidae*) have had their origins in the *Lestidae*, that is to say, the *Lestidae* were the direct ancestors of the suborder *Anisozygoptera* from which all recent forms of Odonata have descended. From these considerations, there is no need to stress the need for a revision of the classification of the old Legion *Lestes*. With this in view, I have been collecting data and material for the past ten years and a comprehensive monograph is now nearing completion, but as it seems probable from the present difficulties in publication, that some time will elapse be-

fore this work can appear, I take this opportunity to present an outline of the new classification involved. It will be seen hereafter that three families are included under one superfamily for which the correct name should be *Lestoidea*, but unfortunately this name is pre-occupied by *Lestoidea* Tillyard, a genus in the family *Megapodagriidae;* thus I have been compelled to employ the name *Lestini* for the superfamily.

Superfamily **LESTINI**

(= Legion **Lestes** Selys plus Legion **Podagrion** pars Selys)

Zygopterous dragonflies of small, medium or, more rarely, large size, characterized by the elongation and production posteriorly of the anterior hamules of the male genitalia. Fore- and hindwings of approximately the same size and shape, with long slender petiole and usually elongate pterostigma; nearly always (save in the most primitive species) an oblique crossvein connecting Riii and IRiii about the middle of the wing (this vein representing the original site of a trachea which was borrowed by the intercalary from Riii). IRiii and Riv exhibiting a gradual lengthening towards the base of wing as traced from the more primitive to the more recent species.

Family 1. **PERILESTIDAE**

Small dragonflies with long and very slender abdomen. Venation characterized by the discoidal cell approaching or actually impinging on the posterior border of wing at which point the anal vein takes origin or is compressed between the discoidal cell apex and posterior border of wing; pterostigma quadrate, subquadrate or oval; oblique cross vein between Riii and IRiii absent or merely represented by the basal attached portion of IRiii.

Subfamily **Perilestinae**

Discoidal cell of forewings closed at base. Radius greatly thickened especially in its basal half.

Key to Genera of Subfamily Perilestinae

1. IRii only 3 cells in length, its inner end distal to the proximal end of pterostigma ..... *Perilestes* Hagen. New World. Genotype *Perilestes fragilis* Hagen.
   IRii more than 3 cells in length, its inner end well proximal to the pterostigma ..... 2.
2. Discoidal cell impinging on posterior border of wing; Riv taking origin distal to subnodus .... *Perissolestes* Kennedy. New World. Genotype *Perilestes remotus* Williamson.
   Discoidal cell with apex slightly removed from posterior border of wing; Riv taking origin at the level of subnodus ..... *Nubiolestes* Fraser. Tropical Africa. Genotype *Eolestes diotima* Schmidt.

Subfamily **Chorismagriinae**

Discoidal cell of forewing with basal side absent and, therefore, open at base; Radius not markedly thickened; IRii with inner end well proximal to pterostigma; Riv taking origin at level of subnodus .....*Chorismagrion* Morton. Australia. Genotype *Chorismagrion risi* Morton.

Family 2. CHLOROLESTIDAE

Dragonflies of larger size and more robust build than in the *Perilestidae*. Wings of males frequently marked or banded with blackish brown or opaque white; pterostigma always more than twice as long as broad; intercalated veins well developed; IRiii arising at level of or widely distal or slightly proximal to subnodus; Riv arising at a variable distance proximal to or at level of subnodus.

Subfamily I. **Chlorolestinae**

Wings of males hyaline or more frequently banded with dark or blackish brown; IRiii and Riv both taking origin from a point nearer the nodus than arculus, the former vein usually at or but slightly distal to subnodus; anal vein leaving posterior border of wing at a point below the discoidal cell and far distal to the cross-vein *Ac*.

Key to Genera of subfamily Chlorolestinae

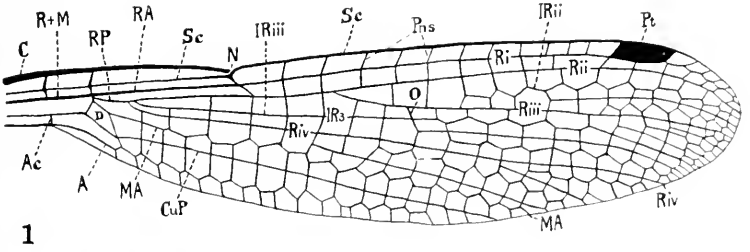
1. Origin of Riv proximal to subnodus ..... 2.
   Origin of Riv from the subnodus ..... 5.
2. IRiii arising at subnodus ..... 3.
   IRiii arising widely distal to subnodus ..*Sinolestes* Needham. China. Genotype *Sinolestes ornata* Needham.
3. Discoidal cell of forewing short and broad, its base about one third the length of posterior side; superior anal appendages of great length, ribbon-like, white ....*Episynlestes* Kennedy. Australia. Genotype *Synlestes albicauda* Tillyard.
   Discoidal cell narrow and elongate, its base less than one third the length of posterior side; superior anal appendages simple, forcipate, black .....4.
4. Anal vein separating from posterior border of wing distal to base of discoidal cell .....*Synlestes* Selys. Australia. Genotype *Synlestes weyersi* Selys.
   Anal vein separating from posterior border of wing proximal to or at level of base of discoidal cell ....*Ecchlorolestes* Barnard. S. Africa. Genotype *Chlorolestes peringuey* Ris.
5. Pterostigma bicolorous; inferior anal appendages of male bifid ..... *Euchlorolestes* Kennedy. S. Africa. Genotype *Agrion fasciatum* Burmeister.

EXPLANATION OF FIGURES

FIG. 1. Forewing of *Lestes sponsa* (Hansem) showing notation employed in this paper: A, Anal vein; MA, Medialis anticus or Median vein; N, Nodus; O, Oblique vein of *Lestes;* Pns, postnodal cross-veins; Pt, pterostigma; Ac, Anal-crossing or Cubital vein; C. Costa; D, discoidal cell or quadrangle; R + M, radius plus medius; RA, radialis anticus or anterior branch of radius; RP, radialis posticus or posterior branch of radius (Rs); Ri, Rii, Riii and Riv, branches of radius; IRii and IRiii, intercalated branches of radius; Sc, subcostal vein (the revised course is shown).

FIG. 2. Male genitalia of: a, *Peritestes remotus* Williamson; b, *Chorismagrion risi* Morton; c, *Lestes sponsa* (Hansem). Note the remarkable similarity between these distantly related species which were formerly placed in different families.

FIG. 3. Spaces between the veins Riv and MA showing 2 intercalaries present in *Paralestes* and a series in *Lestes.*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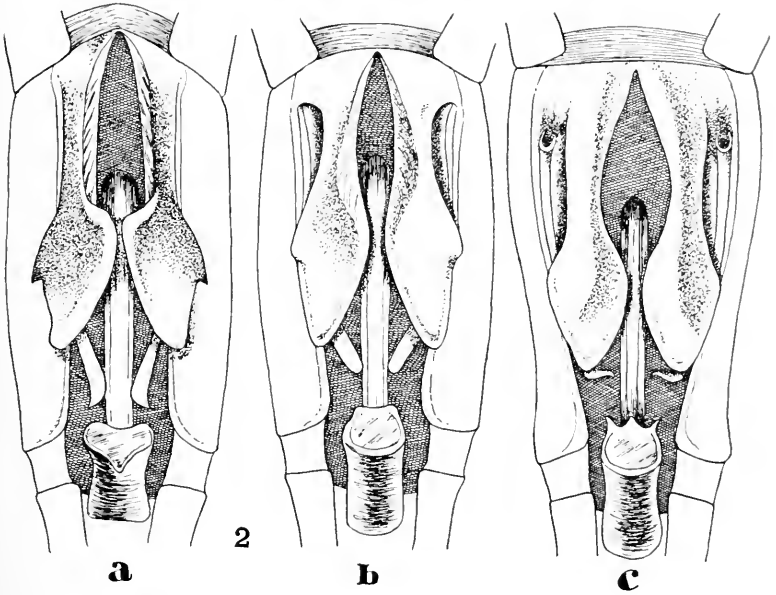
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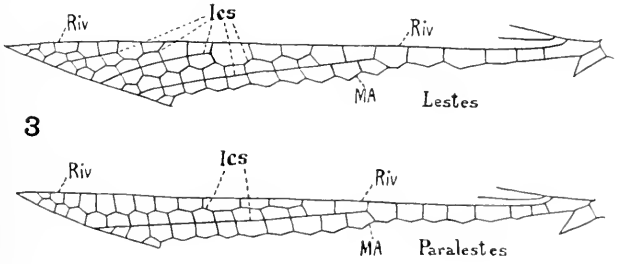
Riv
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3
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Ics
Riv
MA
Paralestes

FIGS. 1–3.

Pterostigma unicolorous; inferior anal appendages of male non-bifid ..... *Chlorolestes* Selys.
S. Africa. Genotype *Chlorolestes conspicua* Selys.

Subfamily 2. **Megalestinae**

Wings of both sexes always hyaline, uncolored; IRiii and Riv taking origin at a point nearer the arculus than to the nodus (as in *Lestes* sens strict.); anal vein leaving posterior border of wing at or often proximal to the level of *Ac*.

Only a single genus: *Megalestes* Selys.

Oriental. Genotype *Megalestes major* Selys.

Family 3. LESTIDAE

Moderately robust, medium sized or small, slender Lestine dragonflies. Discoidal cell well removed from posterior border of wing; an oblique vein invariably present between Riii and IRiii; anal vein leaving the posterior border of wing at the level of *Ac* (except in genus *Chalcolestes* Kennedy in which it is proximal to *Ac*); pterostigma nearly always longer than broad.

Subfamily I. **Sympecmatinae**

Small slender Lestine dragonflies which, when at rest, have the wings closely apposed over the dorsum of body. Discoidal cells of fore- and hindwings very narrow and differing in shape and size; pterostigma variable but usually less elongated and more imperfectly braced than in the next subfamily.

Key to Genera of Subfamily Sympecmatinae

1. Pterostigma of hindwing at a more proximal level than that of forewing, so that when the four wings are closed, those of the hindwings fail to coincide with those of the forewings; inner end of pterostigma oblique and continuous with brace ..... *Sympecma* Burmeister.
Palaearctic. Genotype *Agrion fusca* Lind.

Pterostigma of hindwing at the same level as that of forewing, so that with all the wings apposed, the hindwing pterostigma covers that of the forewing; inner end of pterostigma more or less truncate and often divorced from its brace ..... 2.

2. Veins at base of hindwing coated with long hairs; posterior border of wings at base showing a marked convex or angular expansion ..... *Tricholestes* nov. gen. Papuan. Genotype *Lestes risi* Van der Weele.

Veins at base of hindwing naked; no dilatation of wing bases ..... 3.

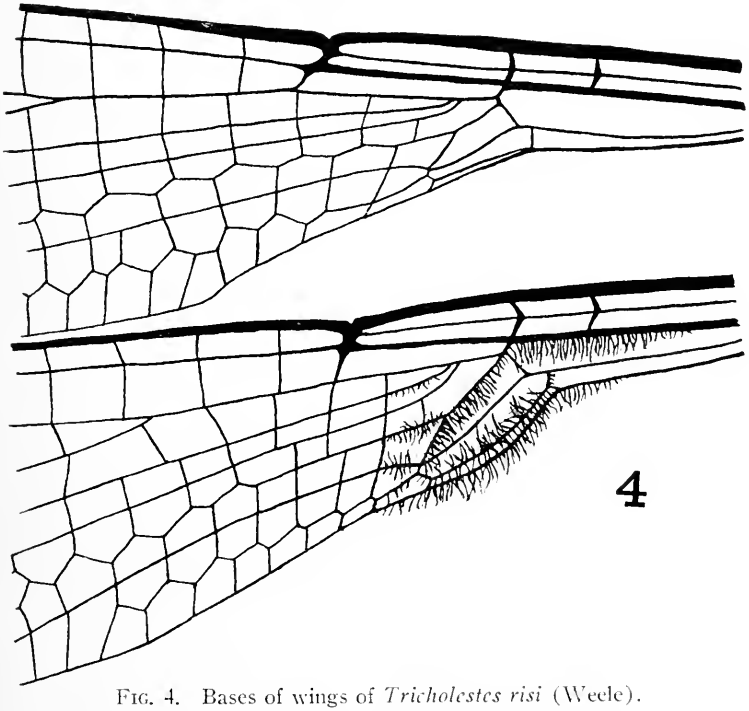


Fig. 4. Bases of wings of *Tricholestes risi* (Weele).

3. Wings tinted with yellow throughout; discoidal cells excessively narrow; pterostigma often bicolorous; markings of thorax and abdomen closely similar to those of *Sympecma fusca* (Lind) ..... *Indolestes* Fraser. Oriental. Genotype *Indolestes indica* Fraser.

Wings untinted; discoidal cells moderately narrow; pterostigma unicolorous; markings of thorax and abdomen differing broadly from those of *Sympecma fusca* .... *Austrolestes* Tillyard. Oriental, Australian. Genotype *Agrion cingulatum* Burmeister.

Subfamily **Lestinae**

Small to large Lestine dragonflies rather more robust than those of the preceding subfamily, and resting with their wings widely open. Discoidal cells of fore- and hindwings closely similar in size and shape; pterostigma (except in genus *Platylestes*) always considerably longer than broad.

Key to Genera of Subfamily Lestinae.

1. Pterostigma quadrate or subquadrate; thoracic markings reduced to scattered spots; anal appendages of female depressed, obtuse at apex ..... *Platylestes* Selys. Oriental. Genotype *Lestes platystyla* Rambur.

   Pterostigma elongate, rarely less than twice as long as broad; thoracic markings, if present, lineate or irregular in character: anal appendages of female conical, acuminate at apex ..... 2.

2. Anal vein separating from the posterior border of wing distinctly proximal to the level of cross-vein *Ac* .... *Chalcolestes* Kennedy. Palaearctic. Genotype *Lestes viridis* Lind.

   Anal vein separating from the posterior border of wing exactly at the level of *Ac* ..... 3.

3. The space between Riv and M not markedly widened at border of wing and enclosing only two long parallel intercalated veins. Dorsum of thorax frequently marked with metallic antehumeral bands which are hook-shaped above or deeply notched on the outer side .... *Paralestes* Schmidt MSS. Oriental Ethiopian. Genotype *Lestes praemorsa* Selys.

   The space between Riv and M markedly widened at border of wings and enclosing a series of gradually shortening intercalated veins. Dorsum of thorax variably marked but never with notched antehumerol stripes ..... 4.

4. Anal border of hindwing with an obtusely angulated dilatation opposite the discoidal cell; discoidal cells remarkably similar in fore- and hindwings, short and broad; Riii with its origin opposite the 2nd postnodal vein .... *Cyptolestes* Williamson. Neotropical. Genotype *Cyptolestes tuberalatus* Williamson.

   Anal border of hindwing normally shaped; discoidal cells fore- and hindwings differentiated, that of hindwing with its base shorter than the costal side ..... 5.

5. Riii markedly recessed towards base of wing, its origin situated opposite the 1st postnodal vein ... *Archilestes* Selys. Nearctic. Genotype *Lestes grandis* Rambur.
   Riii with its origin widely distal to the 1st postnodal vein ..... 6.
6. Wings of male, save in *O. wallacei* (Kirby), broadly banded or spotted with blackish brown ... *Orolestes* McLachlan. Oriental. Genotype *Orolestes selysi* McLachlan.
   Wings of male hyaline, unmarked ..... 7.
7. Large species with abdomen about 50 mm. in length, head, thorax and abdomen entirely green metallic. Pterostigma yellow, swollen ..... *Sinhalestes* gen. nov. Oriental. Genotype *Lestes orientalis* Hagen.
   Smaller species with abdomen only 30 to 35 mm. in length, partly or non-metallic. Pterostigma black or brownish, elongate ..... 8.
8. Riv ending distally short of the level of pterostigma, especially in the hindwing ..... *Superlestes* Williamson. Neotropical. Genotype *Lestes exoleta* Selys.
   Riv ending at or slightly beyond the level of pterostigma ..... 9.
9. General coloring more or less uniform sandy yellow or brown without metallic or dark markings except for a middorsal dark brown stripe on segments 8 to 10 (but very old adults may show stages of melanism). Pterostigma sandy yellow or with pale distal end .... *Xerolestes* gen. nov. Oriental. Genotype *Lestes pallida* Rambur.
   Color usually more or less metallic with dark markings. Pterostigma usually black or blackish brown; dorsum of thorax may be wholly green metallic or with single or duplicate linear metallic stripes with a straight outer border ..... *Lestes* Leach. Cosmopolitan. Genotype *Lestes barbara* Fabricius.

Notes on Odonata of Surinam

V.[1] A New Species of Misagria with a Redescription of the Genus (Odonata: Libellulidae)

By D. C. Geijskes, Paramaribo, Surinam

The genus *Misagria* (Kirby 1889) has for a long time been represented by one species only, the genotype *M. parana* (Kirby 1889). A few years ago (1943), Kimmins [2] described a second species of this genus as *M. bimacula* from British Guiana, of which he says: "This species, which was placed, unnamed, under *Misagria* by McLachlan in his collection, differs in several respects from the genotype (*M. parana*), and were more material available, it might be necessary to erect a new genus for it."

During my explorations in Surinam, I twice collected a species of *Misagria* in the hilly country near the Brownsberg, about 100 km. south of Paramaribo, which proved to be not the common *M. parana* and which was set aside as probably new. After studying the publication of Kimmins, I was much surprised to find in it not my new species from the Brownsberg, but still another one which, however, shows some striking peculiarities in common with the Surinam species. The development of the anal loop in the hindwing and the structure of the male genitalia in both these species, as contrasted with the genotype *M. parana,* is especially remarkable. On the other hand, there are many points possessed in common with the genotype, so that it seems to me not necessary to create a new genus for the two discovered species in the Guianas although they do belong to a distinct

[1] Part I. *Rimanella arcana* Needham and its nymph (Odon. Zyg.). Revista d. Entomologia, 11 (1–2): 173–179; 8 figs. 1940. Part II. Six mostly new Zygopterous nymphs from the coastland waters. Ann. Ent. Soc. Amer., 34: 719–734; 6 figs. 1941. Part III. The genus Coryphaeschna, with descriptions of a new species and of the nymphs of *C. virens.* Ent. News, 54: 61–72. 1943. Part IV. Nine new or little known Zygopterous nymphs from the inland waters. Ann. Ent. Soc. Amer., 36: 165–184; 7 figs. 1943.

[2] Kimmins, D. E. 1943. A new South American Dragonfly (*Misagria bimacula* sp. n.). Ann. & Mag. Nat. Hist., Ser. II, Vol. X, pp. 156–159, 6 textfigs.

group. In other primitive Libelluline genera as *Cannaphila* and *Dasythemis* which are closely related to *Misagria*, we encounter also differences within the species, especially with regard to the length of the anal loop. For this reason I have extended the generic characters of *Misagria* as given below.

Misagria calverti nov. spec.

Male.—Face yellow, labium with a median black stripe of moderate width. Outer margin of labrum finely bordered with black. Upper part of frons brown with metallic blue shining; ocellar tubercle light brown, antennae black. Occipital triangle and rear of head brown, with some yellow markings below.

Prothorax brown, front and hind lobe and the dorsal median yellow, hind lobe more or less rectangular, without hairfringe on top. Pterothorax chocolate brown, crossed by yellow stripes as follows: a broad dorso-median stripe, which is continued between the wingbases in three spots. A second stripe along the upper side of the humeral suture, running downward over the mesinfraepisternum to the middle coxa. The first band covers the lower mesepimeron, connected on top with a yellow spot situated between the humeral suture and this stripe. Band 4 runs along the second suture, finely connected with band 3 in its upper part and crossing the suture line below the stigma, where it is widely connected with band 5 in the upper metepimeron. Stripe 5 in turn is connected in its upper part with band 6, widely extending the lower part of metepimeron.

The bands 2–6 replace largely the brown on the sides of pterothorax, with the result, that only three brown bands occur, viz., a large one under and along the humeral suture, a smaller second one over the stigma and a small third band in the middle or metepimeron. Poststernum yellow for the most part, the sides darkened.

Legs dark brown with lighter parts on the inner side of first femora and at the apical end and first tarsus joint of hind legs. Claws with a large additional tooth at 2/3 length. Abdomen dark brown, marked on segment 1–5 and on segment 7 with dorso-median and lateral yellow spots, reaching in segments 4, 5

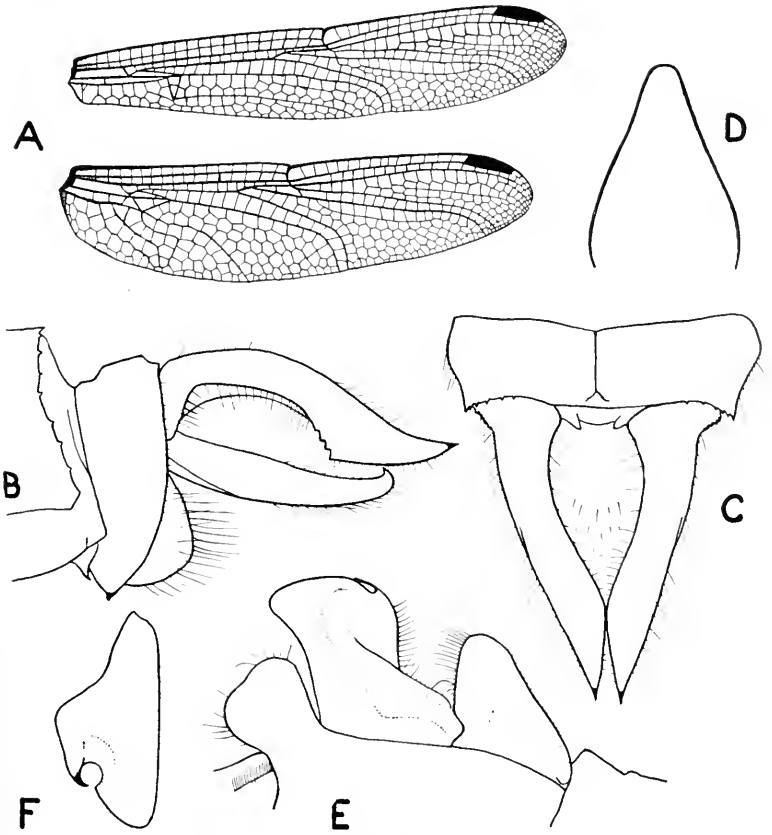
and 7 from base to half the segment length, in the basal segments covering a larger part. Segment 6 with a small lateral spot on each side only; segments 8, 9 and 10 black. Appendages red-brown; appendages superiores strongly curved in the basal half, the tips seen from the dorsal side convergent and pointed; on the under side a triangular projection at 3/5 the length, basal side of this projection armed with a few (4) small teeth. Inferior appendage triangular, reaching to half the distance of the projection and the end of the appendages superiores; apex rounded with two small upturned points.

Wings hyaline, with a small golden wingspot at base, stigmata brown. Antenodal crossveins $\frac{19.18}{16.16}$, last antenodal complete, postnodals $\frac{14.14}{14.14}$. Arculus at third antenodal, triangle with one crossvein, inferior triangle in front wings two- and three-celled. One bridge crossvein in front and hind wing and two cubito-anal crossveins in hind wing. Anal loop well developed and with a definite outer angle, projecting about two cells beyond the apex of the triangle, with a forked cell at the outer angle. Discoidal field in front wing starting with a row of two cells against the triangle, in hind wing with one row of three cells, followed by a row of two cells, two cells long. Membrane small, black. Golden wingspots diffusely fading distally, in front wing reaching to between first and second antenodal and cubito-anal crossvein, or one cell more; in hind wing to near the second antenodal and the second cubito-anal crossvein, ending at the margin 5 cells from the anal wing base.

Genitalia on second abdominal segment: anterior lamina large, triangular from the side, its anterior surface with a median furrow, apical margin distinctly excised. Hamule larger than lamina and hind lobe, outer lobe blunt quadrate, inner lobe in the form of a small hook directed caudad, separated from the outer lobe by a small excision. Hind lobe as high as lamina, broad rounded distally.

Total length 37 mm., abdomen 25 mm., hind wing 31 mm., front wing 33 mm., pterostigma 3–3.25 mm.

Female.—Similar to male, but the blue on frons less brilliant shining, the dorsal and lateral yellow spots on abdominal segments 3–5 and on segment 7 diffusely confluent. Dilated parts on segment 8 large and black. Wings hyaline, golden basal spots somewhat smaller than in male. Pterostigma dark red-brown.



Misagria calverti n. sp. holotype male

A, right fore and hind wing; B, abdominal appendages, left profile view; C, *idem*, dorsal view; D, appendix inferior, ventral view; E, genitalia of second adb. segm., left profile view; F, right hamulus, ventral view.

In front wing arculus distad from third antenodal, in hind wing at or just behind this crossvein; in hind wing three cubito-anal crossveins, antenodals $\frac{21.20}{16.17}$, postnodals $\frac{15.16}{13.12}$. In front wing discoidal field beginning from triangle two times with 3 cells wide, followed 2–3 cells long with a row of two cells wide; in hind wing discoidal field after triangle one time 3 cells followed 2–3 times by a row of two cells wide. Female otherwise as in male.

Total length 42 mm., abdomen 30 mm., hind wing 35 mm., front wing 37 mm., pterostigma 4 mm.

In spite of the difference in size between the male and the female, it seems to me that both the specimens belong to the same species.

SURINAM: Brownsberg, along bush path, settling on dry twigs, Sept. 14, 1938, one male; Sept. 19, 1938, one female (Geijskes leg.). *Holotype* male and *allotype* female in the author's collection.

I take great pleasure in naming this species after the nestor of the neotropical Odonata, Dr. Philip P. Calvert, on the occasion of the celebration of his 80th birthday, in appreciation of his help and encouragement in my study of the Surinam Odonata.

Generic characters of **Misagria**

Dark brown chocolate coloured species of moderate size, marked with yellow or yellow-green stripes and spots, the upper part of frons metallic violet shining and the hyaline wings with golden basal spots.

Eyes connected to one another over a short distance. Vertex with two small points, frons rounded, the median furrow distinct. Lobus of prothorax small rectangular with rounded corners, lying flat, without hairfringe. Pterothorax well developed, chocolate dark brown with yellow or yellow-green markings. Legs long, hind femur with several short spines, claws with an additional tooth at about 2/3 of the claw length. Wings long and slender, hind wing not much broader than front wing, pterostigma large, dark brown. Triangle in front and in hind wing

with one crossvein. Cu_1 in hind wing arising at the anal angle of triangle. Anal loop small and then reaching to the level of the distal end of triangle, or long foot-shaped and then projecting about two cells beyond the apex of triangle. One or two bridge crossveins, placed in proximal part of space and with two or three cubito-anal crossveins in hind wing. Discoidal field in front wing beginning at the triangle with two cells, sometimes (in ♀) twice with three cells.

Male abdomen slender, the first two segments swollen, segments 7–10 moderately widened and flattened; female with segments 3–7 wider, segment 8 with lateral expansions. Male genitalia: anterior lamina with the apical margin pointed forward, or in the median with a furrow and the apical margin excised; hamule large, outer lobe triangular or quadrate, inner lobe in the form of a small hook. Female genitalia: vulvar plate reduced, sides of segment 8 with lateral expansions.

Male appendages superiores with swollen basal part, dentated ventral surface with a triangular projection in the middle or at 2/3 the total length and with the apices pointed and curved upward or directed caudad. Appendage inferior broad triangular and divided at top, or smaller pointed with two upturned points at the apex.

Distribution: Guianas, Amazon, Ecuador.

Nymphs, unknown.[3]

Key to the species of Misagria

1. Anal loop of hind wing short, reaching to the level of the distal end of triangle, containing 8–10 cells. Sides of pterothorax marked with five large yellow stripes, the last ones partly confluent. Male genitalia: apical margin of anterior lamina bent forward; hamule widely excavated so that outer and inner lobes are widely separated, outer lobe triangular. Apex of inferior appendage broad and divided in two dents, which are not upturned. . . . . Guianas, Amazon, Ecuador. *M. parana* Kirby

Anal loop of hindwing long, footshaped, with a definite outer outer angle, projecting about two cells beyond the apex of

[3] I have reared one female nymph of *M. parana*, which is awaiting description.

triangle, containing 14–16 cells. Male genitalia: anterior lamina in the median with a furrow and the apical margin excised; hamule large, outer lobe quadrate, inner lobe in the form of a small hook, separated from the outer lobe by a small excision. Inferior appendage triangular, pointed to the end, apex with a small excision between two small upturned points.....2

2. Sides of pterothorax marked with five large yellow stripes, the last ones partly confluent. Male superior appendages curved in the basal part, the triangular projection on the lower surface after the middle; inferior appendage about 3/4 long as the superiors. Male genital hind lobe on top broadly rounded.....Surinam. *M. calverti* nov. spec.

Sides of pterothorax marked with yellow spots. Male superior appendages long, slender, hind points long and curved upward to subacute apices; the triangular projection on the lower surface before the middle; inferior appendage about half as long as superiors. Male genital hind lobe small lanceolate.....British Guiana. *M. bimacula* Kimmins

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The Entomological Society of Canada

The Entomological Society of Canada is a new national society that will serve as a link between the various regional societies. The decision to form such a society was reached at the 87th annual meeting of the Entomological Society of Ontario on November 1–3. In addition to the Ontario society there are included the Acadian, the Manitoba, the British Columbia and the proposed Quebec society. The Canadian Entomologist will be published jointly by the Ontario and the regional societies and Dr. W. R. Thompson will continue as editor. The president of the new society is W. R. Ross of the Division of Entomology, Ottawa. The other officers are: A. W. Baker, R. H. Wigmore and A. B. Baird. There is a group of seven Directors that includes the presidents of the regional societies.

A Note on the Derivation of the Odonate Fauna of the Island of Ceylon

By F. F. Laidlaw, Moniave, St. Lawrence, Ventnor, Isle of Wight

Ceylon is separated from the Indian mainland by a narrow strait barely 50 miles wide, and nowhere more than about 10 fathoms deep; partly bridged moreover by shoals and islands which form the well-known "Adam's Bridge." The northern part of the island is low-lying, the south-central area mountainous, the hills rising to a height of over 7000 ft. The plains are covered with savannah, the mountains carry a dense rain-forest Both plains and mountains are of course now-a-days largely under cultivation.

Zoologically, the island is a Province of the Indian Subregion (roughly the lands lying to the south of the great valleys of the Indus and Ganges), and its fauna differs from that of the mainland (Indian) Province to a considerable extent. On the one hand some of the characteristic Oriental forms found in India are lacking in Ceylon, the tiger is a familiar example; on the other Ceylon is occupied by several groups which are not found on the mainland. The Acavidae, a family of pulmonate land-mollusca, related to forms from the Seychelles and Madagascar, may serve as an instance. The dragonflies of these two Provinces show interesting differences, with which this note is concerned.

The Indian Subregion differs from the other Subregions of the Oriental Region briefly as follows:

Of the Zygoptera, the *Megapodagriidae* are absent, as are the *Platycnemidae* (except for the ubiquitous genus *Copera*); the *Chlorocyphidae* are poorly represented. Amongst the Anisoptera the Aeschnidae have relatively few species and no endemic genus. Some genera of the *Gomphidae* and of the *Libellulidae* otherwise widely distributed in the Region are not represented; one may quote *Sieboldius* and *Lyriothemis* as examples.

Both Provinces have special positive characters of their own. India has a radiation of 10 species of the Corduliine sub-family *Idionychinae*, of 6 species of *Protosticta*, and of about 12 species belonging to the *Protoneuridae*, referred by FRASER to five endemic genera. The Epallagid genus *Indophaea* has three species remotely allied to a Malaysian form; Chlorogomphus has 2 endemic species. None of these have been found in Ceylon. The only Subregional endemic genus shared by the two Provinces is *Platysticta* with which I deal below. This genus has two species in Ceylon, and one very distinct species in the extreme South of India.

The endemic Indian species are found mainly in the Western Ghats, the long mountain range which runs for nearly 800 miles from north to south along the west coast of the Indian Peninsula, reaching a height of over 7000 ft. in the Nilgiri and Anaimallai Hills. The range is largely covered with rain-forest, and is broken here and there by "gaps." Of these the Palghat gap which separates the Nilgiris from the Anaimallai Hills is the most important. Isolation of the forest-dwelling dragonflies in the several "sections" of the range has been sufficient to allow of some differentiation of the fauna of each of them. Thus *Chlorogomphus campioni* Fraser and *Indiophaea dispar* Rambur are found north of the Palghat gap only, whilst *Chlorogomphus xantheptera* Fraser and *Indophaea fraseri* Laidlaw are restricted to the hills to the South. The Ghats may in fact be looked on as a chain of islands of forest and mountain separated from each other by a "sea" of low-lying, somewhat arid country; and Ceylon may be likewise regarded as a similar but more isolated island. The Ceylonese mountains are about 200 miles distant from the nearest hills of India.

The number of species of dragonflies recorded from Ceylon is 100, allowing for a few doubtful entries. I have listed them below in three categories as follows:

I. Species found in India, and in many cases with a wide distribution through the Oriental Region.

Neurobasis chinensis Linne.
Lestes elata Selys.

Lestes praemorsa Selys (= *decipiens* Kirby).
Copera marginipes Rambur.
Ceriagrion cerinorubellum Rambur.
Ceriagrion coromandelianum Fabricius.
Aciagrion hisopa Selys.
Aciagrion occidentale Laidlaw.
Pseudagrion microcephalum Rambur.
Pseudagrion malabaricum Fraser.
Enallagma malayanum Selys.
Enallagma parvum Selys.
Ischnura senegalensis Rambur.
Ischnura delicata Hagen (= *aurora* Brauer).
Agriocnemis pygmaea Rambur.
Agriocnemis femina Brauer.
Ictinogomphus rapax Rambur.
Anax immaculifrons Rambur.
Anax guttatus Burmeister.
Hemianax ephippiger Burmeister.
Gynacantha hyalina Selys.
Cratilla lineata Brauer.
Lathrecista asiatica Fabricius.
Potamarcha obscura Rambur.
Orthetrum pruinosum neglectum Rambur.
Orthetrum chrysostigma luzonicum Brauer.
Orthetrum glaucum Brauer.
Orthetrum triangulare triangulare Selys.
Orthetrum sabina Drury.
Orthetrum chrysis Selys.
Brachydiplax sobrina Rambur.
Diplacodes trivialis Rambur.
Diplacodes nebulosa Fabricius.
Acisoma panorpoides Rambur.
Crocothemis servilia Drury.
Bradinopyga geminata Rambur.
Neurothemis tullia Drury.
Neurothemis intermedia intermedia Rambur.
Rhodothemis rufa Rambur.
Sympetrum fonscolombei Selys.
Trithemis kirbyi kirbyi Selys.
Trithemis aurora Burmeister.
Trithemis pallidinervis Kirby.
Trithemis festiva Rambur.
Tholymis tillarga Fabricius.
Pantala flavescens Fabricius.
Tramea basilaris burmeisteri Kirby.

Trameа limbata Desjardins.
Hydrobasileus croceus Brauer.
Zyxomma petiolatum Rambur.
Rhyothemis variegata Linne.
Rhyothemis triangularis Kirby.
Urothemis signata Rambur.
Macrodiplax cora Brauer.
Acthriamanta brevipennis Rambur.

Ceylon shares with S. India *Hylaeothemis fruhstorferi* Karsch. This genus has one other species in Borneo, and one in the N. W. Himalaya.

It also shares a subspecies *Sita* Campion of *Indothemis limbata* Selys, the nominate species is found in Lower Burma and Malaya.

I have recorded an unidentified species of *Mortonagrion* from the island (Laidlaw 1924). Fraser (1936) thinks that the record of *Acthriamanta brevipennis* is due to an error. He also suggests that *Hemicordulia asiatica* Selys. and *Neurothemis fulvia* Drury will be added to the list.

II. Representative species, presumably derived from the same stock as existing Indian species.

Vestalis (Vestinus) apicalis nigrescens Fraser.
Pseudagrion rubriceps ceylonicum Kirby.
Paragomphus henryi Laidlaw.
Cyclogomphus gynostylus Fraser.
Burmagomphus pyramidalis sinuatus Fraser.
Megalogomphus ceylonicus Laidlaw.
Microgomphus lankaensis Fraser.
Heliogomphus nietneri Selys.
Heliogomphus lyratus Fraser.
Heliogomphus ceylonicus Selys.
Heliogomphus walli Fraser.
Microgomphus wijaya Lieftinck.
Gomphidia pearsoni Fraser.
Epophthalmia vittata cyanocephala Hagen.
Macromia zeylanica Fraser.
Tetrathemis yerburyi Kirby.
Zygonyx iris ceylonica Kirby.
Onychothemis testacea ceylonica Ris.

III. Species which do not fall into either of the above categories.

Euphaea splendens Selys.

The nearest allies of this species are Malaysian forms such as *variegata* Rambur.

Libellago 4 sp.

A radiation of species perhaps resulting from the absence of competitor pressure. One of them, *indica* has, I believe, invaded the Indian mainland. It was first described by Fraser (1928) as a race of *lineata* from S. India, where it ranges as far north as Poona.

Lestes (*?*) *orientalis* Hagen.

This large species is quite unlike anything known from the Indian Province. Fraser tells me (in litt.) that it is probably generically distinct from true *Lestes* and may be near *Orolestes*, a genus which is known from the Himalaya, through Indochina to Malaysia.

Lestes (*Ceylonolestes*) *gracilis* Hagen.

Lestes (*Ceylonolestes*) *divisa* Selys.

These species belong to a section of the genus which is mainly characteristic of Indochina. A species closely allied to *gracilis* is however found in S. India to the south of the Palghat gap.

Drepanosticta (*Ceylonosticta*) 11 sp.

A radiation presumably also resulting from absense of competitor pressure. It is worth noting that a single species of *Drepanosticta* which is probably allied to the Ceylon forms is found in the Andaman Is. where too a *Libellago* occurs. *Drepanosticta* is not found in Peninsular India, it occurs in Assam, Burma, Malaysia, and further east.

Platysticta 2 sp.

Very distinct from any other Oriental genus. I believe it to be related to the genus *Palaemnema* of S. America. In discussion with Fraser he admits that this is possible though he had (1938) put the latter genus in a subfamily of its own.

Elattoneura 3 sp.

The genus is found in India, and as far to the east as Malaysia. The Ceylon species are all very distinct, and do not suggest near relationship with other species.

Prodasineura sita Kirby.

Regarded by Fraser as related to *autumnalis* Fraser from Burma.

About 57% of the species are held in the *first category*. Two only of these, *Hylaeothemis fruhstorferi* and *Indothemis* show

definite relationship with Indochinese or Malaysian stock. The remainder are almost all of them forms which live in low-lying country, often with a rather arid climate. Some of them are known to have migratory habits (e.g., *Sympetrum fonscolombei*), others have a very wide range, and probably all of them are capable of crossing from the mainland at the present time by way of Adam's Bridge either actively or passively.

The *second category*, 18% of the species, consists of forms whose opportunities of reaching the island have been few, perhaps unique. Most of them are forest dwellers, and many show the effects of prolonged isolation—marked differentiation from the parent stock. Rapid permeation of the stock has probably been helped in some cases by the relatively small area occupied by a species.

25% of the species fall into the *third category*. Twenty of these are definitely related to Burmese or Malayan forms. This specific percentage is exaggerated by the presence of the two radiations, *Libellago* and *Drepanosticta*. The three species of *Elattoneura* give little help to guide us in speculating as to their origin.

The two species of *Platysticta* (along with their Indian congener) are the most interesting members of the fauna. The genus is probably a surviving remnant of an ancient fauna which now has no other representatives in the area. Both S. India and Ceylon are believed to be very old land surfaces, and the survival in them of "palaeogenic" forms is quite possible.

The presence of the very definite Malaysian and Indochinese elements in the fauna of Ceylon, and to a lesser degree in that of S. India would involve at the present time a migration of roughly 1000 miles across the Bay of Bengal, or an equally lengthy journey in conditions unfavourable climatically, round the coast of the Bay.

Two suggestions have been made as to means which would make such a passage possible:

The first is that insects may be carried passively from time to time across the Bay by the N. E. Monsoon wind, which blows steadily and persistently across the bay from the north-east during the winter months.

Migration of this sort could only be a rare accident, and successful colonization very exceptional.

The species listed in the third category certainly suggest a random "selection." It will be noticed that all of them are Zygoptera and not strong fliers, it is possible that the possession of strong power of flight may make a passive migration less likely. Compare CALVERT's (1942) notes on the fauna of the West Indian islands.

The second suggestion, which I owe to Prof. ZEUNER, is that there was a connection between Ceylon and the Indian mainland in Pleistocene times, and that great climatic fluctuations took place in that Period when it is possible that the "equatorial rain-belt lay a little further to the North than it does today. This may have enabled species to migrate round the coasts of the Gulf of Bengal."

To sum up. In addition to the ordinary lowland Oriental and Palaeotropical fauna, about 57% of all its Odonata, Ceylon has about 18% of forms related to Indian species but differentiated more or less, by isolation.

The remainder for the most part show affinities to Burmese or Malayan forms, and it is suggested that such forms have reached Ceylon either as passive immigrants carried by seasonal (Monsoon) winds, or have travelled round the coasts of the Bay of Bengal in Pleistocene times, when physical and climatic conditions differed from those of today.

Lastly the Ceylon and Indian species of the genus *Platysticta* are regarded as *palaeogenic*, that is as survivals of a very ancient fauna.

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On the Life of William T. Davis [1]

By H. M. Parshley, Northampton, Massachusetts

When William T. Davis died in 1945 at the age of 82 he was among the last of the vanishing race of all-round naturalists. He spent a large part of his life tramping the woods and fields of Staten Island, and he was on terms of the utmost familiarity with the whole fauna and flora of the region. He was an indefatigable collector and a specialist of world-wide standing on the taxonomy of the Cicadidae. But he was more than this, and in her excellent biography [2] Miss Abbott presents with gratifying clearness the eccentric, old-fashioned, keen-minded, simple, sincere, thrifty, generous, and lovable character that hundreds of people —from country boys and New York business men to John Kieran and Edwin Way Teale—remember with affection and, most of them, with a sense of definite obligation in one way or another. Shortly before his death, for example, Mr. Davis identified a collection of cicadas for the writer, and when he returned them he generously sent also a handsomely bound volume of his papers on the group.

Davis's life was identified with Staten Island; he was an an authority on its history, its houses and antiquities, as well as on its biology; and he was the guiding spirit and chief financial support of its Institute of Arts and Sciences. It is good to know that his extensive collections of insects in various orders are well housed on the top floor of the Museum of the Institute where they are under the care of Mr. Joseph F. Burke, and that the Davis types of numerous new species are also safe, having been deposited in the American Museum of Natural History in New York. The ancient Victorian house where Davis lived most of his life, at 146 Stuyvesant Place, still stands with its bushy dooryard and overgrown flagstones, a strange anachronism

[1] Contributions from the Department of Zoology, Smith College, No. 226.

[2] *The Life of William T. Davis*, by Mabel Abbott, Cornell University Press, 321 pp., $3.50. October, 1949. Some of the material in the present article is taken from a review accepted for publication in the book review section of a New York newspaper about a year ago, which never appeared in print.

among modern business blocks; but it is no stranger than the man who once lived there, and before long it, too, will disappear.[3] His family had some means, but he worked faithfully for twenty-five years in a New York business office, retiring at forty-six so that he could devote all his time to his scientific and historical interests. He kept a journal and published a book, "Days Afield on Staten Island"; and he contributed numerous papers to scientific journals, describing as new more than half of the 170 known species of North American cicadas. When he ventured away from Staten Island it was usually to attend meetings of entomological societies in New York, Brooklyn, and Philadelphia, or to make collecting trips on Long Island or in New Jersey. Davis was most frugal and abstemious with himself, lunching on bits of chocolate and crackers to save a few cents, and in later years he unnecessarily feared the approach of penury; but in his will he left $20,000 to the Historical Society and almost $100,000 to the Institute.

As Miss Abbott abundantly shows in her sympathetic portrait, Davis was always himself, a man devoid of vanity, affectation, vices, or ostentation. He worked early and late in his attic museum, and he was a fountain of wisdom and knowledge to young and old within the sphere of his varied interests. Encountered in the open, he was a strange apparition: small and spare, dressed in dusty black, wearing a battered stiff straw hat; burdened with an old army knapsack, a black umbrella, and an insect net which was often stowed under his coat behind; his face adorned with a large, red nose and a straggly mustache, his eyes shining through rimless glasses—an odd figure to be sure, but somehow radiating kindliness, intelligence, and an infectious joy in every aspect of nature, including people—except perhaps

[3] Last summer the writer made a pious pilgrimage to Stuyvesant Place where part of the Institute library is temporarily located in charge of Miss Abbott in the old Davis house (now the property of a bank) at No. 146, and a few blocks down the street the Davis collections and other matters of interest are to be found in the permanent Museum building. Davis's urge for "keeping things" is well exemplified in such items as boxes containing hundreds of duplicate specimens of *Pseudolucanus capreolus* and the like. And Mr. Burke, a specialist in the study of diatoms, has beautiful specimens to show the visitor, including a series of many species taken from the cranium of *Pithecanthropus erectus*.

those who set forest fires and "improve" landscapes. Several of Miss Abbott's excellent illustrations show Davis collecting in full regalia. The writer recalls an occasion when a large class of carefree students from the Biological Laboratory at Cold Spring Harbor came upon Mr. Davis in the field. He was equipped as described above and must have seemed a comic figure to the boys and girls who had never seen or heard of him before. But after lunch they got a different impression in the laboratory as he named their specimens and modestly shared other information with them. In a few minutes even the most careless felt the presence of the unusual and gave him their respectful attention: "He knew so profoundly what he was talking about and clothed the subject in such homely charm and interest."

Davis had a wide acquaintance among the entomologists of his time—including, among many, Wheeler, Leng, Olsen, Mrs. Slosson, Bequaert, Torre-Bueno—and Miss Abbott traces out most of these relationships in detail, quoting from letters and from Davis's journal. But many others besides entomologists were reached by Davis's influence. When he was over seventy he was still leading study trips of the local Bird Club and Nature Club and "going on antique hunts with members of the Historical Society." It is notable how often even the most casual acquaintanceship took on the tone of friendship. Many young boys became interested in science through Davis's generous efforts and in later life remained firm friends and admirers, like the soldier who wrote from Holland: "It seems forever since I have seen a man as civilized, as unforgettable."

He was truly a rare and striking personality, even, as Mr. Teale says in his introduction to Miss Abbott's book, "a symbol of the good life." His was not the life for everyone, to be sure, but still it was a good life, for in it he solved in his fashion the problem all must face: how at once to follow the inner light, meet the material demands of life, and maintain a genial warmth in human relations. He loved natural woods and fields and such relics of the past as old houses and tombstones; he was apprehensive of the complexities, conflicts, and encroachments of recent years. As his biographer says, "this was what he believed in —keeping things from being lost or destroyed."

Current Entomological Literature

COMPILED BY R. G. SCHMIEDER

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia and the University of Pennsylvania, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the year 1950 unless otherwise noted. Continued papers, with few exceptions, are recorded only at their first installment.

For other records of general literature and for economic literature, see the Bibliography of Agriculture, Washington, and the Review of Applied Entomology, Series A, London. For records of papers on medical entomology see Review of Applied Entomology, Series B.

NOTE: The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the List of periodicals and serials published in our January and June issues. The number of the volume, and in some cases, the part, heft, &c. is followed by a colon (:). References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to Neotropical species, and not so indicated in the title, have the symbol (S).

Papers published in ENTOMOLOGICAL NEWS are not listed.

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Reviews

INTRODUCING THE INSECT. By F. A. Urquhart. New York: Henry Holt and Co. 1949. Pp. x, 287, 4 colored pls., 160 text figs. Price $5.00.

To write a textbook for the beginner in entomology is a particularly difficult task, as it involves selection of examples from a group which contains more species than all the rest of the animal kingdom. Dr. Urquhart has been very successful in choosing insects which are well distributed on the continent, and which may be commonly seen by most interested observers.

The make-up of the volume suggests that its primary function is to assist the amateur to identify common insects down to the family level. The use of illustrated keys to accomplish this purpose is to be highly commended. The introductory chapters on making, preparing and housing an insect collection, and on anatomy, life history and procedures in identification are particularly clear and easy to follow. The illustrations appear to be well done and quite satisfactory for the purpose intended.

There is a list of general reference books for the reader who wishes to pursue the subject further.—M. E. PHILLIPS.

Atlas of Scale Insects of North America. Series V. Pseudococcidae (Part 1). By Gordon Floyd Ferris. Stanford University Press, Stanford, California, Nov. 1950. Pp. vii + 278, 108 full-page illustrations. Price $7.50.

This part includes about half the known species. Unlike the earlier series by Professor Ferris, this is not "loose-leaf" but is a well bound volume and is called "Volume 5," at least on the jacket and on the cover. There is an introduction of 19 pages, and there are keys to the genera and to the species. Following the style established in the other series, the textual material is held to a minimum and each species is illustrated by a full page of reproductions of careful pen-and-ink drawings.—R. G. Schmieder.

The Mayflies of Florida. By Lewis Berner. University of Florida Press, Gainesville, Fla., 1950. xii + 267 pp., 131 illustrations. Paperbound $5.50.

A systematic treatment with keys to genera and species of both the adults and the nymphs, well illustrated with many line cuts and numerous full page half-tones of adults and nymphs. In addition to the systematic and distributional data, the book gives a good general introduction to the group, and under each species tells what is known of its ecology, its habits and its seasonal distribution. These biological data are often very detailed and occupy most of the page space. Altogether, this is an excellent book, well produced on coated paper.—R. G. Schmieder.

The Classification of Animals. An introduction to zoological taxonomy. By W. T. Calman, formerly Keeper of Zoology, British Museum (Nat. Hist.). Methuen Monographs on Biological Subjects, Methuen and Co., Ltd., London; John Wiley, New York, 1949, vii + 54. Price $1.25.

In spite of its small size, this booklet gives a remarkably clear and complete statement of the aims and methods of zoological taxonomy. It can be heartily recommended to students setting out to study insects and also to many already engaged in taxonomic work in order that they may profit by accepting the suggestions on good usage in systematic publication that are included. Among the topics taken up are the species question (together with a discussion of sub-specific categories), the genus and higher categories, nomenclature, types, the International Code, descriptions and diagnoses, keys, illustrations, measurements and publication. Finally, there is a short list of those books that are indispensable to the systematist.—R. G. Schmieder.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

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ENTOMOLOGICAL NEWS

MARCH 1951

Vol. LXII No. 3

CALVERT ANNIVERSARY VOLUME

on the occasion of

Dr. Philip P. Calvert's Eightieth Birthday

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PUBLISHED MONTHLY, EXCEPT AUGUST AND SEPTEMBER, BY
THE AMERICAN ENTOMOLOGICAL SOCIETY
PRINCE AND LEMON STS., LANCASTER, PA.
AND
1900 RACE STREET, PHILADELPHIA 3, PA.

Subscription, per yearly volume of ten numbers: $4.00 domestic; $4.30 foreign; $4.15 Canada. Entered as second-class matter April 19, 1943, at the post office at Lancaster, Pa., under the Act of March 3, 1879. Acceptance for mailing at the special rate of postage provided for in paragraphs (d-2), Section 34.40, P. L. & R. of 1948, authorized April 19, 1943.

ENTOMOLOGICAL NEWS

ENTOMOLOGICAL NEWS is published monthly, excepting August and September, by The American Entomological Society at Prince and Lemon Sts., Lancaster, Pa., and the Academy of Natural Sciences, 1900 Race Street, Philadelphia 3, Pa., U. S. A.

PHILIP P. CALVERT, Editor Emeritus. R. G. SCHMIEDER, Editor. Editorial Staff: E. J. F. MARX, M. E. PHILLIPS, J. A. G. REHN, and A. G. RICHARDS.

Subscription price, per yearly volume of 10 numbers: Domestic, $4.00; Foreign, $4.30; Canada, $4.15—U. S. Currency.

SUBSCRIPTIONS, ADVERTISEMENTS: All communications and remittances to be addressed to **ENTOMOLOGICAL NEWS, 1900 Race Street, Philadelphia 3, Pa.**

ADVERTISING RATES: Full width of page. Payments in advance.

	1 Inch	2 Inches	3 Inches	6 Inches
One Issue	$ 2.50	$ 4.50	$ 6.50	$10.00
Five Issues	9.00	17.00	24.00	42.00
Ten Issues	16.00	30.00	42.00	72.00

MANUSCRIPTS and all communications concerning same should be addressed to **R. G. Schmieder, Zoological Laboratory, University of Pennsylvania, Philadelphia 4, Pa.**

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ENTOMOLOGICAL NEWS

VOL. LXII MARCH, 1951 No. 3

A New African Microgomphus, and Notes on Some Asiatic Types (Odonata)

By CYNTHIA LONGFIELD, F.R.E.S., London

The first African species to be described belonging to the genus *Microgomphus* Selys was named *M. schoutedeni* by Lt. Col. F. C. Fraser in May 1949 (Rev. Zool. Bot. Afr., 42: 114). The insects had been taken in the Belgian Congo at Kapanga, 1 ♂ Nov. 1932, and Bambesa, 1 ♂ and 1 ♀ May 1938. Up to that time the genus had been considered wholly Oriental.

In November, 1948, Mr. J. A. Whellan of the Dept. Agric. Southern Rhodesia, had captured a single female on the Inyamadzi River, Portuguese East Africa and being unable to classify it, sent it to me in the following spring. The specimen reached me just about the time that *M. schoutedeni* was published. I saw at once that this is a different species, but although the specimen is completely undamaged, it is badly discolored and the exact shape and extent of the pattern is impossible to define. For this reason I am unwilling to name this specimen, although only the second female of African *Microgomphus* known; but I have partially described it later on in this paper.

On May 23rd, 1950, Dr. F. J. O'Rourke of the Liverpool School of Tropical Medicine, caught a third female, of still another species, at the Loiasis Research Scheme, Kumga, BRITISH CAMEROONS, beside a slowly flowing stream in partially cleared forest. This specimen reached me late in July, in a tube of spirit. It was rather damaged in the wings, but the color and pattern were perfectly preserved. I have felt justified in naming this West African specimen, as, in the known species of *Micro-*

gomphus with described females, these very closely resemble the males.

All three of the African females seem to be very closely related, with similar patterns and dimensions and with short vulvar scales. It is deeply to be regretted that only the male of one species is, so far, known.

Microgomphus camerunensis sp. nov.

Female Holotype: (mature). Abdomen + appendages, 27 mm. Forewing, 26 mm. Hindwing, 25 mm. Pterostigma fw. 2.75 mm., hw. 3 mm. Color black, green and citron-yellow.

Head: Labium, lateral lobes, mandible-bases and genae citron-yellow. Two large spots on labrum, anteclypeus and crest of frons citron-yellow, the rest glossy-black as in fig. 1, A. The base of frons, epicranium, antennae and the back of head and eyes, glossy-black. The vertex and occiput reddish-brown, the latter shallowly concave along the raised ridge, which is bordered with an uneven number of very short and irregularly formed black spines, interspersed with a few, sparse, fine, pale hairs. The compound eyes either green or yellow and meeting to within 1 mm. Neck yellow dorsally.

Prothorax: Deeply ridged transversely, raised in the center, with equally prominent anterior and posterior lobes. Black or dark reddish-brown, with citron-yellow laterally on the anterior lobe.

Thorax: Glossy-black dorsally and citron-yellow beneath. The thoracic pattern as in fig. 1, B, the pattern from the dorsal carina to the 2nd lateral suture being green. Also on the dorsum there is a broad green transverse band between each pair of wings.

Legs: Short, the hind femora extending to the beginning of the 2nd abdominal segment and measuring 7 mm. Numerous black spines, not very closely set and gradually lengthening in the center. The inner surface of all the femora is citron-yellow. Tibiae and tarsi are black, coxae citron-yellow.

Wings: All four very slightly tinged with saffron at the bases. Venation black. Pterostigma dark yellowish-brown between

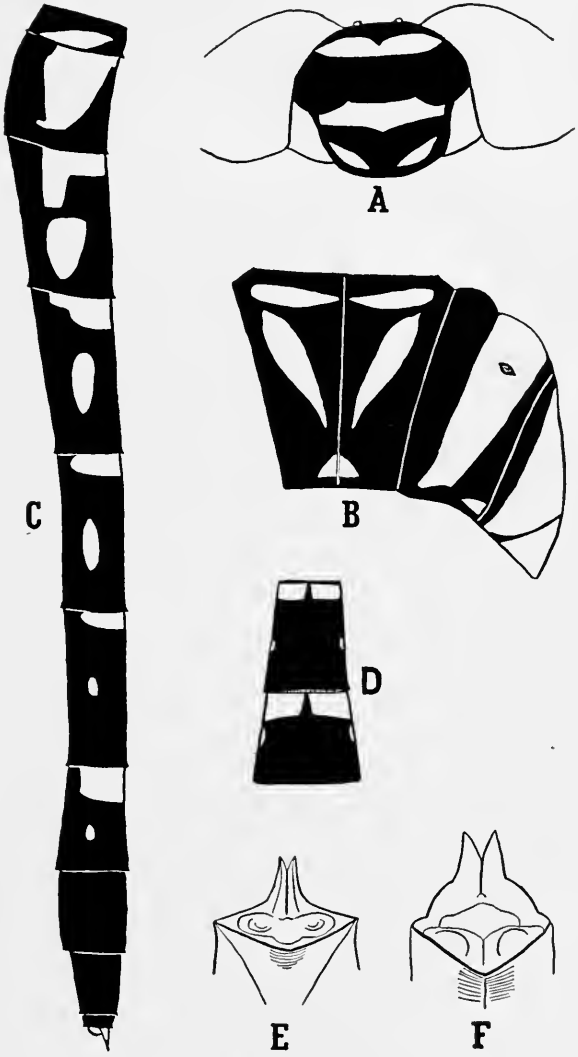

FIG. 1. *Microgomphus camcruncnsis* sp. nov.

A. Pattern of head from in front. B. Thorax pattern. C. Pattern of abdomen from left side. D. Dorsal pattern of 6th and 7th abdominal segments. E. Vulvar scale. F. The same for the Portuguese E. African ♀.

thick black veins, 0.5 mm. deep and covering 4–5 cells. Antenodals $\frac{14 \mid 15}{10 \mid 10}$, postnodals $\frac{10 \mid 10}{10 \mid 10}$, bridge X-veins $\frac{7 \mid 7}{5 \mid 6}$, cubital anal X-veins(Cuq) $\frac{2 \mid 2}{1 \mid 1}$. 1st and 5th antenodals are the primaries. Arculus at the 2nd antenodal or very slightly distal. Discoidal field in forewings of 6 rows of 2 cells, in hindwings 1 row of 3 cells, then 3 rows of 2 cells. One row of cells along hind margin of forewing from base to 1A, with the exception of 3–4 double cells, 3 cells distant from the apical end.

Abdomen: Glossy-black marked with citron-yellow as in fig. 1, C and D. The dorsal pattern is as follows: Segment 1 is yellow to the first transverse carina and also has a minute spot in center of the black area; Segment 2 has a narrow anterior yellow ring and a yellow spot in the center of the black area, the tiny oreillets are also yellow; Segments 3 and 4 resemble Segment 6 in fig. 1, D, but with the anterior rings complete except for the black dorsal carina, also more of the larger yellow lateral spots can be seen from above; Segment 5 exactly like Segment 6; Segment 7 as in fig. 1, D; Segments 8, 9, 10 black. Abdomen beneath black. Appendages yellow with black tips, 0.5 mm. in length. Length of abdominal segments: 1st, 1 mm.; 2nd, 2.5 mm.; 3rd, 0.75 mm.; 4th, 5th and 6th, 4 mm.; 7th, 3 mm.; 8th, 2 mm.; 9th, 1.75 mm.; 10th, 0.5 mm. Vulvar scale yellow, about half as long as 8th segment and shaped as in fig. 1, E.

M. camerunensis is very similar to *schoutedeni* in color-pattern, but can best be separated by the different shape of the occiput together with the short irregular spines, instead of a fringe of black hairs; also by the shorter hind femora. It has a somewhat similar thoracic pattern to *M. wijaya* Lieftinck (1940) from Ceylon, while the vulvar scale resembles that of *M. thelyphonus* Lieftinck (1929) from Java, but it has very much shorter and broader valves than in *M. torquatus* (Selys, 1854) type female from India.

I would here like to take the opportunity to correct two statements made by Lt. Col. F. C. Fraser in 1934 in volume 2 of *The Fauna of British India,* as to the location of 2 type specimens.

The type of *M. torquatus* (Selys) is not in the Selys collection (Brussels), as stated on page 355, but in the British Museum (Natural History). The type of *Cyclogomphus* [*Microgomphus*?] *minusculus* Selys is not lost, as stated on page 361. It was in the MacLachlan collection and is now in the British Museum (Natural History). This female is neither a *Cyclogomphus*, as now defined, nor a *Microgomphus*. I think it is most likely a *Burmagomphus* Williamson.

The *type* of *Microgomphus camerunensis* Longfield and the *Microgomphus* female from Portuguese East Africa are also in the British Museum (Natural History) having been presented by the respective collectors.

Microgomphus sp.

A mature female from the Inyamadzi River, Portuguese East Africa, 12.11.1948. It differs from *camerunensis* in being a yellower insect. The entire frons and clypeus, also nearly all the labrum are citron-yellow, with only a very narrow blackish basal band across the labrum and a faint indication of a fine black surrounding edge to the lip. The tips of the distalia are yellow in the otherwise black antennae, and the back of the head and eyes is either orange or reddish-brown. The shape, color and armature of the occiput is almost identical. The compound eyes meet to within 1.25 mm. and are orange? in color. The prothorax appears to be unmarked. The dorsal pattern of the thorax is similar to *camerunensis*, but laterally it would appear that the yellow vertical band on the metepisternum is joined below to the yellow metepimerum, leaving a large oval black patch astride the 2nd lateral suture. Legs are more yellow than black; the hind femora measure 7 mm. It would appear that on the abdomen there is more yellow laterally, possibly continuous along the lower edge of the tergites. Beneath, the black of the sternites is somewhat pruinose. Segment 8 would seem to have some yellow laterally, but 9 and 10 are black. The light yellowish-brown anal appendages are very slightly blunter than in *camerunensis*, a bit longer (0.75 mm.) and without black tips. The dimensions of the segments differ slightly: 1st, 1 mm.;

2nd, 2.75 mm.; 3rd, 4th and 5th, 4 mm.; 6th, 3.75 mm.; 7th, 3 mm.; 8th, 2 mm.; 9th, 1.75 mm.; 10th, 0.5 mm.; total length—appendages 27.5 mm. The vulvar scale is yellow and shaped as in fig. 1, F. The wings are slightly tinged all over with greenish-yellow, this may be due to age. Pterostigma reddish-brown, 3 mm. long and 0.5 mm. deep in all wings. The cells beneath are small and variable in number, from 4 to 5½. Antenodals $\frac{15 \mid 15}{10 \mid 9}$, postnodals $\frac{10 \mid 9}{10 \mid 9}$, bridge X-veins $\frac{6 \mid 6}{5 \mid 5}$, cubital anal X-veins $\frac{2 \mid 2}{1 \mid 1}$. The 1st and 5th antenodals are the primaries in the forewings and the right hindwing, 1st and 4th in left hindwing. The discoidal field of the forewing has 6 rows of 2 cells and the hindwing 1 row of 3 cells, then 3 rows of 2 cells. The hind margin of the forewing from base to 1A is all of single cells.

From *schoutedeni* it is easily separated by the yellow face, the different shape and armature of the occiput, the shorter hind femora and the yellow anal appendages.

Correction of a Reference to Mantis religiosa L.

In a note concerning *M. religiosa* in ENTOMOLOGICAL NEWS, 61: 205–207, the writer referred to an article in the 79th Annual Report of the Entomological Society of Ontario, 1948: 41–44, and attributed its authorship to "SMITH, C. W." This citation was incorrect and should have been "JAMES, H. G."—W. W. JUDD, University of Western Ontario, London, Ont.

A Note on the Persistence of a Much-Neglected Primary Antenodal Cross Vein in the Order Odonata [1]

By Hsiu-fu Chao [2] Department of Entomology, University of Massachusetts, Amherst, Massachusetts

During the progress of a study of Chinese gomphine dragonflies I have noticed an antenodal cross vein which has remained heretofore unreported. This vein is hereby called the *basal primary antenodal cross vein* and is denoted by Ax_0 since it is basad of the other two previously recognized primary antenodals, Ax_1 and Ax_2. This vein has been shown in the drawings illustrating the wing bases of the dragonflies by Snodgrass (1908, 1930, 1935), but is not named or discussed.

In order to facilitate the discussion of Ax_0 a description of the costal margin of the dragonfly wing seems necessary. In 1948 Fraser stated: "If the nodal region of the wing of any dragonfly be observed under a moderately high-powered microscope, the subcostal vein will be seen to approach the nodus and then make a distinct curve anteriorwards towards the costal margin, at which level it straightens out again and runs along the lower margin of the costal border of the wing as a distinct tubular structure." Thus under this interpretation, followed here, the part basal to the nodus is C and the part distal to the nodus is a portion of Sc.

The flattened costal vein is gradually twisted a short distance from the base of the wing. Its basal portion is broad, dorsoventrally flattened, dorsally longitudinally grooved, and ventrally correspondingly ridged. In dorsal view an intermediary piece (Snodgrass, 1935, pp. 220–221, *C*) is interpolated between

[1] Contribution from the Department of Entomology of the University of Massachusetts, Amherst, Massachusetts.

[2] I wish to express my sincere appreciation to my teacher, Dr. John F. Hanson, for his invaluable guidance and helpful criticism during the progress of my study. Indebtedness is also due to my friend, Mr. George F. Edmunds, of the University of Utah for information from his extensive knowledge of wing venation and mechanics of mayflies.

the extreme base of the posterior margin of C and the posterior lobe of the humeral plate. Ax_0 is located at the junction between the base of the posterior margin of C and the intermediary piece. It is connected with the ventral ridge of C—a condition which is the same for all other costal cross veins. A part of Ax_0 is dorsally obscured by the posterior margin of C, but its greater portion can be seen as clearly as any other veins.

Structurally Ax_0 is exactly the same as the other two veins, Ax_1 and Ax_2, which are strengthened by what Fraser (1937) called "strongly chitinized membrane." Each so-called chitinized membrane is actually formed by the fusion of two abutting lamellar veins, the costal and the subcostal cross veins. These two portions may be separated along their line of fusion when a force such as that exerted in mounting a wing on a slide is applied. It seems appropriate to point out here that another cross vein having exactly the same kind of structure is present This is a composite cross vein on the ventral surface of the wing consisting of the subcostal cross vein at the nodus and the subnodal cross vein. Its significance in wing mechanics has been pointed out by Fraser (1948).

The membrane of the two cells basal to Ax_0 is thicker than that of other cells and is tinged with brown or other colors in different species; or it may be partly transparent, as is the case in many species of gomphine dragonflies.

The basal primary antenodal cross vein is the most basal of all cross veins yet discovered in odonatan wings. Furthermore, it is the most persistent of the antenodal cross veins, being strongly developed probably in all living species of the order Odonata. The reason for its consistent occurrence may be found in the fact that the base of the costal margin is flexibly connected with the humeral plate and the intermediary piece. It seems logical then that a strong cross vein at the very base of the costal region would be most important for production of rigidity of the fore margin of the wing—a condition which is very essential in the sculling type of flight.

Judging from its position this vein resembles the costal brace of mayflies. However, its actual relationship with the latter

vein is not certain since no sufficient evidence has been obtained regarding homologies of wing bases of mayflies and dragonflies.

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——. 1930. How insects fly. Smithsonian Rept., 1929, pp. 383–421. (cf. fig. 11).

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Secondary Sexual Characters on the Legs of Zygoptera (Odonata)

By Douglas St. Quentin, Richard Kralikplatz 2, Wien, Austria

It is known that secondary sexual characters occur on the legs of the male Odonata: In Anisoptera the "tibial-keel" is known and in some genera modified spines as in Cordulegasterinae, in the genera Epigomphus [1] and Leptogomphus.[2] In Zygoptera there occur modifications on the tibiae in form of coloration and dilatation.

In this suborder the modification appears, in some genera and species, as a slight whitish pruinescence on the inner side, the flexor surface, of the tibiae. This pruinescence seems to be an exudate of supra-cuticular pigmentation like the "bloom" of certain fruits. Such pigmentation occurs very frequently on

[1] Calvert, Ent. News XIV, p. 187 (1903).

[2] Laidlaw, Malayan Branch J. Roy. As. Soc. Part II, p. 227 (1926).

different parts of the body of dragonflies and is known as a sign of maturity. The other kind of the modification consists of a light color on this side of the tibiae. Species with a higher degree of the modification and species with whitish legs, show, in some cases, dilated tibiae.

The purpose of this modification is cleared up by the observations of several authors, such as Poulton, Laidlaw, Lieftinck and Fraser; "the males perform a kind of nuptial dance before the female, during which they make a great display of the white pulverulent flexor surface of the hinder pairs of tibiae," says Fraser.[3]

In Anisoptera sexual characters of such kind are unknown. Pruinescence occurs very commonly on the thorax or other parts of the body, but never on the tibiae.

The modification is found in six genera, belonging to two systematic groups: They are the Epallaginae Laidlaw with the genera *Libellago* Selys (= *Micromerus* Rambur), *Chlorocypha* Fraser, *Rhinocypha* Selys, and the Platycnemididae Fraser with the genera *Copera* Kirby, *Proplatycnemis* Kennedy, *Platycnemis* Charp.

Libellago Selys shows, in the most species, a light pruinescence on the inner side of the tibiae. The tibiae are slightly dilated in about 1/10 of their length. Unmodified tibiae occur like *L. miae* Lieftinck or *L. dorsocyana* Lieftinck. In all six genera there also occur species with unmodified tibiae; therefore, it seems that the modification has a separate origin and has developed independently in each genus.

Chlorocypha Fraser is closely allied to *Libellago*. The genera were established by Fraser 1928 for the African species of the old genus *Libellago*. In this genus the inner side of the tibiae is light-colored without pruinescence. *C. rubida* Hagen shows unmodified tibiae. *C. tenuis* Longfield shows a green stripe on the inner side of the black tibiae, perhaps the first step of the modification. *C. curta* Hagen has the tibiae on the inner side light colored, *C. caligata* Selys has the red tibiae that are dilated 1/7 of their length.

[3] Lieftinck Follow, Treubia XIV, p. 386 (1934).

In *Rhinocypha* Selys a pruinescence is found as in the genus *Libellago* Selys, but only the middle- and hind-tibiae are modified. *R. pelops* Laidlaw has unmodified tibiae, *R. phantasma* Lieftinck has the tibiae basally dark and distally light. The most species show a whitish pruinescence on the tibiae and the tibiae are slightly dilated *ca.* 1/10 of their length.

In the Platycnemididae Fraser, likewise, only the middle- and hind-tibiae are modified. The same is true of the sexual characters on the legs of Anisoptera. It seems that the various functions of fore legs, like holding the food, cleaning eyes and mouthparts, make them unusable for other adaptations.

The three genera *Proplatycnemis* Kennedy, *Platycnemis* Charp. and *Copera* Kirby are very closely related. *Proplatycnemis* has been separated by Kennedy 1920 [4] for two species of *Platycnemis* from Madagascar; *Platycnemis* and *Copera* were once put [5] in one genus.

Proplatycnemis agrioides (Ris) shows the tibiae black with a bright bluish stripe on the inner side. It seems to indicate that the whitish legs of the *Platycnemis* have arisen from a type with black legs. The tibiae of *P. agrioides* are slightly dilated.

In the genus *Copera* Kirby, the species show orange to whitish tibiae. Species with unmodified tibiae also occur, such as *C. imbricata* (Selys). Following Lieftinck 1940,[6] *C. vittata* (Selys) and its subspecies show all degrees of the modification from unmodified tibiae to strongly dilated ones.

The typical subspecies *C. vittata vittata* (Selys) inhabits the southern Malay States, a part of Sumatra and all Borneo. The tibiae are not noticeably dilated. Subspecies with strongly dilated tibiae are *C. vittata serapica* (Selys), confined to the Nikobar Islands, and *C. vittata javana* Lieftinck from the wooded districts of south Java. It is very remarkable that both subspecies with strongly dilated tibiae inhabit rather restricted areas. Isolation seems to advance the modification. In Sumatra there are found *C. vittata vittata* (Selys), *C. vittata acutimargo* (Krüger) and *C. imbricata* (Selys) all with undilated tibiae.

[4] Kennedy, J. Ohio Sci. 21, p. 85 (1920).
[5] A Manual of Dragonflies of China, p. 248 (1930).
[6] Lieftinck, Treubia XVII, pp. 281–2306 (1940).

In Borneo occur *C. vittata vittata* (Selys) and *C. vittata palavana* Lieftinck, both with tibiae not noticeably dilated. In Java occur *C. annulata* (Selys), *C. marginipes* (Rambur) and *C. vittata javana* Lieftinck, all with dilated tibiae. It seems that the great islands, Sumatra, Borneo, and Java, has each its particular type of *Copera*. Sumatra and Borneo species and subspecies without, Java species with dilated tibiae.

The genus *Platycnemis* Charp. presents marked variations. The legs of the species are whitish, but it is probable that they are derived from a type with dark legs like *Proplatycnemis* Kennedy. The African species *P. nyansana* Förster shows only slightly dilated tibiae, *ca.* 1/10 of their length. From this type to the type with the highest degree of the modification, *P. foliacea* Selys with 1/3 dilatation, all intermediate steps can be found. In this genus the modification reached an additional degree. In some species the modification appears in the same form on the females also.

In *P. pennipes* Pal. the tibiae of the females are also a little dilated. In *P. latipes* Selys the tibiae of the females are just as strongly dilated as in the males, *ca.* 1/7 of their length. The secondary sexual character has become a specific character.

The development of the modification is easy to follow. The origin may show a type like *Libellago* or *Rhinocypha* with a thin pruinescence on the tibiae, more a physiological sign of maturation than a morphological character. This pruinescence can become, in some forms, a thick stratum and finally, in addition, there is a dilatation of the tibiae. *Chlorocypha* or *Platycnemis* follows a different path. The first step may be indicated by a light stripe on the inner side of the dark tibiae. Then the tibiae became a light color and dilated. In these forms dilatation reaches its highest degree. In some species, but not in the species with the most dilated tibiae, the modification appears also in the females. Thus, the development of this modification resembles the development of antlers in the Cervidae. In this family most genera possess antlers as sexual characters of males. Only in some primitive genera like *Moschus* or *Hydropotes* are antlers lacking. In the genus *Rangifer* the sexual character has become of specific rank, and both sexes have antlers.

Records of some Virginia Odonata

By Leonora K. Gloyd, Illinois Natural History Survey, Urbana, Illinois

This report is based primarily on the dragonflies taken on a brief trip, sponsored by the University of Michigan, to Virginia in September 1934. It is supplemented by a list of species in the collection of the Virginia Polytechnic Institute at Blacksburg, and by a recent collection received from R. L. Hoffman of Clifton Forge. Several species, although rather common, have not previously been reported for the state.

Southeastern Records

On September 11, 1934, after a memorable visit with Doctor and Mrs. Calvert in their home at Cheyney, Pennsylvania, H. K. Gloyd and I set forth on a collecting trip to southeastern Virginia. Heavy rains had fallen during the first two weeks of September throughout most of the state and with additional rains at night, cloudy skies during most of the daylight hours, wet vegetation, and flooded streams, ponds and swamps, we found conditions for collecting dragonflies far from ideal. Our first stop was made, on the morning of September 12, at Falling Creek, 5 miles south of Richmond where we saw only three *Boyeria vinosa* (Say) and one male *Hetaerina titia* (Drury), all flying erratically and apparently excited by the torrential waters of the flooded stream. It was not possible to get within swinging distance of these dragonflies. The *Hetaerina* was shot and caught as it floated downstream within reach.

Our first camp was made in a grove of trees in the vicinity of Cypress Chapel, Nansemond County, near the western edge of the Dismal Swamp. A few hours of sunshine in the morning on September 13 and 14 and for most of the afternoon on the latter day furnished the only good flying weather for dragonflies during our stay of several days. A nearby peanut field, bordered on the south and west by woods, on the north by a clearing in which sat an abandoned house, and on the west by

a small corn patch, was frequented by *Pantala flavescens, Tramea carolina,* and *Somatochlora filosa.* They seemed to be feeding on small insects which arose from the heavy foliage of the peanut plants. The Somatochloras flew low except when one was near with a net. Toward evening the height of their flight kept pace with the upsurging swarms of midges and by seven o'clock in the evening the Somatochloras were at treetop level with only an occasional low flight. One male was caught while he was patrolling a road between timbered areas. *Anax junius, Libellula vibrans,* and *Erythemis simplicicollis* were taken near the abandoned house and at the edge of the cornfield.

A ditch along a fairly well-shaded portion of the road served as the habitat for *Anomalagrion hastatum, Ischnura posita* and *Nehalennia integricollis.* A female *Ischnura posita* attracted my attention because she was flying about with a portion of a male abdomen still attached to her prothorax—mute evidence of sudden tragedy.

The dragonfly population was greatest at a nearby flooded swamp pond. On the cloudy afternoon of September 13, *Lestes vigilax* was abundant in the cattails and marginal vegetation. Other species of Zygoptera were rare. Of the Anisoptera, *Pachydiplax longipennis* and *Erythemis simplicicollis* were rather common. The following morning was bright and warm with sunshine. At 10:00 o'clock only a few *Lestes vigilax* and *disjunctus* were found hanging up and an occasional *Enallagma* was seen. About noon several species of Zygoptera, as well as *Perithemis tenera* and *Pachydiplax longipennis,* came out in considerable numbers. There were many mating pairs of *Enallagma dubium* on the lily pads but most were too far out to reach without wading beyond one's depth. About one o'clock they began to fly toward the edge of the pond and I went in pursuit of a pair. When I again turned back toward the center of the pond, not a zygopteran was to be seen. They had all vanished as if by a common signal. I do not know whether this was due to the intensity of the hot noon-day sun or to the appearance of greater numbers of *Erythemis* and *Libellula.*

The following is a complete list of species we obtained in Nansemond County:

Anomalagrion hastatum (Say). Sept. 13, 1 ♀; Sept. 14, 6 ♂, 2 ♀.

Enallagma dubium Root. Sept. 14, 5 ♂, 5 ♀.

Enallagma geminatum Kellicott. Sept. 13, 2 ♂; Sept. 14, 10 ♂, 3 ♀.

Enallagma signatum (Hagen). Sept. 14, 1 ♂, 1 ♀.

Ischnura posita (Hagen). Sept. 13, 8 ♂, 8 ♀; Sept. 14, 2 ♂, 6 ♀.

Lestes disjunctus Selys. Sept. 13, 1 ♂, 1 ♀; Sept. 14, 2 ♂, 2 ♀.

Lestes vigilax Hagen. Sept. 13, 42 ♂, 35 ♀; Sept. 14, 14 ♂, 3 ♀.

Nehalennia integricollis Calvert. Sept. 14, 1 ♂.

Erythemis simplicicollis (Say). Sept. 13, 1 ♂, 2 ♀; Sept. 14, many seen.

Erythrodiplax minuscula (Rambur). Sept. 13, 2 ♂; Sept. 14, 1 ♂.

Libellula incesta Hagen. Sept. 14, 2 ♂.

Libellula vibrans Fabr. Sept. 13, 1 ♀.

Pachydiplax longipennis (Burm.). Sept. 13, 8 ♂; Sept. 14, 5 ♂, 1 ♀.

Pantala flavescens (Fabr.). Sept. 14, 1 ♂. Rather common at times.

Perithemis tenera (Say). Sept. 14, 1 ♂. Several seen.

Sympetrum vicinum (Hagen). Sept. 14, 1 ♀.

Tramea carolina (Linn.). Sept. 14, 5 ♀. Many more seen.

Somatochlora filosa (Hagen). Sept. 13, 1 ♂; Sept. 14, 4 ♂, 3 ♀.

Anax junius (Drury). Sept. 13, 1 ♀. Others were seen on this date and the following day.

Other species to be recorded from southeastern Virginia are as follows:

Ischnura verticalis Say. Douthat State Park, Bath County, May 24, 1950, 1 ♀, R. L. Hoffman.

Erythrodiplax berenice (Drury). Virginia Beach, Princess Anne County, June 9, 1948, 3 ♂, 3 ♀, G. M. Boush (Va. Polytech. Inst.).

Western Records

The search for favorable weather and suitable collecting grounds as we drove westward across the state was without success until we reached the mountains in Alleghany County. Small streams in the vicinity of Long Dale looked beautiful but

dragonfly life was conspicuously absent. On September 18, after a cold night, the day was warm and blessed with sunshine and a few clouds. Two hours were spent on Simpson Creek, a stream of considerable fall and swiftness, with rocky bottom and occasional spots of coarse gravel, and with many deep holes. It ranged from ten to twenty feet wide and from six inches to three or more feet deep. In the region where we visited it there was a high bank on one side and tall shrubs, frequent alders and other trees grew on the other bank. Only four specimens, representing three species, were taken but the beautiful surroundings and the one new state record, *Boyeria grafiana,* made the time seem well spent.

On September 19, about one mile southeast of Clifton Forge, at a turn in the highway we suddenly came upon an interesting site and stopped for about an hour to collect. Twenty or thirty feet below the road was a rather large pond approximately two-thirds as wide as, and a little longer than, a city block. The north and west sides were formed by the steep roadgrade, the east and south banks were the more sloping sides of a mountain. We worked from the west side where the vegetation was rather dense. Small willows and other first-growth trees produced overhanging limbs and made dry land collecting difficult. Water vegetation was abundant but nevertheless wading was treacherous as the pond bottom was soft and full of holes and irregularities. *Enallagma civile* was extremely abundant and mating pairs were seemingly flying by the hundreds. *Argia violacea, Ischnura verticalis,* and *Sympetrum vicinum* were also mating. *Erythemis simplicicollis* and *Libellula incesta* were seen but little effort was made to collect them as they were wary and we had little time. We saw only the one *Aeshna umbrosa* ♀.

The specimens we collected in Alleghany County are listed below together with those taken recently by Richard L. Hoffman (RLH) from the same county.

Argia moesta (Hagen). Griffith, along Cowpasture River, in fallow field, June 6, 1950, 1 ♂ (RLH).

Argia violacea (Hagen). 1 mi. S.E. of Clifton Forge, Sept. 19, 1934, 3 ♂, 1 ♀. Griffith, June 6, 1950, 1 ♂ (RLH).

Enallagma civile (Hagen). 1 mi. S.E. Clifton Forge, Sept 19, 28 ♂, 15 ♀.

Enallagma geminatum Kellicott. 1 mi. S.E. Clifton Forge, Sept. 19, 3 ♀.

Enallagma signatum (Hagen). 1 mi. S.E. Clifton Forge, Sept. 19, 2 ♀.

Ischnura verticalis (Say). 1 mi. S.E. Clifton Forge, Sept. 19, 2 ♂, 4 ♀. Pond at Selma, May 24, 1950, 2 ♀ (RLH).

Ischnura posita (Hagen). 1 mi. S.E. Clifton Forge, Sept. 19, 3 ♂, 8 ♀.

Pachydiplax longipennis (Burm.). Griffith, on pond, May 18, 1950, 1 ♂ (RLH).

Plathemis lydia (Drury). 1 mi. S.E. Clifton Forge, Sept. 19, 1 ♂, 1 ♀. Long Dale, on Simpson Creek, Sept. 18, 1 ♀.

Sympetrum vicinum (Hagen). 1 mi. S.E. Clifton Forge, Sept. 19, 8 ♂.

Somatochlora tenebrosa (Say). 2½ mi. S.E. of Long Dale, elev. about 2500 ft., Sept. 18, 1 ♂. Flying above a sawdust pile at an old mill site.

Tetragoneuria cynosura (Say). Pond at Selma, May 24, 1950, 2 ♂ (RLH).

Boyeria grafiana Williamson. Long Dale, on Simpson Creek, Sept. 18, 1 ♂.

Boyeria vinosa (Say). Long Dale, on Simpson Creek, Sept. 18, 1 ♂, 1 ♀.

Gomphus lividus Selys. Pond at Griffith, May 18, 1950, 1 ♂ (RLH).

Gomphus quadricolor Walsh. Pond at Griffith, May 18, 1950, 1 ♂ (RLH).

V. P. I. Records

For the following additional records for western Virginia I am indebted to Mr. E. W. King of the University of Illinois and to Prof. James McD. Grayson, of the Department of Biology, Virginia Polytechnic Institute, who kindly sent all of the Odonata in the collection there for identification. All specimens were taken in 1948 on the College Pond on the campus at Blacksburg, Montgomery County, unless otherwise indicated. They were collected by G. M. Boush (B), T. K. Burton (TKB), L. B. Cochran (C), E. C. Cockrell (EC), G. E. Crist (GC), W. E. Ellis (E), J. M. Grayson (G), E. W. King (K), P. S. Smith (S), and ? Walker (W). According to Mr. King the

specimens without data were also collected at Blacksburg, probably in 1948.

Calopteryx maculata (Beauv.). May 23, 1 incomplete ♀ (C); May 27, 1 ♀ (EC); June 20, 1 ♀; June 21, 1 ♂; July 8, 1 ♂ (B); July 10, 1 ♂.

Amphiagrion saucium (Burm.). May 10, 1 ♀ (E); June 25, 1 ♀ (B).

Enallagma civile (Hagen). May 10, 1 ♂ (E); May 12, 1 ♀ (W); May 17, 1944, 1 ♂ (GC); June 20, 2 ♂, 1 ♀; July 2, 1 ♂ and July 8, 1 incomplete ♂ (K).

Enallagma doubledayi (Selys). April 15, 1 ♂ (EC).

Ischnura verticalis (Say). April 22, 1 ♂ (EC); May 6, 1 ♂, 1 ♀ (S); May 10, 1 ♀ (E); May 21, 1 ♂, 1 ♀ (TKB); June 20, 1 ♂, 3 ♀; June 25, 1 ♀ (B).

Lestes disjunctus Selys. May 6, 1 ♂ (EC).

Celithemis elisa Hagen. Mountain Lake, Giles County, June 20, 1 ♂ (B).

Erythemis simplicicollis (Say). July 22, 6 ♂, 1 ♀ (B).

Libellula luctuosa Burm. May 27, 1 teneral ♀ (EC); June 20, 1 teneral ♀ (B); June 23, 1 ♂ (B); June 25, 2 ♂, 2 ♀ (B); July 3, 1 ♂ (B).

Libellula pulchella Drury. June 23, 1 ♂ (B).

Pachydiplax longipennis (Burm.). May 7, 1 ♂ (S); May 10, 1 ♀ (E); May 15, 1 ♂ (EC); June 20, 1 ♂; June 25, 2 ♂, 1 ♀ (B).

Plathemis lydia (Drury). May 15, 1 ♂ (EC); May 20, 2 ♂, 1 ♀ (B); May 27, 1 ♀ (EC); June 23, 1 ♀ (B).

Perithemis tenera (Say). June 25, 1 ♂ (B); July 3, 1 ♂ (K); July 10, 1 ♂ (B); July 22, 1 ♀ (B).

Sympetrum rubicundulum (Say). July 2, 1 ♀ (G); July 22, 2 ♂ (B).

Sympetrum semicinctum (Say). July 8, 1 ♂ (B).

Tramea lacerata Hagen. May 13, 1 ♂ (EC); June 25, 1 ♂ (B); July 10, 1 ♂ (B); no data, 1 teneral ♂.

Somatochlora tenebrosa (Say). No data, 1 ♂.

Tetragoneuria cynosura (Say). May 15, 1 ♂ (EC); July 10, 1 ♂ (B).

Aeshna umbrosa Walker. Sept. 1939, 1 ♀ (G); no data, 1 ♂.

Anax junius Drury. April 15, 1 ♂, 1 ♀ (EC); May 20, 1 ♂ (B).

Basiaeschna janata (Say). No data, 1 ♂.

Epiaeschna heros (Fabr.). May 13, 1 ♂ (W).

Gomphus lividus Selys. May 20, 1 ♂ (B).

The Hibernation of Bombus impatiens Cresson (Hymenoptera: Bombidae)

By Lee H. Townsend, College of Agriculture and Home Economics, University of Kentucky

The most important observations on the hibernation of this species were published by Plath (1927). The observations and experiments of this investigator carried out in New England established the fact that young queens of this species, under normal conditions, hibernate in the soil about the entrance to the maternal nest. He relates finding from 13 to 40 queens hibernating in a small space near the entrance of a former nest. These same observations, without important additions, were published by Plath (1934) in his important book on bumblebees.

Frison (1929) published an important contribution to the knowledge of this species as observed in central Illinois but was never successful in finding hibernating queens. He commented upon Plath's (1927) observations and added "these observations confirm a story told me by a young eastern entomologist, whose name I have forgotten, that he once found nearly a hundred queens of *B. impatiens* hibernating in a small area in sandy soil near New York City."

On account of the rather scanty information available on the hibernation of this species the writer believes the following incident is worthy of presentation.

On March 13, 1948, some workmen were clearing out an osage orange (*Maclura pomifera* (Raf.) Schneid.) fence-row near Georgetown, Kentucky. Several bumblebees were noticed lying in the soil as though in a stupor. As digging continued more specimens were uncovered, all in separate locations. An area of approximately 3 square feet was carefully dug 2 to 4 inches deep and examined. As a result, 86 hibernating queens of *Bombus impatiens* Cresson (Det. Burks, Illinois Nat. Hist. Survey) were found. The soil was loose and fertile without much grass but pervaded by many Osage orange roots. All the queens were in a stupor when found but began to revive as they were handled. These seemed to be all the specimens in this

immediate area. No effort was made to find the site of a former nest.

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Current Entomological Literature

COMPILED BY R. G. SCHMIEDER.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia and the University of Pennsylvania, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the year 1950 unless otherwise noted. Continued papers, with few exceptions, are recorded only at their first installment.

For other records of general literature and for economic literature, see the Bibliography of Agriculture, Washington, and the Review of Applied Entomology, Series A, London. For records of papers on medical entomology see Review of Applied Entomology, Series B.

NOTE: The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the List of periodicals and serials published in our January and June issues. The number of the volume, and in some cases, the part, heft, &c. is followed by a colon (:). References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to Neotropical species, and not so indicated in the title, have the symbol (S).

Papers published in ENTOMOLOGICAL NEWS are not listed.

GENERAL—Dobzhansky, T.—Mendelian populations and their evolution. [3] 84: 401–18. **Fisher, R. S. and F. O. Morrison**—Methods of rearing and sexing Musca domestica L. [80th Ann. Rpt. Ent. Soc. Ontario] pp. 41–45, ill. **Gregg, J. R.**—Taxonomy, language and reality. [3] 84: 419–35. **Mařan, J.**—Le role important de la variation géographique des insectes pour les questions zoogéographiques et évolutives. [Acta Ent. Mus. Nat. Pragae] 23: 23–87 (French summary, 78–83), 1945. **Mell, R.**—Artbildung durch physiologische Differenzierung (chemotaktische Antizipation) in der Gattung Rhopalocampta Wall (Lep., Hesperidae). [Bonner Zool. Beitr.] 1: 86–91, ill. **Newby, W. W.**—Histological techniques applied to insects (Abstract). [Proc. Utah Acad. Sci.] 25: 165–66, 1948. **Nielsen and Nielsen**—Migration. (See under Lepidoptera.) **Kullenberg, B.**—Observations sur Ophrys et les Insectes (Orchidaceae and Hymenoptera). [Bull. Soc. Sci. Nat. Maroc]

28: 138–41, ill. **Rensch, B.**—Die Abhängigkeit der relativen Sexualdifferenz von der Körpergrösse (Coleoptera). (Birds, mammals and insects (Col.).) [Bonner Zool. Beiträge.] 1: 58–69. **Weber, N. A.**—A survey of the insects and related arthropods of arctic Alaska. [83] 76: 147–206. **Wellington, W. G., J. J. Fettes, K. B. Turner and R. M. Belyea.**—Physical and biological indicators of the development of outbreaks of the Spruce budworm, Choristoneura fumiferana (Lep. Tortr.). [24] Sect. D, 28: 308–31, ill.

ANATOMY, PHYSIOLOGY, MEDICAL—Arvy, L., M. Gabe et J. L'Hoste—Contribution a l'étude morphologique du sang des Mantidae. [Rev. Canad. Biol.] 8: 184–200, 1949. **Balduf, W. V.**—Utilization of food by Sinea diadema (Fabr.) (Reduv.). [5] 43: 354–60. **Beck, S. D., N. M. Bilstad and J. H. Lilly**—Prepupal changes in the ventricular epithelium of the European corn borer, Pyrausta nubilalis Hbn. [5] 43: 305–10, ill. **Black, L. M.**—A plant virus multiplies in its insect vector. [53] 166: 852–53. **Broadbent, L., R. P. Chaudhuri and L. Kapica**—The spread of virus diseases to single potato plants by winged aphids. [4] 37: 355–61. **Caspari, E.**—On the selective value of the allels Rt and rt in Ephestia kühniella. [3] 84: 367–80. **Chaudhuri, R. P.**—Studies on two aphid-transmitted viruses of leguminous crops. [4] 37: 342–54. **Farstad, C. W., A. W. Platt and A. J. McGinnis**—Influence of wheat varieties on the sex ratio of the wheat stem sawfly, Cephus cinctus Nort. (Hym., Cephidae). [80th Ann. Rpt. Ent. Soc. Ontario] pp. 27–30. **Florkin, M. et G. Duchâteau**—Concentrations cellulaire et plasmatique du potassium, du calcium et du magnésium chez une série d'animaux dulcicoles. [C. R. Soc. Biol.] 144: 1132–33. **Gardener, E. J.**—Head tumors in Drosophila melanogaster (Abstract). [Proc. Utah Acad. Sci.] 25: 164, 1948. **Gerebtzoff, M. A., M. J. Dallemagne et E. Philippot**—Plasmocytomes rénaux mutilples et plasmocytose à la suite d'injections répétées de DDT au chien. [C. R. Soc. Biol.] 144: 1135–37. **Gerhardinder, K.**—Über den Einfluss unterschiedlicher atmosphärischer Druckverhältnisse bei Rhescyntinae (Lep.). [Zeitschr. Wiener Ent. Ges.] 35: 89–99. **Grison, P. et G. Viel**—Variation de l'effet de produits insecticides en fonction du stade larvaire des Insectes. [C. R. Acad. Sci.] 231: 1090–92. **Grosch, D.**—Olfactometer experiments with male braconids. [5] 43: 334–42. **Haydak, M. H. and A. E. Vivino**—The changes in the thiamine, riboflavin, niacin and pantothenic acid content in the food of female honeybees

during growth with a note on the vitamin K activity of royal jelly and beebread. [5] 43: 361–67. **Howe, R. W.**—Studies on beetles of the family Ptinidae. 4. A note on the anomalous effect of parental age on the speed of development. [28] 86: 325. **Hrbácek, J.**—On the morphology and function of the antennae of the central European Hydrophilidae (Col.). [88] 101: 239–56, ill. **Jones, B. M.**—Acarine growth: a new ecdysial mechanism. [53] 166: 908–09, ill. **Kennedy, J. S. and C. O. Booth**—Methods for mass rearing and investigating the host relations of Aphis fabae Scop. [4] 37: 451–70. **Le Berre, J.-R.**—Action des facteurs climatiques sue l'incitation au vol du Doryphore (Leptinotarsa decemlineata). [C. R. Acad. Sci.] 231: 1096–98. **Lees, A. D.**—Diapause and photoperiodism in the fruit tree red spider mite (Metatetranychus ulmi Koch). [53] 166: 874–75. **Lefèvre, P. C.**—Bruchus obtectus Say ou bruche des haricots (Phaseolus vulgaris L.). [Publ. Inst. Agron. du Congo Belge (I. N. E. A. C.)] Ser. Sci. No. 48: 7–65. **Lienhart, R.**—Nouvelles recherches sur la reine des abeilles (Apis mellifica). [C. R. Soc. Biol.] 144: 1094–96. **Lord, K. A. and C. Potter**—Mechanism of action of organophosphorus compounds as insecticides. [53] 166: 893–94. **Mahdihassan, S.**—Bacterial symbiosis in Aphis rumicis. [Acta Ent. Mus. Nat. Pragae] 25: 123–26, ill., 1947. **Miller, L. W.**—Factors influencing diapause in the European red mite. (Paratetranychus pilosus C. and F.) [53] 166: 875. **O'Rourke, F. J.**—Formic acid production among the Formicidae. [5] 43: 437–43. **Posnette, A. F. and N. F. Robertson**—Virus diseases of cacao in West Africa. VI. Vector investigations. [4] 37: 263–84. **Rainey, R. C.**—The embryonic respiration of the sheep blowfly Lucilia sericata (Calliph.). [68] 25: 87–92, ill. **Schaller, F.**—Étude morphologique du complexe endocrine rétro-cérébral de la larve d'abeille (Apis mellifica L.). [C. R. Soc. Biol.] 144: 1097–1100, ill. **Smith, D. S.**—A study of some of the effects of certain food plants on the grasshopper Melanplus mexicanus mexicanus (Acrididae). [80th Ann. Rpt. Ent. Soc. Ontario] pp. 14–16. **Smith, K. M.**—Structure within polyhedra associated with insect virus disease. [53] 166: 861–62, ill. **Snodgrass, R. E.**—Comparative studies on the jaws of mandibulate arthropods. [82] 116 (No. 1): 1–85, ill. **Sternburg, J. and C. W. Kerns**—Degradation of DDT by resistant and susceptible strains of house flies. [5] 43: 444–58. **von Frisch, K.**—Bees, their vision, chemical senses, and language. Pp. viii + 119, ill. Cornell Univ. Press, Ithaca, N. Y., 1950. **Whiting, P. W. and R. Starrells**—

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ORTHOPTERA—Smith, D. S.—(See under Anatomy.) **Weber, N. A.**—(See under Anatomy.)

HEMIPTERA—Balduf, W. V.—(See under Anatomy.) **Broadbent, et al.**—(See under Anatomy.) **Chaudhuri, R. P.**—(See under Anatomy.) **Drake, C. J. and F. C. Hottes**—Saldidae of the Americas (Hemiptera). [Great Basin Nat.] 10: 51–61 (*), ill. **Dupuis, C.**—Sur une prétendue phase subimaginale dans le développement de certains Hémiptères-Hétéroptères. [C. R. Acad. Sci.] 231: 879–80. **Ferris, G. F.**—Atlas of Scale insects of North America. Series V. The Pseudococcidae (Part I). Stanford Univer. Press, Stanford, Cal. Pp. vii + 278, 108 full page figures. Price $7.50. **Hussey, R. F. and J. L. Herring**—A new Microvelia

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Mieren door Prof. Dr. Alb. Raignier. (Eerste, tweede en derde Deel = Deel 18, 19 en 20 van *Wat leeft en groeit, de wereld van dieren en planten.*) Uitgegeven door de Uitgeverij Het Spectrum te Utrecht. 1950. Deel I: 141 pp., 16 photos, 27 figs. (unnumbered); Deel II: 101 pp., 8 photos, 2 tables, 2 graphs, 16 figs. (unnumbered); Deel III: 136 pp., 8 photos, 36 figs. (unnumbered) + 33 figs. (numbered).

These three volumes, appearing under the title *Mieren* (= Ants) and as a part of the series *Wat leeft en groeit, de wereld van dieren en planten* (= What lives and grows, the world of animals and plants), give Dutch readers a concise, popular and up-to-date account of the fascinating world of the ants. Father Raignier, already well known in myrmecological circles for his scholarly studies on ant ecology, will doubtless reach and charm a wide, new group of readers with the present work.

Myrmecologists in particular and biologists generally will surely find much of interest in *Mieren*. Some of the topics treated are: nests (artificial and natural), colony founding (independent and dependent), care of immatures, habits, trails and territories, behavior of workers, communications, orientation, olfaction, aphids and *Lycaenae*, myrmecophiles and keys for the determination of Dutch ants.

Chapter 5 of volume 3 was written by Father Jos. van Boven. Under the title "Wat loopt daar?" this capable, young taxonomist has presented the reader with keys to the subfamilies (4), genera (16) and species and infraspecific forms (44) of Dutch ants. Since this chapter is well illustrated, and since the formicifauna of Holland is small, readers with the necessary optical equipment should not experience too much difficulty in naming a good proportion of the ants that they might collect.

For those readers who might wish to learn more about ants, twenty well-selected references are included in Appendix I. In this section, entitled "Wat lees ik nog meer?", the names of the following well-known authors appear: R. Brun, F. Buytendijk, H. Donisthorpe, K. Escherich, A. Forel, W. Goetsch, A. Krausse, F. Maidl, H. Schmitz, A. Stärcke, E. Wasmann and W. M. Wheeler.

The binding is of tough, manilla-like paper. The format is 11 by 19 cm. The paper is of good quality. The illustrations by Gerard Huysser are with few exceptions all original. These illustrations are for the most part very well done. Some of the photos are closeups of living ants; these are exceptionally fine examples of small insect photography.

There is no date of impression to be found anywhere in the three volumes. I have listed 1950 as the date of issue, however, since I received the three volumes in one package sometime during the summer of 1950. I believe that Father Raignier sent them out shortly after they appeared in print.

Father Raignier, Father van Boven, the Illustrator and the publishers are to be congratulated on having produced an exceptionally fine little work on ants.—MERLE W. WING.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow: the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

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ENTOMOLOGICAL NEWS

APRIL 1951

Vol. LXII **No. 4**

CALVERT ANNIVERSARY VOLUME

on the occasion of

Dr. Philip P. Calvert's Eightieth Birthday

CONTENTS

PUBLISHED MONTHLY, EXCEPT AUGUST AND SEPTEMBER, BY
THE AMERICAN ENTOMOLOGICAL SOCIETY
PRINCE AND LEMON STS., LANCASTER, PA.
AND
1900 RACE STREET, PHILADELPHIA 3, PA.

Subscription, per yearly volume of ten numbers: $4.00 domestic; $4.30 foreign; $4.15 Canada. Entered as second-class matter April 19, 1943, at the post office at Lancaster, Pa., under the Act of March 3, 1879. Acceptance for mailing at the special rate of postage provided for in paragraphs (d-2), Section 34.40, P. L. & R. of 1948, authorized April 19, 1943.

ENTOMOLOGICAL NEWS

ENTOMOLOGICAL NEWS is published monthly, excepting August and September, by The American Entomological Society at Prince and Lemon Sts., Lancaster, Pa., and the Academy of Natural Sciences, 1900 Race Street, Philadelphia 3, Pa., U. S. A.

PHILIP P. CALVERT, Editor Emeritus. R. G. SCHMIEDER, Editor. Editorial Staff: E. J. F. MARX, M. E. PHILLIPS, J. A. G. REHN, and A. G. RICHARDS.

Subscription price, per yearly volume of 10 numbers: Domestic, $4.00; Foreign, $4.30; Canada, $4.15—U. S. Currency.

SUBSCRIPTIONS, ADVERTISEMENTS: All communications and remittances to be addressed to **ENTOMOLOGICAL NEWS, 1900 Race Street, Philadelphia 3, Pa.**

MANUSCRIPTS and all communications concerning same should be addressed to **R. G. Schmieder, Zoological Laboratory, University of Pennsylvania, Philadelphia 4, Pa.**

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ENTOMOLOGICAL NEWS

VOL. LXII APRIL, 1951 NO. 4

Sclerotizations in the Lateral Body Wall of the Nymphal Abdomen in Odonata

By ERICH SCHMIDT, Bonn (Rhein), Mozartstr. 22, Germany

In 1893, when Dr. PHILIP P. CALVERT published his well known catalogue with its important introduction, he was probably the first to mention the pleura of the nymphs of dragonflies, when he stated (p. 198): "The pleura are equally well chitinized as the large terga and sterna; in the *Zygoptera* they are infolded, in the *Anisoptera* exposed to view on the ventral surfaces." This condition was similarly described and somewhat expanded by TILLYARD (1917, p. 88): "The pleura (of the larva) differ from those of the imago in being strongly chitinized. In the *Anisoptera* they form flat side-pieces to the sterna; in the *Zygoptera* they are infolded. Eight pairs of abdominal spiracles are present, the eighth being the largest. Their positions near the anterior margins of the pleura, close to the terga, correspond with those of the imago."

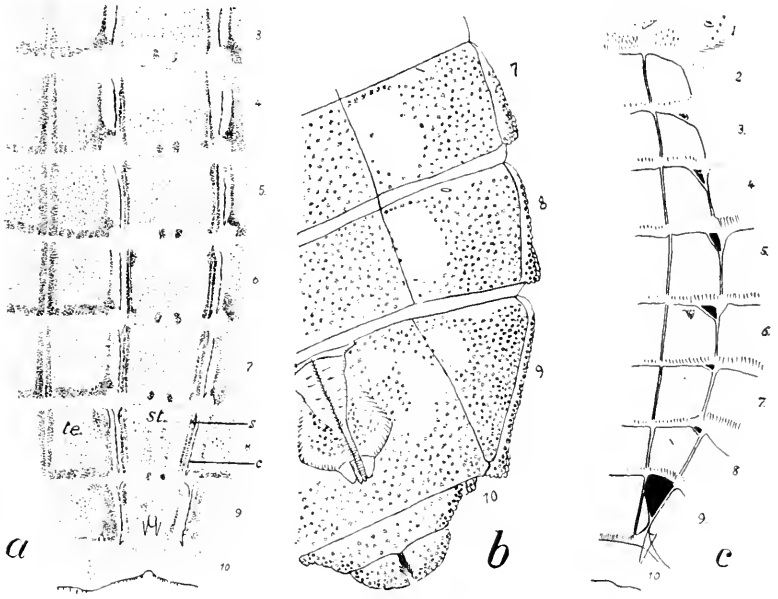
For a long time I have believed that which I expressed in my paper of 1915 (p. 100, translated): "In the larvae of the *Anisoptera,* in place of the imaginal pleural folds, there are found regular pleurites that lie ventrally and laterally to the sternite, and are separated from both sternite and tergite by conspicuous sutures. These pleurites resemble the sternites and tergites in color and they are characterized by the spiracle that lies within them. The nymphs of the *Zygoptera* do not show any such conditions; the boundaries of the tergite and sternite against the pleural membranes are indistinct. In *Euphaea,* the lateral gills lie in the pleural membranes." This opinion concerning the condition in the larvae of *Zygoptera*

was later verified by GARMAN (1917, p. 422): "Each body-ring (of the larvae of *Zygoptera*) is without sutures but is roughly divided by the lateral carinae into sternal and tergal areas." Therefore I was somewhat astonished when, in a paper by WHEDON (1919, pl. XXI, fig. 1), I found a line (*spls*) drawn which was explained as a sterno-pleural suture. Hence, for my own information, I made a preparation of a luxuriously coloured exuviae of *Lestes sponsa* (fig. 1a), in which inside of the lateral carina of segm. 4–8 there was visible a light, irregularly bounded, narrow stripe which perhaps may be considered as a suture. The space between the carina (c) and this suture may be that which corresponds to the "pleurites" of anisopterous larvae; it is a very narrow dark stripe, however, that, in accordance with its coloration, should not be as soft as neighboring parts.

The conditions of these sclerites of anisopterous larvae, considered hitherto to be pleurites, are illustrated in several places in the literature, for instance by CABOT (1890, pl. V, fig. 2a, for *Cordulia* sp.), by BERLESE (1909, fig. 403, for *Aeschna grandis*), WALLENGREN (1914, fig. 3, for *Aeschna*), TILLYARD (1917, fig. 29 B, for *Aeschna brevistyla*), by WHEDON (1919, fig. 8, for *Anax junius*, 13 and 16 for *Tramea carolina*, fig. 30, for *Hagenius brevistylus*), CALVERT (1929, fig. 6, 7, for *Anax junius*), the present writer (1936, t.fig. 4a-f, 10a, b, for some European Gomphids; 1937, t.fig. 11–14, for some *Aeschna* sp.). These ilustrations mostly agree in showing the supposed pleurites as a uniform sclerite, except WALLENGREN (p. 6, fig. 3), who figured sclerotizations of segm. 5 and 6, apparently of *Aeschna grandis*, and showed that in segm. 4–8 "the pleurites are divided into two plates, a small anterior *episternite* (fig. 3, *Ep*) and a greater, posterior, lower, *epimerite* (*Hp*) that borders upon the sternite. The episternite is, namely, situated between the anterior ends of the epimerite and the tergite."

Such was the usual view twenty years ago concerning these lateral sclerites between the dorsal and ventral plates. In 1933, WEBER wrote (p. 203, translated): "The sclerites that occur, not rarely, in the lateral membranes and that are often

designated as pleurae have in reality nothing to do with thoracic pleurae (*subcoxae*), but are secondary formations, if they have not, indeed, been derived from the terga." Hence, it seems better not to adopt such terms as epimerite and



TEXT FIGURE 1

a. *Lestes sponsa* Hansem. ♂, abdomen of exuviae, last instar, cut dorsally and exfolded.

b. *Epiophlebia superstes* (Selys), ♀ exuviae, penultimate instar, left side of end of abdomen from ventral side.

c. *Oxygastra curtisi* (Dale). Exuviae, last instar, left side of abdomen, seen from ventral side. Victory River, mouth, near Bonn; 21, vi, 1942, leg. et ded. H. Fastenrath.

c, lateral carina; *s*, sterno-pleural suture; *st*, sternite; *te*, tergite; 1–10, number of abdominal segments; *tr. scl.* marked in solid black.

episternite but to use non-committal topographic words. We therefore propose for the greater sclerite, formerly named epimerite, the term "*spiracular sclerite*," abbreviated spir. scl., because it bears (but not in segm. 9) the spiracle; and for the smaller sclerite, formerly named episternite, the term "*triangular sclerite*," abbreviated tr. scl., derived from its shape.

Before entering into a detailed comparison of these sclerites in several larvae of *Anisoptera,* which will show an unexpected differentiation in single families and even in genera, some general features should be mentioned:

a) The *tr. scl.* is usually missing in segm. 9 with one exception (*Oxygastra,* see below), and there is generally a uniform and undivided plate, without a spiracle. In *Cordulegaster,* however, even this plate is absent (see below).

b) Furthermore, the coloration, and correspondingly the sclerotization, decreases more and more *in the abdominal segments nearer the thorax* so that it becomes difficult to recognize a suture separating the sclerites. Hence, we shall turn our attention more to the segments of the middle and caudal parts of the abdomen.

c) In many specimens, especially in those dwelling on the bottom, the area near the intersegmental fold is often covered with mud that adheres so firmly between the hairs or bristles of the skin as to form a nearly insuperable obstacle to a pin used to clean the fragile surface of such a valuable skin, even after having softened it with some liquid such as alcohol or water. Hence, its practical value for use in differentiating species is doubtful, since more easily visible characters are often available.

d) To date, we have compared mostly the last instars of larvae, as others were not collected. Surely, the younger stages, especially in the *Libellulinae,* should also be studied.

1. The following comparison was suggested especially from our wish to learn the conditions of sclerotization in the lateral body wall of the abdomen of the strange Japanese *Epiophlebia superstes* (Selys), which, together with several fossils, is now considered to form a special suborder of the Odonata (Handlirsch, 1906, p. 465). The discoverey of its nymph by Esaki, probably in 1923, gave me the idea of writing to Japanese colleagues asking them for a statement concerning this matter, or to send me a cast larval skin. It was not until some months ago, however, that I was fortunate enough to receive two larval skins, a male and a female, both of the penultimate instar, through the kindness of that capable Japanese student Syoziro Asahina

in Tokyo, to whom I am very much indebted. These skins showed at once strongly sclerotized plates quite similar to those in most *Anisoptera;* scl. spir. on segm. 2–9, missing in segm. 1 and 10 (fig. 1b). Spiracles are visible on segm. 1–8. The surface of the ventral side is covered with numerous tubercles, and, though it seemed to be sufficiently clean, no suture separating a *tr. scl.* was visible. The structural conditions, however, approach the conditions found in *Anisoptera* more than those in *Zygoptera.*

2. In general, the greatest number of *tr. scl.* seems to occur regularly in the nymphs of *Aeschnidae,* where they appear on segm. 4–8, as stated by Wallengren (1914, p. 6), or also on segm. 3 (fig. 2a). Variation in the segments supplied with the *tr. scl.* was not observed except for segm. 3, but perhaps the size of the sclerites may be somewhat different in single forms. Surely, the *tr. scl.* in this family are smaller than in most *Libellulidae* and some *Gomphidae* (see below). In segm. 8, the oral and inner side of *tr. scl.* is relatively long; nearer to the base of the abdomen its oral side becomes gradually shorter, the outer side longer. On the anterior side of *spir. scl.* of *Anax* (fig. 2a) a transverse groove was observed, which was not found in *Aeschna.*

3. Larvae of *Petaluridae* were not accessible now, and a younger larva of *Phyllopetalia stictica* Selys showed the *tr. scl.* on segm. 6–8 only, but it may exist also on the anterior segments. In Schmidt, 1941, pl. 2, fig. 2, a full grown nymphal skin of *Phenes raptor* Ramb. was figured, showing the row of *spir. scl.* on segments 2–8; oblique lines visible may perhaps correspond to sutures, or may not. On the same plate, fig. 4 shows distinctly the row of *spir. scl.* on segments 3–9 of a last instar exuviae of *Hypopetalia pestilens* McL.; no oblique sutures are visible. Text figs. 9d and 11c, e, show segm. 8–10 of younger instars of *Petaliids* from Chili with conditions similar to *Aeschnidae,* but no oblique suture is visible in the figures.

4. Of the larvae of *Gomphidae,* which all seem to live on the bottom, I studied at first a skin of *Gomphus pulchellus* without success in discovering any oblique suture, but later, after having compared several other forms, I came to the conclusion that the

tr. scl. in this family seems to be restricted to segm. 7 and 8 only. I found this condition in *Ictinus* (*decoratus* and *pertinax*, fig. 2b), *Leptogomphus* (*Sauteri* and *Lansbergei*), *Archaeogomphus* sp. from Nova Teutonia, Brasil, *Dromogomphus spinosus*, *Burmagomphus Laidlawi* (det. et ded. Dr. F. C. Fraser), and here the sutures were easily visible in dry material. In a study of a series of exuviae of North American *Gomphus*, received from and identified by Dr. E. M. WALKER, after cleaning them or not, I was able to find the *tr. scl.* on segm. 7 and 8 in *G. villosipes*, *brevis*, *quadricolor*, *spicatus*, *furcifer*, *fraternus*, and at last the sutures were discovered also in a somewhat cleaner specimen of *G. pulchellus*, so that it seems that the problem of the presence or absence of the *tr. scl.* will become merely a question of sufficient cleaning of the sclerite's surface; but this is a very dangerous task in such precious skins, where the pin mostly inclines more to penetrate and destroy the skin than to clean its surface. Up to date, I have been unable to find the sutures in *Gomphus vulgatissimus* and *G. flavipes*, *Ophiogomphus serpentinus* and *Onychogomphus forcipatus*, and I wonder, whether it may be present or not even in *Hagenius brevistylus*.

5. A female exuvia of *Cordulegaster annulatus* was cleaned and mounted in Fauvre's fluid. I was much surprised to discover that the *spir. scl.* was missing here even in segm. 9, where it is present in all other *Anisoptera* studied, and even in *Epiophlebia*. *Tr. scl.* was present in segm. 4–8, always of moderate size, but somewhat contrasting in shape to the condition in the *Aeschnidae* (fig. 2a), when compared on the segments nearer to the thorax (fig. 2c).

TEXT FIGURE 2

a–f, Left parts of abdomens, seen from ventral side, of last instar exuviae of Anisoptera; a and c are from preparations in Fauvre's fluid; b, d–f are from dry skins; *tr. scl.* represented by solid black.

a. *Anax imperator* Leach, ♀. Ennertsee near Bonn, 1941.

b. *Ictinus pertinax* Selys, ♂. Central Formosa, 8, vi, 43, leg. M. Chujo.

c. *Cordulegaster annulatus* Latr., ♀. Upper Roer between Kalterherberg and Reichenstein, 21, vi, 41.

d. *Cordulia aenea* (Linn.), ♀. Ennertsee near Bonn.

e. *Crocothemis erythraea* (Brullé), ♂. Asprochoma near Kalamáta, Greece, 3, vi, 39.

f. *Zygonyx iris* Selys, ♀. Tonkin, 1924, det. Dr. F. C. Fraser.

FIGURE 2

6. In the skins of *Corduliinae* studied the *spir. scls.* were always present on segm. 2–9, but the *tr. scl.* showed a surprisingly different condition, furnishing a scale more extended than in any other family and perhaps of phyletic importance within the *Anisoptera.* This will probably become more evident when other important forms such as the nymphs of *Petaluridae,* and some Australian *Corduliinae* will have been compared. Very probably, forms with *tr. scls.* on many (all middle) segments, as in *Aeschnidae,* will show a more primitive condition than those in which the sclerite is reduced to only a few segments, as especially in *Gomphidae* and *Libellulinae* (see below).

a). In our material, we consider as most primitive (of all studied *Anisoptera*) the remarkable condition in *Oxygastra Curtisi* (fig. 1c), in which the *tr. scl.* was found on segm. 3–9, that is, on more segments than in any other observed form. These sclerites are very small in segm. 3, 7 and 8, larger in the others, and largest in segm. 9. No spiracle, however, was found on segm. 9, just as in all other *Anisoptera.* The size and form of *tr. scl.* of segm. 9 of *Oxygastra* makes it probable that the sclerite on segm. 9 of other *Anisoptera* (except *Cordulegaster* again) will be a *tr. scl.* and not a *spir. scl.* as previously supposed! *b*). *tr. scl.* on segm. 4–8: *Somatochlora arctica; c*). on segm. 4–6 and 8: *Cordulia aenea,* which has a longitudinal oblique hump on *spir. scl.,* bearing the spiracle (fig. 2d); other *Somatochlora* sp. (*metallica, flavomaculata, alpestris, cingulata, williamsoni*); *d*). *tr. scl.* on segm. 4–6 only: *Neurocordulia yamaskanensis; e*). on 4–5 only: *Tetrageneuria cynosura; f*). on 3–6: *Procordulia* sp. from Java; *g*). 3–4 only: *Epicordulia regina; h*). *tr. scl.* wholly absent: *Macromia* (*illinoiensis* with a large hump on *spir. scl., clio*), *Didymops transversa* (with a lower hump), and *Epitheca bimaculata.*

7. Similarity in general appearance, along with minor differences, seems to characterize the *Libellulinae,* but never more than 3 pairs of *tr. scl.* were discovered. In most cases I found this sclerite on segm. 3–5; for instance, in the 3 European *Libellula* spp., *Orthetrum cancellatum, Perithemis tenera* (Needham ded. et det.), *Crocothemis erythraea* (fig. 2e), *Sympetrum meridionale* and *scoticum, Pachydiplax longipennis,* in 4 European

Leucorrhinia spp. (not in *L. caudalis*), *Trithemis annulata*. The following exceptions were found: *Zygonyx iris* (det. Dr. F. C. Fraser, fig. 2f) and *Pantala flavescens* had the *tr. scl.* on segm. 3–4, and even *Leucorrhinia caudalis* only on 3.

When preparing the skins (cutting off the dorsal cover and of segm. 10 + appendices, putting away the rectal skin and longitudinal stems of tracheae, then cleaning and mounting in Fauvre's fluid), I saw a pair of *apodemes* of respectable length on the anterior border of *spir. scl.*, vertical to the body surface, each laterally, on both sides, entering the interior cavity. Such apodemes were found on segm. 6 of *Oxygastra Curtisi* (fig. 1c) and *Cordulia aenea* (fig. 2d)—in both figures marked with punctures, in the Fauvre's fluid preparation it was folded back by the pressure of the coverglass—and on segm. 4–6 in *Gomphus pulchellus;* they were not seen in *Cordulegaster, Aeschna cyanea, Anax imperator* and *Sympetrum scoticum*. "There is every reason for believing that sclerites have been correlated with muscles in their evolution, if not necessarily in their origin" (Snodgrass, 1931, p. 5). In consequence of this we may suppose, that sclerotization in the lateral region of the larval abdomen is correlated with the greater number of muscles there than in the imaginal abdomen, and the development of *tr. scl.* should correspond to this condition also. But, although we are fortunate enough to possess some fine and careful studies on abdominal musculature of *Anisoptera*, and although some muscles are described attaching on "pleural" parts, we were unable to find any muscle on *tr. scl.*, neither in Wallengren (1914), who discovered the *tr. scl.* in *Aeschna grandis*, nor in Wiedon (1919), who studied *Anax junius* and *Tramea carolina*, nor in Ford (1923), whose subject was *Libellula 4-maculata*, so that it is probable that no muscle is attached to *tr. scl.* Perhaps such a muscle may still persist in forms in which the *tr. scl.* is of a larger size, as in *Cordulia aenea*, but to date we can only suppose that in the absence of muscles adhering to the sclerite, the latter has lost its function. Here, as in other known instances, a relatively primary and ancient condition may be preserved longer in a minute functionless organ than in an appendage exposed to influences from the outside (cf. Ris, 1916, p. 109 f.).

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Oligoclada calverti n. sp. (Odonata: Libellulidae)

Newton Dias dos Santos, Museu Nacional, Rio de Janeiro, Brasil

O presente trabalho foi escrito com a intenção de participar do volume de *Entomological News* a ser editado em comemoração do 80º, aniversário do Professor Philip P. Calvert, professor emérito da Universidade de Pensilvania e que, ha cerca de 55 anos, se vem dedicando com eficiência e dedicação, ao estudo dos odonatas neotropicais de que é o mais completo conhecedor.

Considero-me feliz de poder associar-me a estas manifestações de afeto, reconhecimento e simpatia ao mestre, a quem devo tantas atenções e ajuda, e a quem desejo muitas felicidades e anos de vida.

Oligoclada calverti n. sp.

Coloração: lábio preto; labro e clipeo amarelo, porém o post-clipeo com os cantos enegrecidos; fronte e vértex azul metálico brilhante; occipute preto; tórax e patas com puinescência azulada; abdomen bruno escuro, com reflexos azulados; asas hialinas, membrânula cinza; ptrostigma preto.

Oustros caracteres: fronte com furca mediana pouco profunda, arredondada e com quina anterior pouco nítida; vértex convexo; occípute sem projeções lateraes; dente da unha subterminal, tão desenvolvido come em *Oligoclada borrori;* carina transversal presente no 4º segmento abdominal.

Nervação: antenodais, na asa anterior, 9,5; na asa posterior 7; postnodais, na asa anterior, 7–8; na asa posterior, 8; árculo entre a 1ª, e 2ª antenodal, proximal do meio; triângulo livre; subtriângulo com 3 células; campo discoidal, na asa anterior, alargando-se um pouco para a margem, com duas séries de células numa distância de 5 células e daí seguido por três séries que aumentam até seis na margem; na asa posterior, com uma série de 3–4 células, seguida por duas séries e por um numero sempre crescente de células até a margem; *bcv* extras, ausentes; *cu. a.* 1; *Rspl* com 5–6 células; *Mspl* ausente; alça anal desenvolvida, sem célula intercalar no canto anal do tri-

ângulo e presente no calcanhar; metade basal com 9–10 células; metade distal com 11 células; *CuP* e *A1* muito separadas na origem; entre *A2* e a margem, 3 séries de células, ao nivel do triângulo.

Genitália: vide figuras.

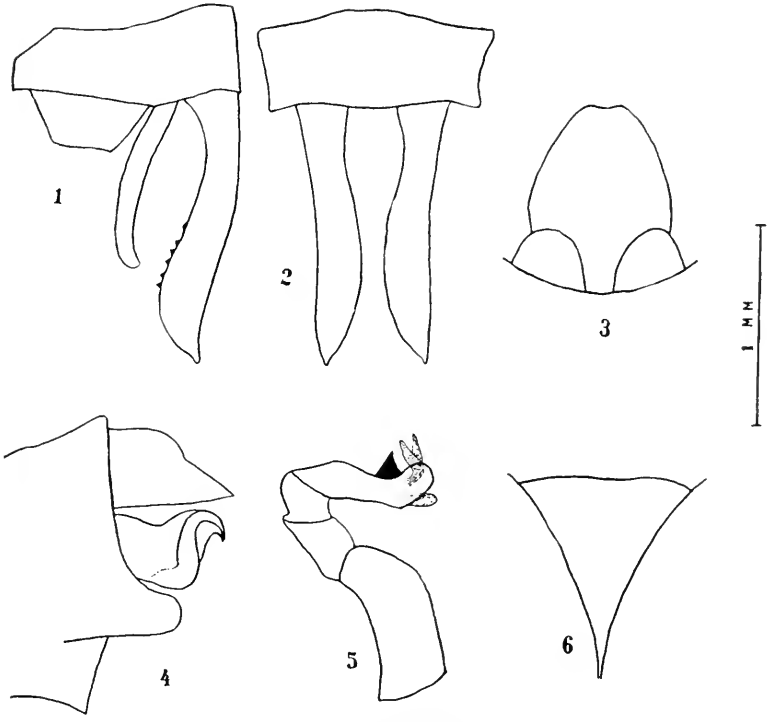
Medidas: ♂; asa anterior 25 × 6, 5 mm; asa posterior, 24 × 8, 5 mm; abdomen (até o 4º segmento), 7 mm; o resto do abdomen foi perdido após estudos.

Material estudado: HOLOTYPUS ♂, no. 10.017, Riacho do Quebra, Lagôa Santa, Minas Gerais, Santos & Machado e Berla col., fevereiro de 1947 (na coleção de o donata do Museu Nacional).

Esta éspecie pelo subtriângulo com 3 células, última antenodal incompleta, carina transversal do 4*o.* segmento abdominal, pelo aspecto do pênis e direção do dente do hâmulo, enquadra-se no grupo IV de Borror, formado por *Oligoclada heliophila* Borror, 1931 e *Oligoclada raynei* Ris, 1919, de cujo grupo porém, não participa pela ausência de projeções laterais do occipute; por êste caracter e pela forma do pênis, verifica-se ser esta espécie intermediária entre o grupo IV e os grupos V e VI de Borror, diferindo, porém, dêsses grupos, pela posição do dente do hâmulo, em direção caudal. Na mesma situação dessa nova espécie, enquadra-se *Oligoclade haywardi* Fraser, 1947, proveniente de Pôrto Iguassú, Território das Missões, Argentina. Fraser deixou de mencionar caracteres importantes para a caracterisação desta espécie, bem como não figurou o pênis, carácter decisivo para o reconhecimento dos grupos naturais, nêsse gênero. Segundo Fraser, *O. haywardi* é aliada de *O. abbreviata* (Rambur, 1842) o que porém, não se pode justificar, segundo demonstra a própria figura *3f* dada por Fraser em seu trabalho onde se verifica que o dente do hâmulo dirige-se em posição caudal. Sendo o pênis de *O. abbreviata* de forma espetacular dentro do gênero, seria curioso conhecer o pênis de *O. haywardi.* Esta éspecie deverá ser filiada ao grupo IV de Borror, sendo estreitamente aliada a *O. calverti.* O lobo genital do *O. calverti* é muito menos agudo do que em *O. haywardi;* em *O. calverti* a lâmina anterior é mais alta do que larga (de perfil) ao passo que ao contrário se verifica em *O. haywardi. Oligoclada haywardi, O. calverti, O. heliophila, O. umbricola* e *O.*

nemesis são as espécies de maior estatura do gênero, a asa posterior alcançando 24 mm.

Esta nova espécie foi penosamente procurada no riacho do Quebra e nos arredores de Lagôa Santa e Rio das Velhas, sem



Oligoclada calverti n. sp.

Fig. 1: Apêndices anais, vista lateral (Holotypus)
Fig. 2: Apêndices anais, vista dorsal (Holotypus)
Fig. 3: Apêndice anal inferior, vista ventral (Holotypus)
Fig. 4: Genitália do 2º segmento, vista lateral (Holotypus)
Fig. 5: Pênis, vista lateral (Holotypus)
Fig. 6: Occipute, vista do bordo posterior (Holotypus)

nenhum sucesse, nos meses de abril e dezembro de 1949. Enquanto *Oligoclada nemesis* é uma espécie tìpicamente das margens da Lagôa Santa, frequentando as associações de helófilas de *Heliocharis sp.*, *Oligoclada calverti* habita água menos biológicamente estabilizadas.

Correction to Notes on Some Aquatic Insects of the Brandywine Creek Drainage, Chester County, Pennsylvania

By John W. H. Rehn, Professor of Biology, Marlboro College; Research Associate, Academy of Natural Sciences of Philadelphia

Since the appearance of the basic report [1] and the supplement [2] I have been informed that specialists have examined some of the material and have corrected certain determinations. It is the purpose of this note to record these changes.

The determinations originally given are placed first and are followed by the revised one.

Odonata [3]

Gomphus villosipes = *Gomphus spicatus.*

Ephemeroptera [4]

Stenonema annexum, F = *Stenonema rubromaculatum* and several *Stenonema pulchellum* group.

Stenomena candidum = *Stenonema pulchellum* group and *Stenonema interpunctatum* group, near *carolina.*

Stenonema ithaca = *Stenonema rubromaculatum.*

Stenonema possibly *ithaca* = *Stenonema* possibly *rubromaculatum.*

Stenonema ohioense Al = *Stenonema* possibly *carolina.*

Baetidae = *Ephemerella deficiens.*

Baetis sp. = *Baetis* near *pluto.*

Pseudocloeon cingulatum = *Pseudocloeon* sp. (3 or 4 species probably represented).

[1] Ent. News, LXI, pp. 171–177 (1950).

[2] Ent. News, LXI, p. 203 (1950).

[3] Determined by Professor P. P. Calvert.

[4] Determined by Professor J. R. Traver.

TRICHOPTERA[5]

Neuroclipsis sp. A1 = *Polycentropus* sp.

These changes slightly increase the number of forms found at station A, and add one to the total at station F. However, the conclusions originally presented still appear to be warranted.

A New Species of Uroxys from Peru (Coleoptera: Scarabaeidae)

By MARK ROBINSON, Research Associate, Department of Insects, The Academy of Natural Sciences of Philadelphia

Uroxys variabilis new species

This species differs from *productus* Arrow by the lack of a strong sulcus in the middle of the pronotum and the shape of the basal groove of the pygidium. From *cuprescens* Westwood it is distinguished by the lack of a strong angulation at the inner edge of the male anterior tibia. From both of the above species and all other species in the genus it can be separated by the apices of the male major elytra, which are very different. Thanks are due Dr. A. Martinez of Buenos Aires, Argentina, for confirming the status of this very interesting insect.

Male major. Elongate; shining; dark reddish, hairs light brownish.

Clypeus triangularly emarginate with a tooth on either side of the emargination. There is a shallow, longitudinal sulcus running back from the clypeal emargination. The eyes are large and are separated by about twice their combined width. The surface of the frons and clypeus is minutely punctured and microscopically alutaceous. The edge of the genae and clypeus are fimbriate.

[5] Determined by Professor H. H. Ross.

Side margins of the thorax are widest just back of the middle. Inside each side margin is a shallow, longitudinal sulcus. The pronotal punctures are a trifle larger in diameter than those on the head.

The apices of the elytra near the first to fourth striae are produced to the rear into rounded lobes. The striae are well indicated and regularly, crenately punctured. The intervals are barely convex. The surface of the intervals are punctured about the same as the pronotum.

The anterior femur is unarmed. The fore tibia is quite long and very thin near the base with the inner edge slightly flexuous. The outer edge is tridentate in the distal one-third. Anterior tibial spur slender, down bent in distal one-third to the acute apex. The suture between the mesosternum and the metasternum is acutely produced forward. Base of the pygidium has a nearly straight groove running from the middle toward each side.

Length, 10.0 mm.; breadth, 5.9 mm.

Male minor. Like the male major with the following exceptions. The apices of the elytra are rounded and not produced into lobes. The suture between the mesosternum and the metasternum is not produced as far forward as it is in the male major. Thorax is widest at the middle. The anterior tibia is shorter and not quite so thin in proportion.

Length, 7.3 to 8.5 mm.; breadth, 3.6 to 4.1 mm.

Female. Agrees with the male minor with the following exceptions. The thoracic side margins are widest before the middle. The anterior tibia is wider with the inner edge nearly straight while the outer edge is tridentate in the distal half. The anterior tibial spur of this sex is not as strongly curved downwards as it is in the male. Pygidium does not slant forward so acutely therefor the abdominal segments are wider along the center.

Current Entomological Literature

COMPILED BY R. G. SCHMIEDER

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia and the University of Pennsylvania, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the year 1950 unless otherwise noted. Continued papers, with few exceptions, are recorded only at their first installment.

For other records of general literature and for economic literature, see the Bibliography of Agriculture, Washington, and the Review of Applied Entomology, Series A, London. For records of papers on medical entomology see Review of Applied Entomology, Series B.

NOTE: The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the List of periodicals and serials published in our January and June issues. The number of the volume, and in some cases, the part, heft, &c. is followed by a colon (:). References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to Neotropical species, and not so indicated in the title, have the symbol (S).

Papers published in ENTOMOLOGICAL NEWS are not listed.

Notice: Included below are many titles taken from the Proceedings of the Eighth International Congress of Entomology (1948), published in Stockholm under date of 1950. The abbreviated reference used below is [8th I. C.].

GENERAL—Bovey, P.—La variabilité des espèces et l'entomologie appliquée. [Bull. Soc. vaud. Sci. nat.] 64: 401–16. **Butler, C. G.**—A new design of microsyringe tip for the instrumental insemination of queen honey bees. [53] 166: 957–58. **Carvalhaes, J.**—Significado ecológico do mimetismo nos insectos. [Brotéria] 19 (47): 145–61. **Clark, E. W. and F. Morishita**—C-M medium: A mounting medium for small insects, mites and other whole mounts. [80] 112: 789–90. **Esaki, T.**—A zoogeographical consideration of the insect fauna in the Pacific islands. [8th I. C.] 373–79. **Forsslund, K. H.**—Über die Einsammlungsmethodik bei Untersuchungen der Bodenfauna. [8th I. C.] 770–72. **Handschin, E.**—Zur Entstehung der Quercyfossilien. [8th I. C.] 137–40, ill. **Hering, E. M.**—Die Oligophagie phytophager Insekten als Hinweis auf die Verwandtschaft der Rosaceae mit den Familien der Amentiferae. [8th I. C.] 74–79. **Jeannel, R.**—Origine et evolution des insectes. [8th I. C.] 80–86. **Kangas, E.**—Die Primärität und Sekundärität als Eigenschaften der Schädlinge. [8th I. C.] 792–98 (Engl. summary). **Kontuniemi, T.**—Gedanken zu gegenseitigen Tauschverbindungen der Museen. [8th I. C.] 145–46. **Malaise, R.**—New entomological evidences of a former trans-Pacific land-connection. [8th I. C.] 434–37. How to keep collected insects free from mould and pests in any climate. [8th I. C.] 926–27. **Merrell, D. J.**—Measurement

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A second circular (see ENT. NEWS, Oct. 1950, for earlier announcement) is now available that gives the preliminary programs for each day's meetings and excursions from August 17–24, the special ladies' program, and the other excursions up until August 27. The membership fee is fixed at ƒ 40.— per member and includes subscription to the *Transactions* as soon as published. The full fee must be paid whether a member attends personally or not. To be assured of participation, applications should be made before June 1st, and summaries of papers to be read should also be submitted by that date. For full details write to Hon. General Secretary, Physiologisch Laboratorium, 136 Rapenburgerstraat, Amsterdam, or to Prof. J. C. Bradley, Cornell University, Ithaca, N. Y., who is a member of the Permanent Executive Committee of the International Congress.

New Journals

Entomologische Arbeiten aus dem Museum G. Frey. Volume 1 has been published by the Museum as of December 31, 1950, under the editorship of Hans Kulzer and consists of 284 pages with text-figures and four plates. It is planned to publish twice a year with a total of about 600 pages annually. Orders should be placed with: Buchhandlung Dr. E. Reitter, Waltherstrasse 27, München 15, Germany.

This journal is devoted almost exclusively to Coleoptera. In its preface, Georg Frey gives an outline of his personal history as a coleopterist and tells the story of the growth of his collections and the establishment of the Museum. Beginning as a collector of local insects, Frey's interest gradually increased so that he undertook collecting trips to other parts of Europe and began acquiring more beetles by trade and by purchase. Finally, he became interested in exotic species also and made trips to Africa, South America and the United States. Gradually, too, he attracted interested and capable co-workers so that the work on the collections became so extensive—with many species to be described, monographs and keys to be published—that it became necessary to undertake this new journal. This first issue contains ten papers, all on Coleoptera except one short paper on *Chrysis*. The more important ones are by H. Kulzer and by C. Koch on Tenebrionidae (the family best represented at the Museum) and by J. Bechyné (in French) on Chrysomelidae and Eumolpidae. All of these include American or Latin American forms. Other papers are by Breuning, Guignot, Koch Stöcklein and Schein.

Bonner Zoologische Beiträge. Published quarterly by the Zoologisches Forschungsinstitute und Museum Alexander Koenig, in Bonn a. Rhein, Germany, this journal was begun because of a lack of media for the publication of faunistic and systematic works. In keeping with the specialties of the museum, it will publish chiefly on vertebrates and on insects. The first issue contains seven papers (56 pages) on birds and bats and 37 pages on insects. Of the insect papers, those by Mell, Rensch, Buchholz and Klapperich are of interest to workers on American insects and are included under the titles in "Current Entomological Literature" in ENT. NEWS for March. Price: DM 3.50 per issue; DM 14.— per volume, less 10% for advance payment, from Comel Verlag Köln, Dellbrück, Gierather Strasse 45.

With regret, we note that **Entomon**, after a very fine first volume in 1949 (see ENT. NEWS, Oct. 1949), has not been able to continue publication.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Miridae (Capsidae)—American species wanted, with locality labels, in exchange for British species. D. Leston, F.R.E.S., 6 Frognal Rise, London N. W. 3, England.

Wanted—Entomological microscope in good condition; Spencer, Bausch & Lomb, or other standard make. David G. Shappirio, 4811 17th St., N.W., Washington 11, D. C.

Coleoptera—Large quantities of Cicindelidae, Buprestidae, Lucanidae, Cerambycidae wanted in exchange for all families of Coleoptera from Ill., Ind. and Mo. Joseph B. Hayes, 1905 N. Pulaski Rd., Chicago 39, Ill.

American Sarcophagidae—wanted for identification. H. R. Dodge, 291 Peachtree Street, Atlanta 3, Georgia.

German lepidopterist wishes to correspond and receive live material (eggs and pupae) in exchange for dried imagoes. Johannes Reichel, Koenigsberg, Krs. Wetzlar 16, Germany.

For exchange—The periodic Cicada, T. septendecim. Desire Lepid. espec. Papil., Sphing. & Speyeria. Also Col., espec. Ceramb. & Lucan. John W. Morris, 2704 Genesee St., Syracuse 9, N. Y.

Cynipid and Itonidid galls—American species wanted; purchase or exchange for British species. Fresh or dried. D. Leatherdale, F.R.E.S., Old Woodstock, Oxford, England.

Wanted—Reprints or papers concerning insects taken in Alaska for inclusion in list of Alaskan insects. R. H. Washburn, Alaska Experiment Station, Palmer, Alaska.

ENTOMOLOGICAL NEWS

MAY 1951

Vol. LXII **No. 5**

CALVERT ANNIVERSARY VOLUME

on the occasion of

Dr. Philip P. Calvert's Eightieth Birthday

CONTENTS

PUBLISHED MONTHLY, EXCEPT AUGUST AND SEPTEMBER, BY
THE AMERICAN ENTOMOLOGICAL SOCIETY
PRINCE AND LEMON STS., LANCASTER, PA.
AND
1900 RACE STREET, PHILADELPHIA 3, PA.

Subscription, per yearly volume of ten numbers: $4.00 domestic; $4.30 foreign; $4.15 Canada. Entered as second-class matter April 19, 1943, at the post office at Lancaster, Pa., under the Act of March 3, 1879. Acceptance for mailing at the special rate of postage provided for in paragraphs (d-2), Section 34.40, P. L. & R. of 1948, authorized April 19, 1943.

ENTOMOLOGICAL NEWS

ENTOMOLOGICAL NEWS is published monthly, excepting August and September, by The American Entomological Society at Prince and Lemon Sts., Lancaster, Pa., and the Academy of Natural Sciences, 1900 Race Street, Philadelphia 3, Pa., U. S. A.

PHILIP P. CALVERT, Editor Emeritus. R. G. SCHMIEDER, Editor. Editorial Staff: E. J. F. MARX, M. E. PHILLIPS, J. A. G. REHN, and A. G. RICHARDS.

Subscription price, per yearly volume of 10 numbers: Domestic, $4.00; Foreign, $4.30; Canada, $4.15—U. S. Currency.

SUBSCRIPTIONS, ADVERTISEMENTS: All communications and remittances to be addressed to **ENTOMOLOGICAL NEWS, 1900 Race Street, Philadelphia 3, Pa.**

MANUSCRIPTS and all communications concerning same should be addressed to **R. G. Schmieder, Zoological Laboratory, University of Pennsylvania, Philadelphia 4, Pa.**

The receipt of all papers will be acknowledged and, if accepted, they will be published as soon as possible. If not accepted, authors will be so advised and postage requested for return of manuscripts. Articles longer than six printed pages may be published in two or more installments, unless the author is willing to pay for the cost of a sufficient number of additional pages in any one issue to enable such an article to appear without division.

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SEPARATES of articles without covers, without extraneous matter, will be furnished by the printer at the following prices: 1–4 pages, 25 copies, $3.13; 50 copies, $3.13; 100 copies, $3.75. 5–8 pages, 25 copies, $5.00; 50 copies, $5.00; 100 copies, $5.94. 9–12 pages, 25 copies, $7.81; 50 copies, $7.81; 100 copies, $9.06. Covers: first 50, $3.44; additionals at .025 cents each. Plates, printed on one side: first 50, $2.50; additional at 0.188 cents each. Transportation charges will be extra. THE LANCASTER PRESS, INC., Lancaster, Pa.

PLATE I

ENTOMOLOGICAL NEWS

VOL. LXII MAY, 1951 No. 5

Sympetrum semicinctum (Say) and its Nearest Allies (Odonata)

By E. M. WALKER, Royal Ontario Museum of Zoology, Toronto

The marked difference in size and color pattern between specimens of *Sympetrum semicinctum* (Say) from eastern and western North America is well known but has received little attention from American students of Odonata. Two European workers, however, Ris and Bartenev, have dealt with this matter at some length. Ris (1911) termed *S. semicinctum* a species of "considerable polymorphism" and suggested that the various forms that he recognized and described probably deserved distinctive names, although he left the naming of them to others. Under the name of *S. semicinctum* Ris recognized two main series or forms, an eastern and a western, the latter form with three subdivisions, distinguished by differences of color pattern and inhabiting distinct geographical ranges. Bartenev (1915) described Ris' western forms collectively as a new subspecies, which he named *S. semicinctum occidentalis*. His description, which is in Russian,* appears to be essentially a translation of Ris' work and includes his descriptive notes on the three subdivisions of this western form. No reference is made to a type

* For a translation of this description my sincere thanks are due to Mr. M. G. Gideonoff of the Royal Ontario Museum.

PLATE I

Sympetrum semicinctum (Say) and *S. occidentale* Bartenev, slightly reduced. Males on the left, females on the right.

Top row: *S. semicinctum*, male, Lake Simcoe, Ontario; female, Kettleby, Ontario. Second row: *S. occidentale occidentale*, male, Chilliwack, B. C.; female, Cultus Lake, B. C. Third row: *S. occidentale californicum*, male, "California"; female, Auburn, Calif. Bottom row: *S. occidentale fasciatum*, male and female, Suffield, Alberta.

specimen, nor could we find any evidence that Bartenev possessed a specimen of his subspecies *occidentalis* although he refers to specimens in his collection of the eastern *S. semicinctum*. We prefer, however, to give Bartenev the benefit of the doubt, and we are therefore retaining his name, with the emended spelling *occidentale,* and are provisionally accrediting this name to his authority. We believe, however, that *S. occidentale* deserves the rank of a species rather than a subspecies.

Having decided to investigate the taxonomy of the *semicinctum* species complex, the writer applied to Dr. J. Speed Rogers, Director of the Museum of Zoology, University of Michigan, Ann Arbor, for permission to study the material in the Williamson collection. In response to this request all of the material in this collection labelled *Sympetrum semicinctum* was immediately shipped to the Royal Ontario Museum of Zoology, and for this prompt and generous co-operation we desire to express our thanks and appreciation.

The Williamson collection contains ample material for the recognition and characterization of the various definable forms in this species complex and their general geographical ranges in the United States. It has been supplemented by the material in the Canadian National Collection at Ottawa and the Royal Ontario Museum at Toronto, which afford additional data on the distribution of the species in Canada.

Ris (1911) made no subdivision of the eastern form of *S. semicinctum* but, as already mentioned, he divided the western form into three groups, differing mainly in the wing pattern and having distinct distributional ranges, viz., (a) Colorado and New Mexico, (b) Nevada and California, and (c) Washington and British Columbia.

The results of our study confirm the findings of Ris both as to the taxonomic divisions of the group and their geographical distribution. We would add the following before discussing the subject in detail:

The eastern form is remarkably uniform throughout its range and shows no tendency to intergrade with any of the western forms. Its distributional range is also distinct and, as far as

our material indicates, does not overlap any of the territory inhabited by the western forms. In general terms the range of the eastern form may be described as the northern half of the United States and adjacent parts of Canada, east of the Great Plains.

The groups comprising the western form are alike in various features in which they differ from the eastern form. The general range of this form is from southern British Columbia and Alberta to South Dakota and southward to California, Arizona and New Mexico.* The three groups into which this form is divisible are not sharply separated but are, on the whole, easily distinguishable.

In view of these findings we see no reason for continuing to regard the eastern and western forms as a single species, even though the structural differences are extremely slight. We would restrict the name *semicinctum* to the eastern form and apply Bartenev's name *occidentale* as the specific name of the western groups collectively. The subdivisions of *S. occidentale* are typical subspecies, each characteristic of its geographical range, but intergrading with the other subspecies where the boundaries of their ranges meet. The exact boundaries of these ranges are as yet unknown.

Key to the species and subspecies of the semicinctum group of the genus Sympetrum

1. Generally smaller (average of 10 ♂♂ and 10 ♀♀; abd., excl. apps., ♂ 17.8, ♀ 17.3, hind wing ♂ 21.5, ♀ 20.3); face darker, olivaceous to brown; sides of thorax without black markings on the pleural sutures and without a black streak in front of the spiracle; trochanters and posterior face of fore femora reddish brown; range northern U. S. and adjacent parts of Canada east of the Great Plains. . . . . *semicinctum*

Generally larger (average of 10 ♂♂ and 10 ♀♀ of each subsp.: abd. ♂♀ 21.4, h.w. ♂♀ 25.3); face light yellow (sometimes darkening with age); with distinct black markings on the pleural sutures and with an oblique black stripe in front

* *S. semicinctum* has also been recorded from Oklahoma (Bird, 1932), but we have seen no specimens from this state.

of the spiracle; trochanters and posterior surface of fore femora pale yellow; range U. S. and southern Canada from Pacific coast to Great Plains.....*occidentale* 2

2. Yellow area of wings rarely darkened distally on both pairs of wings and, if so, not forming a transverse band crossing the two wings of each side; range west of the Rocky Mountains.....3

Yellow area of wings proximally pale or relatively pale, distally darkened, forming a transverse band of nearly uniform width across both pairs and ending fairly sharply in a nearly straight or curved line; range, arid or semi-arid plains, chiefly east of the Rocky Mountains, but reaching eastern Utah and N.E. Arizona.....*o. fasciatum*

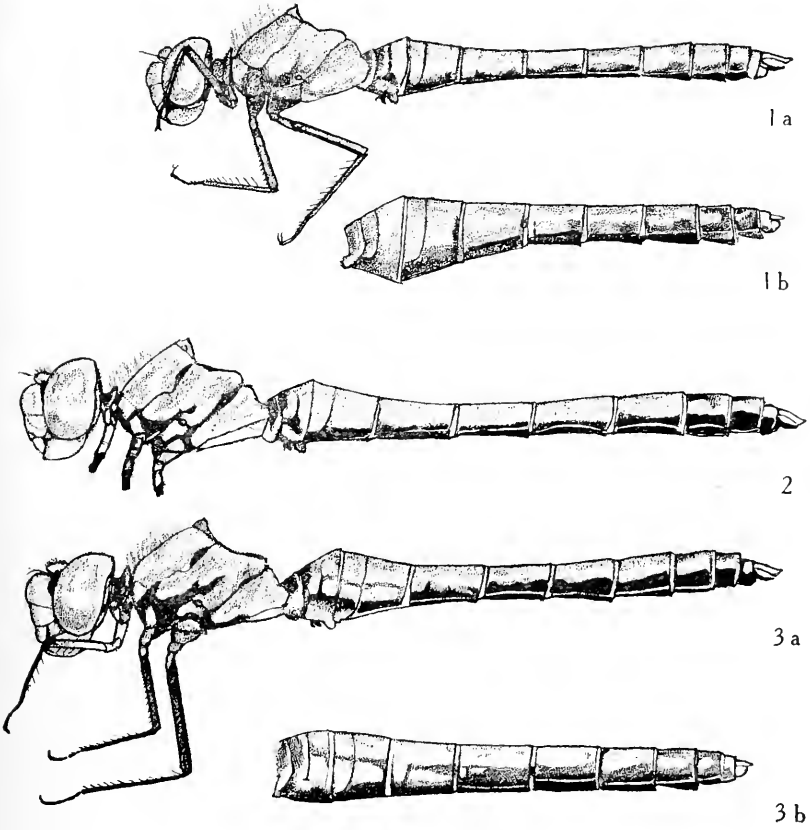
3. Yellow area of hind wings of ♂ extending 1–3 cells beyond nodus, color deepening distally in old ♂♂, in fore wings usually ending abruptly at nodus or only one cell before or beyond; in ♀ reaching nodus in both wings, or 2–3 cells proximal to it in fore wings; color nearly uniform yellow; sides of thorax in old individuals dark yellowish brown, tending to obscure the black markings; range southern British Columbia to Oregon, Idaho and northern Utah.....*o. occidentale*

Yellow area of hind wings of ♂ reaching nodus, not darkening distally; in front wings of ♂ and both pairs of ♀ very pale and diffuse; general body coloration of both ♂ and ♀ paler than the above, the sides of the thorax and basal segments of abdomen turning grayish or greenish with maturity; range California and western Nevada, grading into *occidentale* in eastern Nevada.....*o. californicum*

Sympetrum semicinctum (Say)

The general color is darker and more obscurely marked than in *occidentale*. In mature individuals the only pale yellowish areas are the small marginal spots on the rear of the head and two ill defined spots on the sides of the pterothorax, which often disappear in old males. These yellow spots are margined below with blackish, but there are no clearly defined black markings in the pleural sutures nor above the bases of the coxae, such as are always present in *occidentale*. The abdomen is reddish brown on the basal three segments, becoming distally red in the male, and the black latero-marginal spots on segments 3–6 are more or less discontinuous or absent from the more anterior

segments. The basal area of the wings is as follows: ♂, fore wings pale yellow about as far as the second cell beyond the triangle, fading out diffusely; hind wings colored as far as the nodus or about one cell beyond, the proximal half deep yellow to brown, the distal half darker brown, this shade extending in a broad arc to the anal triangle; ♀, basal yellow area of fore wings deeper and more extensive than in ♂, reaching to within



EXPLANATION OF TEXT-FIGURES

Fig. 1a. *Sympetrum semicinctum* (Say), ♂. 1b. Abdomen, ♀.
Fig. 2. *S. occidentale fasciatum* n. subsp., ♂.
Fig. 3a. *S. occidentale occidentale* n. subsp., ♂. 3b. Abdomen, ♀.

2 or 3 cells of the nodus and more sharply delimited; that of hind wings about as broad as in ♂ but of a more uniform yellow.

Material identified (88 ♂♂, 54 ♀♀): *Nova Scotia:* Annapolis and Halifax counties, VII 31 to IX 30; *New Brunswick:* Gagetown, VIII 9. *Quebec:* Covey Hill, Knowlton, Kazabazua and Wakefield, VII 25 to IX 4. *Ontario:* Middlesex, Welland, Peel, York, Ontario, Bruce, Simcoe, Leeds, Lanark, Renfrew and Carlton counties, Muskoka, Parry Sound and Nipissing districts. Also observed in Rainy River District, VI 19 to IX 24. *Maine:* Orono, Bradley, VII 1 to IX 30. *New Hampshire:* Intervale, IX 16–20. *New York:* Ithaca, VII 24. *Pennsylvania:* Allco.* *Michigan:* St. Joseph, Livingston and Oakland counties, VII 4–12. *Indiana:* LaGrange, Whitley, Huntington and Wells counties, VI 25 to IX 5. *Virginia:* Wythe Co., VI 27. *North Carolina:* Buncombe Co., VIII 23. *Tennessee:* Gatlingsburg, Sevier Co., VII 18.

Records of *S. semicinctum* from Minnesota and Iowa probably belong to this species. There is a male in the Williamson collection labelled "Klamath Co., Oregon, Aug. 10, 1934 (Hubbs)." There is also in this collection a small dark male of *S. o. occidentale* Bart. labelled "Logan Co., Ohio, July 4, 1934, E. B. W. et al." The two specimens look superficially somewhat alike and have doubtless been transposed. Other specimens taken at these same localities on the same dates and by the same collectors support this belief.

We have observed no geographical variation in this species in either size or color pattern. Specimens from Tennessee, Michigan and Nova Scotia, e.g., are entirely similar in every respect. Individual variation in size is about as usual in *Sympetrum*. Measurements of 10 ♂♂ and 10 ♀♀ were as follows: Length ♂ 24.5 to 31.0, ♀ 24.0 to 29.0; abd. (excl. apps.) ♂ 15.0 to 19.5, ♀ 15.0 to 19.0; hind wing ♂ 18.5 to 22.5, ♀ 18.0 to 22.0.

Although generally distributed, *S. semicinctum* appears to be everywhere a rather scarce species, never occurring in large numbers as most of the species of its genus do. This is probably due, in part at least, to its type of breeding place, which is chiefly marshy spots on the course of small, spring-fed streams.

* "Allco" probably stands for Allegheny County.—Ed.

Sympetrum occidentale Bartenev

Although the average size of this species is definitely greater than that of *S. semicinctum*, the smallest individuals are scarcely larger than the average of the eastern species. In young individuals the clear yellow color of the face, sides of the thorax and basal segments of the abdomen, and the definite black thoracic markings, give this species an aspect that is very distinct from that of *semicinctum*. In old specimens the yellow parts may become darkened to a dull ochraceous, greenish or grayish, and the black markings are then less conspicuous, though always discernible. The black latero-marginal spots on segments 3–6 of the abdomen form a more definite and continuous stripe than in *semicinctum*. In the female this stripe is divided anteriorly (seg. 3 and 4) into two, a mid-lateral and a ventro-lateral. This feature is sometimes seen, though less distinctly, in the males. It is not, however, a characteristic of *S. occidentale*, being not infrequently present in females of *S. semicinctum*.

We have found no constant structural differences between the two species. In the males the outer branch of the hamuli tends to be longer and more slender in *occidentale* but this character is by no means constant. A careful comparison of the anal appendages of the male also revealed no reliable differences. The penis likewise appears to be lacking in diagnostic features but we have not sufficient material for an adequate study of this organ.

As Bartenev designated no type of his subspecies *occidentalis*, which we have elevated to the rank of a species, it is necessary to select a type from one of its three subspecies as we now recognize them. We have chosen as the typical subspecies that which is most nearly intermediate between the other two, geographically and perhaps also taxonomically. The type specimens are recorded under this subspecies, *S. occidentale occidentale*.

S. occidentale is an abundant species, apparently with a much wider variety of breeding places than its eastern relative. Whitehouse (1941) states: "While the Harrison Bay district (its smaller lakes and streams) yielded a fine variety of dragonflies,

the great body of water itself seemed in mid-August to be favored only by *semicinctum,* which positively swarmed in mated pairs busy ovipositing." This is a type of habitat entirely foreign to *S. semicinctum.*

S. occidentale Bartenev **occidentale** subsp. n.

This subspecies, when old and darkened, is most like *semicinctum* in appearance. This is seen in the wing pattern as well as the dark body coloration and relative obscurity of the black thoracic markings. These can always be seen, however, and judging from the material at hand the size is constantly larger. Although usually not larger than the other subspecies of *S. occidentale,* it reaches the maximum size for the species in specimens from Chilliwack and Harrison Bay, B. C. Males vary in length from 32.5 to 40.0 mm., ♀♀ 31.0–35.0; abd. (exc. apps.) ♂ 20.0–23.5, ♀ 20.0–24.0; hind wing ♂ 25–28; ♀ 24–26.

Holotype ♂ and *allotype* ♀: New Bridge, Baker Co., Oregon, Sept. 9, 1909 (pair), C. H. Kennedy; in the Williamson collection, Museum of Zoology, Ann Arbor, Mich.

Material identified (34 ♂♂, 53 ♀♀): *British Columbia:* Langford Lake and Departure Bay, Vancouver Island; Abbotsford, Cultus Lake, Chilliwack and Harrison Bay, New Westminster District; Oliver and Osoyoos, Similkameen District; Okanagan Landing, Osoyoos District; Aspen Grove and Mt. Ida, near Salmon Arm, Kamloops District; VII 17 to IX 24. *Washington:* Sunnyside, Yakima Co., VII 24 to VIII 24. *Oregon:* Klamath Co., VIII 10–13; New Bridge and Baker City, Baker Co., IX 9–14. *Idaho:* Pocatello, Bannock Co.; Medimont, Kootenai Co.; Toponz, Lincoln Co.; VI 28 to X 6. *Utah:* Provo; City Creek Canyon; and State Canyon, Provo, 5000′, and Vineyard, Utah Co.; Ogden and Farr West, Weber Co.; Hurricane, Washington Co.; VII 14 to IX 14.

Specimens from Farr West and Provo, Utah, show in most cases some reduction or diffusion of the yellow color of the wing bases in the females, as compared with the material from Washington and western British Columbia. Paler coloration of the thorax with a tendency to become grayish with age is also seen in the Utah specimens and in some degree in specimens from

Bannock, Idaho, and the interior of British Columbia, e.g., the Kamloops District. These features are perhaps correlated with a drier climate. They are present in a more marked degree in the following subspecies.

S. occidentale californicum subsp. n.

Ris (l.c.) has given an excellent description of this form, which we translate, with slight modifications, as follows: "The yellow basal areas of the wings are reduced and pale, in the fore wing of the ♂ very pale and extending to about the second cell beyond the triangle, with somewhat stronger yellow streaks in the subcostal and cubital spaces, or reduced to these streaks alone; in hind wing as far as the nodus, golden yellow, somewhat deeper in Sc and Cu, the distal darkening wholly lacking, or reduced to a few brown lines along the veins; ♀ in fore wing as in ♂, in hind wing not reaching the nodus, about 2 cells distad of triangle or, at the minimum, not beyond the triangle, very diffuse to the anal margin, or only to the middle of the loop, or scarcely beyond the membranule." The general coloration of the body is somewhat paler than either of the other subspecies and the thorax and basal segments of the abdomen become grayish or greenish with age, having a slightly pruinose appearance.

Holotype ♂ and *allotype* ♀: American River, Sacramento, California, July 15, 1914 (pair), C. H. Kennedy; in the Williamson collection, Museum of Zoology, Ann Arbor, Mich.

Material identified (18 ♂♂, 21 ♀♀): *California:* Surprise Valley, Modoc Co.; Auburn, Placer Co.; American River, Sacramento Co.; Laws, Inyo Co.; and a long series from "California" without further data; VII 15 to VIII 28. *Nevada* (including intergrades with subsp. *occidentale*): Humboldt Co.; Pershing Co.; Eureka Co.; Pyramid Lake, Washoe Co.; Nye Co.; Cherry Creek, White Pine Co.; VII 6 to VIII 28.

This seems to be the most variable in size of the three subspecies of *S. occidentale,* and is on the whole the smallest. The series from "California" contains a number of individuals, chiefly females, that are about the same size as average *S. semicinctum.*

Measurements of 10 ♂♂ and 1 ♀♀ from various localities are as follows: Length ♂ 31–37 mm., ♀ 28.0–33.5; abd. (excl. apps.) ♂ 18.5–23.5, ♀ 19.5–22.5; hind wing ♂ 22.5–28.0, ♀ 22–26.

Intergradation with *S. o. occidentale* is found in White Pine, Eureka and Nye counties, Nevada. In the series from White Pine Co., 9 ♂♂ and 15 ♀♀, the females could all be placed almost equally well with *occidentale*. The pale thoracic pleura, which turn grayish in old individuals, are like those of *californicum*, while the yellow area of the hind wings (♀♀) is smaller than in typical *occidentale* but not so diffuse as in typical *californicum*. The males could be placed almost equally well in either subspecies but the yellow (or brown) area of the wings is never distinctly deepened distally as it is in fully mature *occidentale*. Intergradation of the two subspecies in the coastal zone, i.e., between Oregon and California, has not been observed in the limited material from that region.

Sympetrum occidentale fasciatum subsp. n.

This subspecies in its typical form is easily recognized by its wing pattern. The colored area reaches the nodus in the front wings and one or two cells beyond it in the hind wings, and in both pairs the proximal part of this area is pale, or, in old individuals, relatively pale, while the distal part is dark yellow or brown, forming a band of nearly uniform width, crossing both wings from front to hind margin and terminating abruptly in an almost straight line. The pale yellow parts of the thorax and abdomen turn greenish gray in old individuals. The black markings of the thorax tend to be less heavy than in the other subspecies. While *fasciatum* is, on the whole, somewhat less stocky in build than the other forms, with the abdomen relatively a little longer (text-fig. 2), this difference is not constant enough to be useful as a taxonomic character.

The range in size is similar to that of *S. o. californicum*. Measurements of 10 ♂♂ and 10 ♀♀ are as follows: length ♂ 30–37 mm., ♀ 30–34.5; abd. ♂ 18–23, ♀ 20–23; hind wing ♂♀ 23–27.

Holotype ♂ and *allotype* ♀: Grand Co., Utah, 2 mls., n. of

Moab, June 16, 1937, Leonora K. Gloyd. In the Williamson collection, Museum of Zoology, Ann Arbor, Mich.

Material identified (38 ♂♂, 27 ♀♀): *Alberta:* Suffield; VIII 2. *South Dakota:* Washabaugh Co., 7 mls. s. of Kadoka; VIII 12. *Nebraska:* Halsey and Nebr. National Forest, Thomas Co.; VIII 23. *Kansas:* State Park, Scott Co.; VII 20. *Wyoming:* Fremont Co., 40 mls. e. of Dubois; VII 23. *Colorado:* Clear Creek Co.; Montclair and Berkeley, Arapahoe Co.; Denver; Golden and Morrison, Morrison Co.; Lamar, Prowers Co.; Walsenburg, Huerfano Co.; San Luis Valley, Monte Vista, Rio Grande Co.; Mesa Co., 1.1 ml. n. of Grand Junction; VII 13 to X 10. *Utah:* Fort Duchesne, Uintah Co.; Grand Co., 2 mls. n. of Moab; VI 15 to IX 8. *New Mexico:* Raton, Colfax Co.; Albuquerque, Bernallillo Co.; Las Vegas, San Miguel Co.; VII 15 to X 21. *Arizona:* Apache Co., 22 mls. w. of Eager; VIII 24.

This subspecies thus inhabits the arid and semi-arid plains east of the Rocky Mountains, from southern Alberta to New Mexico, also reaching eastern Utah and northeastern Arizona. Records of *S. semicinctum* from Oklahoma and Texas probably belong to this form.

The only specimens we have seen that give indications of intergrading with other subspecies are those from Rio Grande Co., in southwestern Colorado, viz. 2 ♂♂ and 4 ♀♀ from the San Luis Valley, Monte Vista. These are like *fasciatum* in the clearly defined yellow areas of the wings and in the relatively large size of this area on the front wings, but they differ from typical *fasciatum* in having only slight traces of the dark distal wing bands.

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Some Notes on the Odonata Fauna of Mountain Lake, Virginia

By C. Francis Byers [1]

The scarcity of local lists of Virginia Odonata as well as the prominent role being played by the Mountain Lake Biological Station of the University of Virginia in the study of the natural history of the Southeast, makes it desirable to record known information of the fauna and flora of the area in which it is located.

The Mountain Lake Biological Station is situated in Giles County, in western Virginia, at an elevation of nearly 4,000 feet. The writer was in residence at the Station from July 23 to August 26, 1949, during which time an attempt was made to study the dragonfly fauna of the region. The following account is the result of this study.

Dragonflies are not common in the Mountain Lake area. Neither a large number of species nor a large number of individuals were found. Except for the *Argia, Ischnura,* and *Enallagma* of the less wooded portions of the lake shore and the *Epicordulia* flying over its waters, one seldom saw more than one dragonfly at a time. Collections made at lower elevations, at the ponds and rivers around Blacksburg and Pembroke, showed a somewhat greater variety of dragonflies.

Annotated List [2]

Agrion maculatum Beauvais. 1 ♂, 1 ♀, July 28, 1948, Sinking Creek; 1 ♂, 2 ♀, July 30, 1948, V.P.I. Pond, Montgomery Co. (from the Station Coll.); 3 ♂, 1 ♀, Aug. 10, 1949. Taken along Sinking Creek for a mile above the covered bridge at the foot of Salt Pond Mountain. Sinking Creek is a rapidly flowing, rock bottomed, mountain river.

Argia apicalis (Say). 4 ♂, 3 ♀, August 5, Claytor Lake, Pulaski Co. Taken along clay, pebbly shore, little or no vegetation.

[1] Contribution from the Department of Biology, University of Florida.

[2] Unless otherwise stated all species listed were collected in Giles Co., Virginia, in 1949, and were taken by the author.

Argia moesta putrida (Hagen). 1 ♀, July 27; 2 ♂, July 29; 1 ♂, July 30. Found flying in emergent vegetation along the non-wooded portions of the shores of Mountain Lake, especially the northwest shore, at the Boat House, and the south shore near the Mountain Lake Hotel.

Argia translata Hagen. 1 ♂, July 30, 1948, V.P.I. Pond, Montgomery Co. (from the Station Coll.); 1 ♂, July 30, 1949. In emergent vegetation at south end of Mountain Lake.

Enallagma civile (Hagen). 3 ♂, 2 ♀, July 30, 1948, V.P.I. Pond, Montgomery Co. (from the Station Coll.).

Enallagma exsulans (Hagen). 1 ♂, 1 ♀, July 26; 2 ♂, 1 ♀, July 29; 2 ♂, July 30; 1 ♂, Aug. 15. Collected from emergent vegetation along the northwest and south shores of Mountain Lake, at the Boat House and Hotel docks, respectively. The male on Aug. 15 was found in a spider web.

Ischnura verticalis (Say). 2 ♂, 2 ♀, July 26; 1 ♂, 1 ♀, July 29; 2 ♂, 3 ♀, July 30; 2 ♂, Aug. 5. Found flying with *E. exsulans* in emergent vegetation along northwest and south shores of Mountain Lake.

Lanthus albistylus (Hagen). 16 nymphs, nearly fully grown, were collected by Mr. Chester Mann, August 11, at White Pine Lodge. Mr. Mann describes the habitat as, "Pools, 10 feet wide, 4.5 inches deep. Clear water, sand bottom with pebbles, rubble and bowlders. Scant vegetation. Odonata in debris at bottom of the pool." The author saw several adults among the rocks and trees at the north end of Mountain Lake which were probably of this species—none were taken.

Boyeria vinosa (Say). 2 ♂, Aug. 10 (collected by R. E. Bellamy); 1 ♀, Aug. 20. Sinking Creek near the covered bridge.

Anax junius (Drury). 1 ♂, Aug. 6, 1948, Pembroke (from the Station Coll.).

Aeschna umbrosa Walker. 1 fully developed nymph collected by Chester Mann, July 27, at the head of Little Stony Creek. On August 10, the author saw an adult *Aeschna* caught in the up-air currents on top of Bald Knob at an elevation of 4,400 feet. On another day an *Aeschna* was seen flying along a narrow, heavily wooded trail leading to Rattle Snake Rock. Neither of these specimens were captured.

Cordulegaster diastatops (Selys). 3 large and 2 small nymphs were collected by Chester Mann on August 11 at White Pine Lodge, along with specimens of *Lanthus albistylus,* in clear water pools. A small nymph was taken from a sphagnum bog at the head of Little Stony Creek on July 27. An adult female of this genus was observed laying eggs in the Station swimming pool on August 1.

Epicordulia princeps (Hagen). 1 ♂, 1 ♀, Aug. 11. One of the more common and difficult species to capture. Found darting along the shore and flying over the open water of Mountain Lake. Also, observed at the station swimming pool.

Somatochlora tenebrosa (Say). 1 ♀, Aug. 15. Captured while hovering at the base of emergent reeds in a small sphagnum pool near the first cottage along the road leading into the Station grounds. A male and a female were observed at this pool the day before but were not taken. Two *Somatochlora* nymphs were taken by Chester Mann in a somewhat similar habitat at the head of Little Stony Creek on July 27. They may be of this species. In a letter to Dr. I. F. Lewis, in the Station files, Dr. James G. Needham mentions taking several nymphs in trash along the east shore of Mountain Lake which he identified as *S. elongata*. Dr. E. M. Walker (1925) [3] records 1 ♀ of *S. tenebrosa* collected at Mountain Lake on August 25, 1899.

[3] The North American dragonflies of the genus Somatochlora. University of Toronto Studies, No. 26, page 106.

Celithemis elisa (Hagen). 1 ♂, 1 ♀, July 30; 1 ♂, 1 ♀, Aug. 11. Fairly common in the tall grass and low bushes near the south shore of Mountain Lake on the Hotel grounds.

Perithemis tenera (Say). 1 ♂, July 30, 1948, V.P.I. Pond, Montgomery Co. (from the Station Coll.).

Libellula luctuosa Burmeister. 1 ♂, 1 ♀, July 30, 1948, V.P.I. Pond, Montgomery Co.; 1 ♀, Aug. 5, 1949, Claytor Lake, Pulaski Co.

Libellula lydia Drury. 2 ♂, Aug. 7. Found flying near the swimming pool and on the Station grounds.

Libellula pulchella Drury. 1 ♂, Aug. 9. Collected from low vegetation in cut-over area back of the Station swimming pool.

Pachydiplax longipennis (Burmeister). 2 ♂, July 30, 1948, V.P.I. Pond, Montgomery Co.; 1 ♂, Aug. 6, Pembroke (from the Station Coll.).

Erythemis simplicicollis (Say). 1 ♀, Aug. 7. Flying near the swimming pool on the Station grounds.

Note

In the files located in the library of the Mountain Lake Biological Station there are two notes and a written list giving names of species of Odonata collected at Mountain Lake and vicinity. I have not seen the specimens upon which these lists are based. They may be summarized as follows:

1. Letter from James G. Needham to I. F. Lewis, date July 11, 1931, giving names of dragonflies collected on Mountain Lake as follows: *Argia apicalis, Argia sedula, Enallagma exsulans, Somatochlora elongata* (nymph), *Aeschna* (nymph).

2. A note on dragonflies collected by Mary E. Davis at Farrior Farm, Giles Co., May 7, 1938, as follows: *Enallagma civile, Ischnura verticalis, Gomphus lividus, Macromia* sp.

3. A written list of dragonfly names. Source unknown to the author.

A New Species of Uroxys from Peru (Coleoptera: Scarabaeidae)

By Mark Robinson, Research Associate, Department of Insects, The Academy of Natural Sciences of Philadelphia

(*Continued from page 140*)

Length, 7.5 to 9.1 mm.; breadth, 3.7 to 4.4 mm.

Type. Male major: Yanamonte, La Mar, Ayacucho, Peru. September 20, 1941 (F. Woytkowski). [In the collection of the author.]

Allotype. Female; with the same data as the type. [In the collection of the author.]

Paratypes. 3 males, 10 females; with the same data as the type. Paratypes are deposited in the collection of the Academy of Natural Sciences, Philadelphia; A. Martinez, Buenos Aires, Argentina; O. L. Cartwright, Washington, D. C. and in the collection of the author. The specimens used to describe the above species were presented to the author through the kindness of E. D. Quirsfeld.

Current Entomological Literature

COMPILED BY R. G. SCHMIEDER.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia and the University of Pennsylvania, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the year 1950 unless otherwise noted. Continued papers, with few exceptions, are recorded only at their first installment.

For other records of general literature and for economic literature, see the Bibliography of Agriculture, Washington, and the Review of Applied Entomology, Series A, London. For records of papers on medical entomology see Review of Applied Entomology, Series B.

NOTE: The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the List of periodicals and serials published in our January and June issues. The number of the volume, and in some cases, the part, heft, &c. is followed by a colon (:). References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to Neotropical species, and not so indicated in the title, have the symbol (S).

Papers published in ENTOMOLOGICAL NEWS are not listed.

GENERAL—Anon.—Leland Ossian Howard, 1857–1950 (Obituary). [37] 43: 958–62, portrait. **Chow, C. Y., T. C. Huang and T. F. Yue**—Bibliography of Chinese Arthropods of medical and veterinary importance. [Quart. Jour. Taiwan Mus.] 3: 157–85. **Dobzhansky, Th.**—The science of ecology to-day. (A review of Allee *et al.*: Principles of Animal Ecology. Saunders & Co., Phila., 1949.) [75] 25: 408–09. **Dowdy, W. W.**—Further ecological studies on stratification of the arthropods. [26] 32: 37–52. **Dresner, E.**—The toxic effect of Beauveria bassiana (Bals.) Vuil, on insects . [45] 58: 269–78. **Haupt, H.**—Rekonstruktionen permokarbonischer Insekten. [Beiträge z. tax. Zool.] 1: 25–43. **Hering, E. M.**—Monophagie und Xenophobie. Die Nahrungswahl phytophager Insekten und die geographische Herkunft ihrer Wirtspflanzen. [Die Naturwiss.] 37: 531–36. **Holdenried, R., F. C. Evans and D. S. Longanecker**—Host-parasite-disease relationships in a mammalian community in the central coast range of California. [25] 21: 1–18. (Acarina, Siphon., Hemip., Anopl., Malloph., Dipt.), 1951. **Key, K. H. L.**—A critique of the phase theory of locusts. [75] 25: 363–407. **Laird, M.**—Lepidopterous eggs and larvae from the exterior of aircraft fuselages. [53] 166: 1081. **Lesse, H. de**—Notes zoologiques et botaniques sur l'ouest du Groenland. [La Terre et la Vie] 97: 175–201. **Manton, S. M.**—The evolution of the locomotor mechanisms of the Arthropoda. [Proc. Linn. Soc. London] 162: 22–23. **McElvare, R. R.**—Grace Herreshoff Sperry (Obituary). [18] 46: 21, 1951. **Mortenson, E. W.**—The use of sodium

hypochlorite to study Aedes nigromaculis embryos. [52] 10: 211–12. **Orfila, R. N.**—Doctor Filipo Silvestri (1873–1949) (Obituary). [Rev. Soc. Ent. Argent.] 14: 320–26. **Perry, W. J. and A. P. Webster**—Simple high altitude observation chamber for the study of insect physiology. [52] 10: 209–11. **Rao, D. Seshagiri**—A simple type of insect olfactometer. [Indian Jl. Ent.] 11 (1949): 71–75. **Ratkovich, M.**—Primera lista de insectos Tucumanos utiles. [Publ. Misc., Estac. Exp. Agric. Tucuman] pp. 1–33, 1950. **Schneirla, T. C.**—The relationship between observation and experimentation in the field study of behavior. [Ann. N. Y. Acad. Sci.] 51 (6): 1022–44. **Stroud, C. P.**—A survey of the insects of White Sands National Monument, Tularosa Basin. [1] 44: 659–77. **U.S.N.M.**—Report of the U. S. Nat. Mus. for the year ending June 30, 1950. Dept. Zool., Accession of insects, p. 26. Smithsonian Inst., Washington, D. C. **Vibe, C.**—Some insects new to Greenland. [Ent. Meddelelser] 25: 419–20. Homop., Trich., Lep., Dipt., Col.)

ANATOMY, PHYSIOLOGY, MEDICAL—Allegret, P.—Influence de la rétention expérimentale de la soie sur la métamorphose de Bombyx mori (Lép.). [C. R. Acad. Sci.] 232: 268–70, 1951. **Barth, R.**—Die männlichen Duftorgane von Papilio polystictus Btlr. und proneus Hbn. (Lep.) zugleich ein Beitrag zum feineren Bau der Duftschuppen. [102] 21: 513–35. **Beermann, W.**—Chromosomenkonstanz bei Chironomus. [Die Naturwiss.] 37: 543. **Briones, M. H.**—Tumores y alimentacion. I. Efectos de las variaciones en la dieta de levadura sobre tumores melánicos de la Drosophila melanogaster. [Biologica, Santiago de Chile] Fasc. 8–11: 55–67. **Brncic, D.**—Un nuevo tumor hereditario de la Drosophila melanogaster, tu^{49h}. [Biologica, Santiago de Chile] Fasc. 8–11: 69–81. **Cloudsley-Thompson, J. L.**—The water relations and cuticle of Paradesmus gracilis (Diplopoda). [74] 91: 453–64, ill. **Chow et al.**—Medical arthropods. (See under General.) **Davies, L.**—The hatching mechanism of muscid eggs (Dipt.). [40] 27: 437–45. **De Meillon, B. and F. Hardy**—Fate of Cimex lectularius on adult and baby mice. [53] 167: 151–52, 1951. **Drilhon, A. et R. G. Busnel**—Les acides aminés libres et les substances fluorescentes du sang et du tube de Malpighi de la chenille de Bombyx mori (Lepid.). [C. R. Acad. Sci.] 232: 182–84, 1951. **Drilhon, A., R. G. Busnel et C. Vago**—Les acides aminés et les substances fluorescentes du sang, et des tubes malpighi, de la chenille de Bombyx mori L. [C. R. Acad. Sci.] 232: 360–61, 1951. **Dupuis, C.**—Allochromie liee aux

modifications du métabolisme chez les Hemiptères des genres Dolycoris et Carpocoris. [C. R. Acad. Sci.] 232: 262–64, 1951. **Haget, A.**—Mise en évidence, dans la blastule de Leptinotarsa (Col.) d'une zone indispensable au développment embryonnaire normal. [C. R. Soc. Biol. 144: 972–74. **Harnisch, O.**—Die Eigenart der oxybiotischen Erholung nach Anaerobiose bei Chironomidenlarven (Dipt.). [Biol. Zentralbl.] 69: 449–63. Einige Messungen zum Glykogengehalt und Glykogenstoffwechsel der Larve von Chironomus bathophilus. [Zool. Anz.] 145: 301–05. **Hassett, C. C., V. G. Dethier and J. Gans**—A comparison of nutritive value and taste thresholds of carbohydrates for the blowfly. [12] 99: 446–53. **Heubner, W.**—Über Wanderung des DDT in Insektennerven. [Sb. dtsch. Akad. Wiss., Berlin, Math. Nat. Kl.] 1948. Publ. by Akad. Verlag 1949. Review in [28] 87: vii, 1951. **Hughes, T. E.**—The embryonic development of the mite Tyroglyphus farinae. [72] 120: 873–86, ill. **Hughes, R. D. and C. O. Goode**—Male haploidy in an Anoetid mite. [Virginia Jour. Sci.] n.s., 1 (4): 349. **Ibbotson, A. and J. S. Kennedy**—The distribution of aphis infestation in relation to leaf age. II. [4] 37 (3278): 680–96. **Lhoste, J.**—Sur la presence de ganglions epipharyngiens chez Forficula auricularia. [C. R. Acad. Sci.] 232: 264–66, ill., 1951. **Moore, W.**—Nutrition of insects. [Virginia Jl. Sci.] n.s., 1: 350. **Niswander, R. E.**—Life history and respiration of the milkweed bug Oncopeltus fasciatus. [58] 51: 27–33, 1951. **Novak, V. J. A.**—New aspects of the metamorphosis of insects. [53] 167: 132–33, 1951. **Parry, D. A.**—Microclimate close to the ground. [53] 167: 73–74, 1951. **Rempel, J. G.**—A study of the embryology of Mamestra configurata (Walker), (Lep., Phalaen.). [23] 83: 1–19, ill., 1951. **Ribbands, C. R.**—Changes in the behavior of hive bees following their recovery from anaesthesia. [40] 27: 302–10, 1951. **Sacktor, B.**—A comparison of the cytochrome oxidase activity of two strains of houseflies. [37] 43: 832. **Salkeld, E. H.**—A toxicological and histophysiological study of certain new insecticides as "stomach poisons" to the honey-bee Apis mellifera L. [23] 83: 39–52, ill., 1951. **Schildmacher, H.**—Über Photosensibilisierung von Stechmückenlarven durch fluoreszierende Farbstoffe (Dipt.). [Biol. Zentralbl.] 69: 468–77. **Schneirla, T. C. and R. Z. Brown**—Army-ant life and behavior under dry-season conditions. 4. Further investigation of cyclic processes in behavioral and reproductive functions. [Bull. Amer. Mus. Nat. Hist.] 95 (5): 269–353, $1.25. **Scoggin, J. K. and O. E. Tauber**—Survey of the

literature on insect lipids. [34] 25: 99–124. **Singh, K.**—On the anatomy of the fourth instar larva (prepupal phase) of the Jamnun whitefly Dialeurodes eugeniae (Homop., Aleurod.). [Indian Jl. Ent.] 11 (1949): 25–46. **Urbani, E.**—Osservazione preliminari sugli acidi nucleici e sulla natura della "massa di Giardina" nell'oocite di Dytiscus marginalis. Nota II. [Atti, Acc. Naz. Lincei, Rec. Cl. Sc. fis. mat. nat.] 8: 504–08, ill. **Way, M. J. and B. A. Hopkins**—The influence of photoperiod and temperature on the induction of diapause in Diataraxia oleracea L. (Lepid.). [40] 27: 365–75. **West, A. S.**—The precipitin test as an entomological tool. [23] 82: 241–44. **Wigglesworth, V. B. and J. W. L. Beament**—The respiratory mechanisms of some insect eggs. [74] 91: 429–52, ill. **Willis, E. R. and L. M. Roth**—The attraction of Tribolium castaneum to flour. [37] 43: 927–32. **Winteringham, F. P. N., P. M. Loveday and H. Harrison**—Resistance of houseflies to DDT. [53] 167: 106–07, 1951.

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Micks, D. W.—The laboratory rearing of the common fowl tick Argas persicus. [46] 37: 102–05, 1951. **Newell, I. M.**—New species of Copidognathus (Halacaridae). [2] No. 1476: 1–19, ill. **Schubart, O.**—Diplopoda. (See under Hymenoptera.) **Soares, B. A. M.**—Sôbre o coração o sistema nervoso estômato-gástrico e a circulação cardíaca nos escorpiões do gênero Tityus. [Zoologia, S. Paulo] No. 15: 239–64, ill. **Traver, J. R.**—Unusual scalp dermatitis in humans caused by the mite, Dermatophagoides (Acar., Epidermopt.). [65] 53: 1–25, ill., 1951. **Turk, F. A.**—Myriopodological notes. III. The iatro-zoology, biology and systematics of some tropical "myriopods." [6] ser. 12, 4: 35–48, 1951. **Wharton, G. W., D. W. Jenkins, J. W. Brennan, H. S. Fuller, G. M. Kohls and C. B. Philip**—The terminology and classification of Trombiculid mites (Acarina). [46] 37: 13–31 (k), ill., 1951.

SMALLER ORDERS—Broadhead, E.—A revision of the genus Liposcelis Mots. with notes on the position of this genus in the order Corrodentia and on the variability of 10 Liposcelis species. [88] 101: 335–88. **Chow, C. Y. and T. C. Huang**—The identification of known species of Taiwan (Formosan) fleas (Siphonap.). [Quart. Jour. Taiwan Mus.] 3: 113–22, ill. **Cott, H. E.**—A secondary homonym in Thysanptera. [60] 26: 187. **Edmunds, G. F.**—Notes on neotropical Ephemeroptera. I. New or little known Leptophlebiidae. [102] 21: 551–54. **Fox, I.**—Relative and seasonal abundance of the comon rat ectoparasites of San Juan, Puerto Rico. (Acar. and Siph.) [46] 37: 85–95, 1951. **Harker, J. E.**—The effect of temperature on the final instar nymphs of three species of Australian Ephemeroptera. [68] 25: 111–14. **Marcus, H.**—Los organos genitales de Dinjapyx marcusi (Silv.). [Folia Univ.] 4: 57–62, ill. Sobre la muda de Dinjapyx marcusi. *Ibid.*, 81–85. **Munroe, E. G.**—The identity and generic position of Chauliodes disjunctus Walker (Megalop., Coryd.) [23] 83: 33–35, 1951. **Schmidt, E.**—Über das letzte Larvenstadium einiger europäischer Aeschniden (Odonata). [Opusc. Ent.] 15: 193–201. **Traver, J. R.**—Notes on neutropical mayflies. Pt. IV. Fam. Ephemeridae. [102] 21: 593–614, ill. **Werneck, F. L.**—Os malófagos de mamíferos. Pt. II. Ischnocera (cont. de Trichodectidae) e Rhynocophthirius. Inst. O. Cruz, pp. 1–207, 1950. **Whitehead, W.**—Notes on the growth and development of a caddis larva, Limnephilus vittatus (Trichoptera). [The Naturalist] No. 836: 13–15. **Williams, L. A. and C. C. Hoff**—Fleas from the Upper Sonoran Zone near Albu-

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Review

Pierre Viette. Lépidoptères Rhopalocères de l'Océanie Française; Faune de l'Empire Français, XIII. 1950.

This is the very highest type of what might be called the stamp collector's approach to the butterflies. It is well organized, perfectly clearly presented, with keys, good figures, including genitalia when useful, and all the data necessary to determine the butterflies from the French islands of the southwest Pacific —but hardly anything more. The prospective field collector will miss data on caterpillars, foods, life cycle and ecology; the zoogeographer will have to make his own tabulations, based on other works; for the distributions cited are practically limited to material from the French islands, and outside localities are not quite trustworthy. There is also no synonymy, and one will be occasionally puzzled to find the species in other works.

A rough count shows 42 species actually reported from New Caledonia and 43 from the New Hebrides, with a few more known from both the Loyalties and the New Hebrides, which ought to occur in New Caledonia. There are ten from Tahiti, five from the Marquesas and only scattering records of wide-

spread species from the remaining islands. The endemics are about as one might expect: a few from New Caledonia, including the endemic genus Paratisiphone, none that I notice from the New Hebrides, though there are some striking subspecies of wide-spread species; two from the Marquesas and somewhat surprisingly an endemic genus of Blues from Tahiti (Hypojamides). It is notable that all save those from New Caledonia are represented by very few specimens—the Tahiti species by two specimens taken a century apart, the two Marquesans by a unique and three females. It looks as though a few may yet be found, but more probably several are gone forever before discovery.

Type localities are cited without question, and it should be noted that "Coromandel" is often one of the notorious early false localities. *Delias ellipsis* is cited without question from "Australia," but Talbot notes that the types are labelled "Antipolo," a place which does not exist in Australia; perhaps there is or once was a village of that name in the New Caledonia group. In any case the newly discovered specimen from New Caledonia is the first trustworthy record of the species from anywhere, and of this wide-spread genus from New Caledonia.

"Danaus plexippus" is noted without synonymy, and only a close reading shows that the American Monarch is meant rather than the Asiatic species which Linnaeus confused with it, and which has fought for the name ever since. To add to the confusion it is given as subgenus Danaus, which is correct for the Asiatic, but not so good for the American species (*Diogas* d'Almeida).

Libythea is put in the Nymphalinae, following Zerny and Beier, without noting that while the palpi are not too important, the genus also has Erycinid and not Nymphalid legs, and an unique larva. Surely it deserves at least a subfamily (or a "splitter's" family).—Wm. T. M. Forbes.

The **Wasmann Journal of Biology.** This is a new name for the well known and now enlarged "Wasmann Collector." Vol. 8, No. 2, which is at hand, comprises 254 pages, half of which deal with insects and include papers by E. S. Ross, W. Hovanitz, E. G. Linsley and J. W. MacSwain, W. L. Brown. It is published by the University of San Francisco, three times a year. Editor: Edward L. Kessel. Price: $5.00 per volume.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Miridae (Capsidae)—American species wanted, with locality labels, in exchange for British species. D. Leston, F.R.E.S., 6 Frognal Rise, London N. W. 3, England.

Wanted—Entomological microscope in good condition; Spencer, Bausch & Lomb, or other standard make. David G. Shappirio, 4811 17th St., N.W., Washington 11, D. C.

Coleoptera—Large quantities of Cicindelidae, Buprestidae, Lucanidae, Cerambycidae wanted in exchange for all families of Coleoptera from Ill., Ind. and Mo. Joseph B. Hayes, 1905 N. Pulaski Rd., Chicago 39, Ill.

American Sarcophagidae—wanted for identification. H. R. Dodge, 291 Peachtree Street, Atlanta 3, Georgia.

German lepidopterist wishes to correspond and receive live material (eggs and pupae) in exchange for dried imagoes. Johannes Reichel, Koenigsberg, Krs. Wetzlar 16, Germany.

For exchange—The periodic Cicada, T. septendecim. Desire Lepid. espec. Papil., Sphing. & Speyeria. Also Col., espec. Ceramb. & Lucan. John W. Morris, 2704 Genesee St., Syracuse 9, N. Y.

Cynipid and Itonidid galls—American species wanted; purchase or exchange for British species. Fresh or dried. D. Leatherdale, F.R.E.S., Old Woodstock, Oxford, England.

Wanted—Reprints or papers concerning insects taken in Alaska for inclusion in list of Alaskan insects. R. H. Washburn, Alaska Experiment Station, Palmer, Alaska.

ENTOMOLOGICAL NEWS

JUNE 1951

Vol. LXII **No. 6**

CALVERT ANNIVERSARY VOLUME

on the occasion of

Dr. Philip P. Calvert's Eightieth Birthday

CONTENTS

PUBLISHED MONTHLY, EXCEPT AUGUST AND SEPTEMBER, BY
THE AMERICAN ENTOMOLOGICAL SOCIETY
PRINCE AND LEMON STS., LANCASTER, PA.
AND
1900 RACE STREET, PHILADELPHIA 3, PA.

Subscription, per yearly volume of ten numbers: $4.00 domestic; $4.30 foreign; $4.15 Canada. Entered as second-class matter April 19, 1943, at the post office at Lancaster, Pa., under the Act of March 3, 1879. Acceptance for mailing at the special rate of postage provided for in paragraphs (d-2), Section 34.40, P. L. & R. of 1948, authorized April 19, 1943.

ENTOMOLOGICAL NEWS

ENTOMOLOGICAL NEWS is published monthly, excepting August and September, by The American Entomological Society at Prince and Lemon Sts., Lancaster, Pa., and the Academy of Natural Sciences, 1900 Race Street, Philadelphia 3, Pa., U. S. A.

PHILIP P. CALVERT, Editor Emeritus. R. G. SCHMIEDER, Editor. Editorial Staff: E. J. F. MARX, M. E. PHILLIPS, J. A. G. REHN, and A. G. RICHARDS.

Subscription price, per yearly volume of 10 numbers: Domestic, $4.00; Foreign, $4.30; Canada, $4.15—U. S. Currency.

SUBSCRIPTIONS, ADVERTISEMENTS: All communications and remittances to be addressed to **ENTOMOLOGICAL NEWS, 1900 Race Street, Philadelphia 3, Pa.**

MANUSCRIPTS and all communications concerning same should be addressed to **R. G. Schmieder, Zoological Laboratory, University of Pennsylvania, Philadelphia 4, Pa.**

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ENTOMOLOGICAL NEWS

VOL. LXII JUNE, 1951 No. 6

Some New Dragonfly Records for Kentucky (Odonata)

By CARL COOK, Crailhope, Kentucky

In 1924 Garman [1] published the only more or less comprehensive list of Kentucky dragonflies that has appeared to date. Based on collections made by himself, together with numerous previously published records, he was able to bring together a total of 65 [2] species for his list.

Since that time the dragonflies have been almost completely neglected in Kentucky, less than a dozen additional species have been recorded for the state since Garman's paper. Because of this almost total lack of information concerning the distribution of this group of insects in Kentucky, the writer has undertaken to prepare a complete catalogue of the Odonata known to occur within the state. However, since a great deal more collecting needs to be done, most especially in the western and far eastern parts of the state, before our knowledge of the distribution of the various species in the different counties is sufficient to allow the completion of my state list. And since this field work is expected to take at least two more summers to complete, I believe there is justification for offering this short list of new records in the meantime so that these records may be available for use by other students of the Odonata as soon as possible.

[1] GARMAN, H. 1924. Odonata from Kentucky. *Entom. News* 35: 285–288.

[2] GARMAN actually lists 66 species but according to RIS (A revision of the Libelluline Genus Perithemis. *Miscell. Pub. Mus. Zool. Univ. Mich.* No. 21, p. 17. 1930.) all records of *Perithemis domitia* from the United States belong to *tenera*.

During the ten years I have been collecting dragonflies in Kentucky, I have taken a total of 94 different species of which 35 have not been reported from Kentucky previously. Two others are being recorded because their capture represents extensions of the known seasonal range for these species. This list is based upon a collection of 1182 specimens made from the following twenty counties: Adair, Allen, Barren, Casey, Christian, Edmonson, Fayette, Floyd, Green, Hardin, Hart, Letcher, Marion, Metcalfe, Pulaski, Rockcastle, Taylor, Wayne, Washington, and Whitley. It will be instantly apparent to the reader that little more than "scratching the surface" has yet been done in collecting dragonflies in Kentucky; we have collections from less than a quarter of the state's 120 counties and nowhere, with the possible exception of the writer's immediate neighborhood, have dragonflies been collected at all extensively in the state. Even in counties where collections have been made, it must not be assumed that they were made with equal completeness, for instance, Pulaski County is undoubtedly capable of yielding as many species as Green County yet because we passed through Pulaski with only one five minute stop we were able to collect but one species, while from Green County where we have collected more or less intensely over the past ten years, we have taken 81 species.

It is hoped that resident collectors and persons passing through, or collecting in, Kentucky will make an effort to secure specimens of dragonflies at every opportunity. The writer would welcome the opportunity to examine all such collections for possible extensions of geographic or seasonal range and proper credit will be given for any usable records.

Representative specimens of all species listed herein are in my own personal collection, a few have been sent to Dr. Philip P. Calvert for the collection of The Academy of Natural Sciences of Philadelphia, and still others have been given to various other students of this group of insects. The writer is responsible for all specific determinations, with the exception of the two species noted below.

I wish to acknowledge the assistance of my mother, Mrs. Elizabeth Cook, in collecting many of the specimens, and in

other matters. I am especially indebted to Dr. Philip P. Calvert for determining *Ophiogomphus aspersus* and *Neurocordulia yamaskanensis*, and to Dr. Minter J. Westfall, Jr., who very kindly checked representatives of many of the Anisoptera and has been of much assistance in other ways.

List of Species

Hetaerina titia tricolor (Burmeister). Green Co.—Little Barren River near Crailhope, 16 ♂, 1 ♀, Sept. 12, 1945; 3 ♂, Sept. 19, 1945; 1 ♂, Sept. 26, 1945: 9 ♂, Sept. 18, 1947; 1 ♀, July 24, 1948; 10 ♂, 1 ♀, Sept. 18, 1948; 7 ♂, 1 ♀, Sept. 6, 1949; 2 ♂, Sept. 9, 1949; 11 ♂, 2 ♀, Sept. 27, 1949; 2 ♂, Sept. 28, 1949; 3 ♂, Oct. 4, 1949. Adair Co.—Green River near Neatsville, 7 ♂, Sept. 19, 1948. Edmonson Co.—Green River at Mammoth Cave Ferry, 3 ♂, 1 ♀, Aug. 13, 1947; 2 ♂, July 26, 1948. Rockcastle Co.—Rockcastle River near Livingston, 3 ♂, Sept. 20, 1948. Metcalfe Co.—South Fork of Little Barren River at Sulphur Well, Aug. 16, 1947, 2 ♀; Nov. 2, 1949, 3 ♂.

Lestes forcipatus Rambur. Green Co.—Crailhope, 12 ♂, 7 ♀, April 4, 1948; 7 ♂, April 10, 1945; 9 ♂, April 11, 1945; 1 ♂, April 14, 1945; 2 ♀, April 16, 1948; 4 ♂, April 23, 1945; 7 ♂, April 24, 1945; 7 ♂, 2 ♀, May 5, 1945; 5 ♂, 3 ♀, May 9, 1945; 5 ♂, 1 ♀, May 13, 1945; 2 ♂, 2 ♀, May 19, 1945; 12 ♂, 2 ♀, May 20, 1945; 1 ♀, May 22, 1945; 1 ♂, May 28, 1945; 4 ♂, 2 ♀, May 29, 1945; 2 ♂, 2 ♀, June 4, 1945; 1 ♀, June 18, 1948; 1 ♂, July 8, 1946; 1 ♂, July 19, 1947; 5 ♂, 2 ♀, Aug. 28, 1947, 1 ♂, 1 ♀, Aug. 29, 1947. Edmonson Co.—Sloans Crossing Pond, Mammoth Cave National Park, 6 ♂, 1 ♀, June 5, 1949; 3 ♂, July 26, 1948. Hardin Co.—Radcliff, 8 ♂, July 22, 1946.

Lestes inaequalis Walsh. Hardin Co.—Radcliff, 1 ♀, July 22, 1946; 3 ♂, June 9, 1948.

Lestes vigilax *Hagen.* Edmondson Co.—Sloans Crossing Pond, Mammoth Cave National Park, 2 ♂, Aug. 13, 1947; 1 ♂, July 15, 1949. Whitley Co.—Fish Hatchery near Williamsburg, 11 ♂, 3 ♀, Aug. 20, 1949. Wayne Co.—Mt. Pisgah, Aug. 20, 1949, 5 ♂, 4 ♀.

Lestes unguiculatus Hagen. Green Co.—Crailhope, 3 ♂, Aug. 12, 1947; 1 ♂, Aug. 27, 1947.

Chromagrion conditum (Hagen). Hardin Co.—Radcliff, 4 ♂, July 22, 1946; 7 ♂, 7 ♀, June 9, 1948.

Enallagma basidens *Calvert.* Green Co.—Crailhope, 16 ♂, 4 ♀, Sept. 6, 1949; 89 ♂, 21 ♀, Sept. 9, 1949; 2 ♂, Sept. 12, 1949;

11 ♂, Sept. 14, 1949. Little Barren River near Crailhope, 1 ♀, Sept. 27, 1949. I caught two males of *E. Basidens* at a small fish pond on September 6th, but could not find any more after searching for over an hour. Later in the afternoon, I returned and was able to add four mating pairs and several additional males to my catch. I visited the pond again on September 9th, when it was fairly teeming with *basidens*, they were so abundant I collected a hundred specimens in an hour taking only mating pairs and those males which were congregated together in such a manner that several could be caught with each swing of the net. They seem to be gregarious, a dozen or more alighting on the same stalk, preferably some projecting dead weed stem or tuft of emergent grass within two or three feet of the pond shore. The single female from Little Barren River was taken while sweeping emergent vegetation for Trichoptera.

Enallagma vesperum Calvert. Hardin Co.—Radcliff, 1 ♂, July 22, 1946.

Ischnura kellicotti Williamson. Hardin Co.—Radcliff, 1 ♂, 1 ♀, June 9, 1948. These were the only ones seen, they were taken when I made a swing for *Lestes inaequalis*. They were probably a mating pair.

Ophiogomphus aspersus Morse. Green Co.—Little Barren River near Crailhope, 1 ♂, July 31, 1940. I have seen several others at this locality, but we have always found this species to be very difficult to capture.

Ophiogomphus rupinsulensis (Walsh). Green Co.—Basin Spring Hollow, Crailhope, 1 ♂, July 5, 1947. Little Barren River near Crailhope, 1 ♂, July 2, 1949; 1 ♀, July 10, 1948. Allen Co.—Big Barren River near Scottsville, 1 ♂, July 5, 1949. Adair Co.—Green River near Neatsville, 1 ♂, June 19, 1946.

Gomphus lividus Selys. Green Co.—Little Barren River near Crailhope, 1 ♂, April 17, 1946; 2 ♂, April 21, 1946; 1 ♂, 1 ♀, April 24, 1945; 6 ♂, May 30, 1948; 1 ♂, June 13, 1948. Allen Co.—Big Barren River near Scottsville, 1 ♂, July 5, 1949. Adair Co.—Green River near Neatsville, 3 ♂, June 19, 1946. Letcher Co.—Rockhouse Creek, 1 ♂, May 29, 1946. Taylor Co. —Robinson Creek near Elkhorn, 2 ♂, June 19, 1946. Floyd Co. —Levisa Fork River near Prestonsburg, May 28, 1946, 1 ♂. Whitley Co.—Jellico Creek, May 29, 1946, 1 ♂. Rockcastle Co.—Rockcastle River near Livingston, 3 ♂, June 2, 1948. Marion Co.—Rolling Fork River near Bradfordsville, 1 ♂, June 9, 1948.

Gomphus descriptus Banks. Letcher Co.—Rockhouse Creek, 1 ♂, May 29, 1946.

Gomphus quadricolor Walsh. Green Co.—Little Barren River near Crailhope, 2 ♂, May 27, 1948; 1 ♀, May 24, 1949; 3 ♂, 3 ♀, May 28, 1949; 2 ♂, May 30, 1949; 9 ♂, 2 ♀, June 8, 1949; 3 ♂, May 23, 1949. This species usually rests on the ground some distance back from the river's bank, preferably on some bare sandy spot exposed to full sunlight. Sometimes males may be seen resting on a boulder in mid-stream where they are shy and much more difficult to capture than when resting on the ground.

Gomphus (Gomphurus) fraternus (Say). Green Co.—Little Barren River near Crailhope, 22 ♂, 1 ♀, May 27, 1948; 5 ♂, May 30, 1948; 2 ♂, May 28, 1949. Edmonson Co.—Sloans Crossing Pond, Mammoth Cave National Park, 1 ♂, June 5, 1949. Rockcastle Co.—Rockcastle River near Livingston, 4 ♂, June 2, 1948.

Gomphus (Gomphurus) lineatifrons Calvert. Green Co.—Crailhope, 1 ♂, May 17, 1947. This is the earliest date known to me at which this species has been taken. It has been recorded from Kentucky before, but it is not a common dragonfly in collections.

Gomphus (Stylurus) notatus Rambur.[3] Green Co.—Little Barren River near Crailhope, 2 ♂, October 4, 1949. This record is an extension to the known seasonal range for this species.

Gomphus (Arigomphus) villosipes Selys. Green Co.—Crailhope, 1 ♀, May 20, 1946; 1 ♂, May 28, 1945; 1 ♂, May 29, 1945; 1 ♂, 1 ♀, June 4, 1946; 1 ♂, May 28, 1949. Edmonson Co.—Sloans Crossing Pond, Mammoth Cave National Park, 18 ♂, 4 ♀, June 5, 1949.

Gomphaeschna furcillata (Say). Green Co.—Crailhope, 1 ♀, June 4, 1947.

Aeshna mutata Hagen. Green Co.—Basin Spring Hollow, Crailhope, 1 ♂, June 16, 1946.

Cordulegaster maculatus Selys. Floyd Co.—Left Fork Beaver Creek near Melvin, 1 ♂, May 28, 1946. Whitley Co.—Jellico Creek, 4 ♂, 2 ♀, May 29, 1946. Adair Co.— Casey Creek near Knifley, 1 ♀, June 19, 1946.

Neurocordulia yamaskanensis (Provancher). Green Co.—Little Barren River near Crailhope, 6 ♂, June 28, 1946; 5 ♂,

[3] I agree with the published viewpoint of Needham, Walker, Williamson and others that *Stylurus*, and perhaps *Arigomphus* as well, is worthy of generic recognition. However, pending complete revision of the various groups in question, I follow here the more conservative road in treating them as subgenera.

June 30, 1946; 3 ♂, July 4, 1946; 7 ♂, July 5, 1946; 1 ♂, 1 ♀, July 18, 1946; 3 ♂, 3 ♀, July 19, 1946; 2 ♂, 1 ♀, July 22, 1946; 5 ♂, 1 ♀, July 24, 1946; 4 ♂, 3 ♀, July 25, 1946; 2 ♂, 30 ♀, August 2, 1946; 1 ♂, June 1, 1947; 1 ♂, June 15, 1947; 11 ♂, 7 ♀, July 29, 1947; 7 ♂, 2 ♀, June 16, 1948; 1 ♀, July 27, 1948; 4 ♂, 4 ♀, July 28, 1948; 2 ♂, 6 ♀, July 30, 1948; 6 ♀, August 10, 1948; 5 ♂, May 12, 1949; 4 ♂, May 16, 1949; 3 ♂, May 21, 1949; 5 ♂, June 25, 1949; 1 ♀, July 23, 1949; 12 ♂, 3 ♀, July 24, 1949; 8 ♀, August 8, 1949. This species seems to be very local in distribution but is very abundant where it does occur. On Little Barren River they are restricted to a stretch about one-half mile below the mouth of Greasy Creek and may be found on the wing for about thirty minutes just after sunset.

Tetragoneuria cynosura (Say). Green Co.—Crailhope, 6 ♂, 3 ♀, April 10, 1946; 13 ♂, 2 ♀, April 11, 1945; 5 ♂, 2 ♀, April 12, 1946; 5 ♂, 1 ♀, April 13, 1946; 4 ♂, 6 ♀, April 14, 1946; 1 ♂, May 20, 1946; 3 ♂, April 23, 1949; 7 ♂, 2 ♀, May 13, 1949; 3 ♂, June 4, 1949. Edmonson Co.—Sloans Crossing Pond, Mammoth Cave National Park, 52 ♂, 13 ♀, May 14, 1949; 21 ♂, 11 ♀, June 5, 1949. Hart Co.—Hardyville, May 14, 1949, 4 ♂. Barren Co.—Pageville, 2 ♂, July 5, 1949. Floyd Co.—Melvin, 5 ♂, 1 ♀, May 28, 1946. Fayette Co.—Lexington Reservoir, 8 ♂, April 18, 1946. Hardin Co.—Radcliff, 3 ♂, 1 ♀, June 9, 1948. Christian Co.—between Fairview and Hopkinsville, 1 ♀, May 7, 1947. The Christian Co., specimen was ovipositing in a puddle of rain water on the highway. We immediately begin to search the puddle for eggs and were not long in finding a strand about two inches long covered with a slimy gelatinous substance.

Tetragoneuria cynosura simulans Muttkowski. Green Co. —Crailhope, 3 ♂, 1 ♀, April 13, 1946; 2 ♂, 1 ♀, April 14, 1946; 6 ♂, May 13, 1949. Edmonson Co.—Sloans Crossing Pond, Mammoth Cave National Park, 22 ♂, 7 ♀, May 14, 1949; 9 ♂, 7 ♀, June 5, 1949. Hart Co.—Hardyville, 5 ♂, May 14, 1949. Fayette Co.—Lexington Reservoir, 2 ♂, April 18, 1946.

Helocordulia uhleri (Selys). Floyd Co.—Left Fork Beaver Creek near Melvin, 7 ♂, May 28, 1946.

Nannothemis bella (Uhler). Edmonson Co.—Sloans Crossing Pond, Mammoth Cave National Park, 3 ♂, June 5, 1949. Hardin Co.—Radcliff, 2 ♂, 3 ♀, June 9, 1948.

Celithemis elisa (Hagen). Green Co.—Crailhope, 4 ♂, 2 ♀, May 20, 1946; 3 ♂, June 4, 1947; 1 ♂, 2 ♀, July 5, 1947; 3 ♂, 1 ♀, June 4, 1949. Edmonson Co.—Sloans Crossing Pond, Mammoth Cave National Park, 7 ♂, 3 ♀, June 5, 1949. Pulaski Co.—Somerset, 1 ♀, June 2, 1948.

Celithemis fasciata Kirby. Edmonson Co.—Sloans Crossing Pond, Mammoth Cave National Park, 3 ♂, July 26, 1948; 2 ♂, July 15, 1949. These five males are very near to being intermediate between typical *fasciata* from Florida and *monomelaena*. They evidently belong to the same form as those reported by Williamson [4] and Westfall.[5]

Celithemis verna Pritchard. Edmonson Co.—Sloans Crossing Pond, Mammoth Cave National Park, 1 ♂, 1 ♀, July 26, 1948; 2 ♂, 4 ♀, May 14, 1949.

Sympetrum ambiguum (Rambur). Green Co.—Crailhope, May 20, 1946, 1 ♂; 1 ♂, June 26, 1946; 1 ♂, July 5, 1946; 1 ♀, July 28, 1946; 1 ♂, August 25, 1946; 1 ♀, September 11, 1946; 1 ♂, July 26, 1949; 2 ♀, August 17, 1949. Edmonson Co.—Mammoth Cave National Park, 1 ♂, July 26, 1948. Rockcastle Co.—Livingston, 1 ♀, June 2, 1948. Washington Co.—Willisberg, 1 ♂, July 22, 1946.

Sympetrum vicinum (Hagen). Green Co.—Crailhope, 2 ♂, October 2, 1946; Little Barren River near Crailhope, 1 ♂, September 6, 1946. Edmonson Co.—Sloans Crossing Pond, Mammoth Cave National Park, 16 ♂, 7 ♀, July 15, 1949. Allen Co.—Scottsville, 1 ♀, July 5, 1949. Rockcastle Co.—Livingston, 4 ♂, 1 ♀, June 2, 1948. Hardin Co.—Radcliff, 6 ♂, July 22, 1946. Whitley Co.—Fish Hatchery near Williamsburg, 4 ♂, 1 ♀, August 20, 1949.

Libellula (Ladona) deplanata Rambur. Edmonson Co.—Sloans Crossing Pond, Mammoth Cave National Park, 2 ♂, 1 ♀, May 14, 1949; 3 ♂, 2 ♀, June 5, 1949.

Libellula (Eolibellula) semifasciata Burmeister. Green Co.—Basin Spring Hollow, Crailhope, 2 ♂, May 5, 1946. Edmonson Co.—Sloans Crossing Pond, Mammoth Cave National Park, 6 ♂, 9 ♀, May 14, 1949. Hardin Co.—Radcliff, June 9, 1948, 3 ♂.

Libellula (Holotania) incesta Hagen. Green Co.—Crailhope, 3 ♂, June 26, 1946; 6 ♂, 1 ♀, July 5, 1946; 3 ♂, 2 ♀, July 26, 1949; 3 ♂, August 17, 1949. Edmonson Co.—Sloans Crossing Pond, Mammoth Cave National Park, 4 ♂, 2 ♀, June 5, 1949; 9 ♂, 1 ♀, July 26, 1948. Fayette Co.—Lexington Reservoir, 3 ♂, June 9, 1948.

[4] Williamson, E. B. 1934. Dragonflies collected in Kentucky, Tennessee, North and South Carolina, and Georgia in 1931. *Occ. Pap. Mus. Zool. Univ. Mich.* No. 288, p. 20.

[5] Westfall, M. J., Jr. 1942. A list of the dragonflies (Odonata) taken near Brevard, North Carolina. *Entom. News* 53: 127.

Libellula (Holotania) vibrans Fabricius. Green Co.—Crailhope, 3 ♂, June 26, 1946; 1 ♂, July 5, 1946.

Libellula (Holotania) axillena Westwood. Green Co.—Crailhope, 1 ♂, June 26, 1946; 1 ♂, August 25, 1949.

Trapezostigma carolina (Linne). Green Co.—Crailhope, 1 ♂, 1 ♀, May 20, 1946; 1 ♂, May 13, 1945; 3 ♂, June 26, 1946; 2 ♂, 2 ♀, July 5, 1946; 1 ♂, July 19, 1947; 7 ♂, 2 ♀, August 28, 1947; 1 ♂, August 29, 1947. Edmonson Co.—Sloans Crossing Pond, Mammoth Cave National Park, 3 ♂, May 14, 1949; 5 ♂, 2 ♀, June 5, 1949; 2 ♂, 2 ♀, July 26, 1948. Letcher Co.—Jenkins, May 29, 1946, 1 ♂. Hart Co.—Hardyville, May 14, 1949, 2 ♂. Hardin Co.—Radcliff, 3 ♂, 1 ♀, June 9, 1948; 1 ♂, July 22, 1946. Allen Co.—Scottsville, 2 ♂, July 5, 1949. Christian Co.—Fairview, 1 ♂, August 17, 1949.

A New Atrytone from Nebraska (Lepidoptera: Hesperioidea)

By Paul R. Ehrlich and Nicholas W. Gillham

On examining the series of *Atrytone conspicua* Edw. in the American Museum of Natural History, we discovered a series of *conspicua,* collected by Leussler at Valley and Omaha, Nebraska, which we believe represents a population deserving of subspecific status. We hereby propose:

Atrytone conspicua ssp. **buchholzi** nov.

This subspecies is easily separated from specimens of *conspicua conspicua* by its larger size and its robust appearance. In the males, there is a tendency towards obsolescence of the light markings on the underside of the primaries. This character is found only occasionally in Eastern specimens.

Average length of one primary wing (base of subcosta to apex): male *buchholzi,* 16.9 mm.; male *conspicua,* 14.3 mm.; female *buchholzi,* 18.3 mm.; female *conspicua,* 15.4 mm.

The measurements of *buchholzi* are based on the type series. The measurements of typical *conspicua* are based on more than

70 specimens from New York, Massachusetts, Connecticut, New Jersey, and Pennsylvania.

Near topotypical *conspicua* from Michigan has been examined and is identical in all respects to the above-mentioned Eastern material. Wisconsin and Iowa specimens are intermediate between *conspicua* and *buchholzi*, and should probably be designated merely as belonging to *Atrytone conspicua* Cl. *conspicua-buchholzi*.

Type Material: Holotype male, Valley, Nebraska, VII–10–1925, R. A. Leussler; *allotype* female, Valley, Nebraska, VIII–2–1924, R. A. Leussler; deposited in the American Museum of Natural History. There are 29 male and 23 female *paratypes*, nos. 1–52, Valley and Omaha, Nebraska, July (various dates), 1913, 1914, 1924, 1925, 1926 and 1928. Nos. 1 and 20 in coll. Otto Buchholz; nos. 3 and 22 in coll. P. S. Remington; nos. 4, 5, 23, and 24 in the Canadian National Collection; nos. 6 and 25 in coll. C. F. dos Passos; nos. 7 and 26 in coll. H. A. Freeman; nos. 8 and 27 in coll. A. W. Lindsey; nos. 9, 10 and 30 in the Carnegie Museum; nos. 13–19, 31–35, 43 and 44 in the American Museum of Natural History; nos. 36 and 45 in the Museum of Comparative Zoology at Harvard University; nos. 42 and 52 in the Academy of Natural Sciences of Philadelphia; nos. 37–41 and 46–51 in the United States National Museum. The remaining paratypes are in the authors' collections.

We take pleasure in naming this subspecies in honor of Mr. Otto Buchholz of Roselle Park, New Jersey, as a slight token of appreciation of his many favors.

We wish to thank Messrs. W. D. Field and A. H. Clark of the National Museum for their advice and aid, Dr. G. W. Rawson of Summit, New Jersey, for the loan of Michigan *conspicua*, and Dr. F. H. Rindge of the American Museum, who lent us material from their collection and gave us many helpful suggestions. Lastly, we would like to express our appreciation to Mr. E. L. Bell of the American Museum, who, as an expert, expressed the opinion that the new subspecies is valid.

Description of a New Species of Anoplura (Lemurphthirus verruculosus) from a Madagascar Lemur

By Ronald A. Ward, Department of Zoology, University of Chicago, Chicago 37, Illinois

Lemurphthirus verruculosus species novum

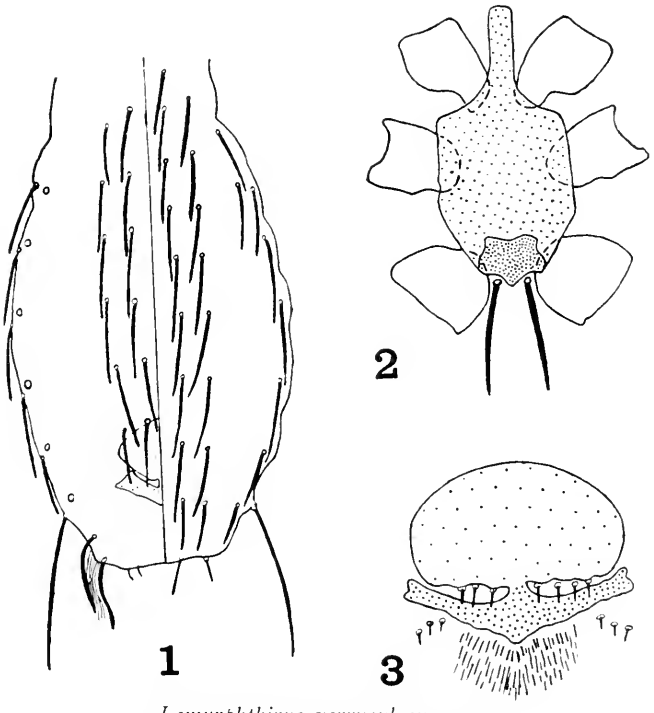
This species may be readily distinguished from the other species in the genus, *Lemurphthirus galagus* Bedford, by the converging prothoracic apophyses, basal extension of the sternal plate, scaly abdominal integument and the female genitalia as figured.

Female: Head slightly longer than broad; anterior margin slightly rounded with a narrow antennal band; post-antennal area parallel-sided; occipital region constricted with a marked median convex portion posteriorly. Dorsum with two hairs on each side a short distance below the base of the antennae; on the lateral margin of the post-antennal area there are three hairs on each side; a long bristle, a short spine and one hair at each latero-posterior angle. Median convex portion of occiput with a short spine on each side. V-shaped sclerotic plate connecting head to thorax on ventral surface not as well developed as in *galagus*. Antennae 5-segmented; first segment large, about as broad as long, with a thorn-like seta dorsally near the distal post axial angle; chaetotaxy and remaining segments similar to *galagus*.

Thorax long, with legs widely separated, similar in shape to that of *galagus*. Prothoracic apophyses straight but markedly converging posteriorly (in contrast to the parallel apophysises of *galagus*). Sternal plate large, covering the bases of the coxae (as in fig. 1); with a long narrow basal extension that reaches the head; with a long bristle at either side of the more sclerotized distal end. Prothorax with a long bristle near the lateral posterior angle. Metathoracic phragma as in *galagus*. Thoracic spiracles present.

Abdomen with integument scaly dorsally and ventrally. Paratergal, sternal and tergal plates apparently absent. Spiracles present on segments 3–8. Spiracles 3–7 with a short hair near the base. Chaetotaxy of the segments is as follows:

		Dorsal	Ventral
Segment	1	0–2–0	0–4–0
	2	0–4–0	1–4–1
		1–4–1	1–4–1
	3	2–4–2	1–4–1
	4–7	1–4–1	1–4–1
	8	1–4–1	1–0–1



Lemurphthirus verruculosus sp. n.

Fig. 1. Abdomen of *L. verruculosus* sp. n. Left side—ventral aspect; right side—dorsal aspect.

Fig. 2. Ventral aspect of sternal plate with bases of coxae.

Fig. 3. Ventral aspect of female genitalia.

Female genitalia complex, as in fig. 3.

Measurements of Female Holotype

	Length	Width
Head	.19 mm.	.16 mm.
Prothorax	.17 mm.	.21 mm.
Thorax (entire)	.26 mm.	
Abdomen	.80 mm.	.45 mm.
Total body	1.25 mm.	
Antennae	.16 mm.	.05 mm.

Holotype, an adult female, from a formalin specimen of a Mouse Lemur collected at Bemangidy, Fort Dauphin Dist., Tulear Prov., MADAGASCAR in 1948 by H. Hoogstraal and R. Ailison. (Collectors' host field No. 4524.) Holotype deposited in collection of Division of Insects, United States National Museum.

Notes on the Range Extension of Adejeania Vexatrix (Diptera: Tachinidae or Larvaevoridae) into Wyoming and British Columbia

Adejeania vexatrix (Osten Sacken) has been recorded by Curran (Bull. American Mus. Nat. Hist. 89 (2): 55–56, 1947) and others from the southwestern United States from Arizona, New Mexico, and Colorado. It has also been recorded from Utah by Knowlton, Harmston, and Staines (Utah Agric. Exper. Sta. Mimeog. ser. 200 (Tech.), Part 5: 14, 1939). The following records—from Wyoming and British Columbia—extend the northern distribution of this species by almost 700 miles. The Wyoming record, based on a male specimen in the Entomological Collection at San Jose State College, was collected at Mammoth Hot Springs, Yellowstone National Park, on August 4, 1940, by Ernest G. Meyers. The British Columbia record, based on a female specimen from the Entomological Collection of the University of British Columbia, loaned through the kindness of Prof. G. J. Spencer, was collected at Invermere, Kootenay County, on September 24, 1943, by J. L. Johnson. Both of these records are continuations of its distribution along the Rocky Mountain range.—PAUL H. ARNAUD, Natural History Museum, Stanford University, California.

List of Titles of Publications Referred to by Numbers in Entomological Literature in Entomological News.

1. American Midland Naturalist. Notre Dame, Indiana.
2. American Museum Novitates. New York, N. Y.
3. American Naturalist. Garrison-on-Hudson, New York.
4. Annals of Applied Biology. London.
5. Annals of the Entomological Society of America. Columbus, Ohio.
6. Annals and Magazine of Natural History. London.
7. Annales Academia Brasileira Sciencias. Rio de Janeiro.
8. Anales del Instituto de Biologia Mexico. Mexico City.
9. Anatomical Record. Philadelphia.
10. Arkiv för Zoologie. K. Svenska Vetenkapsakademien i. Stockholm.
11. Arquivos de Higiene e Saude Publica. São Paulo.
12. Biological Bulletin. Woods Hole, Massachusetts.
13. Bios, Rivista Biol. Geneva.
14. Boletin de Entomologia Venezolana. Caracas.
15. Boletin del Museo de Historia Natural "Javier Prado." Lima, Peru.
16. Boletin do Museu Nacional do Rio de Janeiro. Brasil.
17. Bull. Acad. Sci. (Izvestia Akad. nauk) U S S R (S. biol.).
18. Bulletin of the Brooklyn Entomological Society. New York.
19. Bulletin of Entomological Research. London.
20. Bulletin of the Museum of Comparative Zoology. Cambridge, Mass.
21. Bulletin of the Southern California Acad. of Sciences. Los Angeles.
22. C. r. Acad. Sci. (Doklady Akad. nauk) U S S R. Leningrad.
23. Canadian Entomologist. Guelph, Canada.
24. Canadian Journal of Zoology. Ottawa, Canada.
25. Ecological Monographs. Durham, North Carolina.
26. Ecology. Durham, North Carolina.
27. Entomologica Americana. Brooklyn Ent. Society, New York.
28. Entomologist's Monthly Magazine. London.
29. Entomological Record and Journal of Variations. London.
30. The Entomologist. London.
31. Florida Entomologist. Gainesville, Florida.
32. Frontiers. Philadelphia, Pennsylvania.
33. Great Basin Naturalist. Provo, Utah.
34. Iowa State College Journal of Science. Ames, Iowa.
35. Journal of Agricultural Research. Washington, D. C.
36. Journal of Animal Ecology. London.
37. Journal of Economic Entomology. Geneva, New York.
38. Journal of the Elisha Mitchell Science Society. Chapel Hill, N. C.
39. Journal of Entomology and Zoology. Claremont, California.
40. Journal of Experimental Biology. London.
41. Journal of Experimental Zoology. Philadelphia, Pennsylvania.
42. Journal of Heredity. Baltimore, Maryland.
43. Journal of the Kansas Entomological Society. Lawrence, Kansas.
44. Journal of Morphology. Philadelphia, Pennsylvania.
45. Journal of the New York Entomological Society. New York.
46. Journal of Parasitology. New York.
47. Journal of the Tennessee Academy of Sciences. Nashville, Tenn.
48. Journal of the Washington Academy of Sciences. Washington, D. C.
49. Memorias do Instituto Oswaldo Cruz. Rio de Janeiro.
50. Microentomology. Stanford University, California.
51. The Microscope. London.
52. Mosquito News. Albany, New York.
53. Nature. London.
54. Nature. Washington, D. C.
55. Le Naturaliste Canadien. Quebec.

56. Natural History. New York.
57. Occasional Papers, Mus. of Zool., Univ. of Michigan. Ann Arbor.
58. Ohio Journal of Science. Columbus, Ohio.
59. Opinions and Declarations. Intern. Com. Zool. Nomencl. London.
60. Pan-Pacific Entomologist. San Francisco, California.
61. Parasitology. London.
62. Proceedings of the Academy of Natural Sciences. Philadelphia.
63. Proceedings of the Biological Society of Washington. Wash., D. C.
64. Proceedings of the California Academy of Science. San Francisco.
65. Proceedings of the Entom. Soc. of Washington. Washington, D. C.
66. Proceedings of the Hawaiian Entomological Society. Honolulu.
67. Proceedings of the National Acad. of Sciences. Washington, D. C.
68. Proceedings of the Royal Entomological Society of London. Ser. A.
69. Proceedings of the Royal Entomological Society of London. Ser. B.
70. Proceedings of the Royal Entomological Society of London. Ser. C.
71. Proceedings of the U. S. National Museum. Washington, D. C.
72. Proceedings of the Zoological Society of London. London.
73. Psyche, A Journal of Entomology. Boston, Massachusetts.
74. Quarterly Journal of Microscopical Science. London.
75. Quarterly Review of Biology. Baltimore, Maryland.
76. Revista Academia Columbiana de Cien. Exact. Fis. y Nat. Bogotá.
77. Revista Chilena de Historia Natural. Valparaiso, Chile.
78. Revista Instituto Salubridad y Enfermedades Tropicales. Mexico.
79. Revista Sociedad Mexicana de Historia Natural. Mexico City.
80. Science. Washington, D. C.
81. Scientific Monthly. New York.
82. Smithsonian Miscellaneous Collections. Washington, D. C.
83. Transactions of the American Entomological Society. Philadelphia.
84. Transactions of the Amer. Micros. Soc. Menasha, Wisconsin.
85. Transactions of the Illinois State Academy of Sciences. Springfield.
86. Transactions of the Kansas Acad. of Sci. Manhattan, Kansas.
87. Transactions of the Royal Canadian Institute. Toronto.
88. Transactions of the Royal Entomological Society. London.
89. U. S. Dept. of Agric., Farmer's Bulletins. Washington, D. C.
90. U. S. Dept. of Agric., Technical Bulletins. Washington, D. C.
91. University of California Publications in Entomology. Berkeley.
92. University of California Publications in Zoology. Berkeley.
93. University of Kansas, Science Bulletins. Lawrence, Kansas.
94. Ward's Natural Science Bulletin. Rochester, New York.
95. Zoologica. New York.
96. American Journal of Public Health. Boston.
97. American Journal of Tropical Medicine. Baltimore.
98. Annals of Tropical Medicine and Parasitology. Liverpool.
99. Canadian Journal of Research. Section E, Medical Sciences, Ottawa.
100. Evolution. New York.
101. Mitteilungen der schweitzerischen entomologischen Gesellschaft, Bern.
102. Revista de Entomologia. Rio de Janeiro, Brasil.
103. Proceedings of the Royal Society of London.
104. Anales de la Escuela Nacional de Ciencias Biologicas. Mexico.
105. Journal of Cellular and Comparative Physiology. Philadelphia.
106. Redia. Florence, Italy.
107. Annales de la Société Entomologique de France. Paris.
108. Bulletin de la Société Entomologique de France. Paris.
109. Notulae Naturae. Philadelphia.
110. L'Entomologiste. Paris.
111. Revista Brasiliera de Biologia. Rio de Janeiro.
112. Eos, Revista Española de Entomologia. Madrid.
113. Minist. de Agri. de la Nación, Inst. Sanidad Vegetal, Buenos Aires.

Current Entomological Literature

COMPILED BY R. G. SCHMIEDER

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia and the University of Pennsylvania, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the year 1951 unless otherwise noted. Continued papers, with few exceptions, are recorded only at their first installment.

For other records of general literature and for economic literature, see the Bibliography of Agriculture, Washington, and the Review of Applied Entomology, Series A, London. For records of papers on medical entomology see Review of Applied Entomology, Series B.

NOTE: The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the List of periodicals and serials published in our January and June issues. The number of the volume, and in some cases, the part, heft, &c. is followed by a colon (:). References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to Neotropical species, and not so indicated in the title, have the symbol (S).

Papers published in ENTOMOLOGICAL NEWS are not listed.

GENERAL—Baum, W. A.—Ecological use of Meteorological temperatures. [80] 113: 333–34. **Dammerman, K. W.**—Original spelling and emendation in nomenclature. [Tijdschr. voor Ent.] 93: 198–205. **Frey, G.**—Vorwort zur Entstehung des Museums Frey. [Ent. Arb. Mus. G. Frey] 1: 1–8, 1950. **Gates, R. R.**—The taxonomic units in relation to cytogenetics and gene ecology. [3] 85: 31–50. **Glen, R.**—Trends in research in the Division of Entomology. [23] 83: 62–68. **Hassan, A. A. G.**—The classification and evolution of the spiracular system in insects. [Bull. Soc. Fouad Ier D'Ent.] 34: 299–305, 1950. **Hennig, W.**—Grundzüge einer Theorie der phylogenetischen Systematik. Pp. 1–370. Hrsg. vom Deutschen Ent. Inst., Berlin-Friederichshagen. Deutscher Zentralverlag, Berlin O 17. 1950. **Newell, I, M., R. van den Bosch and F. H. Haramoto**—An improved method of rearing field-collected fruit-fly larvae. [66] 14: 297–99, ill. **Park, T. and M. B. Frank**—The population history of Tribolium free of sporozoan infection. [36] 19: 95–105, 1950. **Pastrana, J. A. y H. Gahan**—Criá en masa de Macrocentrus ancylivorus Roh. en la República Argentina. [Minist. Agr. y Granad., ser. A] 6 (19): 1–22, ill., 1950. **Wolcott, G. N.**—The insects of Puerto Rico. [Jour. Agr., Univ. Puerto Rico] 32 (1): 1–224. *Ibid.* 32 (2): 225–416, 1948.

ANATOMY, PHYSIOLOGY, MEDICAL—Agrell, I.—Pupal diapause caused by vitamin deficiency (Lepid.). [53] 167: 283–84. **Allard, A.**—Dinoponera gigantea, a vicious stinging ant (Formicidae). [48] 41: 88–90. **Armstrong, G., F. R. Bradbury and H. Standen**—Penetration of the in-

sect cuticle by isomers of benzene hexachloride. [53] 167: 319–20. **Bergold, G. H.**—The polyhedral disease of the spruce budworm, Choristoneura fumiferana (Lep., Tortr.). [Canad. Jl. Zool.] 29: 17–23, ill. **Bischoff, A.**—Das drüsige Ventralorgan und die Drüsen an den reduzierten Hinterbeinen in der Gattung Acidalia Tr. mit Bemerkungen zur Gattungssystematik. [Arch. Naturgesch.] 12: 434–521, ill., 1944. **Butler, C. G.**—The honeybee, an introduction to her sense physiology and behavior. Oxford Univ. Press, N. Y., vii + 139 pp., 1949. $2.50. **Chabaud, A. G.**—L'infection par des Ixodinés provoque-t-elle une immunité chez l'hôte? [Annales de Parasit.] 25: 474–79, 1950. **Chadwick, L. E.**—Stroke amplitude as a function of air density in the flight of Drosophila. [12] 100: 15–27. **Davies, D. M.**—Some observations on the number of blackflies (Dipt., Simuliidae) landing on colored cloths. [Canad. Jl. Zool.] 29: 65–70. **Forster, K. A.**—Über das Bienengift. [Naturw. Rundschau] 4: 15–16. **Fudalewicz, W.**—The innervation and sense organs in the wings of Typhlocyba sp. (Homoptera). [Bull. Intern. d'Acad. Polanaise Sci., Lett., Cl. Mat. et Nat.] No. 7–10 *B* II (1949): 219–34 (in English), 1950. **Gander, R.**—Experimentelle und oekologische Untersuchungen über das Schlüpfvermögen der Larven von Aedes aegypti L. [Revue Suisse Zool.] 58: 215–78. **Goldschmidt, R. B.**—New heteromorphoses in Drosophila melanogaster. [60] 27: 1–11. **Guénin, H.-A. et M. Scherler**—La formule chromosomiale du doryphore Leptinotarsa decemlineata. [Revue Suisse de Zool.] 58: 359–70. **Guennelon-Aubanel, G. et P. Grison**—Phénomènes de tolérance et de résistance à l'arsénic diplombique chez Rhynchitis coeruleus de Geer. [C. R. Acad. Sci.] 232: 755–56. **Harvey, G. T. and A. W. A. Brown**—The effect of insecticides on the rate of oxygen consumption in Blatella. [Canad. Jl. Zool.] 29: 42–53. **Hrbáček, J.**—Morphology and physiology of the spiracles of the family Hydrophilidae (Col.). Věstnik Ceskoslov. Zool. Spol.] 13: 136–76, ill., 1949 (in English). **Kästner, A.**—Reaktion der Hüpfspinnen (Salticidae) auf unbewegte farblose und farbige Gesichtsreize. [Zoologische Beiträge] n.f. 1: 12–50, 1950. **Kramar, J.**—Contribution à l'étude de l'appareil digestif de la larve de Coréthra (Chaoboris cristallinus deG.). [Věstnik Ceskoslov. Zool. Spol.] 13: 267–71, 1949. **Landa, V.**—Contribution to the question of gynandromorphism in Ephemeroptera. [Věstnik Ceskoslov. Zool. Spol.] 13: 272–79, 1949 (English summary). **Lees, A. D.**—Termites and their castes. [Science Progress] 39: 327–30.

The compound eye as an analyser of polarized light. *Ibid.*, 330–32. DDT-resistant houseflies. *Ibid.*, 332–34. **Leńkowa, A.**—The structure of the female reproductive organs in some gonohorristic and parthenogenetic species of the genus Polydrosus Germ (Col., Curcul.). [Bull. Intern. d'Acad. Polanaise Sci. Lett., Cl. Mat. et Nat.] No. 7–10 *B* II (1949): 4477–84 (in English), 1950. **Orser, W. B. and A. W. A. Brown**—The effect of insecticides on the heartbeat of Periplaneta. [Canad. Jl. Zool.] 29: 54–64. **Scoggin, J. K.**—Effects of selected diets and metamorphosis on lipid composition of Dermestes maculatus DeG. (Abstract.) [34] 25: 353–54. **Slípka, J.**—The structure of the compound eyes of imago of the genus Tipula. [Časopis Českoslov. Spol. Ent.] 47: 96–109 (English summary), ill., 1950. **Teyrovsky, V.**—Catalepsy in the whirligig bettle Gyrinus natator L. [Věstnik Českoslov. Zool Spol.] 13: 334–47, 1949 (English summary). **Waterhouse, D. F.**—Connective tissue strands in blowfly larvae. [Austral. Jl. Sci.] 13: 25–26, 1950. **Wellington, W. G.**—Variations in the silk-spinning and locomotor activities of larvae of the spruce budworm Christoneura fumiferana at different rates of evaporation. [Trans. Roy. Soc. Canada, Sect. V] 44: 89–101, 1950. **Williams, C. B.**—Changes in insect population in the field in relation to weather conditions. [Proc. Roy. Soc., ser. B] 138: 130–56.

ARACHNIDA AND MYRIOPODA—Auerbach, S. I.—A key to the centipedes of the Chicago area. [Bull. Chicago Acad. Sci.] 9: 109–14. **Chabaud, A. G.**—(See under Anatomy.) **Crompton, J.**—The Spider. Collins, London, 1950. **Edmunds, L. R.**—A check list of ticks from Utah. [60] 27: 23–26. **Hoffman, R. L.**—The name of the common eastern spirobolid milliped. [31] 34: 15–16. **Kästner, A.**—(See under Anatomy.) **Strandtmann, R. W.**—The mesostigmatic nasal mites of birds. II. New and poorly known species of Rhinonyssidae. [46] 37: 129–40.

SMALLER ORDERS—Bailey, S. F.—A homonym in the genus Thrips (Thysanoptera). [60] 27: 19. **Clay, T.**—Systematic notes on the Piaget collection. Pt. 2. (Mallophaga). [6] ser. 12, 4: 173–82. **Eads, R. B.**—A new species of Jellisonia Traub from Mexico (Certaoph., Siph.). [46] 37: 147–50, ill. **Eichler, W.**—Notulae Mallophagologicae. XVII. Die Mrysideen. [Zool. Anz.] 146: 45–55. **Elbel, R. E.**—Comparative studies on the larvae of certain species of fleas (Siphonaptera). [46] 37: 119–28, ill. **Landa, V.**—Ephemeroptera. (See under Anatomy.) **Lees, A. D.**

—(see under Anatomy.) **Munroe, E. G.**—Pest Trichoptera at Fort Erie, Ontario. [23] 83: 69–72. **Priesner, H.**—Studies on the genus Scolothrips (Thysanoptera). [Bull. Soc. Fouad I^er^ D'Ent.] 34: 39–68 (k*), 1950. Further studies in Hoplothrips and allied genera. *Ibid.*, 69–120 (k), 1950. **Ross, E. S.**—A new species of Embioptera from Oceania. [66] 14: 307–10, ill. **Ross, H. H.**—The Trichoptera of Lower California. [64] 27: 65–76. **Šlais, J.**—Anatomie du Boreus hiemalis L. (Panorpata). II. Organe digestif. [Věstnik Ceskoslov. Zool. Spol.] 13: 303–24, 1949, ill. (French summary). **Strübing, H.**—Beiträge zur Biologie von Boreus hiemalis L. (Mecoptera). [Zool. Beiträge] n.f 1: 51–110, 1950. **Tuzet, O. et J.-F. Manier**—La spermiogenese du Lithobius calcaratus (Chilop.). [C. R. Acad Sci.] 232: 882–84, ill. **Westfall, M. J.**—Notes on Tetragoneuria sepia Gloyd, with description of the female and nymph (Odonata). [31] 34: 9–14.

ORTHOPTERA—Liebermann, J.—Sintesis de Sinipta, Stal, 1873, con la descripcion de una nueva especie Argentina, S. hectorisperonii (Acrid.). [Minist. Agr. y Granad, ser. A.] 6 (52): 1–13, ill. 1950. **Princis, K.**—On a collection of Blattaria in the Zoological Museum of the University of Oslo. [Norsk. Ent. Tidsskr.] 8: 129–34, 1950.

HEMIPTERA—Balduf, W. V.—Problems on the binomics of the squash bug, Anasa tristis. [85] 43: 244–48. **Carvalho, J. C. M.**—Neotropical Miridae. XL. A new genus and species of Bryocorinae in the collection of the British Museum N. H. [6] ser. 12, 4: 168–73. Neotropical Miridae. XLI: Tenthecoris orchidearum (Reuter 1902) in Britain, and a key to the species of the genus. *Ibid.*, 294–304. **DeCarlo, J. A.**—Descripción de especies nuevas de Ranatridae y Belostomidae y algunas aclaraciones referentes a otras conocidas. [111] 10: 521–32, 1950. **Fudalewicz, W.**—(See under Anatomy.) **Gupta, P. D.**—On the structure, development and homology of the female reproductive organs of Dysdercus cingulatus (Fabr.) (Pyrrhoc.). [Indian Jour. Ent.] 11: 131–42, ill. **Herring, J. L.**—The aquatic and semiaquatic Hemiptera of northern Florida. Part 3. Nepidae, Belastomatidae, Notonectidae, Pleidae, and Corixidae. [31] 34: 17–29. **Laing, F.**—The standing of the genus Pemphigus Htg. (Aphid.). [28] 87: 108–09. **Lent, H.**—Nova espécie de Triatoma Laporte, 1833 (Reduv.). [111] 10: 437–440, ill., 1950. **Slater, J. A.**—An investigation of the female genitalia as taxonomic characters in Miridae. (Abstract.) [34] 25: 355. **Usinger, R. L.**—

Heteroptera of the Marshall Islands. [66] 14: 315–21. **Wygodzinsky, P.**—Contribution towards the knowledge of the family Cryptostemmatidae. [111] 10: 377–92, ill., 1950. **Zimmerman, E. C.**—Notes on the Buchanan White types of Hawaiian Heteroptera. [66] 14: 333–36 (k to Saldula).

LEPIDOPTERA—Adamczewski, S.—On the systematics and origin of the generic group Oxyptilus Zeller (Alucitidae). [Bull. Brit. Mus. (N. H.)] Entomology 1 (5): 304–87, 20 pls. **Bergold, G. H.**—(See under Anatomy.) **Bischoff, A.**—(See under Anatomy.) **Clarke, J. F. G.**—New species of Gelechiidae from Argentina. [48] 41: 140–42, ill. **El-Sawaf, Saleh Kamel**—The life history of the greater wax-moth Galleria mellonella L. in Egypt with special reference to the morphology of the mature larva. [Bull. Soc. Fouad I^er^ D'Ent.] 34: 247–97, 1950. **Evans, W. H.**—The care of larvae in diapause. [Lep. News] 4: 70, 1951. **Janse, A. J. T.**—The moths of South Africa. Gelechiadae. Vol. 5, pt. 2, pp. 61–172, price: 10/—. Vol. 5 pt. 2, plates 33–38, price: 19/6. Pretoria, 1950. **Mukerji, S.**—Studies on the chaetotaxy of larvae of Plusia species (Lep., Phalaen.). [69] 20: 15–24, ill. **Nabokov, V.**—Remarks on F. Martin Brown's "Measurements and Lepidoptera." [Lep News] 4: 75–76, 1950. **Travassos, L.**—Contribuição ao conhecimento dos Arctiidae. XXII. Ainda sôbre as espécies do gênero Bertholdia Schaus, 1896. [111] 10: 447–64, ill., 1950. **Sala, F. P.**—Field notes on diurnal moths of the genus Annaphila. [Lep. News] 4: 71, 1950. **Sarlet, L.**—Oeufs de Lycaenidae. [Lambillionea] 50: 19–20, ill., 1950. Iconographie des oeufs de Lepidopteres. *Ibid.*, 29–33. Oeufs de Satyridae et de Nymphalidae. *Ibid.*, 60. **Swezy, O. H.**—Tinea despecta, Meyrick, a hitherto unrecorded case-moth in Hawaii (Tineid.). [66] 14: 313–14. **Vazquez G., L.**—Observaciones sobre Pieridos mexicanos. [8] 21: 417–29, ill., 1950. **Wellington, W. G.**—(See under Anatomy.) **Woodroffe, G. E.**—A life history study of the brown house moth, Hofmannophila pseudospretella (Oecoph.). [19] 51: 529–53, ill. **Zimmerman, E. C.**—A new Protaulacistis from Hawaii (Pyraust.). [66] 14: 337–40.

DIPTERA—Breuer, M. E. e C. Pavan—Genitália masculina de Drosophila (Diptera): grupo Annulimana. [111] 10: 469–88, ill., 1950. **Bequaert, J. C.**—Notes on Hippoboscidae. 20. A revision of the Hippoboscidae of Chile. [Agr. Tec. Chile] 10: 5–9, 1950. **Clements, A. N**—The use of the prosternum in classifying Asilidae. [69] 20: 10–14,

ill. **Davies, D. M.**—(See under Anatomy.) **de Buen, A. M.**—Nota sobre Hippoboscidae de Mexico. [8] 21: 415–16, 1950. **Floch, H. et E. Abonnec**—Les phlébotomes américains (clef 'd'identification de 97 femelles connues. [Ann. de Parasit.] 26: 99–117, ill. **Fredeen, F. J. H., J. G. Rempel and A. P. Arnason**—Egg-laying habits, overwintering stages, and life-cycle of Simulium arcticum. [23] 83: 73–76. **Fullaway, D. T.**—Review of the Indo-Australasian parasites of the fruit-flies (Tephritidae). [66] 14: 243–50. **Gaud, P. et J. Laurent**—Les soies doublees chez les larves d'Anopheles. [Annales de Parasit.] 25: 480–84, ill., 1950. **Hardy, D. E.**—Studies in Pacific Bibionidae. Pt. II. Genus Philia, Meigen. [66] 14: 257–75 (k). **Hardy, G. H.**—Theories of the world distribution of Diptera. [28] 87: 99–102. **Kramar, J.**—(See under Anatomy.) **Lindner, E.**—Die Fliegen der palearktischen Region. Lfg. 134–164. (Limon., Tend. (Orthocl., Clun.), Dolich., Psil., Phor., Emp., Megam., Diop., Pioph., Larviv., Platyst., Seps.) Stuttgart 1940–50. **Newell, et al.**—(See under General.) **Oliveira, S. J. de**—Sôbre uma nova espécie neotrópica do gênero Clunio Haliday, 1855 Chiron.). [111] 10: 493–500, ill. **Rees, D. M. and L. T. Nielsen**—Four new mosquito records from Utah. [60] 27: 11–12. **Rizki, M. T. M.**—Morphological differences between two sibling species of Drosophila pseudoobscura and D. persimilis. [67] 37: 156–59. **Tilden, J. W.**—Observations on Rhopalomyia californica (Itonididae). [60] 27: 20–22. **Weathersbee, A. A., F. T. Arnold and M. M. Askey, Jr.**—Additional mosquito records from South Carolina. [47] 26: 79–84. **Woodhill, A. R.**—A note on experimental crossing of Aedes (Stegomyia) scutellaris scutellaris Walker and Ae. (St.) scut. katherinensis Woodhill. [Proc. Linn. Soc. N. S. Wales] 1949, 74: 224–26.

COLEOPTERA—Barber, H. S.—Hispella a synonym for Hispa Linn., and a new Dactylispa from China. [60] 27: 17–18 (Chrysom.). **Bechyné, J.**—7e Contribution à la connaisance du genre Chrysolina Motsch. (Chrysom.). [Ent. Arb. Mus. G. Frey] 1: 47–185 (k*), 1950. Eumolpides Américains nouveaux ou peu connus. *Ibid.* 205–36. Notes sur les Chrysomeloides de l'Amérique du Sud et du Centre. *Ibid.* 237–69 (k*). **Bonnet, D. D. and S. M. K. Hu**—The introduction of Toxorhynchites brevipalpis into the Territory of Hawaii (Curc.). [66] 14: 237–42. **Gander, R.**—(See under Anatomy.) **Glaçon, S. et G. Le Masne**—Une methode d'e'levage et de transport des Coleoptères caver-

nicoles. [C. R. Acad. Sci.] 232: 1027–29. **Guénin et Scherler**—(See under Anatomy.) **Hansen, V.**—Biller. XIV. Clavicornia. 2. Del og Bostrychoidea. [Danmarks Fauna] 56: 1–253. **Horion, A.**, unter mitarbeit zahlreicher Koleopterologen—Faunistic der deutschen Käfer. Bd. 1. Adephaga—Caraboidea. Verlag Vittorio Klostermann. Frankfort/Main, 1941. Bd. II. Palpicornia—Staphylinoidea (ausser Staphylinidae). pp. 1–388. *Ibid.* 1949. **Hrbáček, J.**—(See under Anatomy.) **Jeannel, R.**—Sur la systématique des genres de la tribu Pselaphini Raffray. [Rev. Franc. d'Ent.] 18: 5–11 (k). **Kaszab, Z.**—A new species of Gonocephalum (Tenebr.) from the Philippine Islands. [6] ser. 12, 4: 182–85. **Khan, M. Q.**—A contribution to a further knowledge of the structure and biology of the weevils Sitophilus oryzae and S. granarius with special reference to the effects of temperature and humidity on the rate of their development. [Indian Jour. Ent.] 11: 143–201. **Knull, J. N.**—Two new species and one subspecies of North American Buprestidae. [58] 51: 87–89, ill. **Kulser, H.**—3. Beitrag zur Kenntniss der Tenebrioniden. [Ent. Arb. Mus. G. Frey] 1: 9–46 (k), 1950. **Kuschel, G.**—Nuevas sinonimias revalidacciones y combinaciones (9° aporte a Col. Curcul.) [Agr. Tec. Chile] 10: 10–21, 1950. **Lane, F.**—Cerambycoidea neotropica nova, II. [Dusenia] 2: 1–20, ill. **Lenkowa, A.**—(See under Anatomy.) **Long, E. J.**—Ecological notes on Thanatophilus americana L. (Silph.). [85] 43: 249–52. **Monrós, F.**—Descripciones y comentarios sobre Chlamisinae neotropicales (Chrysom.). [111] 10: 409–24. ill., 1950. **Papp, C. S.**—Some new Phytophaga from South America and India. [Tijdschr. voor Ent.] 93: 131–33 (Eumolp., Cryptoceph.), 1950. **Park and Frank**—(See under General.) **Reddy, D. B.**—Determination of sex in adult rice and granary weevils. [60] 27: 13–16. **Schein, H.**—Neue Cetoniden. [Ent. Arb. Mus. G. Frey] 1: 273–76 (S), 1950. **Teyrovsky, V.**—(See under Anatomy.) **Tilden, J. W.**—Notes on Chrysobothris bacchari van Dyke (Bupr.). [Col. Bull.] 5: 1–3. **Van Dyke, E. C.**—New species of Coleoptera from North America. [60] 27: 27–35 (Carab. Elat., Bupr., Curcul.). **Wolfenbarger, D. O.**—On the distribution of Heilipus squamosus (Lec.), a pest of the Avocado (Curc.). [31] 33: 139–41, 1950. **van Zwaluwenburg, R. H.**—Some Elaterid beetles from New Guinea. [66] 14: 323–25.

HYMENOPTERA—Allard, A.—(See under Anatomy.) **Brian, M. V.**—The stable winter population structure in

species of Myrmica. [36] 19: 119–23, 1950. **Butler, C. G.**—(See under Anatomy.) **Forster, K. A.**—(See under Anatomy.) **Fullaway, D. T.**—(See under Diptera.) **Lees, A. D.**—Eyes of honeybee. (See under Anatomy.) **Moure, J. S.**—Notas sôbre Meliponinae. [Dusenia] 2: 25–70 (k). **Pastrana and Gahan**—(See under General.) **Röszler, P.**—Myrmecologisches aus dem Jahre 1938. [Zool. Anz.] 146: 88–96 (with life hist. data). **Steffan, J. R.**—Note sur la classification des Brachymeriinae (Chalc.). [108] 55: 146–50 (S*). **Weld, L. H.**—A new species of Trybliographa (Cynipidae). [66] 14: 331–32.

Reviews

Classification of the Blattaria as indicated by their wings (Orthoptera). By John W. H. Rehn. Memoirs of the American Entomological Society, No. 14. 134 pp., 13 pls., 141 figs. January 1951. $5.00.

For several years friends of John W. H. Rehn have known of his study of cockroach wings as a doctorate problem at Cornell University. The results have now been published in a manner that reflects high credit upon the author, upon those who advised him in the shaping of the problem, and upon the American Entomological Society for making those results available in the most recent number of an outstanding memoirs series.

There has been a growing need for a reclassification of the roaches, felt alike by orthopterists and general entomologists who have been plagued by the overlapping characters of certain traditional subfamilies and the tendency of both textbook writers and taxonomists to adopt systems with quite different ranks accorded the various groups of genera. Primarily by making a critical study of 68 carefully chosen key genera, and by surveying many others, Dr. Rehn has attempted to develop a natural classification down to the tribal level. Fundamentally, the classification which he offers appears to be very sound, and modifications which specialists will undoubtedly suggest will in no way detract from the basic value of the work or the regularity with which it will be consulted for many decades.

Wings, in their shape, venation, methods of folding, and texture, are the primary characters used in the classifications. Beyond the introductory explanation that the mature ideas of associates and fundamental impressions on natural groups were

utilized, it is not clear from the text that other characters were used. This will lead many readers to believe that the classification is based *entirely* on wings. It is my understanding, however, that such is not the case, this fact at once suggesting that the results are less subject to revision, as further studies are made, than might reasonably be expected in the case of a system based wholly on one set of characters. As presented, however, the classification is built around the apparent natural evolution of cockroach wings, and the subject is followed through clearly and consistently, with no digressions concerning other characters.

Students who may study this work as an example of a classification built primarily on one set of characters, based largely on selected genera, should also understand the factors which were combined to make the investigation successful. The living Blattaria include an estimated 450 described genera and over 3,500 species, with many more to be recognized as descriptive and revisionary work continues. From a group of this size a novice could hardly be expected to select, even if a collection of adequate size were available, the key or "indicator" genera which would enable a satisfactory natural classification to be erected. For more than 15 years John Rehn has been doing, individually and in conjunction with his father, revisionary work with Orthoptera from all parts of the world. The Orthoptera collection of the Academy of Natural Sciences of Philadelphia, which supplied the material for the investigation, in 1900 consisted of a few hundred specimens, but is now one of the largest and most representative in existence, undoubtedly the best so far as roaches are concerned. It represents, in essence, much of the life-work of two men, James A. G. Rehn and the late Morgan Hebard. Until very recently, when promising students of roaches have appeared in Europe, these two men initiated most of the clarifying, progressive influence added to roach systematics since the passing of Robert Shelford of England, who in the first decade of our century made a beginning at placing the group on a sounder footing than had been possible for the pioneers, foremost of whom were Brunner and Saussure. The value of the present classification thus is due in no small measure to the rich variety of genera available for study and to the care and thought with which the plan was conceived. To this we may add that a special student of wing venation, W. T. M. Forbes, advised the author during the work at Cornell. The wing terminology followed is that of the Comstock-Needham system, as modified by Dr. Forbes, and with some additional terms habitually used by orthopterists.

Those interested in phylogeny and evolution will find much of interest in this work, with its 136 figures of wings, arranged in their apparent natural order, and its diagrams and discussions of probable evolutionary development. The author did not attempt to include fossil roaches with the living ones, but it is evident that the venation of many fossil forms has much in common with that of the primitive family Polyphagidae, and the ground is now prepared for the integration of fossil and Recent systems. It may be noted that the small basal anal fan of the primitive Australian termite *Mastotermes* is likewise much like that of certain Polyphagidae, supporting the current view that termites and roaches have a common ancestry, or that termites are a specialized offshoot from primitive roaches. In many previous systems, *Polyphaga* and its allies were not recognized as the basic primitive group of existing roaches.

In 1948, when the main portion of the present investigation had been completed, but of course not published, C. F. A. Bruijning of Leiden incorporated in a large paper on Malayan roaches his views on evolutionary trends in wing development. The primitive character of the Polyphagidae, the significance of different ways of folding, and the specialized nature of the appendiculate field of certain higher forms were fully recognized by him. In effect, therefore, these two workers on opposite sides of the Atlantic Ocean independently reached a comparable conclusion regarding many natural relationships. Personally, I feel that fuller comments on Bruijning's observations would have been helpful in the introduction of Rehn's classification.

The Blattaria are treated as "a series, or as a superfamily, in the suborder Dictyoptera," and 5 families are recognized, with 17 subfamilies and 43 tribes. The classification is natural, new, and progressive, with ample opportunity for spread and balance in arranging categories based on characters of differing fundamental importance. Yet, the identity of the order Orthoptera is preserved, and a student is not confused by a maze of families such as sometimes appear in new classifications. In 1932 Brues and Melander placed the Orthoptera in 5 orders, and recognized 24 families of roaches. When we realize that the serious systematic study of Orthoptera is relatively recent, and that much fundamental knowledge has been assembled in this century by Ander, Carpentier, Chopard, Crampton, Ford, Judd, Karny, Roberts, Slifer, Snodgrass, Walker, Zeuner and others who have made comparative studies, it logically follows that we should adopt a new, more realistic arrangement of the suborders and superfamilies. The new roach classification is commendable for

its progressive features, yet at the same time it is pleasantly conservative in a broad sense.

Taxonomists will find useful the identification keys to families and subfamilies, which are based wholly on wings. Only two subfamilies have numerous tribes, the Epilamprinae with 12, and the Pseudomopinae with 11. The genera and species illustrated are indexed, but a few other genera which are discussed, such as *Phlebonotus* and *Notolampra* (p. 79), are omitted. For almost every specimen illustrated, the name of the entomologist making the identification and the date when it was made, also the place where the specimen was collected, are carefully documented. The author states that names used for tribal and other categories have been chosen because they are unambiguous and representative. Some workers will feel that the tribal name Corydini, which Rehn has used, should be abandoned because Princis [1] has just pointed out that *Corydia* Serville 1831 is a synonym of *Therca* Billberg 1820, each having the same type species. In the absence of definite rules regarding the names of supergeneric categories, however, it appears permissible and even desirable to retain those based on synonymous genera if such usage otherwise makes for stability and uniformity. To change a well known family or tribal name whenever a type genus falls in synonymy could easily keep higher categories in a continual state of confusion.

In addition to the different basic approach and resulting rearrangement of the systematic structure, several matters of relationship shown by the new classification are especially noteworthy. Distinct families are based on *Diploptera* and *Oulopteryx*. The striking wing venation of the former is well known, but *Oulopteryx* is an obscure genus described by Hebard in 1921 with two species occurring in French Guiana and Brazil. The family has several quite basic features, including the spiral rolling of the appendiculate field when the wing is closed. *Hormetica* and *Brachycola* are placed in a new subfamily, the Brachycolinae. Rehn finds that the former subfamily Panchlorinae cannot be maintained separate from the Epilamprinae, and the Panchlorini now appear as a tribe of the latter subfamily. Taxonomists have long debated the distinctness of the Ectobiinae and Chorisoneurinae; the latter are now reduced to tribal status

[1] K. Princis, 1950, Opuscula Ent. 15: p. 162. Unpublished notes of A. N. Caudell show that he realized this synonymy a good many years ago. Though long considered of questionable nomenclatorial validity, the Billberg genera, where based on described species, are now generally accepted.

within the Ectobiinae. *Calolampra,* usually considered a close relative of *Epilampra,* is made the basis of the tribe Calolamprini and arranged in a different line of development from the Epilamprini (see diagram of probable relationship of components of the Epilamprinae, p. 63). It is not clear to me why *Calolampra* is thus placed nearer *Oniscosoma* and *Blaptica,* of the Oniscosomini, than to *Epilampra.*

One naturally wonders what modifications of the new classification will be found necessary as further studies are made. The 68 genera which were critically studied and illustrated have been grouped in 43 tribes, an average of less than 2 genera per tribe, not counting additional genera that were surveyed. Clearly, the choices made have been excellent, but with such a ratio the possibilities for corrections becoming necessary are considerable. At least 16 tribes are now each considered to include a single genus. The subfamily Euthyrrhaphinae is treated as including only one genus, *Euthyrrhapha.* I have found, however, that *Zetha* Shelford 1913 also belongs in the subfamily. *Zetha* is a little known genus originally described from Ecuador from a short-winged female; fully winged males have since been discovered and several species are recognized, one of which has been taken in Central America and the Azores. Tegmina of *Zetha* show the venation more clearly than do those of *Euthyrrhapha,* and the wings have a smaller number of veins, so that some modification of the subfamily diagnosis will be necessary.[2]

Concerning the Oulopterygidae, the author states that *Melyroidea* probably is a member of the family; evidently no specimens were seen. The National Museum has a specimen of *Melyroidea magnifica* Shelford, collected at Chanchamayo, Peru, in 1948, and the suggested family placement is confirmed. Shelford proposed *Melyroidea* in 1912 for two then new species, *mimetica* with short cerci and believed to be from near Rio de Janeiro, and *magnifica* with very long cerci from Ecuador. I suspect that the two species are non-congeneric, and possibly *mimetica* really belongs to *Oulopteryx,* so in order to prevent further confusion *Melyroidea magnifica* Shelford is here designated type of *Melyroidea.* The tegminal area between radius and media of *M. magnifica* is entirely veined, and the diamond-shaped area lacking veins described for *Oulopteryx* is not consistent for the family. The cerci are basically much more elongate and of different shape than those of *Oulopteryx,* so that distinct genera are clearly represented and perhaps separation

[2] For some time I have had a study of the genus *Zetha* in progress.

on an even higher level within the family will eventually be desirable.

Specimens of two apparently distinctive groups, the Nocticolinae and Archiblattinae, were not available to John Rehn for study, and published information was insufficient to place them definitely. In my opinion, certain of the various wingless genera may also require special provisions in the classification when fuller studies are made. For instance, the wingless *Cryptocercus,* which is an unusual component of the Nearctic fauna and also includes Asiatic species, has been grouped traditionally with *Panesthia,* but Cleveland [3] has reported *Cryptocercus* to be quite different both externally and internally.

It is perhaps natural that an entomologist interested in identification problems should continually look for too much of what we ordinarily expect of monograph in this analytical outline of higher categories. However, as a result of difficulty in placing certain genera, which Rehn did not discuss, in the appropriate tribes, I cannot help but feel that a logical and extremely valuable appendix would have been a check list assigning the known genera in their proper place in the system, insofar as possible at this time.

It would be interesting, and probably decidedly helpful, to correlate the biology of roaches with the classification. I have considered, in a very preliminary fashion, the genera known to be viviparous, as opposed to those depositing well formed oöthecae. So far as I have learned, all roaches of the Pseudomopinae and those grouped in advance of that subfamily in Rehn's linear arrangement deposit oöthecae of the usual sort. The typical Panesthiidae, the Diplopteridae, and apparently the majority of the remaining Blattidae, except Blattinae and Nyctiborinae, are viviparous. *Cryptocercus,* unlike *Panesthia,* has a peculiar oötheca, and the Polyphagidae, so far as their breeding habits are known to me, have highly distinctive oöthecae. This brief outline of breeding habits is given to further suggest the natural and logical character of most of the new system, and to indicate the possible value of studies along this line.

The new classification of the Blattaria marks a highly significant step forward and as such adds dignity to our taxonomic science. We may hope that its author will be among the foremost to continually test the links of this chain he has forged, and to add new or stronger links where gaps are found.—Ashley B. Gurney, Bureau of Entomology and Plant Quarantine, Washington, D. C.

[3] L. R. Cleveland, 1934, Mem. Amer. Acad. Arts Sci. 17: p. 188.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Miridae (Capsidae)—American species wanted, with locality labels, in exchange for British species. D. Leston, F.R.E.S., 6 Frognal Rise, London N. W. 3, England.

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ENTOMOLOGICAL NEWS

JULY 1951

Vol. LXII **No. 7**

CALVERT ANNIVERSARY VOLUME

on the occasion of

Dr. Philip P. Calvert's Eightieth Birthday

CONTENTS

PUBLISHED MONTHLY, EXCEPT AUGUST AND SEPTEMBER, BY
THE AMERICAN ENTOMOLOGICAL SOCIETY
PRINCE AND LEMON STS., LANCASTER, PA.
AND
1900 RACE STREET, PHILADELPHIA 3, PA.

Subscription, per yearly volume of ten numbers: $4.00 domestic; $4.30 foreign; $4.15 Canada. Entered as second-class matter April 19, 1943, at the post office at Lancaster, Pa., under the Act of March 3, 1879. Acceptance for mailing at the special rate of postage provided for in paragraphs (d-2), Section 34.40, P. L. & R. of 1948, authorized April 19, 1943.

ENTOMOLOGICAL NEWS

ENTOMOLOGICAL NEWS is published monthly, excepting August and September, by The American Entomological Society at Prince and Lemon Sts., Lancaster, Pa., and the Academy of Natural Sciences, 1900 Race Street, Philadelphia 3, Pa., U. S. A.

PHILIP P. CALVERT, Editor Emeritus. R. G. SCHMIEDER, Editor. Editorial Staff: E. J. F. MARX, M. E. PHILLIPS, J. A. G. REHN, and A. G. RICHARDS.

Subscription price, per yearly volume of 10 numbers: Domestic, $4.00; Foreign, $4.30; Canada, $4.15—U. S. Currency.

SUBSCRIPTIONS, ADVERTISEMENTS: All communications and remittances to be addressed to **ENTOMOLOGICAL NEWS, 1900 Race Street, Philadelphia 3, Pa.**

MANUSCRIPTS and all communications concerning same should be addressed to **R. G. Schmieder, Zoological Laboratory, University of Pennsylvania, Philadelphia 4, Pa.**

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ENTOMOLOGICAL NEWS

VOL. LXII JULY, 1951 No. 7

New Records of Maine Dragonflies (Odonata)

By DONALD J. BORROR, Department of Zoology and Entomology, Ohio State University, Columbus 10, Ohio

Since the appearance of the latest list of the Odonata of Maine (Borror, 1944), four additional summers of collecting by the writer in south-central Maine have yielded a number of new records of Odonata. Many of these represent new locality or new county records, and the records of four species represent new state records. These four species bring the total number of species of Odonata for Maine to 119.

There has been considerable dragonfly collecting in some sections of Maine, but other sections remain relatively unexplored, at least as far as the dragonfly fauna is concerned. The table below, which includes the records in this paper, represents fairly well the thoroughness of dragonfly collecting in different parts of Maine.

TABLE I. Species of Odonata Recorded from Maine Counties

Androscoggin	9	Oxford	21
Aroostook	4	Penobscot	85
Cumberland	15	Piscataquis	20
Franklin	6	Sagadahoc	17
Hancock	80	Somerset	5
Kennebec	80	Waldo	30
Knox	47	Washington	15
Lincoln	90	York	22

In the following list the species are numbered as in the writer's 1944 list. The four species new to Maine are *Coenagrion interrogatum* (No. 116), *Erythrodiplax berenice* (No. 117), *Libel-*

lula (*Holotania*) *cyanea* (No. 118), and *Erythemis simplicicollis* (No. 119). The locality records, which are records not previously published, are listed by counties (COUNTY names are in CAPITALS). Locality names are taken from the topographic maps of the U. S. Geological Survey. Detailed data are given only for the new county records; in the case of records from new localities in counties from which a species has previously been reported, only the localities are listed. The records from counties marked with an asterisk (*) are new county records. All material listed, together with that indicated by locality names only, is in the writer's collection. The dates following the new records of each species are the extreme dates for collections of adults, based on eight seasons of records (June 9 through August 29) by the writer in south-central Maine.

1. **Agrion aequabile** (Say). KNOX: Warren. LINCOLN: Winslow Mills. 6/20–7/27.

2. **Agrion maculatum** Beauvais. KNOX: Razorville, Stickney Corner. LINCOLN: Muddy Pond, Muscongus, Seitensparker Pond, Winslow Mills. 6/17–8/24.

4. **Lestes congener** Hagen. *AROOSTOOK: Monticello, 2 ♀, 7/29/50; Houlton, 2 ♀, 7/30/50. KENNEBEC: Vassalboro. LINCOLN: Biscay Pond, Medomak, Pemaquid Pond. 7/13–8/28.

5. **Lestes disjunctus** Selys. KENNEBEC: East Pittston, Hamilton Pond, Vassalboro. KNOX: Warren. LINCOLN: Adams Pond, Cooper Mills, Jefferson, Knowlton Corner, Medomak, Muscongus, Nobleboro, Round Pond, Sherman Lake, South Waldoboro. SAGADAHOC: Richmond Corner, Woolwich. WALDO: Liberty, North Searsmont. 6/30–8/29.

6. **Lestes dryas** Kirby. LINCOLN: Biscay Pond, McCurdy Pond. 6/16–8/10.

7. **Lestes eurinus** Say. LINCOLN: New Harbor. 6/29–7/19.

8. **Lestes forcipatus** Rambur. KENNEBEC: Hamilton Pond, Vassalboro. LINCOLN: McCurdy Pond, Muscongus, New Harbor, Somerville. 6/30–8/26.

9. **Lestes inaequalis** Walsh. *KNOX: North Pond, 1 ♂, 7/3/48, 1 ♂, 6/20/50; Warren, 1 ♀, 7/3/48. LINCOLN: Biscay Pond, Nobleboro. *WALDO: North Searsmont, 1 ♂ and 1 ♀, 7/27/46. 6/16–7/27.

10. **Lestes rectangularis** Say. KENNEBEC: Litchfield Plains, Vassalboro. KNOX: Razorville. LINCOLN: Biscay Pond, Cooper Mills, Medomak, Muddy Pond, Muscongus, Nobleboro, Round Pond, Sherman Lake, Somerville, South Waldoboro, Sprague Corner. *SAGADAHOC: Richmond Corner, 1 ♂, 7/16/50. WALDO: Frankfort, North Searsmont. 6/11–8/26.

11. **Lestes unguiculatus** Hagen. KENNEBEC: East Pittston, Vassalboro. LINCOLN: Biscay Pond, Medomak. *SAGADAHOC: Popham Beach, 2 ♂ and 1 ♀, 7/27/48, 1 ♂, 7/28/50. 6/21–8/29.

12. **Lestes vigilax** Hagen. KNOX: Warren. LINCOLN: Adams Pond, Cooper Mills, McCurdy Pond, Medomak Pond, Nobleboro. WALDO: North Searsmont. 6/14–8/29.

13. **Argia moesta** (Hagen). LINCOLN: Biscay Pond, Winslow Mills. 6/14–7/31.

14. **Argia violacea** (Hagen). HANCOCK: Tunk Mountain. KENNEBEC: Togus Pond. KNOX: Razorville, Warren. LINCOLN: Adams Pond, Cooper Mills, Knickerbocker Lakes, Muddy Pond, Muscongus, Seitensparker Pond, South Waldoboro, Winslow Mills. SAGADAHOC: Woolwich. WALDO: Frankfort, North Searsmont. 6/12–8/29.

16. **Nehalennia irene** (Hagen). *AROOSTOOK: Monticello, 1 ♂ and 1 ♀, 7/29/50; Houlton, 1 ♀, 7/30/50. KENNEBEC: East Pittston, Litchfield Plains, Vassalboro. KNOX: Harbor Island, Otter Island. LINCOLN: Adams Pond, Jefferson, Medomak, Medomak Pond, Nobleboro, Round Pond, Sherman Lake, South Waldoboro, Winslow Mills, Wreck Island. *SAGADAHOC: Richmond Corner, 2 ♀, 7/6/50; Woolwich, 1 ♀, 8/12/46. WALDO: Frankfort, North Searsmont. 6/11–8/24.

17. **Chromagrion conditum** (Hagen). *KNOX: Razorville, 1 ♂, 7/17/46. LINCOLN: Biscay Pond, Jefferson, McCurdy Pond. 6/14–7/17.

18. **Enallamga aspersum** (Hagen). *KNOX: Forest Pond, 1 ♂, 8/15/48. LINCOLN: New Harbor. 7/8–8/24.

19. **Enallagma boreale** Selys. *KNOX: Razorville, 1 ♂, 6/23/48. LINCOLN: Biscay Pond. 6/9–7/22.

20. **Enallagma civile** (Hagen). KNOX: Eastern Egg Rock, Warren. LINCOLN: Adams Pond, Duckpuddle Pond, Little Medomak Pond, Nobleboro, Sherman Lake. 6/20–8/27.

22. **Enallagma divagans** Selys. KNOX: Warren. 6/20–7/3.

23. **Enallagma ebrium** Hagen. *AROOSTOOK: Monticello, 7 ♂, 7/29/50. KENNEBEC: East Pittston, Litchfield Plains, Vassalboro. *KNOX: Razorville, 1 ♂ 7/17/46. *LINCOLN:

Adams Pond, 1 ♂, 7/7/46; Biscay Pond, 2 ♂, 6/26/48; Dresden Mills, 1 ♀, 7/7/48; Jefferson, 1 ♂, 7/14/46; Muscongus Island, seen (collected by a student) 6/23/49; New Harbor, 1 ♂, 7/18/48; Somerville, 1 ♂, 7/17/46. *Sagadahoc: Richmond Corner, 4 ♂, 7/16/50. 6/23–8/1.

24. **Enallagma exsulans** (Hagen). Knox: Warren. Lincoln: Biscay Pond, Winslow Mills. 6/20–8/8.

25. **Enallagma geminatum** Kellicott. Knox: Warren. Lincoln: Pemaquid Pond. *Waldo: Liberty, 2 ♂, 7/27/46, 4 ♂, 7/29/50. 6/30–8/20.

26. **Enallagma hageni** (Walsh). *Aroostook: Monticello, 2 ♂, 7/29/50. Kennebec: East Pittston, Litchfield Plains. Knox: Crystal Pond, Warren. Lincoln: Adams Pond, Back Meadow Brook, Cooper Mills, Dresden Mills, Hog Island, Jefferson, Knickerbocker Lakes, Medomak, Muscongus, Nobleboro, Sherman Lake, Sprague Corner, Winslow Mills. Waldo: Frankfort, Liberty, North Searsmont. 6/9–8/22.

28. **Enallagma minusculum** Morse. Lincoln: Biscay Pond. 6/12–8/19.

29. **Enallagma signatum** (Hagen). *Lincoln: Duckpuddle Pond, 1 ♀, 8/3/48, 1 ♂, 8/16/48; Medomak Pond, 2 ♂ and 1 ♀, 7/7/49; Pemaquid Pond, 1 ♀, 6/26/49. 6/26–8/16.

30. **Enallagma vesperum** Calvert. Lincoln: Adams Pond, Knickerbocker Lakes. 6/14–8/19.

116. **Coenagrion interrogatum** (Selys). *Lincoln: Jefferson, 1 ♂, 7/3/48. There are a number of records of this boreal bog species in eastern Canada, but this is the first record of it in northeastern United States.

31. **Coenagrion resolutum** (Hagen). *Kennebec: East Pittston, 1 ♀, 7/7/48. Lincoln: Jefferson, Medomak, Medomak Pond, Muscongus Island, Webber Pond. 6/18–7/14.

32. **Ischnura kellicotti** Williamson. *Lincoln: Biscay Pond, 1 ♂, 7/28/46; Webber Pond, 1 ♀, 7/7/50 (by A. C. Borror), 2 ♂ and 1 ♀, 7/10/50 (by A. C. Borror). There is only one other record of this species in Maine, a male and three females taken by Mattie Wadsworth near Manchester (Kennebec Co.), 7/2/00 (Wadsworth 1902). These records are the most northeastern records of the species. 7/7–7/28.

33. **Ischnura posita** (Hagen). Lincoln: Back Meadow Brook, Biscay Pond, McCurdy Pond, Webber Pond. 6/16–8/23.

34. **Ischnura verticalis** (Say). *Aroostook: Monticello, 1 ♀, 7/29/50. Kennebec: Litchfield Plains, Vassalboro.

KNOX: Crystal Pond, Razorville, Warren. LINCOLN: Adams Pond, Cooper Mills, Jefferson, Knickerbocker Lakes, Medomak, Muddy Pond, Nobleboro, Round Pond, Sherman Lake, South Waldoboro, Sprague Corner, Winslow Mills. SAGADAHOC: Richmond Corner, Woolwich. WALDO: Frankfort, North Searsmont. 6/9–8/29. This is the most abundant and widespread species of dragonfly the writer has taken in Maine; eight seasons of collecting have yielded 357 records of it, as compared with 275 records of the next most common species, *Enallagma hageni*.

35. **Anomalagrion hastatum** (Say). LINCOLN: Keene Neck, New Harbor. 8/9–8/27.

36. **Hagenius brevistylus** Selys. *KNOX: Warren, seen 8/8/49. LINCOLN: Biscay Pond, Nobleboro, Webber Pond. *WALDO: Liberty, 1 ♂, 7/27/46. 6/14–8/11.

43. **Gomphus (Gomphurus) abbreviatus** Hagen. *LINCOLN: Winslow Mills, 1 ♀, 7/3/48, 1 ♀, 6/20/50. 6/20–7/3.

45. **Gomphus (Gomphus) exilis** Selys. KNOX: Warren. LINCOLN: Biscay Pond, Damariscotta Pond, Dick's Pond,[1] Duckpuddle Pond, Hastings Pond, Sherman Lake, Seitensparker Pond. *WALDO: Liberty, seen 7/27/46. 6/9–8/26.

48. **Dromogomphus spinosus** Selys. *LINCOLN: Webber Pond, 1 ♂ (teneral) 6/26/50 (by Ruth W. Long). 6/26–7/29.

49. **Lanthus albistylus** (Hagen). *KNOX: Razorville, 1 ♂, 7/17/46.

51. **Gomphaeschna furcillata** (Say). LINCOLN: McCurdy Pond, Sprague Corner. 6/12–6/30.

52. **Basiaeschna janata** (Say). KNOX: North Pond, 1 ♂ and 1 ♀, 6/20/50. LINCOLN: Dresden Mills. 6/12–7/13.

53. **Boyeria vinosa** (Say). *KNOX: Forest Pond, seen 8/8/46. LINCOLN: Biscay Pond, Muddy Pond, Muscongus. 8/5–8/26.

54. **Anax junius** (Drury). KENNEBEC: Litchfield Plains. KNOX: Harbor Island, Matinicus Rock. LINCOLN: Cooper Mills, Little Medomak Pond, Nobleboro, Sherman Lake. 6/12–8/29.

55. **Epiaeschna heros** (Fabricius). *KNOX: Forest Pond, 1 ♂, 6/18/50. *LINCOLN: Hog Island, seen 6/25/46; Muscongus, 1 ♂, 6/24/46 (by Virginia Armstrong), seen 7/2/48; Muscongus Island, seen 6/26/46 and 6/18/48. 6/18–7/2.

[1] This pond is not named on the U. S. Geological Survey topographic map, and is locally called both Dick's Pond and Ross's Pond. It is in Bristol Twp., about a mile north of Hastings Pond.

56. **Aeschna canadensis** Walker. KENNEBEC: Hamilton Pond, Vassalboro. LINCOLN: Biscay Pond, Medomak, Round Pond. 7/8–8/29.

62. **Aeshna tuberculifera** Walker. LINCOLN: Adams Pond, Biscay Pond. 8/3–8/28.

63. **Aeshna umbrosa** Walker. LINCOLN: Keene Neck, Medomak. 7/26–8/28.

65. **Cordulegaster diastatops** (Selys). LINCOLN: Hog Island, Webber Pond. 6/17–6/25.

66. **Cordulegaster maculatus** Selys. LINCOLN: Muscongus. 6/22–7/8.

69. **Macromia illinoiensis** Walsh. *LINCOLN: Pemaquid Pond, 1 ♀, 7/23/49; Winslow Mills, 1 ♀, 7/14/46 (by A. C. Borror), 2 ♂, 7/3/48, seen 6/20/50. 6/20–7/23.

70. **Didymops transversa** (Say). LINCOLN: Hastings Pond, Keene Neck, Muscongus, Muscongus Island, Sherman Lake, Winslow Mills. 6/15–7/17.

73. **Epicordulia princeps** (Hagen). *LINCOLN: Hog Island, 1 ♀, 8/13/46 (by H. L. Cogswell). This specimen and the other two collected by the writer in Maine (North Pond, Knox Co., ♂, 7/17/40 and ♀, 6/20/50) lack a nodal spot; only one (the one from Hog Island) has any coloring at the base of the hind wing, and this coloring is chiefly in the antenodal and basilar spaces, and above the triangle; all three have a dark apical wing spot that extends about halfway to the stigma from the wing tip.

75. **Tetragoneuria cynosura simulans** Muttkowski. KNOX: Warren. LINCOLN: Dick's Pond (see footnote 1, p. 213), Hastings Pond, Nobleboro. 6/12–7/29.

77. **Tetragoneuria spinigera** Selys. LINCOLN: Pemaquid Pond. 6/15–6/29.

78. **Helocordulia uhleri** (Selys). LINCOLN: Biscay Pond. 6/16–7/22.

79. **Somatochlora elongata** (Scudder). *LINCOLN: Webber Pond, 1 ♀, 8/24/46 (by Paul D. Urbano).

82. **Somatochlora kennedyi** Walker. LINCOLN: Jefferson, Pemaquid Pond. 6/12–7/28.

84. **Somatochlora tenebrosa** (Say). *LINCOLN: Hog Island, 1 ♂, 8/7/49 (by Jeff Swinebroad).

86. **Somatochlora williamsoni** (Walker). *LINCOLN: Webber Pond, 1 ♀, 8/14/50.

88. **Dorocordulia lepida** (Hagen). LINCOLN: Biscay Pond, Damariscotta Pond, New Harbor, Nobleboro. 6/11–8/18.

89. **Dorocordulia libera** (Selys). LINCOLN: Adams Pond, Biscay Pond, Hog Island, Jefferson, Winslow Mills. 6/19–7/31.

91. **Nannothemis bella** (Uhler). LINCOLN: Jefferson, North Waldoboro. 6/14–8/22.

92. **Celithemis elisa** Hagen. LINCOLN: Duckpuddle Pond, Nobleboro. *WALDO: Liberty, 2 ♂, 7/27/46, seen 7/29/50. 6/17–8/29.

93. **Celithemis martha** Williamson. LINCOLN: Biscay Pond, Little Medomak Pond, New Harbor. 6/26–8/26.

117. **Erythrodiplax berenice** (Hagen). *LINCOLN: Hog Island, 1 ♂, 8/8/49 (by Robert Thatcher). *SAGADAHOC: Popham Beach, 7 ♂ and 8 ♀, 7/28/50. These are the first records of this species in Maine, and except for one Quebec record (East Bolton, Gibson 1913) are the northernmost records of the species. Judging from its abundance in the brackish marshes back of Popham Beach (7/28/50), it is probable that this species occurs in similar marshes all along the coast, at least in the western half of the state. Of the eight females collected, six had brownish spots in the wings and the other two had clear wings.

94. **Libellula (Eolibellula) semifasciata** Burmeister. LINCOLN: Hog Island, Webber Pond. 6/20–7/2.

118. **Libellula (Holotania) cyanea** Fabricius. *SAGADAHOC: Richmond Corner, 1 ♂, 7/16/50. This is the first record of this species in Maine, and represents the most northeastern record of the species.

95. **Libellula (Holotania) incesta** Hagen. KENNEBEC: Litchfield Plains. *KNOX: Forest Pond, seen 8/15/48; North Pond, seen 7/7/49; Razorville, 1 ♂, 7/17/46; Warren, 2 ♂, 8/8/49. LINCOLN: Cooper Mills, Duckpuddle Pond, Medomak Pond, New Harbor, Pemaquid Pond. *WALDO: Liberty, seen 7/27/46, 1 ♂, 7/29/50. 7/5–8/18.

96. **Libellula (Holotania) luctuosa** Burmeister. LINCOLN: Biscay Pond, Keene Neck, Muscongus Island, Sherman Lake. *WALDO: Liberty, seen 7/29/50. 7/1–8/11.

97. **Libellula (Ladona) exusta** Say. *KNOX: North Pond, seen 7/3/48. LINCOLN: Biscay Pond, Davis Island, Duckpuddle Pond, Little Medomak Pond, New Harbor, Nobleboro, Sherman Lake, Sprague Corner. 6/11–7/28.

98. **Libellula (Ladona) julia** Uhler. LINCOLN: Hastings Pond, New Harbor, Pemaquid Pond. 6/14–7/22.

99. **Libellula (Libellula) quadrimaculata** Linnaeus. KENNEBEC: East Pittston. KNOX: Razorville. LINCOLN: Adams

Pond, Biscay Pond, Jefferson, McCurdy Pond, Medomak, New Harbor, Nobleboro, Somerville, Winslow Mills. 6/12–8/5.

100. **Libellula (Neotetrum) pulchella** Drury. KENNEBEC: Litchfield Plains, Vassalboro. KNOX: Matinicus Rock. LINCOLN: Adams Pond, Keene Neck, Medomak, Muscongus, New Harbor, Nobleboro, South Waldoboro, Winslow Mills. *WALDO: Frankfort, seen 7/24/48. 6/21–8/27.

101. **Libellula (Plathemis) lydia** Drury. LINCOLN: Adams Pond, Biscay Pond, Muscongus Island, New Harbor, Nobleboro, Round Pond, South Waldoboro. 6/19–8/24.

102. **Sympetrum costiferum** (Hagen). KNOX: Forest Pond. LINCOLN: Cooper Mills, Hastings Pond, Muscongus. *WALDO: Liberty, 2 ♂ and 1 ♀, 7/27/46. 7/20–8/29.

104. **Sympetrum internum** Montgomery. KENNEBEC: East Pittston, Togus Pond, Vassalboro. KNOX: Harbor Island. LINCOLN: Adams Pond, Cooper Mills, Jefferson, Medomak, Muddy Pond, Muscongus, Nobleboro, Sherman Lake, Somerville, South Waldoboro. *SAGADAHOC: Richmond Corner, seen 7/16/50; Woolwich, 1 ♂, 8/12/46. *WALDO: Liberty, 1 ♀, 7/27/46, seen 7/29/50; North Searsmont, 1 ♂, 7/27/46. 6/23–8/29.

105. **Sympetrum obtrusum** (Hagen). KENNEBEC: Vassalboro. LINCOLN: Biscay Pond, Cooper Mills, Medomak, Muscongus, New Harbor. 6/28–8/29.

106. **Sympetrum semicinctum** (Say). LINCOLN: Biscay Pond, Cooper Mills. *WALDO: Liberty, 1 ♂, 7/27/46. 7/27–8/13.

107. **Sympetrum vicinum** (Hagen). KENNEBEC: Vassalboro. *KNOX: Warren, 2 ♀, 8/8/49. LINCOLN: Adams Pond, Cooper Mills, Medomak, New Harbor, Nobleboro, South Waldoboro, Winslow Mills. *SAGADAHOC: Woolwich, 1 ♂, 8/12/46. 7/7–8/29.

108. **Leucorrhinia frigida** Hagen. *KENNEBEC: East Pittston, 1 ♂, 7/7/48; Hamilton Pond, 3 ♂, 8/1/49. LINCOLN: Biscay Pond, Little Medomak Pond. 6/18–8/7.

110. **Leucorrhinia hudsonica** (Selys). LINCOLN: Biscay Pond, Jefferson, North Waldoboro, Pemaquid Pond. 6/11–7/28.

111. **Leucorrhinia intacta** (Hagen). KENNEBEC: East Pittston, Litchfield Plains. KNOX: North Pond. LINCOLN: Adams Pond, Back Meadow Brook, Biscay Pond, Jefferson, McCurdy Pond, Medomak, Muscongus, New Harbor, Nobleboro, Winslow Mills. *SAGADAHOC: Richmond Corner, seen 7/16/50. WALDO: Liberty. 6/12–7/31.

112. **Leucorrhinia proxima** Calvert. KENNEBEC: East Pittston. LINCOLN: Jefferson, McCurdy Pond, Medomak, Nobleboro, Somerville. 6/12–8/22.

113. **Pachydiplax longipennis** (Burmeister). *LINCOLN: Hog Island, 1 ♀, 7/6/49 (by Robert L. Birch). This is the second record of this southern species in Maine.

119. **Erythemis simplicicollis** (Say). *LINCOLN: Biscay Pond, an adult ♂ seen 8/23/49; Medomak, 1 ♀, 7/19/50; New Harbor, an adult ♂ seen 7/19/50; Sherman Lake, 1 ♀, 7/16/50. These are the first records of this species in Maine, and represent the most northeastern records of the species.

114. **Pantala flavescens** (Fabricius). LINCOLN: Keene Neck, New Harbor, Round Pond. 7/16–8/27.

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BORROR, D. J. 1944. An annotated list of the Odonata of Maine. Can. Ent., 76: 134–150.

GIBSON, A. 1913. The entomological record of 1912. 43rd Ann. Rept. Ent. Soc. Ontario, pp. 113–140.

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Corrections to the Paper on "The Male Genitalia of Syrphus, Epistrophe and Related Genera" (Diptera: Syrphidae).

By C. L. FLUKE, University of Wisconsin

Unfortunate circumstances caused a number of errors to appear in the above-named paper published in the Transactions of the Wisconsin Academy of Sciences, Arts and Letters Vol. 40: pp. 115–148, August 15, 1950. My purpose in calling attention to these mistakes is primarily to correct a very serious error due to mislabelling of the specimens of two species described by me in 1942 (Revision of the Neotropical Syrphini Related to Syrphus; American Mus. Novitates No. 1201).

The two species referred to are *Epistrophe remigis* Fl. and *Epistrophe altissima* Fl. The identification labels on these two

species became interchanged and the error was not noticed until the paper on the genitalia had been published. The original descriptions are in order and the holotypes are properly labelled to agree with them.

Specimens of *altissima,* labelled *remigis* were sent out to several of my friends and no serious trouble would have resulted except that Dr. Hull (Trans. Zool. Soc. London, Vol. 26: p. 293, 1949) erected a new subgenus, *Metepistrophe*, for *remigis* Fl., but it was evidently based on the specimens so labelled, which were actually *altissima* Fl.

The paper on genitalia carried this new subgenus and added *argentipila* Fl. to it, but here again it was done on mislabelled specimens of *remigis*. My interpretation places *remigis* (correctly labelled) under the genus *Episyrphus* and places *altissima* under *Metepistrophe*.

The errors that have come to my attention at this time are given below:

Page 115, 2nd paragraph, 7th line, read *Metasyrphus* for *Matasyrphus*.
Heading of each odd-numbered page 117–147, read genitalia for genetalia.
Page 119, Fig. 19, read *invigorus* for *ivigorus*.
Page 121, Figs. 49 and 60, read *lasiophthalmus* for *lasiopthalmus*.
Page 124, Fig. 97, read *remigis* for *altissimus*.
Page 125, Fig. 97, read *remigis* for *altissimus*.
Page 126, Figs. 124 and 130, read *altissimus* for *remigis*.
Page 127, Figs. 124 and 130, read *altissimus* for *remigis*.
Page 139, third paragraph, first line, read fourth for third.
Page 139, fourth paragraph, first line, read third for fourth.
Page 139, line seven from the bottom, read *remigis* for *altissima*.
Page 140, second paragraph, line one, read *altissimus* for *remigis*.
Page 141, fourth line from the bottom, read *talus* for *tylus*.
Page 142, second paragraph, enclose *venustus* Meig. in brackets.
Page 145, line 19, read *remigis* for *altissimus*.
Page 145, last line, read *altissimus* for *remigis*.
Page 148, reference 12, add London after Soc.

Notes on Habits and "Broods" of June Beetles [1]

By R. D. Shenefelt and H. G. Simkover, University of Wisconsin, Madison, Wisconsin

Certain observations made during a four-year study of June beetles at Wisconsin forest tree nurseries regarding feeding habits, flight habits and "broods" of June beetles are believed worthy of recording.

A. Feeding Habits

In general, June beetles are not supposed to feed on conifers, but European larch at Griffith State Nursery, in central Wisconsin, was so heavily utilized in 1949 that the branches were nearly stripped for a distance of about 12 inches from the tip. Table 1 lists the species and the percentages collected from larch. Of all June beetles collected from vegetation at the nursery in 1949, 14.20% were taken from this host. In contrast, in 1947 no specimens were found on larch, only one in 1948, and very few in 1950.

Table 1. Per Cent June Beetles Taken from Larch at Griffith State Nursery During 1949

Species	Total from all hosts	% from larch
Phyllophaga crenulata (Froehl.)	442	14.25
Phyllophaga drakii (Kby.)	503	9.34
Phyllophaga fusca (Froehl.)	2	50.00
Phyllophaga prunina (Lec.)	105	37.14
Phyllophaga rugosa (Melsh.)	103	20.39
Phyllophaga tristis (Fab.)	55	1.82

Two specimens of *crenulata* were taken from white spruce in 1949 after being observed while eating the young, succulent needles.

[1] Results of a cooperative project between the College of Agriculture of the University of Wisconsin and the Wisconsin Conservation Department. Approved for publication by the Director of the Wisconsin Agricultural Experiment Station.

There appears to be a particular physiological condition of the host which proves attractive to the beetles since they are drawn in large numbers to specific plants in a given year while other plants of the same species are avoided. For example, *tristis* in 1948 was attracted to one bur oak in large numbers (823 having been taken one night) while another bur oak of about the same size and apparently in the same condition attracted almost no beetles although it stood within 20 feet of the first. The tree which attracted large numbers in 1948 was fed upon by only a few beetles in 1950, although *tristis* was very numerous on other trees. Furthermore, the attractiveness varies during the feeding season, i.e., some, but not all, trees lose the ability to draw the beetles.

B. Flight Habits

(1). *Height of flight.*—During a 28 day period in 1947 five light traps at the Griffith Nursery, placed at a height of about five feet, averaged 41.48 June beetles captured per night per trap. Meanwhile, a trap located on a fire tower at the nursery at 17 feet averaged 55.74 or 1.35 times the number taken in those at five feet. Another trap located on the tower at 44 feet averaged 3.70 beetles or only 6.6% of that at 17 feet. One located at 72 feet, which was operated for fifteen nights, caught 62.2% as many beetles as the one at 44 feet during the same nights. A trap at 92 feet took no beetles during four nights although the trap at 17 feet averaged 174 beetles for these nights. However, the towerman stated that it was not unusual to find June beetles in his room at the top of the tower, approximately 102 feet, if the windows were left open at night. There were no obvious differences in the proportions of the sexes which were captured at the different heights.

A total of over 6,000 marked males, of several species, was liberated at various times just before dusk. The majority rose to an estimated height of 30–35 feet before leveling off.

From these observations, and from watching the insects come to the trees in the evening, the writers believe that the average height of flight of June beetles is higher than the literature would lead one to believe.

(2). *Nocturnal activity.*—June beetles are supposed to emerge from the soil or litter within a relatively short period in the evening and literally swarm to the host plants where mating and feeding commence at once. Supposedly they remain rather quiescent until near dawn when they move back to the ground. However, *tristis* is the only species at the nurseries that has been observed to swarm in this manner.

Apparently some unknown stimulus is responsible for the rhythmic nocturnal activity and diurnal quiescence. Beetles in the laboratory become active in the evening even when a strong light is shown on the cage continuously and although the temperature remains unchanged. When brought into the laboratory from cold storage and warmed up they show the same sort of rhythm regardless of the time of year.

A light trap which segregates insects caught during hourly intervals has been operated for the past four years. Collections made in this trap indicate that the time of maximum attractiveness of the traps is from approximately 9:30 P.M. to 1:30 A.M. From the evidence obtained, it appears that the beetles fly to the host plants and settle down about dusk or later, feed for a time, and then fly and feed sporadically throughout the remainder of the night. In general, the proportion of females to males captured becomes smaller as the night progresses, reaching the lowest point at about 1:30 A.M. and then increasing somewhat up to 4:30 A.M.

C. "Broods"

The authors question the validity of the use of the terms "Brood A," "Brood B," and "Brood C" in the sense in which these terms have been used by writers in the past, e.g., Davis (1918, p. 6). The term "brood" is defined by Torre Bueno as "all the individuals that hatch at about one time, from eggs laid by one series of parents and which normally mature at about the same time." If used to indicate the year of flight, the term "brood" is misleading.

A survey of the literature amply demonstrates that the length of time required for the development of June beetles is dependent

upon the specific conditions encountered. Davis (1916, p. 263) wrote, "It is easy to understand why a species should have a three-year life cycle in the latitude of Indiana and a four-year cycle in northern Wisconsin, where the season is so short, and, on the other hand, why the same species, in the southern states where the growing season is much longer, should require but two years to complete its growth. *It is, however, puzzling to find that the same species in the same cage may complete its cycle in two years in one case but require three years in another.*" (Italics by present writers.)

C. L. Fluke, University of Wisconsin, and T. R. Chamberlin, U.S.D.A., B.E.P.Q., have informed the writers that they have reared *tristis* in 3 months and *rugosa* in 9 months in the greenhouse. While *tristis* has a two-year cycle in central Wisconsin, it has a one-year cycle at about the same latitude in Michigan according to W. F. Morofsky, Michigan State College.

The time of emergence of adults for feeding and mating varies from year to year. For instance, a difference of nearly a month has been observed in the time of major flight during the four years records have been kept at Griffith State Nursery. Furthermore, egg laying and feeding may be delayed by cold weather and the total period of flight drawn out. In 1947 *prunina* was taken in light traps from May 25 to as late as September 10 and in 1948 *crenulata* was captured from May 14 to August 25. While these represent extreme flight periods, it is readily observable from the records obtained that the flight periods of many of the species are long. In addition, some females remain alive in soil cages and continue to oviposit for some time after the flight is apparently completed.

In contrast, adult beetles removed from cold storage in February ate forced willow leaves within a few days in the laboratory and were later fed head lettuce. Eggs were found as early as the middle of March.

Eggs of *rugosa* were obtained in 1948 from June 28 to August 19 from outdoor rearing cages and in 1950 some viable eggs were still present in early September. Incidentally, eggs of *futilis* have been held in cold storage for a full year before being allowed to hatch.

In late November, 1947, at a time when the ground was frozen to a depth of three inches, 265 larvae were taken from a 16-foot cage stocked during the summer with adults of *rugosa, prunina,* and *anxia.* The larvae were kept in cold storage and examined under binoculars on December 4. The fact that grubs of these three species may overwinter in the first instar was established when 70 of the 265 were found to still retain the hatching spines on the metathorax.

All of these facts substantiate the idea that the developmental period of June beetles is dependent upon the particular environment under which the insects exist. They further indicate that it would be entirely possible for "the same species in the same cage to complete its cycle in two years in one case but require three years in another" and thus for a portion of "Brood A" to become "Brood B."

Within a given locality, the period of oviposition for different species may occur in different years when the lengths of the life cycles are not the same. Such species cannot possibly constitute a "brood" in the accepted sense of the term since they neither hatch at the same time nor are the eggs laid by one series of parents.

In addition, there are great differences between localities in the species present and it does not seem correct to regard one set of species as belonging to the same "brood" as another, perhaps entirely different, set. In fact, it does not appear justifiable to regard even two different species as forming one "brood," although their cycles may coincide.

In view of the circumstances, the authors believe that the word "flight" should be substituted for the word "brood" and be used to indicate the population of adult June beetles for a given year.

Literature Cited

Davis, J. J. 1916. A progress report on white grub investigations. Jour. Econ. Ent. 9: 261–281.

——. 1918. Common white grubs. U. S. Dept. Agric. Farmer's Bull. 940.

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Biological Notes on Two Species of Chrysopidae (Neuroptera)

By J. W. Tilden, San Jose State College, San Jose, California

Chrysopa cockerelli Banks

Two larvae of this species were taken in March, 1948, already nearly grown. This would indicate that this species develops early in the season. These larvae are "peddlers," carrying trash on the dorsum, entangled in the cuticular spines. The material is of several sorts. Larval exuviae, exoskeletons of prey, bits of dried leaves, strands of vegetable fiber and unidentified material were found, and certain minute fungi grow on the accumulation, giving it a dark color. This mass is not discarded at ecdysis, but the larva molts under the mass, retaining the major portion.

One larva was placed under a binocular microscope and the "pack" carefully removed. For a day or so thereafter the larva was nearly nude, but exoskeletons of prey (aphids) began to appear and at the final molt the cast skin was added so that by the time the larva was ready to pupate, it was again covered with debris. Oddly enough, actual placing of material was never observed in spite of careful watching.

Feeding of the larvae of this species is very similar to that of the much more common *Chrysopa ploribunda* Fitch.

The cocoon of this species is spherical and is covered by the trash of the "pack," and so appears dark in color and inconspicuous. The pupal period was eighteen days. Emergence is by means of a round "lid" as in *ploribunda*.

Chrysopa ploribunda Fitch

Most of the observations made on this species verify the work of numerous others and are not worth repeating, but certain observations on spinning and voracity appear to be of interest.

At maturity, the larva crawls to a sheltered place and prepares to spin its cocoon. Crannies in leaves of bark are usually chosen. The larva spins with the tip of the abdomen, which is moved back and forth in a manner analogous to the movements

of the head in spinning caterpillars. Withycombe (1924, pp. 369–371) has shown that the source of the silk is the modified malpighian tubules.

A few loose strands are tied first over the whole surface in loose loops. Within this preliminary structure, the larva curls up with the head turned in toward the abdomen. The tip of the abdomen is then directed outward and is moved freely, in movements involving the three or four terminal segments. In this way silk is laid down in short figures of eight patterns, as far as the insect can reach without uncurling. From time to time the larva rolls slightly, continuing to spin as it turns. In this way all parts of the cocoon receive about the same amount of silk. It should be noted that the outer supporting strands are double, caused by the circumstance that in spinning these strands the larva touches the tip of the abdomen to the surface on which it rests, and then to adjacent surfaces, subsequently returning the abdomen to the original position. One strand is spun with the outward movement and another with the return movement, spinning being continuous.

The loose preliminary strands form the outer part of the cocoon, while the denser inner part is formed during the revolving process described above. The inner portion, while closely woven, is not thick and the curled up larva is visible after the cocoon is complete. After spinning is complete, the prepupal condition is assumed, lasting from three to seven days before pupation occurs.

Aphids (*Aphis helichrysi* Kalt.) were used in experiments on food habits with the larvae of this species. These aphids occur in small colonies on the tips of the food plants. It is rather difficult to determine the exact number of aphids eaten, since the growth of the colony in some cases nearly equals the rate of feeding by *Chrysopa*. Third instar larvae depleted a colony in two or three days, destroying it. Very small second instar larvae, however, did not bring such a colony under control. From this it is believed that a colony of this species of aphid can support one *Chrysopa* larvae without being exterminated.

It is inexact to count the exoskeletons of the aphids on the bottom of the container without carefully determining which are

carcasses and which are normal exuviae of the aphids; hence notes on the number of aphids eaten by one larva are not as clear cut as might be desired, but it can be stated that a colony of twenty or more aphids (as of the time of collection) was destroyed in forty-eight hours by third instar larvae as a rule. Individual observations indicate that from seven to fourteen large aphids may be eaten by one third instar *Chrysopa* larva without stopping.

Using the aphid colony as a population unit, it was ascertained that a third instar *Chrysopa* larva will destroy three or four colonies of this species of aphid during the six or eight days that comprise the length of this final instar. This indicates a predator of great efficiency.

It also becomes apparent that the third instar of *Chrysopa ploribunda* is the most effective by far, mainly because of its larger size.

LITERATURE CITED

WITHYCOMBE, C. L. 1924. Some aspects of the biology and morphology of the Neuroptera. With special reference to the immature stages and their possible phylogenetic significance. Trans. Ent. Soc. London 1924: 313–411.

Current Entomological Literature

COMPILED BY R. G. SCHMIEDER.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia and the University of Pennsylvania, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the year 1951 unless otherwise noted. Continued papers, with few exceptions, are recorded only at their first installment.

For other records of general literature and for economic literature, see the Bibliography of Agriculture, Washington, and the Review of Applied Entomology, Series A, London. For records of papers on medical entomology see Review of Applied Entomology, Series B.

NOTE: The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the List of periodicals and serials published in our January and June issues. The number of the volume, and in some cases, the part, heft, &c. is followed by a colon (:). References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to Neotropical species, and not so indicated in the title, have the symbol (S).

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EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Miridae (Capsidae)—American species wanted, with locality labels, in exchange for British species. D. Leston, F.R.E.S., 6 Frognal Rise, London N. W. 3, England.

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ENTOMOLOGICAL NEWS

OCTOBER 1951

Vol. LXII **No. 8**

CALVERT ANNIVERSARY VOLUME

on the occasion of

Dr. Philip P. Calvert's Eightieth Birthday

CONTENTS

PUBLISHED MONTHLY, EXCEPT AUGUST AND SEPTEMBER, BY

THE AMERICAN ENTOMOLOGICAL SOCIETY

PRINCE AND LEMON STS., LANCASTER, PA.

AND

1900 RACE STREET, PHILADELPHIA 3, PA.

Subscription, per yearly volume of ten numbers: $4.00 domestic; $4.30 foreign; $4.15 Canada. Entered as second-class matter April 19, 1943, at the post office at Lancaster, Pa., under the Act of March 3, 1879. Acceptance for mailing at the special rate of postage provided for in paragraphs (d-2), Section 34.40, P. L. & R. of 1948, authorized April 19, 1943.

ENTOMOLOGICAL NEWS

ENTOMOLOGICAL NEWS is published monthly, excepting August and September, by The American Entomological Society at Prince and Lemon Sts., Lancaster, Pa., and the Academy of Natural Sciences, 1900 Race Street, Philadelphia 3, Pa., U. S. A.

PHILIP P. CALVERT, Editor Emeritus. R. G. SCHMIEDER, Editor. Editorial Staff: E. J. F. MARX, M. E. PHILLIPS, J. A. G. REHN, and A. G. RICHARDS.

Subscription price, per yearly volume of 10 numbers: Domestic, $4.00; Foreign, $4.30; Canada, $4.15—U. S. Currency.

SUBSCRIPTIONS, ADVERTISEMENTS: All communications and remittances to be addressed to **ENTOMOLOGICAL NEWS, 1900 Race Street, Philadelphia 3, Pa.**

MANUSCRIPTS and all communications concerning same should be addressed to **R. G. Schmieder, Zoological Laboratory, University of Pennsylvania, Philadelphia 4, Pa.**

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ENTOMOLOGICAL NEWS

VOL. LXII OCTOBER, 1951 No. 8

Doctor William Procter (1872–1951)

Doctor William Procter, distinguished scientist, died suddenly and unexpectedly in West Palm Beach, Florida, April 19, 1951. Doctor Procter was born in Cincinnati, Ohio, on September 8, 1872, the son of Harley Thomas and Mary Elizabeth Sanford Procter. His grandfather founded the Procter and Gamble Company in 1837.

Much of Doctor Procter's boyhood was spent in the Berkshires of western Massachusetts. He graduated from Phillips Exeter Academy in 1891, and from Yale University with the degree of Ph.B. in 1894, having specialized in chemistry and business. Between 1895 and 1897 he took an extended trip around the World, visiting Japan, China, India, and many other countries. He was a graduate student in the Sorbonne (Paris, France) in 1896–1897. For the succeeding twenty years he was engaged in business, chiefly in the field of railroad organization and securities. Later he became actively associated with, and a director of, the Procter and Gamble Company.

In 1917 Doctor Procter gradually relinquished business and began graduate work in zoology at Columbia University, continuing until 1920, but never working toward a higher degree. His interests were chiefly in genetics, embryology and protozoology, he being associated with men such as Wilson, Morgan, Calkins, Huettner, Sturtevant, and others of the brilliant group then in the Department of Zoology at Columbia. It was this inspiring experience that influenced Doctor Procter to devote the remainder of his life to work in biology.

Ever since he was a boy of about 15, or in the mid-80's, the Procter family had spent nearly every summer on Mount Desert

Island, Maine, chiefly at Bar Harbor. In 1921 Doctor Procter established a research laboratory on the Island, at first in association with others at Salisbury Cove. Various disagreements led to his withdrawal from this association and instituting his own laboratory on his estate at Corfield, on Frenchman's Bay, about a mile north of Bar Harbor. Most of the early work of the laboratory was devoted to a study of the rich marine fauna of the Island, the results being published in a series of volumes mentioned later. Doctor Procter's fine work attracted the staff in biology at the University of Montreal, and in 1936 he was called to Montreal where he passed an examination and was awarded the degree of Doctor of Science. This same year he established "The Biological Survey of the Mount Desert Region, Incorporated."

It was in 1918 that the Boston Society of Natural History (later the New England Society) selected Mount Desert Island for detailed study of the insect fauna, and the curator of the collections, Charles W. Johnson, spent a portion of each summer on the Island until 1926. In that year, Procter and Johnson made elaborate plans for further study, but this was interrupted by Johnson's death in 1932. Doctor Procter then entered upon his work on the insect fauna of the Island with an unflagging interest and vigor. Parts of every year, usually from early May into October, were spent at the home at Corfield, and every part of the Island, including virtually every square foot, was combed for insects. The small station near Salisbury Cove called "Penikese" and the main laboratory at Corfield were the bases where much work was accomplished, by the running of light traps and other methods. As discussed in his publications, Doctor Procter constantly changed his light traps as to position, and color and intensity of the light, and these yielded a vast range of specimens and species.

Of the series of seven volumes, or parts, published in his survey, the first was by the late Charles W. Johnson who worked on the insect fauna of the Island. This was largely responsible for diverting Doctor Procter's interests from the marine to the terrestrial fauna. It is of interest to note that

this first volume on the insects of Mount Desert was dedicated to the late Professor Charles Henry Fernald, founder of the Department of Entomology at the now University of Massachusetts, in 1886, who was born on the Island on March 16, 1838. Parts 2 to 7 of the series were written by Doctor Procter, Parts 2 to 5 relating to the marine fauna, Parts 6 and 7 to the insects.*

In Part 7 of this series, Doctor Procter describes the 421 field stations that he had established and examined between 1927 and June 1945. Following the publication of this concluding volume, the study was continued and the number of field stations was further increased. In 1946, Doctor Procter had amassed records from the Island of no fewer than 349 families, 2,660 genera, and 6,578 species and subspecies of Arthropods, all but 200 of which were insects. Virtually all of these are represented in his personal collection. In this concluding volume on the insects, he dedicates the work as follows: "I have listed alphabetically the many persons who have shown their interest and kindness in giving me help of many kinds. To them I am profoundly grateful and, as mentioned elsewhere, I dedicate this volume to them as a mark of my appreciation." This list includes some 79 names. One name that was omitted inadvertently, since he was of the greatest help in the preparation of the work and is cited hundreds of times throughout the volume, is Doctor A. Edmund Brower, of Augusta, Maine. Doctor Brower was stationed on Mount Desert in the early and mid-30's and cooperated closely with Doctor Proctor both in collecting and in identification of the insects, particularly the Lepidoptera, and especially the Micros.

During his life Doctor Procter made many donations and contributions to various causes and to many persons, these never being publicized in any manner. Thus, during the difficult years

* Biological Survey of the Mount Desert Region. Part VI. The Insect Fauna, pp. 1–496, map, 11 figs., portrait of C. W. Johnson; 1938. (Includes 5,465 species and subspecies, Hexapoda and Arachnida.) The Same, Part VII. The Insect Fauna, pp. 1–566, map, 10 figs.; 1946. (Includes 6,578 species and subspecies.)

of the recent war he made substantial contributions to the Entomological Society of America, which enabled the Society to publish their "Annals" of the period with little or no reduction in size. He served on the advisory board of the zoology department of Columbia University, on the board of the Wistar Institute of Anatomy and Biology, as a trustee of the American Museum of Natural History, and in several other important capacities. Likewise he was a member of many scientific societies, both in America and abroad. In later years, and chiefly through his personal friendship with Doctor George A. Baitsell, of Yale University, he became very much interested in the Society of the Sigma Xi, contributing generously to its various Grants-in-aid, and particularly to RESA (The Scientific Research Society of America). This culminated in the establishment of the William Procter Prize for Scientific Achievement, the first award of which was made to Doctor Karl T. Compton at Cleveland, Ohio, on December 29, 1950.

Doctor Procter remained a bachelor until he was 38, when he married Miss Emily Pearson Bodstein on Feburary 3, 1910. Seldom has there been a couple more devoted and appreciative of the efforts of the other than Doctor and Mrs. Procter. A distinguished musician and French scholar, Mrs. Procter was invalided by arthritis for several years before her death at Bar Harbor on September 25, 1949.

Doctor Procter bequeathed his collection of insects, together with the cabinets, drawers, books and records appertaining thereto, to the University of Massachusetts. It will be maintained as a separate unit as "The William Procter Collection of Mount Desert Insects." In his will, Doctor Procter has specified that there be no additions made to this collection unless by specimens taken on Mount Desert Island, stating "My reason being that its great value is to show a biotic entity, and it has taken years of hard work to assemble same, though every hour one of pleasure."

Some of us were privileged to know Doctor Procter well and to appreciate his many splendid qualities. He was a most amazing combination of an outstanding man of business and

a keen entomologist. In one moment he might be discussing the purchase of the World whale oil supply for his Company, while at the next he would be in raptures over the capture of a microscopic beetle or other insect new to his collection. His knowledge of the habits and habitats of the Mount Desert insects was profound. The detailed record of the fauna of his beloved Island will long serve as his monument.

CHARLES P. ALEXANDER

The Tribal Position of Certain Genera of the Pyrgomorphinae (Orthoptera: Acrididae)

By JAMES A. G. REHN, Curator of Insects, The Academy of Natural Sciences of Philadelphia

The author recently completed a monographic analysis of the acridoid subfamily Pyrgomorphinae as found in Australia, which is to appear as a section of a comprehensive study of the grasshoppers of that continent, prepared at the request of, and to be published by, the Scientific and Industrial Research Organization of that Commonwealth.

In the course of this work, and that on other sections of the Acridoidea, it has been found necessary to examine numerous non-Australian genera to evaluate the relationships and possible origin of genera occurring in Australia. In doing this cases of faulty associations made in the past are frequently encountered. These are due in some instances to previous authors having lacked actual material of relevant genera, or at least of a sufficient representation to furnish a proper background for generalizations, while in other cases errors of judgment or interpretation have been responsible for conclusions which now prove to be unwarranted or unsound.

The genera placed in the pyrgomorphid "section Poecilocerae," or, as I prefer to regard it, the tribe Poekilocerini (*Pockilocerus* being the original spelling of the key genus), by the last critical analyst of the subfamily as a whole, Ignacio Bolivar in 1909,[1]

[1] Genera Insectorum, Acridiidae, Pyrgomorphinae.

included the Australian genera *Petasida* White, and *Monistria* Stål, the Burmese *Chlorizeina* Brunner, the Malagasy *Rubellia* Stål, the north African and South Asian *Poekilocerus* Serville, and the tropical African *Sphenexia, Stenoscepa, Cavendia* and *Humpatella,* all of Karsch. The key genus *Poekilocerus* has a type of distribution, i.e. across northern Africa, Arabia and parts of India, which is found in many palaeotropical genera of semi-arid or savannah environments. The Australian genera, both those included by Bolivar in 1909, and those since made known, are being discussed in the forthcoming monograph.

The Burmese genus *Chlorizeina* was described by Brunner in 1893,[2] but, as he states, was unknown in 1909 to Bolivar from material. The original description is relatively superficial and Brunner's figures sketchy. As he figured the male sex, this can be regarded as the type of *unicolor,* although we were not told from which of the two original localities it came, nor whether there were before Brunner more than a single male.

Since it was first described our knowledge of *Chlorizeina* has been but moderately amplified. In 1941 Ramme described and figured a second species, *C. elegans,* from Maymyo, Upper Burma,[3] and also he has given us a figure of the abdominal apex and cercal outline of the male sex of *unicolor* as understood by him,[4] from material taken at Hmaubi ("Hmawbi" in the London *Times* atlas), which is about twenty miles nearly due north of Rangoon, Burma, and at a very low elevation. In checking over unstudied series in the Academy collection I found a third species of the genus represented by both sexes from Kalaw, in the Southern Shan States of Burma, which I am describing elsewhere.

It is now evident to me that *Chlorizeina* is not a member of the Poekilocerini, but instead is an aberrant component of the Indo-Malayan tribe Tagastini ("Tagastae" of Bolivar). The genus

[2] Ann. Mus. Civ. Stor. Nat. Genova, XXXIII, p. 130, pl. V, figs. 51a and 51b. Based solely on *C. unicolor* Brunner, there described. The species was founded on both sexes from Palon, Pegu, Burma, and Bhamo, Burma.

[3] Mitt. Zoolog. Mus. Berlin, 25, heft 1, p. 36, text-fig. 13e, pl. XII, fig. 2. [♂; Maymyo, Upper Burma, elevation 800 meters.]

[4] Idem, p. 36, text-fig. 13u, pl. XII, figs. 1a and 1b.

has been compared with material of *Tagasta* and *Annandalea*, both of Bolivar, which were placed in that assemblage by that author. With these two genera *Chlorizeina* agrees in the dense and closely placed, in fact subattingent, longitudinal venation of the tegmina, instead of the more open, ramifying and usually less strict type of the Poekilocerini, in the appreciably, but not strongly, marked longitudinal carinulae on the dorsal face of the cephalic and median femora, in the definite and well developed supra-coxal lobe of the caudal femora, in the acute apices of the genicular lobes of the caudal femora, and in the distinct and regular pattern of the external paginae of the same, as well as their carinately defined ventro-external face. From the poekilocerine genera *Chlorizeina* differs in all of the above mentioned respects.

The Malagasy genus *Rubellia* Stål is represented by material of both sexes in the Academy series, and similarly it is not a member of the Poekilocerini, where for many years it has been placed. Instead it is clearly one of the tribe Sphenariini ("Sphenariae" of Bolivar), along with *Sphenarium* Charpentier, *Prosphena* Bolivar, *Chirindites* Ramme and *Yunnanites* Uvarov, with all of which it has been physically compared. While the alar organs are always more developed in *Rubellia* than in any of the other genera which have been placed in the Sphenariini, it is apparently more nearly related to the African *Chirindites* than to any of the other components, yet the two genera are widely separated from one another. In addition to many features of *Rubellia* which support the position here given, such as the basic fastigial structure, numerous details of the caudal femora and of the meso-metasternum, the virtually unarmed prosternum is a feature of the Sphenariini, and not of the Poekilocerini. While other tribes of the Pyrgomorphinae have unarmed prosterna, they are distinguished by numerous features not shared by *Rubellia*. I regard *Rubellia* as the most primitive and generalized of the genera of the Sphenariini, by reason of its possession of a fully alate phase in its alately dimorphic genotypic species *R. nigrosignata*.

Of the four tropical African genera described by Karsch, and which have been placed in the Poekilocerini, *Cawendia*, of which

several species are now before me, must certainly be removed from the Poekilocerini. Its exact assignment is as yet uncertain, but it cannot be retained in that assemblage. While no material is before me at this writing I have every reason to believe that of the three remaining genera *Sphenexia* and *Stenoscepa* may prove to be members of the Sphenariini, and not of the Poekilocerini. As to the remaining genus—*Humpatella* Karsch—material, and of both sexes, will be needed to place it with certainty, as the literature is of little use for so doing.

Summarizing, I do not believe the tribe Poekilocerini will be found present in Africa south of the range of the broadly north African *Poekilocerus*. Further it is my opinion that the latter genus and the Australian genera are all which can properly be referred to that tribe, and that no members of it will be found in truly humid sections of the Old World tropics. Also it would appear that the Sphenariini is a very old and widely spread tropical and subtropical assemblage, with its genera, which represent numerous subsidiary evolutionary lines, scattered over Farther India, extreme southern China, Madagascar, tropical Africa (but not Guinea forest areas), and various parts of the New World tropics and subtropics. The Tagastini is a dominant Indo-Malayan entity reaching from eastern India (Bhutan and Assam) to the Philippines and the Moluccas, and is represented in Farther India by three genera, i.e. *Tagasta, Annandalea* and *Chlorizeina*.

It is increasingly evident that the Pyrgomorphinae is a comparatively ancient group of grasshoppers, basically of a "Gondwanaland" type of distribution, possessing marked plasticity in certain features in numerous genera and species. Also it has earmarks of an ancient line, which has been able to maintain itself through the possession of particular faculties which presumably have survival value, as repugnatorial glands, "bleeding" ability, aposematic coloration, and in some genera and certain species intra-specific alar dimorphism. Further the possession of a vertically cleft fastigium, a character unique in the Acridoidea, is in itself evidence of the Pyrgomorphinae being a relatively long established line.

The Second Species of Psectrothrips (Thysanoptera: Thripidae)

By Lewis J. Stannard, Jr., Illinois Natural History Survey, Urbana, Illinois

The previously monobasic genus *Psectrothrips* was erected for a large thrips with a greatly elongated, *Ctenothrips*-like head outline. So remarkable is the appearance of this species, the genotype *delostomae* Hood, that, in the process of placing the new short headed species herein described, I nearly ruled out the possibility that it might belong in *Psectrothrips*. Not only are the two species quite different in gross appearance but also seemingly in their habits and geographic locations. Both species live isolated from one another, *delostomae* in Peru and *beckeri* sp. nov. in Honduras; and as far as is known, both frequent different host flowers, *Delostoma dentatum* and *Cornutia grandifolia*, respectively.

Actually, however, as will be pointed out, the structural differences of the two species are not of great magnitude despite first impressions. Also their present isolation is not extremely great for the two home ranges are on land masses that were connected possibly in the Cretaceous and almost certainly in the Oligocene, Miocene, and Pliocene (Simpson, 1950). Then, too, their life zones have always been tropical, and their hosts belong in the same plant order according to Johnson (1931), or in two closely related orders according to Bessey (1915).

Because of the prolonged head form of *delostomae*, *Psectrothrips* was originally considered to be related to *Ctenothrips* which has a head similarly shaped. Now with the discovery of the second species with another type of head, it is necessary to add the genera *Frankliniella* and *Taeniothrips* and others as relatives. Certainly the head of *beckeri* would be difficult to separate from some of the species in the two aforementioned genera in shape and in details of setal arrangements and sculpture. Besides, *Taeniothrips* parallels *Psectrothrips* in containing species with radically divergent heads such as *T. orionis*, long with bulging eyes, versus *T. simplex* with its short transverse head. Perhaps the long head of *delostomae* is in part an expression of heter-

ogonous growth correlated with the factors that have produced a larger body as well.

In adding *beckeri*, the following six characteristics now seem to me to be the principal ones for the recognition of *Psectrothrips:*

1. Antennae 9 segmented. See Hood, 1937, p. 265, fig. 2, c.
2. Prothorax with but a single pair of very long setae situated one on each of the posterior angles, fig. 1. Also see Hood, 1937, p. 265, fig. 2, a.
3. Abdominal tergum 7 with a complete or nearly complete, even comb of setae across the posterior border in addition to the comb on segment 8 and the partial lateral combs on several other segments. See Hood, 1937, p. 265, fig. 2, b.
4. Fore wings with a nearly even and closely set row of setae on both longitudinal veins, as similarly found in *Frankliniella.*
5. Metanotum hexagonally reticulate, fig. 2, somewhat as in *Isoneurothrips* and *Ctenothrips.*
6. Abdominal tergum 9 of the males with a pair of stout thorn-like spines, fig. 3, similarly as in males of *Frankliniella* and others.

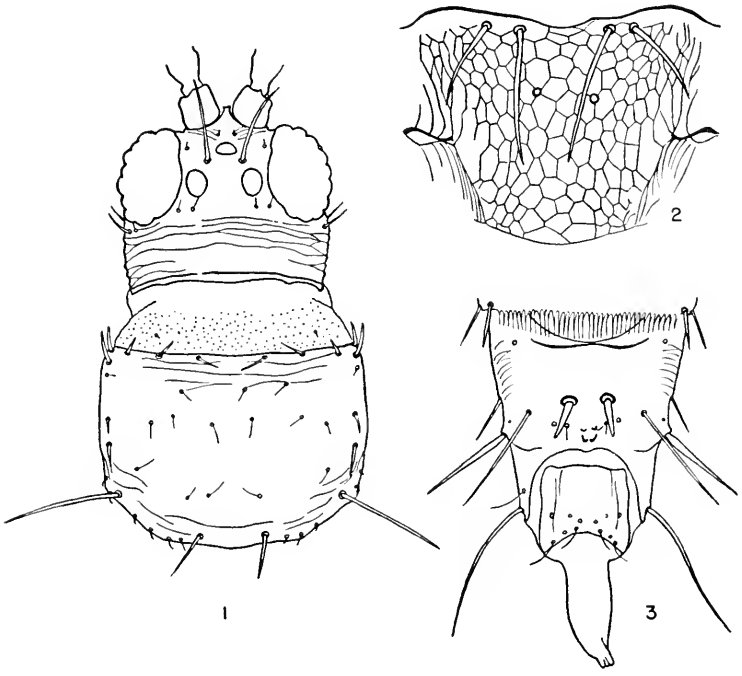
Most of the other characters mentioned in the original description (Hood, 1937) apply equally to the two species. The above new concept, however, deemphasizes the large size, the long head, the pair of strong antero-lateral prothoracic setae, and the noninterruption of the seventh abdominal posterior comb. Structures of the latter kind serve to distinguish only the genotype. *Psectrothrips* can be set apart from all of the genera in the Thripidae by the combination of three characteristics, i.e., the antennal form, the abdominal combs, and the prothoracic setation, although these same characters individually may be found scattered in a number of genera.

Psectrothrips beckeri sp. nov.

In naming this species, a distinctive thysanopteron, I am pleased to have the opportunity to honor my friend Mr. Edward C. Becker, a coleopterist, who went far out of his way to bring back one of the finest collections of thrips ever to come from

Central America. This species is but one of the many in the Becker Collection which was donated to the Illinois Natural History Survey.

Female (macropterous).—Length of body, exclusive of antennae, distended, nearly 2 mm. Color almost entirely darkish



Psectrothrips beckeri sp. nov.

Fig. 1. Dorsal aspect of head and prothorax.
Fig. 2. Reticulations of metanotum.
Fig. 3. Terminal abdominal terga of male.

brown underlain with yellowish subdermal pigments, pedicel of third antennal segment, extremities of legs and lateral portions of metathorax lighter to nearly yellow, setae blackish brown, forewings grayish brown with a lighter streak between the veins and lighter at the base beyond the scale, hind wings pale gray with a median longitudinal dark stripe. Head as in fig. 1, wider (through eyes) than long, postocular setae reduced to minute

size. Prothorax as in fig. 1, differing from *delostomae* in that the two pairs of antero-lateral setae are about the same length (subequal to the mid laterals). Mesonotum with transverse striations. Abdominal sterna without median setae in addition to the setae along the posterior margin. Seventh abdominal comb interrupted in the middle in the holotype specimen but complete in some of the paratypes.

Male (macropterous).—Length of body, exclusive of the antennae, distended, about 1.6 mm. Generally similar to female except somewhat lighter in color especially in the legs. Oblong glandular areas on the forward median region of the abdominal sterna; by contrast, males of *delostomae* (according to Priesner's key, 1949) possess square shaped glandular areas.

Holotype.—Female; La Ceiba, Honduras; July 9, 1949; (E. C. Becker); on *Cornutia grandifolia* (determined by Dr. Paul C. Standley for Mr. Becker).

Allotype.—Male, same data as above.

Paratypes.—7 ♀ and 12 ♂, same data as above, mounted on slides; 6 ♂, same data as above except May 14, 1949, preserved in alcohol.

The holotype, allotype and a portion of the paratypes are deposited in the Illinois Natural History Survey. The remaining paratypes will be distributed to the California Academy of Sciences, the Philadelphia Academy of Natural Sciences, the United States National Museum, and to the Collection of Prof. Dr. Hermann Priesner of Cairo, Egypt.

All of the 21 specimens in the mounted type series show considerable variation in the number of setae of each of the veins of the fore wings and in the extent of the comb on the seventh abdominal segment. No individual of either sex bears the same number of vein setae on the right and left forewings. These vein setae range in number from 22 to 16 on the anterior vein and from 17 to 11 on the posterior vein. Generally the tendency is for a complete seventh abdominal comb although the median area of the comb occasionally lacks setae, particularly in the female.

Except for the comparative remarks made in the description and in the introduction, no further analysis of the two species can be made at this time since I have never seen specimens of

delostomae. The published illustrations of these species provide sufficient reference points for their separation one from another.

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A New Mite from Nests of the Wood Rat, Neotoma micropus

By R. B. Eads and B. G. Hightower, State Department of Health, Austin, Texas

Mites taken from nesting material of the Baird wood rat, *Neotoma micropus,* represent a new species of the genus *Androlaelaps* and the description is presented in this paper.

Androlaelaps johnstoni, n. sp.

Female. (Plate I, Figs. A, B, C, D.) A light brown mite, small for this genus, elongate-oval in outline and with faint shoulders. Average measurements in microns of 3 specimens: total length, exclusive of gnathosoma, 528; total width of body at widest point, 349; length of dorsal plate, 494; width of dorsal plate, 308; length of genitoventral plate to the anterior border of the anal plate, 43. The setae are of moderate length and thickness.

Sternal plate reticulate, slightly concave on anterior margin, posterior margin almost truncate. Lateral margins strongly

concave, with postero-lateral corners projecting between coxae II and III. First pair of sternal setae on anterior border, second pair level with the middle of coxae II, the third pair level with anterior third of coxae III; a pair of prominent, slit-like pores placed immediately below and between the first pair of setae. Presternal area with a distinct pair of transversely striated presternal plates. Endopodal plates indistinct; endopodal setae not noticeably longer than the third pair of sternal setae. Genitoventral plate expanded beyond coxae IV, and bearing the typical single pair of genitoventral setae; genitoventral plate extends closer to the anal plate than the total length of the anal plate. Approximately 14 setae situated on the non-sclerotized lower half of the venter.

Two pairs of metapodal plates present, one pair elongate and a smaller pair circular in shape. Anal plate roundly triangular, measuring approximately 78 microns in length by 76 microns in width; anal setae subequal in length. Peritreme extends beyond coxa I to slightly beyond coxa IV, stigma situated near the anterior margin of coxa IV.

Leg II shorter and stouter than legs I and IV, with leg III somewhat shorter than leg II. Coxae I, II and III with two slender setae, coxa IV with one. Characteristic spurs on femora, genu and tibia of leg II; large spur of femora II smooth with a bluntly rounded apex, flanked by a stout spine and two large setae (Fig. D); tarsus II with two stout median spines on basal half and three stout bristles toward apex (Fig. C).

Epistome concave in outline with smooth margins, hypostome with 6 rows of denticles, each row consisting of 4 to 6 teeth; chelae quite short, fixed chela with one large and one small tooth, plus a small, uninflated seta near the apex; movable chela with a minute tooth near the middle.

Male. Unknown.

Types. The holotype female was taken from nesting material of the Baird wood rat, *Neotoma micropus*, by G. C. Menzies and B. G. Hightower, Gaines Co., Texas, October 5, 1950. Two paratype females were taken from a *N. micropus* nest by B. G. Hightower, Zavala Co., Texas, September 6, 1950. The holotype has been deposited in the United States National

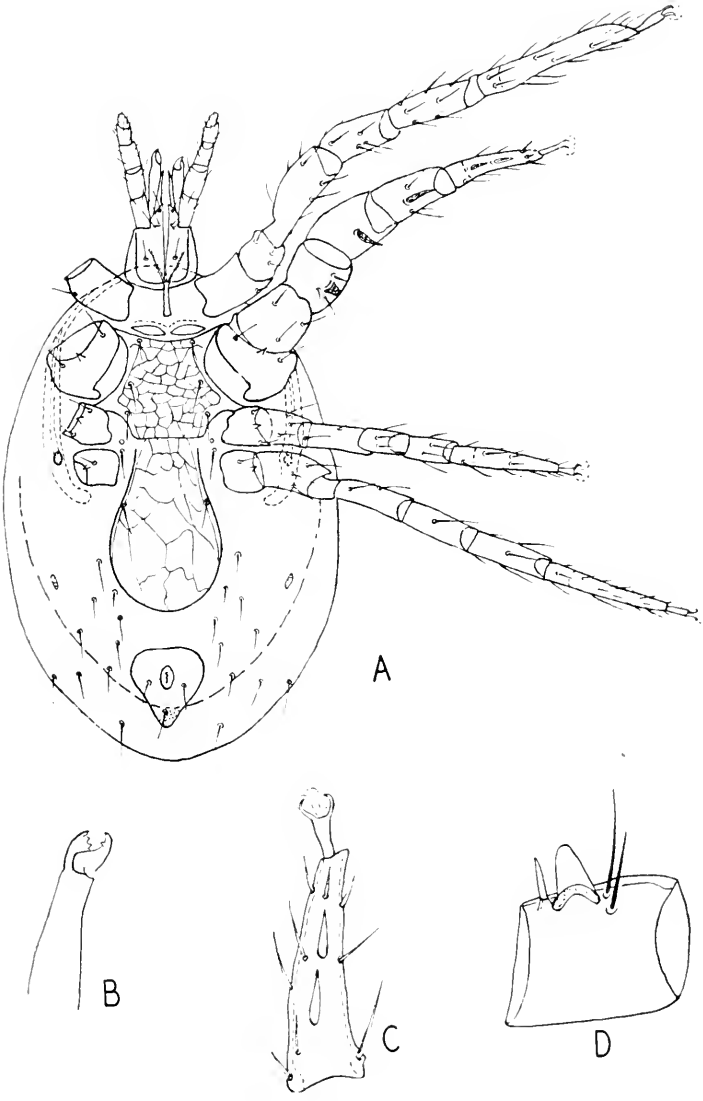

PLATE I

Androlaelaps johnstoni, new species. FIG. A. Female venter. FIG. B. Female chelicera. FIG. C. Female tarsus II. FIG. D. Female femur II.

Museum and the paratypes retained in the collection of the Texas State Department of Health.

Remarks. The small size, minute chelae, and the presence of 2 stout spines on tarsus II, in addition to the usual spurs of the femora, genu and tibia on leg II, serve to distinguish this species from other known *Androlaelaps*. The mite is named for Dr. H. G. Johnston, Head of the Department of Entomology, Texas A. & M. College, who gave many of us our first introduction to insect taxonomy.

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Current Entomological Literature

COMPILED BY R. G. SCHMIEDER.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia and the University of Pennsylvania, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the year 1951 unless otherwise noted. Continued papers, with few exceptions, are recorded only at their first installment.

For other records of general literature and for economic literature, see the Bibliography of Agriculture, Washington, and the Review of Applied Entomology, Series A, London. For records of papers on medical entomology see Review of Applied Entomology, Series B.

Note: The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the List of periodicals and serials published in our January and June issues. The number of the volume, and in some cases, the part, heft, &c. is followed by a colon (:). References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to Neotropical species, and not so indicated in the title, have the symbol (S).

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NOVEMBER 1951

Vol. LXII **No. 9**

CALVERT ANNIVERSARY VOLUME

on the occasion of

Dr. Philip P. Calvert's Eightieth Birthday

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PUBLISHED MONTHLY, EXCEPT AUGUST AND SEPTEMBER, BY
THE AMERICAN ENTOMOLOGICAL SOCIETY
PRINCE AND LEMON STS., LANCASTER, PA.
AND
1900 RACE STREET, PHILADELPHIA 3, PA.

Subscription, per yearly volume of ten numbers: $4.00 domestic; $4.30 foreign; $4.15 Canada. Entered as second-class matter April 19, 1943, at the post office at Lancaster, Pa., under the Act of March 3, 1879. Acceptance for mailing at the special rate of postage provided for in paragraphs (d-2), Section 34.40, P. L. & R. of 1948, authorized April 19, 1943.

ENTOMOLOGICAL NEWS

ENTOMOLOGICAL NEWS is published monthly, excepting August and September, by The American Entomological Society at Prince and Lemon Sts., Lancaster, Pa., and the Academy of Natural Sciences, 1900 Race Street, Philadelphia 3, Pa., U. S. A.

PHILIP P. CALVERT, Editor Emeritus. R. G. SCHMIEDER, Editor. Editorial Staff: E. J. F. MARX, M. E. PHILLIPS, J. A. G. REHN, and A. G. RICHARDS.

Subscription price, per yearly volume of 10 numbers: Domestic, $4.00; Foreign, $4.30; Canada, $4.15—U. S. Currency.

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ENTOMOLOGICAL NEWS

VOL. LXII NOVEMBER, 1951 No. 9

Two Notes on Corduliine Nymphs (Odonata: Libellulidae)

By ERICH SCHMIDT, Bonn (Rhine), Mozartstr. 22

1. NYMPHAL DIFFERENTIATION IN THE EUROPEAN *Somatochlora arctica* AND *alpestris*

At the end of June, 1935, the writer visited the Black Forest for collecting dragonflies and their nymphal skins. After a stay at Hinterzarten, in the environs of which some imagoes of *Somatochlora* were taken, he stopped also on the bog of Feldsee (1,111 m.), where besides these an Aeschnid imago, which from its extended blue coloration was at first believed to be an *Anax* male, was seen but escaped. Surely, this was the first specimen of *Aeschna coerulea* which I saw flying. Afterward, the bog (ca. 1,100 m.) near Spiesshorn was visited, and there additional imagoes of *Aeschna coerulea* were seen flying and were, in part, secured. The two boreo-alpine *Somatochlora* were more plentiful here, especially their nymphal skins; and those of *Leucorrhinia dubia* were even more common. Not before June 24, 1939, upon returning from a trip to southern Italy and Greece, did I touch the latter place near Spiesshorn again and spend there a most pleasant day, cloudy but without rain. Probably many preceding days had been sunny ones for I succeeded in collecting nearly 300 exuviae during 9 hours of this day in a boggy area of not more than 15 acres that contained several spots of open water. The absence of the reflection of sunlight from the water favored the finding of these exuviae. A third visit at nearly the same season in 1944 was a complete failure since only some scarce skins of *Leucorrhinia dubia* were

seen. Altogether, more than 150 exuviae of the two *Somatochlora* species were taken without the corresponding imagoes and, without doubt, needed identification.

It was easy, however, to find exuviae of *Somatochlora arctica* together with the newly emerged imago at Spiesshorn bog, where I mostly arrived at nearly the same season as Dr. F. Ris in Cierfs, Switzerland, who there discovered the two hitherto unknown nymphs of both *S. alpestris* and *S. arctica.* At the times of my arrivals at Spiesshorn bog *S. alpestris* was always fully developed as Ris also stated it was in Cierfs; but fortunately I succeeded in finding a male nymphal skin of the latter together with its imago on 26.VI.33 at Teufelskreise near Schneekopf (978 m.), Forest of Thuringia, and the exuviae found on 13.VII.41 at Maurizi bog near Gottesgab (1,028 m.), Erzgebirge, under the leadership of A. Schöttner, surely also belonged to *S. alpestris,* since *S. arctica* was missing there.

Ris was the first to describe these nymphs (1911, pp. 25–28, 32–34) and published a key to all Middle-European Corduliine nymphs. This key was completed for all Europe by Valle (1931, p. 50), who described the nymph of the holarctic *Somatochlora Sahlbergi* from Fennish Petsamo, and by Grassé (1930, pp. 9–14) with his description of the nymph of *Macromia splendens* from S. France. The key of May (1933, pp. 107–109) in *Somatochlora* is a mere copy of that of Ris (1911). Fraser (1949, p. 55) gave a key to the nymphs of the British species, in which he preferred other characters for both species than Ris, which, however, were also included in Ris' descriptions. Both Ris and Fraser had only a few exuviae of the two species at hand so that they were unable to appreciate the variation that exists in some characters. Perhaps E. M. Walker (1925, pp. 40, 42) knew of this when he remarked that the "typical *S. arctica* of northern Europe and Asia . . . differs very much less in form and coloration from *S. alpestris* than the American representatives of these two groups differ respectively from each other."

My own attempts at identifying the exuviae were at first not at all satisfactory and I was anxious to find a certain and

constant character for separating them. Beginning with the nymphal skins identified by the nearby newly emerged imago, I believed that the distribution of long hairs on the abdominal

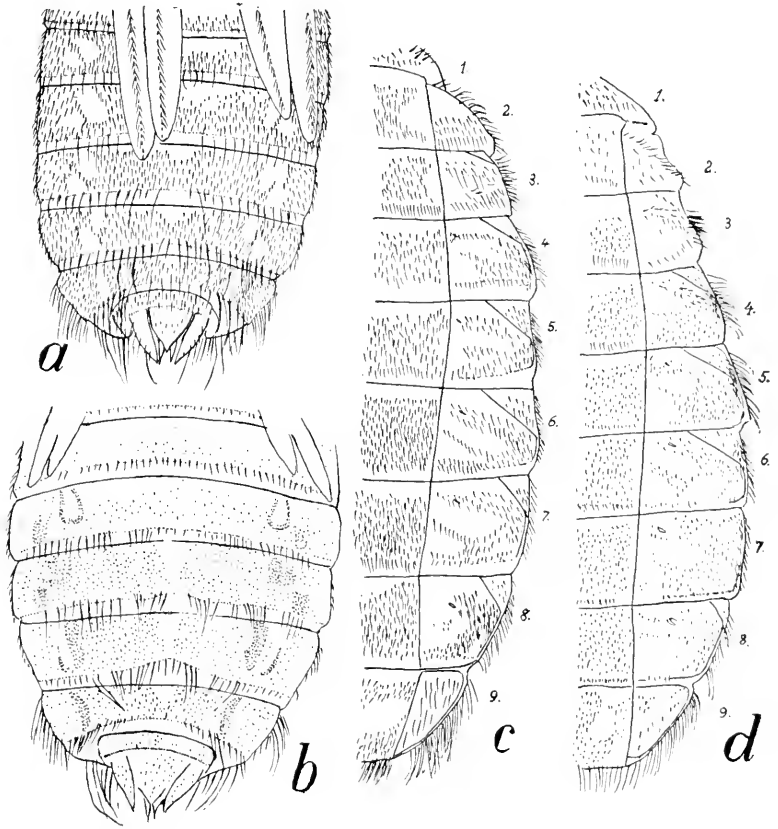

FIGURE 1

a, c *Somatochlora arctica* Zett. ♂ nymphal skin; b. d *S. alpestris* Selys ♂ nymphal skin, all from the bog near Spiesshorn, Black Forest, 24.VI.39. a, b abdominal segments 5–10, dorsal view; c, d left side of abdomen, ventral view; no. 1–9 are the segments.

surface might be the fundamental character that RIS suggested when he supposed that the nymphs of the two species appear to be different "prima vista." But this character is not the most

striking one. Probably I had supposed it was, for a long time, but did not recognize it and anticipate its importance until I had made a drawing of the end half of the abdomen of both species (fig. 1a, b). This striking character was at first not sufficiently noted in the erroneous supposition that it might depend on and vary in consequence of different degrees of extension of the abdominal segments in a longitudinal direction, and also with the thickness and volume of the whole abdomen as is the case in the more slender nymphs of *Aeschna* (cf. SCHMIDT, 1936, p. 55 f.). All other characters that are given in the literature fail, or are of lesser importance, as the following tables 1 and 2 will show.

TABLE 1. Characters of the Whole Body and Abdomen

No.	Character	*Som. arctica*	*Som. alpestris*	Result
1	Length of body	17–19 mm.	18.5–20.5 mm.	Overlapping
2	Shape of abdomen	Sides more parallel, blunt at the end	Fusiform, more acute at the end	Fundamental
3	Width of abdomen	6.2–7.0 mm.	6.5–7.5 mm.	Overlapping
4a	Length of caudal spines	0.8–1.3 mm.	1.0–1.3 mm.	Not satisfactory
4b	Length of segm. 10	0.3–0.5 mm.	0.3–0.5 mm.	Not satisfactory
4c	Relation 4a:4b	Mostly 1.0:0.4 = 2½	Mostly 1.3:0.4 = 3	Overlapping
5	Distribution of long hairs on abdomen (fig. 1a–d)	Longest on caudal border of segm. 6–9 and lateral of 8–9; long hairs also on nearly whole surface	Long hairs only on caudal border of segm. 6–9 and lateral of 8–9; very short hairs on other parts	Very useful
6	Patterns of abdomen (fig. 1a, b)	Naked paired spots of same color as surrounding parts on segm. 2–9	Dark naked paired spots on same segments as *S. arctica*	Doubtful and scarcely useful, only if skins are not bleached by the sun

Character 1 was obtained from 10 specimens; 3, 4 and 6 from five specimens of each species. The measurements of characters 1 and 3 were made by means of a simple ruler, those of 4a and 4b with the scale of a cross-table of my microscope, in the hope of avoiding an optical illusion. Character 2 was expressed in other terms than originally and should correspond more closely to actual conditions.

The following characters of the labium (mask) are all inconvenient since they are usually not visible from the outside on dry

skins without additional preparation (softening, etc.), and often the mask is covered by the antennae. Moreover, these characters are insufficient, as is shown by Table 2 which is compiled from 5 specimens of each species.

TABLE 2. Characters of the Labium (Mask)

No.	Character	*Som. arctica*	*Som. alpestris*	Result
7	Number of serrations on distal border	9–11, mostly 10	10–11, mostly 10	Not satisfactory
8	Number of spines on each serration	3–4–5	2–3–(4)	Overlapping
9	Number of labial setae	8–9, all equally common	7–9, mostly 8	Not satisfactory
10	Number of mental setae	9–13, mostly 12	13–14	Partly overlapping

The incisions on the distal border of the mask are deeper near the movable hook than on the base (lower part), and the number of spines (character 8) also varies and does not agree in any of the five specimens studied. Tables 3 and 4 show this variation.

Under these circumstances it seemed desirable to search for other characters that would be suitable for distinguishing the nymphs of these two species.

TABLE 3. Variation of Character No. 8 in *Som. arctica.*

Number of serration, counted from base	1	2	3	4	5	6	7	8	9	10
Maximum number of corresponding spines	14	4	5	5	5	5	3	3	2	1
Minimum number of corresponding spines	5	2	3	3	3	3	2	2	1	1
Most frequent number of spines	9	4	4	4	4	3	3	2	1–2	1

TABLE 4. Variation of Character No. 8 in *Som. alpestris.*

Number of serration, counted from base	1	2	3	4	5	6	7	8	9	10
Maximum number of corresponding spines	9	3	4	3	4	3	3	3	2	1
Minimum number of corresponding spines	2	2	2	3	3	2	2	2	1	—
Most frequent number of spines	2, 5, 6, 7	2, 3	3	3	3	3	3	2	1, 2	1

11. The first that I believed to be important in both males and females, was the *impression of the genitalia* on the inside of the skin, marks or prints that are visible on the outside if the surface is clean as is usually the case. In the male such marks appear on segm. 2, 3 and 9. Those on segm. 2 consist, in both *Somatochlora* species, of the inconspicuous lamina anterior (fig. 2d, e, *la*) and nearer the hind border is a pair of posterior hamules (*ha*); between the latter a median print is visible, probably the sheath of the penis (ligula). The third segment bears the impression of the penis that appears as a conspicuous, nearly circular vault with different but somewhat variable processes. The shape of the hamules and the color of the ligula give useful characters (see the key, below. The print of segm. 9 was not studied.

In the female, some prints are visible only on segm. 8 and 9. A pair of triangular tubercles between the two segments are most conspicuous, but the different characters are not very remarkable (fig. 2f-h).

12. But some weeks ago, I was astonished to discover quite another character, one that suggested the writing of this paper. It was the difference in the *distribution of the "triangular sclerites"* in the two species of *Somatochlora* (fig. 1c, d; see SCHMIDT, 1951, ENT. NEWS, pp. 125–134). The presence or absence of these sclerites, especially on abdominal segment 7, agreed completely with RIS' fundamental characters of the shape of abdomen and the arrangement of long hairs (characters 2 and 5). This character was compared on 73 exuviae of *S. arctica,* which has the sclerites on segm. 4–8, and on more than 80 of *S. alpestris,* where they are missing on segm. 7. In the latter species the triangular sclerites were mostly present also on segm. 8, except on one male and one female skin where they were absent. This character is easily visible with only a little enlarging if skins are clean, as is mostly the case.

13. The presence or absence of *divided setae,* however, at the distal end of fore tibia was difficult to see, apparently, in all *Somatochlora* nymphs; it seems that only very few such setae occur here, and not even regularly. These setae—I succeeded in finding not more than 3 setae in only one exuviae of *S. metallica*

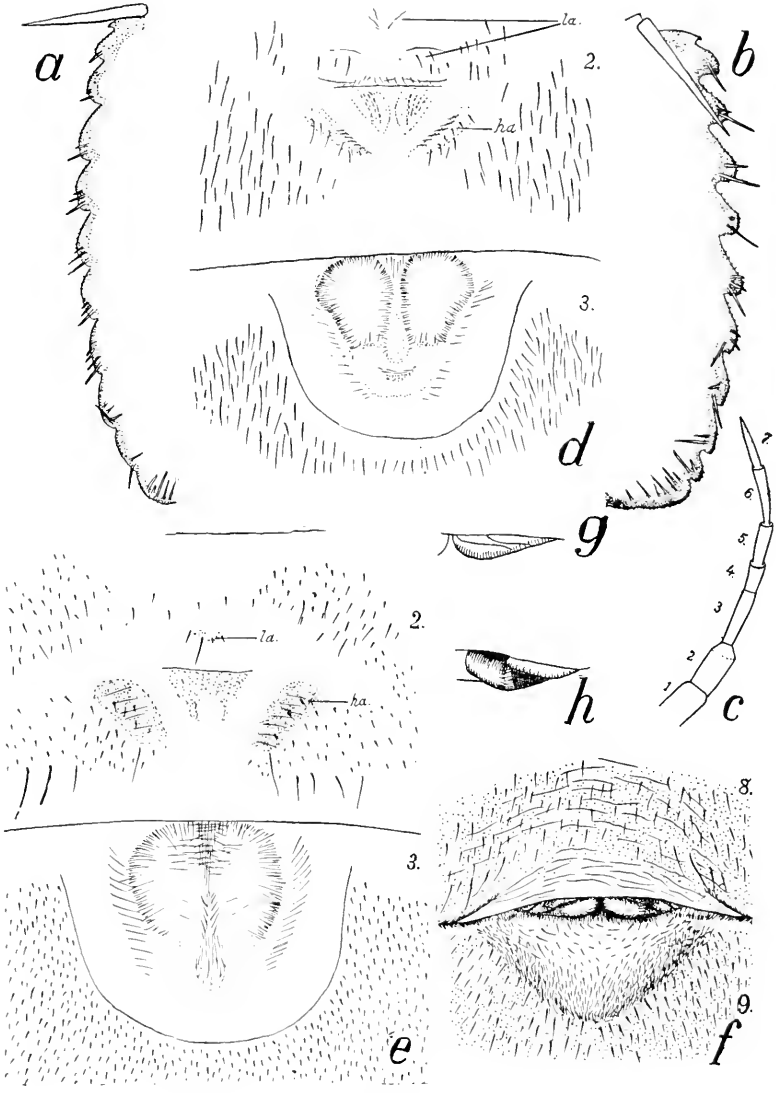

FIGURE 2

a, d, g *Somatochlora arctica* Zett.; b, c, e, f, h *S. alpestris* Selys; nymphal skins from the bog near Spiesshorn, Black Forest, 24.VI.39.

a, b distal border of labium with movable hook; c antenna; d, e prints of male genitalia on abd. segm. 2 and 3; *la* lamina anterior; *ha* posterior hamules; f print of female genitalia on abd. segm. 8–9; g, h left tubercle of female exuviae between segm. 8 and 9.

and another of *S. alpestris* among several skins studied of both species and of *S. arctica*—are restricted to a small heap on distal end of fore tibia, while other genera, such as *Epitheca, Cordulia* (see SCHMIDT, 1944, textfig. 3d) and the nymph described below, show a long row of such setae extending from the distal end of the tibia to the first two joints of the tarsi.

The result of these studies is the following key to the nymphs of both species, preceded by some characters that are common to them.

Both species have neither lateral nor dorsal spines on the abdomen. Legs moderately long. Antennae with 7 joints, the third and sixth being the longest (fig. 2c), while *S. metallica* and *S. flavomaculata* have only 3rd joint longest (as in fig. 3c). Very long hairs on caudal border of abdominal segments 6–9, and on lateral border of 8–9. Distal border of labial mask with 9–11 serrations, mostly 10, the incisions near movable hook deeper than the others; 7–9 labial setae on both sides.

A. Smaller and narrower on the average. Total length of body of exuviae 17–19 mm.; abdomen with more parallel sides, more blunt at the end (fig. 1a), its greatest width 6.2 – 7.0 mm. Long hairs on the greater part of surface of abdomen except on paired lateral spots on segm. 2–9, the long hairs present also on underside (fig. 1a, c). Triangular sclerites on segm. 4–8 (fig. 1c). 3–5, mostly 3–4, spines on middle serrations of distal border of labium (fig. 2a); mental setae 9–13, mostly 12. ♂: Between the dark, relatively narrow *imprints* of posterior hamules a dark, often paired, print of the ligula is visible; on segm. 3 the print of the penis with a median, caudal, transversely furrowed prolongation (fig. 2d). ♀: No vault on segm. 9; the two tubercles between segm. 8 and 9 less prominent, some oblique, but not deep grooves not very conspicuous (fig. 2g). . . . . *S. arctica*

B. Larger and broader on the average. Total length of body of exuviae 18.5 – 20.5 mm; abdomen more fusiform, somewhat acute at the end (fig. 1b), its greatest width 6.5 – 7.5 mm. No long hairs on abdominal surface (fig. 1b, d), except some borders of segments mentioned above. Triangular sclerites on segm. 4–6, mostly also on segm. 8, never on 7 (fig. 1d). 2–3 (rarely 4) spines on each serration of distal border of labial mask (fig. 2 b); mental setae 13–14 on each side. ♂: Between the dark, relatively wide paired prints of the posterior hamules

on abd. segm. 2 a light unpaired print is visible; print of penis on segm. 3 with one not always visible pair of caudal prolongations (fig. 2e). ♀: Segm. 9 with a slight vault near anterior border; tubercles between 8th and 9th segment bear an oblique deep groove (fig. 2f, h). ..... *S. alpestris*

2. The Supposed Nymph of the Chilean *Paracordulia tomentosa* (Fabr.) *

In the Schönemann collection of Chilean insects purchased by the Zoological Museum of the University of Berlin a female exuviae is preserved with the label, "Cauquénes, Auf einem Baum, am Fluss . . . , sept. 1894." This nymphal skin has a total length of 24 mm., and, from its similarity to the well-known nymph of the European *Epitheca bimaculata*, it belongs probably to the subfamily Corduliinae.

There are, however, two Corduliine species known from Chile as imagoes, *Gomphomacromia paradoxa* Brauer and *Paracordulia tomentosa* (Fabr. = *villosa* Ramb. teste E. M. Walker, 1925, p. 16), both species being represented by imagoes also from Cauquénes. *Gomphomacromia paradoxa*, a common insect in Chile, with surely a most interesting but still unknown nymph, had an imaginal abdomen ca. 24–27 mm. in length; the other species, also not rare, is larger and its imaginal abdomen measures ca. 32 mm. Since the present nymphal skin is relatively large, we conclude that it belongs to the larger imago, that is, to *Paracordulia tomentosa* (Fabr.). We may suppose also that the hitherto unknown nymph of *Gomphomacromia paradoxa* will be found to have triangular sclerites on several segments of the abdomen.

The present nymphal skin is somewhat smaller than that of *Epitheca bimaculata* which measures ca. 28 mm. It has the two

* And now (five months after having submitted the manuscript for this paper) I have received from Argentina a reprint of the work by Needham and Bullock of 1943 entitled, "The Odonata of Chile," from the Zoological Series of the Field Museum of Natural History, Vol. 24, no. 32. Here, under the name *Anticordulia villosa* (Ramb.) there is described, very obviously, the same animal. The descriptions differ somewhat from each other since the two authors lay unequal stress upon the different characters.

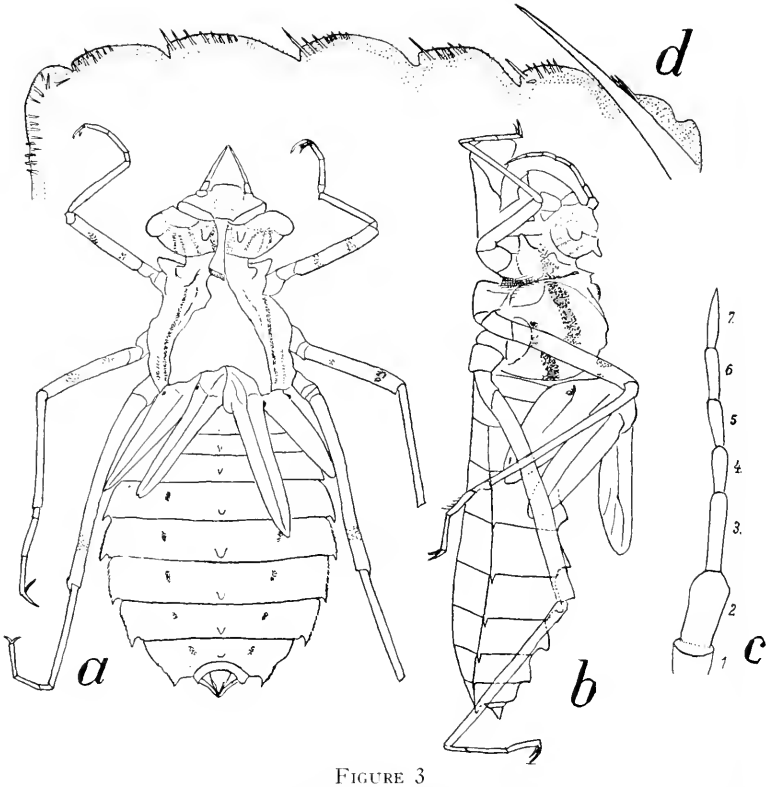

FIGURE 3

Supposed nymph of *Paracordulia tomentosa* (Fabr.), Cauquénes, Chile; female, Sept. 1894, leg. Schönemann.

a total dorsal view; b same, seen from left side; c antenna; d distal border of labial mask.

occipital processes (fig. 3a, b) of *Epitheca*, but they are larger. The head has a frontal border; the back edges are more rounded than in *Epitheca*. Lateral lobes of labial mask have only 7 serrations on each side (fig. 3d), not as deep as in *Epitheca*, each bearing 7 spines in the middle part of the row; mental and labial setae 7 on each side. Prothorax laterally with a conspicuous process which is directed laterally (not frontally, as in *Epitheca*), blunt and rounded behind. Antennae (fig. 3c) with 7 joints, the third being the longest (as in *Epitheca*). Lateral brown bands of thorax similar to those of *Epitheca* and *Cordulia*. At

base of each wing sheath a dark brown hump is present, as in *Epitheca*. Greatest width of abdomen 11 mm. (as in *Epitheca*); lateral abdominal spines present on segm. 5–9 (fig. 3a) (in *Epitheca* only on 8 and 9, but much larger), increasing slightly in size towards the end of abdomen; dorsal spines on segm. 3–9 (fig. 3b), those on 4–8 large but blunt (in *Epitheca* segm. 2–9 with very acute dorsal spines); segm. 4–8 (–9) each with a pair of lateral longitudinal brown spots of half of length of one segment, situated near middle between dorsal and lateral spines; ventral side without triangular sclerites (as in *Epitheca*); in median line of caudal end of 8th sternite two small trigonal tubercles are visible, the rudiments of female genital processes; on segm. 6, lateral from the spiracle near anterior border of the segment, a conspicuous transverse groove corresponds to an interior apodeme (as in *Epitheca*). Legs long, femora 1–2 with two not very conspicuous darker bands on upper side; distal end of tibia and first and second joints of tarsi of fore legs on underside with numerous divided setae in a longitudinal row (in *Epitheca*, same on all legs!). Hind femora 9 mm. long, with only one dark apical band.

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Notes on the Genus Aterpia Gn. (= Esia Heinr.) (Lepidoptera, Tortricidae) *

By Nicholas Obraztsov, Munich, Germany

The genus *Esia* Heinr. was described by Heinrich (1926) with the Nearctic species *approximana* (Heinr.) as genotypus. As additional species of this genus, Heinrich named two Palearctic species, *charpentierana* (Hb.) and *spuriana* (HS.). My studies on the Palearctic Tortricidae have convinced me of the correctness of Heinrich's classification and I have established that one more species also belongs to the same genus. This is *sieversiana* (Nolck.). In this way the genus *Esia* consists of a single Nearctic and three Palearctic species. The present paper is occupied with the nomenclature of the genus and with that of the species which is usually known as *charpentierana* (Hb.) and brings a list of Holarctic species including their synonymy.

Guenée has published a genus which he named *Aterpia* Gn. This genus was established for *anderreggana* Gn. and was stated to be monotypic. The species of Guenée is, according to Joannis (Ann. Soc. Ent. France 88, 1919, p. 9), an old name for *spuriana* (HS.). As this species is congeneric with *approximana* (Heinr.), there is no doubt that *Esia* Heinr. 1926 is a subjective synonym of *Aterpia* Gn. 1845. On the strength of priority, the latter name must be used instead of *Esia* Heinr.

The specific name *charpentierana* (Hb. 1822) is not the oldest of the species which is usually known under this name. According to Herrich-Schäffer (Syst. Bearb. Schm. Eur. 4, 1851, p. 218) *charpentierana* is the same species which Fischer v. Röslerstamm found in the collection of Schiffermiller under the name of *corticana* (Schiff. 1776). The original description of *corticana* does not contradict this evidence and is as follows: "Dunkelgrau und weißgefleckter W.[ickler]." Charpentier (Zinsler, Wickler etc., 1821, p. 85), who saw also the types of

* Contribution from the Zoological Collection of the Bavarian State, Division of Entomology.

corticana in the collection mentioned earlier than Fischer v. Röslerstamm, compared those with *Argyroploce schulziana* (F.) = *pinetana* (Hb.) and found them smaller and more brownish gray than *schueziana*. Werneburg (Beitr. Schm.-Kunde 1, 1864, p. 554) did not doubt that Charpentier and Fischer v. Röslerstamm saw the same original specimens of *corticana* (Schiff.) in the collection of Schiffermiller.

It is no fortuity that Hübner (1822–23) named this species *charpentierana* as he considered the view of Charpentier to be erroneous and, I suppose, he intended in this way to point out the merit of Charpentier as discoverer of a new species. Hübner conceived as *corticana* two other species, but we have no proof that he was familiar with all the original specimens of *corticana* in Schiffermiller's collection. If he had seen them he would have been probably not so uncertain in the determination of this species! Hübner (Samml. eur. Schm., Tortr., 1796–99, t. 3, fig. 13) designated as *corticana* first of all the species which is known at present as *Apotomis turbidana* Hb. He himself later perceived this error and replaced the erroneous name of *corticana* (Hb., non Schiff.) by that of *turbidana* (Hübner, Verz. bek. Schm., 1825, p. 380). Hübner (Samml. eur. Schm., Tortr., 1811–13, t. 33, fig. 209; 1818–19, t. 43, fig. 270) has moreover designated as *corticana* another species, i.e., the modern *Zeiraphera isertana* (F.). Soon he changed this name to *kuhlweiniana* (Hübner, 1825, p. 377) and made use of *corticana* Hb. only for designation of Hb. fig. 270. Compared with the original description of *corticana* (Schiff.) this figure is not the species mentioned.

In this way the deposition of Fischer v. Röslerstamm is a single perceptible one and I will agree with Herrich-Schäffer (l.c.): *corticana* (Schiff.) = *charpentierana* (Hb.).

List of the Holarctic Species of the Genus Aterpia Gn.

Genus **Aterpia** Gn. 1845

Aterpia Guenée, Ann. Soc. Ent. France (2) 3, 1845, p. 161.—Genotype: *Aterpia anderreggana* Gn. 1845.

Olethreutes (part.) Heinrich, Ins. Ins. Mens. 7, 1919, p. 65.

Esia Heinrich, U. S. Nat. Mus., Bull. 132, 1926, p. 109.—Genotype: *Olethreutes approximana* Heinr. 1919.

Nearctic species

approximana (Heinr.).

approximana Heinrich, Ins. Ins. Mens. 7, 1919, p. 65 (Olethreutes).—Canada m.; U.S.A. s.or.

Palearctic species

corticana (Schiff.).

corticana Schiffermiller, Syst. Verz. Schm. Wien. Geg., 1776, p. 131 (Phalaena); *charpentierana* Hübner [Samml. eur. Schm., Tortr., 1822–23, t. 45, fig. 281; non bin.], Syst.-alph. Verz., 1822, p. 59 (Olethreutes); ? *interruptana* Frölich, Enum. Tortr. Würt., 1828, p. 70 (Tortrix); ? *bipunctana* (part.) Lederer, Wien. Ent. Monatschr. 3, 1859, p. 287 (Penthina).—Europa c.; Gallia m.; Balticum or.; Rossia s.oc.

sieversiana (Nolck.).

sieversiana Nolcken, Arb. Naturf.-Ver. Riga, 1870, p. 407 (Penthina).—Suecia; Balticum or.; Bavaria m.; Sibiria m.or.

anderreggana Gn.

anderreggana Guenée, Ann. Soc. Ent. France (2) 3, 1845, p. 161 (Aterpia); *spuriana* Herrich-Schäffer, Syst. Bearb. Schm. Eur. 4 [Tortr., 1849, t. 47, fig. 334; non bin.], 1851, p. 211 (Sericoris); *andereggiana* Kennel, Pal. Tortr., 1913, t. 16, fig. 41–42 (Argyroploce; nom. emend.); *andereggana* Joannis, Ann. Soc. Ent. France 88, 1919, p. 9 (Aterpia; non. emend.).—Alpes Europae c.

ab. *rebeliana* Mitterberger, Soc. Ent. 27, 1912, p. 19 (Olethreutes).

Notice of Proposed Suspension of the Rules of Zoological Nomenclature

Applications to be published in Bull. Zool. Nomencl., Vol. 2, pt. 11, include: *Nysius* Dallas, 1852 and *Arthroneis* Spinola, 1837 (File 181). In Vol. 6, pt. 2: *Laternaria* Linnaeus, 1764, proposed suppression of, and validation of *Fulgora* Linnaeus, 1767 (File 162). *Geotrupes* Latreille, 1796 (File 338). *Lipeurus, Colpocephalum, Gyropus,* all of Nitzsch, 1818 (File 343).

Specialists that desire to comment on these applications please write to Francis Hemming, 28 Park Village East, Regent's Park, London N. W. 1, England before March 28, 1952, giving the file number.

Current Entomological Literature

COMPILED BY R. G. SCHMIEDER

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia and the University of Pennsylvania, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the year 1951 unless otherwise noted. Continued papers, with few exceptions, are recorded only at their first installment.

For other records of general literature and for economic literature, see the Bibliography of Agriculture, Washington, and the Review of Applied Entomology, Series A, London. For records of papers on medical entomology see Review of Applied Entomology, Series B.

NOTE: The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the List of periodicals and serials published in our January and June issues. The number of the volume, and in some cases, the part, heft, &c. is followed by a colon (:). References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to Neotropical species, and not so indicated in the title, have the symbol (S).

Papers published in ENTOMOLOGICAL NEWS are not listed.

GENERAL—Arcangeli, A.—Teoria sulla origine del gonocorismo dall'ermafroditismo primario e sulla origine dal gonocorismo della partenogenesi, dell'ermafroditismo secondario e della intersessualità. [Boll. Ist. e Mus. Zool. Torino] 2 (1949–50): 237–557. **Bartlett, B. R.**—A new method for rearing Drosophila and a technique for testing insecticides with this insect. [37] 44: 621. **Carvalhaes, J.**—Significado ecológico do mimetismo nos insectos. 4. [Broteria] 20: 64–65. **Chauvin, R.**—Méthodes de mesures physiques et méthodes de prélèvement en écologie entomologique. [L'Année Biol.] 27: 313–23. **DeBacker, S.**—Techniques d'étude des microclimats en écologie terrestre. [L'Année Biol.] 27: 297–308. **Dobzhansky, T. and H. Levene**—Development of heterosis through natural selection in experimental populations of Drosophila pseudoobscura. [3] 85: 247–64. **Dominicis, A. de**—In memoria di Filippo Silvestri. [Ann. Fac. Agr. Portici] 17: I–XVII (Obit. and portr.), 1948–49. **Franz, H.**—État de nos connaissance sur la microfaune du sol. [L'Année Biol.] 27: 241–54. **Hassall, A., M. A. Doss and J. M. Humphrey**—Index-catologue of medical and veterinary zoology. Part 14, authors S to Schweig., pp. 4349–4676. U. S. Dept. Agr., $1.25. **Hodgden, B. B.**—Some entomological aspects of a flood emergency. [52] 11: 94–95. **Huffaker, C. B.**—The return of native perennial bunchgrass following the removal of Klamath weed (Hypericum perforatum L.) by imported beetles. [26] 32: 443–58. **Kettle, D. S.**—Some factors affecting the population density and flight range of insects. [68] 26: 59–63. **Ludwin, I.**—Natural selection in Drosoph-

ila melanogaster under laboratory conditions. [100] 5: 231–42. **Marcuzzi, G.**—Notas preliminares sobre la fauna y flora de la Isla de Margarita. [Mem. Soc. Cien. Nat. La Salle] 10: 207–56, 1950. **Masi, L.**—Filippo Silvestri. [Mem. Soc. Ent. Ital.] 29: 125–35 (Obit., portrait), 1950. **McAtee, W. L. and J. S. Wade**—Raymond Corbett Shannon, 1894–1945. [65] 53: 211–22 (Biographical sketch and bibliography). **Muesebeck, C. F. W., A. B. Gahan and E. R. Sasscer**—Sievert Allen Rohwer, 1888–1951. [65] 53: 227–30 (Obit., portrait). **Paclt, J.**—Concerning orthography of scientific names. [80] 114: 63–64. **Pavan, M.**—Ricerche sperimentali sul comportamento degli artropodi. I. Apparecchio per lo studio delle tassie. [Boll. Soc. Ent. Ital.] 80: 27–32, ill., 1950. **Piemeisel, R. L., F. R. Lawson and E. Carsner**—Weeds, insects, plant diseases, and dust storms. [81] 73: 124–28. **Polivka, J. B.**—Effect of insecticides upon earthworm population. [58] 51: 194–96. **Renden, J. M.**—Mating of ebony vestigial and wild type Drosophila melanogaster in light and dark. [100] 5: 226–30. **Ripper, W. E., R. M. Greenslade and G. S. Hartley**—Selective insecticides and biological control. [37] 44: 448–59. **Schneirla, T. C.**—Bees (A review of: Bees—their vision, chemical senses, and language by Karl von Frisch). [26] 32: 562–65. **Shenefelt, R. D. and J. T. Medler**—Should a "Law of Recency" be added to the International Code of Zoological Nomenclature? [80] 114: 154–46. **Skerrett, E. J., A. Stringer and D. Woodcock**—The insecticidal action of DDT. [Biochem. Jour.] 49 (2): Proc. Biochem. Soc., pp. xxviii–xxix. **Snodgrass, R. E.**—Anatomy and morphology. [45] 59: 71–73. **Springer, P. F. and J. R. Webster**—Biological effects of DDT applications on tidal salt marshes. [52] 11: 67–74. **Stanley, J.**—The autotrephon: an apparatus for rearing insects under controlled conditions with automatic time-controlled withdrawal of samples. [26] 32: 413–442, ill. **Sudia, W. D.**—A device for rearing animals requiring a flowing water environment. [58] 51: 197–202. **Thomas, E. S.**—Distribution of Ohio animals. [58] 51: 153–67. **Tilden, J. W.**—The insect associates of Baccharis pilularis de Cand. [50] 16: 149–88. **Ullyett, G. C.**—Insects, man and the environment. [37] 44: 459–64. **Weiss, H. B.**—Rodrigues Ottolengui, 1861–1937. [45] 59: 93–98.

ANATOMY, PHYSIOLOGY, MEDICAL—Agrell, I.—The diapause problem. [L'Année Biol.] 27: 287–95. **Ball, H. J. and S. D. Beck**—The role of the circulatory and

nervous systems in the toxic action of parathion. [37] 44: 558–64. **Barr, A. R. and L. Kartman**—Biometrical notes on the hybridization of Culex pipiens L. and C. quinquefasciatus Say. [46] 37: 419–20. **Berio, E.**—Descrizione dell'articolazione dell'addome sul torace nei Chrysididi (Hym.). [Mem. Soc. Ent. Ital.] 29: 112–16, 1950. **Blower, G.**—A comparative study of the Chilopod and Diplopod cuticle. [74] 92: 141–61. **Bonhag, P. F.**—The skeleto-muscular mechanism of the head and abdomen of the adult horsefly (Diptera: Tabanidae). [83] 77: 131–202, ill. **Brunet, P. C. J.**—The formation of the ootheca by Periplaneta americana. I. The micro-anatomy and histology of the posterior part of the abdomen. [74] 92: 113–27. **Buchli, H.**—Les potentialités évolutives des castes chez Reticulitermes de Saintonge. [C. R. Acad. Sci.] 233: 206–08. **Burtt, E.**—The ability of adult grasshoppers to change color on burnt ground. [68] 26: 45–48, ill. The occurrence of fully winged forms in usually brachypterous African Pyrgomorphinae. *Ibid.* 64–66, ill. **Caspers, H.**—Rhythmische Erscheinungen in der Fortpflanzung von Clunio marinus (Dipt., Chiron.) und das Problem der lunaren Periodizität bei Organismen. [Arch. Hydrobiol.] Suppl. Bd. 18: 415–594, ill. **Dunn, E.**—Wing coloration as a means of determining the age of the Colorado potato beetle (Leptinotarsa decemlineata Say). [4] 38: 433–34, ill. **Elkins, J. C.**—Head capsule of the Hemipteran, Triatoma sanguisuga (LeC.). [Field and Lab., Dallas] 19: 128–32. **Ehrlich, I.**—Ueber das verhalten der Geschlechtschromosomen von Acanthaclisis occitanica Vill. (Neuroptera) während der meiotischen Prophase. [Glasnik Biol. Sek., Zagreb] 2/3: 168–69, 1950. **Gambaro, P.**—Lo stadio ibernante dell'Aspidiotus perniciosus Comst. [Atti Ist. Venet. Sci. Lett. Art. Cl. Sci. mat. e nat.] 108: 139–43. **Geigy, R. und E. Ernst**—Einfluss der Luftfeuchtigkeit auf die Lebensdauer verschiedener Termitenarten im Hungerversuch. [Rev. Suisse Zool.] 58: 414–20. **Geigy, R. und U. Rahm**—Beiträge zur experimentellen Analyse der Metamorphose von Sialis lutaria L. (Megaloptera). [Rev. Suisse Zool.] 58: 408–13. **Geiszler, G.**—Keimzellenstudien. II. Das Verhalten der Plasmakomponenten während der Spermatogenese bei Insekten (Chrysochraon dispar (Orth.) und Notonecta glauca (Rhynch.). [Zeitschr. wiss. Zool.] 156: 200–58, 1944. **Goldschmidt, R. B.**—The maternal effect in the production of the Bd-M-intersexes in Drosophila melanogaster. [41] 117: 75–110. **Grandori, R. e L., D.**

Facetti—Effetti tossici selettivi della carbacolina su alcune specie di insetti. [Boll. Zool. Agr. Bach.] 17: 123–28. **Grandori, R. e L., Carè, E.**—Sulla presenza di cellule giganti nel sistema nervoso centrale di Musca domestica L. [Boll. Zool. Agr. Bach.] 17: 93–99, ill. **Green, A. A.**—The control of blowflies infesting slaughter houses. I. Field observations of the habits of blowflies. [4] 38: 475–94. **Hackman, R. H.**—The chemical composition of the wax of the white wax scale, Ceroplastes destructor (Newstead). [Arch. Biochem. Biophys.] 33: 150–54. **Haget, A.**—Quelque précisions sur le phénomène d'induction dans la morphogenèse de l'intestin moyen chez l'embryon de Leptinotarsa (Coleop.). [C. R. Acad. Sci.] 232: 2480–82. **Hassanein, M. H.**—Studies on the effect of infection with Nosema apis on the physiology of the queen honey-bee. [74] 92: 225–31. **Hassett, C. C. and D. W. Jenkins**—The uptake and effect of radiophosphorus on mosquitoes. [Physiol. Zool.] 24: 249–66. **Hoffman, R. A. and A. W. Lindquist**—Studies on treatment of flies with radioactive phosphorus. [37] 44: 471–73. **Jones, B. M.**—The sensory physiology of the harvest mite Trombicula autumnalis Shaw. [40] 27: 461. **Katô, M. and M. Toriumi**—Studies on the associative ecology of insects. III. Nocturnal activity of Culex tritaeniorhynchus Giles and Anopheles hyrcanus sinensis Wied. [Sci. Rpts., Tôhoku] ser. 4, 19: 1–6. **La Greca, M.**—L'evoluzione delle pleure pterotoraciche degli insetti Blattotteroidi. [Boll. Zool., Torino] 16: 119–29, ill., 1949. **Lawson, F. A.**—Structural features of the oothecae of certain species of cockroaches. [5] 44: 269–85, ill. **Lerma, B. de**—Sulla presenza di cellule giganti nel cerebron e nella massa gangliare sottoesofagea dei Coleotteri. [Boll. Zool., Torino] 16: 169–77, 1949. **Levenbook, L.**—The variation in fat and glycogen content of bot fly (Gatrophilus intestinalis) larva tracheal organ during development. [40] 28: 173–80. The effect of carbon dioxide and certain respiratory inhibitors on the respiration of larvae of the horse bot fly. (G. intest.). *Ibid.* 221–45. **Lüdtke, H.**—Ueber retinomotorische Erscheinungen im Insektenauge. [Naturwiss.] 38: 285–87. **Lüscher, M.**—Ueber die Determination der Ersatzgeschlechtstiere bei der Termite Kalotermes flavicollis Fabr. [Rev. Suisse Zool.] 58: 404–08. **Mercier-Parot, M.**—Action de la température sur la transmission par les Drosophiles femelles de la sensibilité héréditaire au gaz carbonique. [Bull. Biol. Fr. Belg.] 85: 226–36. **Meyer,**

G. F.—Versuch einer Darstellung von Neurofibrillen im zentralen Nervensystem verschiedener Insekten. [Zool. Jahrb., Abt. Anat.] 71: 413–26, ill. **Monterosso, B.**—Note araneologiche. XXII. Partenogenesi in Teutana triangulosa. [Boll. Accad. Gioenia] Serie IV, fasc. 2: 103–12, 1949. XVI. Deposizione delle uova e contruzione del bozzolo in Teutana triangulosa (Wolk). *Ibid.* Serie 3, fasc. 21: 17–38, 1948. **Oertel, E., E. A. Fieger, V. R. Williams and E. A. Andrews**—Inversion of cane sugar in the honey stomach of the bee. [37] 44: 487–92. **Petit, C.**—Le rôle de l'isolement sexuel dans l'evolution des populations de Drosophila melanogaster. [C. R. Acad. Sci.] 232: 2482–84. **Pimentel, D., J. E. Dewey and H. H. Schwardt**—An increase in the duration of the life cycle of DDT-resistant strains of the house fly. [37] 44: 477–81. **Precht, H.**—Experimentelle Untersuchungen über Geotaxis, Geomenotaxis und Schwerezubegrenzung. [Zeitschr. wiss. Zool.] 156: 332–64, 1944. **Pujatti, D.**—Acanthellae di Moniliformis dubius (Acanthocephala) nella Periplaneta australasiae F. (Blattidae) in Sud-India. [Mem. Soc. Ent. Ital.] 29: 110–11, ill., 1950. **Reali, G.**—Interferenza dei centri nervosi cefalo-toracici sull'azione dell'atropina, pilocarpina ed eserina in larve di Galleria mellonella L. [Boll. Zool. Agr. Bach.] 17: 59–79. **Risler, H.**—Der Kopf von Bovicola caprae (Gurlt) (Mallophaga). [Zool. Jahrb., Abt. Anat.] 71: 325–74, ill. **Ronsisvalle, C.**—Influenza della temperatura sullo sviluppo embrionale dei Ragni. [Boll. Acc. Gioenia] Serie IV, fasc. 3: 158–68, 1949. **Rosin, S.**—Zur Entwicklungsphysiologie der Mutante Pearl (Pl) von Drosophila melanogaster. [Rev. Suisse Zool.] 58: 398–403. **Satô, S.**—Development of the compound eye of Culex pipiens var. pallens Coq. [Sci. Rpts., Tohôku Univ.] ser. 4, 19: 23–28, ill. Larval eyes of Culex pipiens var. pallens. *Ibid.* 29–32, ill. **Schulze, P.**—Vergleichend-morphologische Untersuchungen über die Augen der Schildzecken (mit Ausblicken auf die mutmassliche Trilobitenverwandschaft der Ixodides). [Zool. Jahrb., Abt. Anat.] 71: 289–324, ill., 1951. (Summary in: Verh. deutch. Zool. 1948, 90–95, 1949.) **Schwinck, I.**—Veränderungen der Epidermis, der Perikardialzellen und der Corpora allata in der Larvenentwicklung von Panorpa communis L. unter normalen und experimentalen Bedingungen. [Roux' Arch.] 145: 62–108. **Spiller, D.**—Digestion of alphacellulose by larvae of Anobium punctatum DeG. [53] 168: 209–10. **Stride, G. O. and E. W. Yemm**—The nutrition of

the dried fruit beetle Carpophilus hemipterus. [Biochem. Jour.] 49 (2): Proc. Biochem. Soc., p. xxvi. **Takaoka, M.**—Studies on the metamorphosis of insects. I. Partial puparium formation in Drosophila melanogaster. [Sci. Rpts., Tohôku] ser. 4, 19: 88–90. **Umeya, Y.**—Studies on embryonic hibernation and diapause in insects. [Proc. Japan Acad.] 26: 1–9. **Urbani, E.**—Studio comparativo della massa di Giardina nei Dytiscidae. [Lincei Rend. Sc. fis. mat. e nat.] 9: 384–89, ill., 1950. **Vachon, M.**—Les glandes des chélicères des Pseudoscorpios (Arachnides). [C. R. Acad. Sci.] 233: 205–06. **Voy, A.**—Étude de la croissance chez deux espèces d'Orthoptéroides: Blatta orientalis L. (Blattidae), Carausius morosus Br. (Phasmidae). [Bull. Biol. Fr. Belg.] 85: 237–65. Croissance régénétrice au cours des cinq ages de la phase larvaire chez phasme (Carausius morosus Br.). [C. R. Acad. Sci.] 233: 209–11. **White, M. J. D. and N. H. Nickerson**—Structural heterozygosity in a very rare species of grasshopper. [3] 85: 239–46, ill. **Wiesmann, R.**—Ueber einen biologischen Test zum Nachweis und zur Bestimmung von synthetischen Kontacktinsektiziden bei Bienenvergiftungen. [Zeitschr. Pflanzenkr. (Pflanzenpath.) Pflanzenschutz.] 58: 161–71. **Wykes, G. R.**—The preferences shown by honey-bees for certain nectars. [4] 38: 546.

ARACHNIDA AND MYRIOPODA—Blower, G.—(See under Anatomy.) **Camargo, H. F. deA.**—Contribuição ao estudo das Aranhas Brasilieras (Araneae). [Papeis Avulsos] 9: 223–48 (*). **Jones, B. M.**—(See under Anatomy.) **Lipovsky, L. J.**—A new genus of Walchiinae (Acarina, Tromb.). [43] 24: 95–102, ill. **Mello-Leitão, C. de**—Famílias, subfamília, espécies e gêneros novos de Opiliões e notas de sinonimia. [Bol. Mus. Nac. n.s. Zool.] No. 94: 1–33, ill., 1949. **Monterosso, B.**—(See under Anatomy.) **Panouse, J.-B.**—Sur la systematique des Solifuges. [Bull. Mus. Nat. d'Hist. Nat.] 22: 717–22. **Ronsisvalle, C.**—(See under Anatomy.) **Schubart, O.**—Novos Diplópodos do Brasil. [Papeis Avulsos] 9: 145–57, ill. **Schulze, P.**—(See under Anatomy.) **Soares, B. A. M. e H. E. M.**—Alguns opiliões do sul do Brasil. [Papeis Avulsos] 9: 47–60. **Vachon, M.**—A propos d'une association phoretique: Coleoptere-Acariens-Pseudoscorpions. [Bull. Mus. Nat. d'Hist. Nat.] 22: 728–33. (See also under Anatomy.)

SMALLER ORDERS—Barnhart, C. S.—A new silverfish of economic importance found in the United States

(Thysanura). [58] 51: 184–86, ill. **Bick, G. H.**—Notes on Oklahoma dragonflies. [47] 26: 178–80. **Buchli, H.**—Termites. (See under Anatomy.) **Despax, R.**—Plécoptères. [Faune de France] 55: 1–280, ill. **Geigy and Ernst**—Termites. (See under Anatomy.) **Guimarães, L. R.**—Sobre uma nova espécie de Pterophthirius Ewing 1923 (Anoplura). [Papeis Avulsos] 9: 83–88, ill. Sobre alguns gêneros e espécies de Heptapsogastridae (Mallophaga). *Ibid.* 249–58, ill. Pequenas notas sobre Melafagos. II. *Ibid.* 321–40, ill. **Harwell, J. E.**—Notes on the Odonata of northeast Texas. [Texas Jl. Sci.] 3: 204–07. **Kimmins, D. E.**—New species of Neuroptera from the Solomon Islands. [6] ser. 12, 4: 780–85. **Lüscher, M.**—Termites. (See under Anatomy.) **Penn, G. H.**—Seasonal variation in the adult size of Pachydiplax longipennis (Burmeister). (Odonata.) [5] 44: 193–97. **Risler, H.**—Mallophaga. (See under Anatomy.) **Salmon, J. T.**—Keys and bibliography to the Collembola. [Zool. Publ. Victoria Univ. College] No. 8: 1–82. **Traub, R. and V. J. Tipton**—Jordanopsylla allredi, a new genus and species of flea from Utah (Siphonaptera). [48] 41: 264–70, ill. **Ulmer, G.**—Köcherfliegen (Trichoptera) von den Sunda-Inseln (Teil I). [Arch. Hydrobiol.] Suppl. Bd. 19: 1–328, ill.

ORTHOPTERA—Anon.—The cockroach. Its life history and how to deal with it. [Brit. Mus. (Nat. Hist.) Econ. Ser.] No. 12, 1–26. **Brunet, P. C. J.**—(See under Anatomy.) **Gurney, A. B.**—The names of the field and house crickets. [37] 44: 611. **Hageman, D. C.**—Notes on the distribution and habits of two species of Arphia (Acrid.) that occur in New York and New Jersey. [45] 59: 111–14. **LaGreca, M.**—(See under Anatomy.) **Lawson, F. A.**—Oothecae. (See under Anatomy.) **Strohecker, H. F.**—Three new species of North American Orthoptera. [5] 44: 169–72, ill. **Thomas, E. S.**—Orchelimum. (See under General.) **Voy, A.**—(See under Anatomy.) **Wilkins, O. P. and O. P. Breland**—Notes on the great walking stick, Megaphasma denticrus (Stal). [Texas Jl. Sci.] 3: 305–10. **White and Nickerson**—(See under Anatomy.)

HEMIPTERA—Beamer, R. H.—A new genus and two new species of Delphacine Fulgorids. [5] 44: 198–200. A review of the genus Kelsia in America north of Mexico with four new species (Fulgoridae). [43] 24: 117–21, ill. **Beirne, B. P.**—The nearctic species of Oncopsis (Cicadell.). [23] 83: 185–94. **Carvalho, J. C. M. and W. E. China**—

Neotropical Miridae. XLII. On the Eccritotarsoid complex. [6] ser. 12, 4: 672–97. **Elkins, J. C.**—(See under Anatomy.) **Gambaro, P.**—Osservazione sul grado di fecondità dell'Aspidiotus perniciosus Comst. nel Veneto. [Boll. Soc. Ent. Ital.] 80: 75–82, 1950. (See also under Anatomy.) **Hackman, R. H.**—(See under Anatomy.) **Hungerford, H. B.**—A new Hydrometra from Mauritius. [43] 24: 109–11. **Jordan, K. H. C.**—Bestimmungstabellen der Familien der Wanzenlarven. [Zool. Anz.] 147: 24–31 (Heteroptera). **Knull, D. J.**—Sixteen new leafhoppers and notes (Cicadell.). [58] 51: 168–78. Eight new leafhoppers from the United States. *Ibid.* 179–83. **Lent, H.**—Secunda espécie do gênero Bolbodera Valdés, 1910 (Reduviid.). [111] 11: 153–56. **Lent, H. and P. Wygodzinsky**—Espécies do gênero Zelurus Hahn (Reduviid.). [111] 11: 173–79, ill. **Phillips, J. H. H.**—An annotated list of Hemiptera inhabiting sour cherry orchards in the Niagara peninsula, Ontario. [23] 85: 194–208. **Ruppel, R. F. and D. M. DeLong**—Studies of the genus Kunzeana. I. Five new species of Mexican Kunzeana. [58] 51: 187–91, ill. **Slater, J. A.**—Notes and new records of Iowa Hemiptera (Heteroptera). [Proc. Iowa Acad. Sci.] 57: 519–21. **Turner, N.**—A short-winged form of Oncopeltus fasciatus Dal. [45] 59: 115. **Tuthill, R. D.**—Records and descriptions of some Micronesian Psyllidae. [Pacific Sci.] 5: 273–78. **Wygodzinsky, P.**—Sôbre algumas espécies do gênero Ghilianella Spinola, 1850 (Reduviid.). [111] 11: 223–26. Contribuição ao conhecimento do genero Heniartes Spinola, 1837 (Reduviid.). [Arq. Mus. Nac.] 41: 9–74, ill., 1948.

LEPIDOPTERA—Brown, F. M.—Colorado Plebius saepiolus. [5] 44: 286–92. **Cary, M. M.**—Distribution of Sphingidae (Lepidoptera: Heterocera) in the Antillean-Caribbean region. [83] 77: 63–129, ill. **Judd, W. W.**—(See under Hymenoptera.) **Juul, K.**—Nordens Eupithecier. En udforlig Behandling af de i Fennoskandia of Danmark forekommende Eupitheciae Curt.; Eupethecia, Gymnoscelis, Chloroclystis (Geometr.). Gravers Andersens Forlag, Aarhus, 1948. Bound, $4.75. (Plates of genitalia, colored plates of the moths and caterpillars; abridged descriptions in English of each moth, larva and chrysalis; distribution.) **Patocka, J.**—Contribution a la morphologie et au systeme des Pyralides. [Folia Ent., Brno] 13: 107–09, ill., 1950 (French summary). **Paulian, R.**—Papillons communs de Madagascar. Inst. Rech. Sci., Tananarive-Tsimbazaza,

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Reviews

A Monograph of the Collembola or Springtail Insects of New York State. By Elliot A. Maynard. Comstock Publishing Co., Inc., Ithaca, N. Y. Pp. xxii, 339, 37 pls. Price $7.50.

It is always satisfying to note the publication of a competent monographic work on a generally neglected group of insects. It is the fate of small forms that they are often overlooked in collecting and by-passed in identification. It may therefore be a surprise to some readers that the author of this book has here recorded from New York state 200 species and forms of this small order. Fifty-seven of these are new to science, as are also four of the genera.

Aside from the main systematic section of the volume, the author discusses the general external and internal structure, the life cycle, habitat, food, geographic distribution, economic importance, collection and preservation, and the nomenclature and synonymy of the order. There are keys to the species as well as to the higher categories. A glossary is given and a very lengthy 40-page bibliography of the Collembola of the world. The systematist will find the plates (four colored), with their 669 figures, of great assistance.—Maurice E. Phillips.

Insect Control by Chemicals. By A. W. A. Brown, John Wiley & Sons, Inc. N. Y., 1951. 780 pages and index. Price $12.50.

As its name implies, this book is concerned with insect control. It is extremely complete, investigating such subjects as the structure of organic chemicals, susceptibility of insects to poisons, equipment, application of insecticides, toxicity and hazards to man and other animals, and related subjects. Especially interesting are the chapters relating to specific controls for specific insects. Each chapter has an extended bibliography.

This book is of use to anyone interested in the control of insects, whether he is a manufacturer, consultant, salesman or pest control operator. It is a reference book which is up-to-date and as complete as it can be within the limitation of one volume. —Douglass Burnett, Jr.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Miridae (Capsidae)—American species wanted, with locality labels, in exchange for British species. D. Leston, F.R.E.S., 6 Frognal Rise, London N. W. 3, England.

Wanted—Entomological microscope in good condition; Spencer, Bausch & Lomb, or other standard make. David G. Shappirio, 4811 17th St., N.W., Washington 11, D. C.

Coleoptera—Large quantities of Cicindelidae, Buprestidae, Lucanidae, Cerambycidae wanted in exchange for all families of Coleoptera from Ill., Ind. and Mo. Joseph B. Hayes, 1905 N. Pulaski Rd., Chicago 39, Ill.

American Sarcophagidae—wanted for identification. H. R. Dodge, 291 Peachtree Street, Atlanta 3, Georgia.

German lepidopterist wishes to correspond and receive live material (eggs and pupae) in exchange for dried imagoes. Johannes Reichel, Koenigsberg, Krs. Wetzlar 16, Germany.

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ENTOMOLOGICAL NEWS

DECEMBER 1951

Vol. LXII **No. 10**

CALVERT ANNIVERSARY VOLUME

on the occasion of

Dr. Philip P. Calvert's Eightieth Birthday

CONTENTS

PUBLISHED MONTHLY, EXCEPT AUGUST AND SEPTEMBER, BY
THE AMERICAN ENTOMOLOGICAL SOCIETY
PRINCE AND LEMON STS., LANCASTER, PA.
AND
1900 RACE STREET, PHILADELPHIA 3, PA.

Subscription, per yearly volume of ten numbers: $4.00 domestic; $4.30 foreign; $4.15 Canada. Entered as second-class matter April 19, 1943, at the post office at Lancaster, Pa., under the Act of March 3, 1879. Acceptance for mailing at the special rate of postage provided for in paragraphs (d-2), Section 34.40, P. L. & R. of 1948, authorized April 19, 1943.

ENTOMOLOGICAL NEWS

ENTOMOLOGICAL NEWS is published monthly, excepting August and September, by The American Entomological Society at Prince and Lemon Sts., Lancaster, Pa., and the Academy of Natural Sciences, 1900 Race Street, Philadelphia 3, Pa., U. S. A.

PHILIP P. CALVERT, Editor Emeritus. R. G. SCHMIEDER, Editor. Editorial Staff: E. J. F. MARX, M. E. PHILLIPS, J. A. G. REHN, and A. G. RICHARDS.

Subscription price, per yearly volume of 10 numbers: Domestic, $4.00; Foreign, $4.30; Canada, $4.15—U. S. Currency.

SUBSCRIPTIONS, ADVERTISEMENTS: All communications and remittances to be addressed to **ENTOMOLOGICAL NEWS, 1900 Race Street, Philadelphia 3, Pa.**

MANUSCRIPTS and all communications concerning same should be addressed to **R. G. Schmieder, Zoological Laboratory, University of Pennsylvania, Philadelphia 4, Pa.**

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ENTOMOLOGICAL NEWS

VOL. LXII DECEMBER, 1951 No. 10

The Early Nymphal Stages of Tramea lacerata Hagen (Odonata: Libellulidae)

By GEORGE H. BICK, Zoology Department, Tulane University, New Orleans

On July 1, 1937, a pair of this species in tandem was collected at the Audubon Park Lagoon in New Orleans. Immediately afterwards, the abdomen of the female was squeezed gently and a number of eggs was obtained. A balsam mount of several eggs was made immediately. They were ovate with a rather conspicuous tubercle as shown in fig. 1. Maximum length was .46 mm., maximum width was .32 mm. The color ranged from white to yellow when first laid but two days later the eggs had become dark brown.

The dishes containing eggs were placed beneath a large glass dome above which a 60-watt desk lamp burned continuously and were examined at least once daily. On July 8 the first nymphs were noted and 37 were placed in individual containers. The pronymphal stage was not observed. The stage following the pronymph is considered the first (I) nymphal instar in all that follows. The number of nymphs reared through the various instars was: I(15), II(12), III(4), IV through IX(1). On December 10 this last individual died while in the 10th instar.

On July 23, 1937, another pair was collected and eggs obtained as described above. The dishes of eggs were examined daily but in this case they were left exposed and the desk lamp was not used. The first nymphs were noted on July 28 when 25 were removed and placed in individual caster cups. The pronymph was not observed. The number of nymphs reared

through the various instars was: I(25), II(23), III(19), IV(14), V(13), VI(10), VII(8), VIII(6), IX(5), X(2), XI(2). On February 5 both of these last individuals died in the 12th instar.

All nymphs were kept in caster cups until September 9 when they were transferred to finger bowls. The containers were cleaned six times during these rearings and fresh lagoon water added afterwards. Small amounts of *Azolla caroliniana, Lemna* sp., *Hydrocotyl* sp., *Utricularia* sp. were usually present in the containers.

Immediately after hatching, material from a *Paramecium* culture was added and the nymphs were observed capturing many of the protozoans. *Culex* egg rafts were added shortly afterwards. As the nymphs grew, mosquito larvae, amphipods, and small mayfly nymphs were given in various combinations at a maximum of three-day intervals. For the most part a minimum of two mosquito larvae were added to each container daily. During a 141-day interval (August 31–January 19), one nymph ate: 59 mosquito larvae, 39 amphipods, 3 mayfly nymphs. This diet was probably inadequate since living food was generally absent at each examination. Moreover it appears quite meager compared with Calvert's (1947) data on food consumption of *Aeshna cyanea* and *Aeshna tuberculifera.*

Each container was examined daily and cast skins were immediately removed to 70% alcohol. A random series of balsam mounts of exuviae of instars I through VII was prepared. In 1937, observations and measurements of the living material and a few notes based on dead individuals in alcohol were recorded for instars I through X. Measurements were from the dorsal aspect of the living material except for the tarsi and antennae which were from the balsam mounts. The work was interrupted in 1938 and the material not reëxamined until 1948 when all of the skins in alcohol were no longer available. It is unfortunate that the following morphological data must be based largely on original notes which were not always consistent regarding the characters noted in the various instars, and on the random series of balsam mounts.

DURATION OF INSTARS

The incubation period for one group of eggs was seven days (July 1–7) and for the second, five days (July 23–28). The duration of the various instars in days (instar, range, average in parentheses) based on a combination of the two groups of eggs was: I:2–11(4.8); II:1–9(3.5); III:2–9(6.2); IV:2–8 (4.3); V:1–9(4.3); VI:8–14(9.0); VII:4–16(8.1); VIII:9–28(16.7); IX:17–86(30.8); X:31, 35; XI:57, 95.

Time data for the two individuals which died in the 12th instar were: I(2, 2); II(2, 3); III (8, 7); IV(3, 4); V(3, 3); VI(12, 7); VII(7, 7); VIII(11, 7); IX(24, 17); X(31, 35); XI(57, 95). Thus the first individual reached the 12th instar after 158 days and the second after 192 days.

This time lapse is unusually long compared with most other rearings of the Libellulinae. Warren (1915) reared *Pantala flavescens* to transformation after 10 or 11 instars in from 65 to 101 days. Lamb (1925, 1929) reared the same species to the 11th instar (penult) in 80 days. Nevin's (1929) *Sympetrum vicinum* transformed after 11 instars in 97 to 100 days. Bick (1941) reared *Erythemis simplicicollis* to transformation after 13 instars in 113 days. On the other hand, Calvert (1929) reared *Nanothemis bella* to transformation after 11 or 12 instars in 674 to 1,037 days. However, I believe that my time data, especially for the later stages, cannot be considered typical. Certainly the long duration of later instars was due largely to inadequate diet.

There was usually considerable individual variation in the duration of any one instar even though all individuals were kept side by side under apparently identical conditions of light and temperature, and received similar amounts of food. Such variation in duration of instars has been reported for nearly every anisopteran reared under laboratory conditions. It seems clear that the number of molts is not an accurate criterion for biologic age (see Calvert, 1929, pp. 246–249). Thus from the group of eggs laid on July 23, 14 nymphs were alive 25 days later; of these, 10 were in the 6th instar, 3 in the 5th, and 1 in the 4th. Fifty days later, 9 were alive and 6 were in the 8th

instar, 2 in the 9th, and 1 in the 7th. Seventy-five days later 3 were alive, and 2 were in the 9th instar, and 1 in the 10th. After 100 days 3 were alive and all were in the 10th instar.

GROWTH RATES AND SUPPOSED NUMBER OF NYMPHAL INSTARS

Average measurements and growth rates based on living individuals are given in table 1. By using the average growth rate for each part and assuming that growth would continue at these rates, dimensions of the later instars were calculated and are presented at the bottom of the table. These calculations may be continued until the dimensions given in various taxonomic descriptions of the mature nymph are reached. Needham (1901), Garman (1927), Byers (1930) all give the following: total length 24, head width 7.5, abdominal length 14, abdominal width 9. All of these measurements would be approximated at different instars; total length in XIV, head width in XII, abdominal length in XV, abdominal width in XIII. I believe that complete rearings of a number of individuals will show that the nymphal life varies between 12 and 15 instars and that several rather distinct size classes will be represented in the ultimate instar.

In spite of the fact that the growth rates varied from instar to instar and were not the same for various structures in the same instar, I am impressed by the fact that the average figure for all measurements was 1.27 for *laccrata* and that the same average figure was obtained previously for *Erythemis simplicicollis* (Bick, 1941). Moreover, Dr. Calvert's (1929, 1934) average growth rates for *Anax junius* and for *Nanothemis bella* were 1.29 and 1.25 respectively. The overall average for these four rearings is 1.27 which certainly approximates the Brooks (1.25) and the Przibram-Megusar (1.26) ratios.

CONSTANT CHARACTERS

Only a very few characters were constant to all instars. The body is smooth, clean and light cream to light tan in color. At least one dark band is present on femora, tibiae and antennae. The labium is spoon shaped and the movable hook at least 5–6

TABLE 1. Average Measurements and Growth Rates for Eight Successive Instars

Instar	Number	Total Length		Head Width		Head Length		Abd. Width		Abd. Length		Av. GR
		mm.	GR	mm.	GR	mm.	GR	mm.	GR	mm.	GR	
I	19	1.18		.41		.23		.36		.69		
			1.20		1.46		1.26		1.47		1.14	1.31
II	24	1.42		.60		.29		.53		.79		
			1.19		1.21		1.17		1.17		1.15	1.18
III	21	1.69		.73		.34		.62		.91		
			1.24		1.42		1.29		1.40		1.19	1.31
IV	12	2.09		1.04		.44		.87		1.08		
			1.25		1.24		1.27		1.34		1.29	1.28
V	9	2.62		1.29		.56		1.17		1.39		
			1.34		1.26		1.25		1.29		1.47	1.32
VI	10	3.52		1.63		.70		1.52		2.04		
			1.23		1.21		1.28		1.28		1.25	1.25
VII	9	4.35		2.07		.90		1.94		2.56		
			1.24		1.24		1.23		1.27		1.18	1.23
VIII	4	5.37		2.57		1.11		2.46		3.03		
Av. GR			1.24		1.29		1.25		1.32		1.24	1.27
Calculated Sizes												
IX		6.87		3.31		1.39		3.25		3.76		
X		8.79		4.27		1.74		4.29		4.66		
XI		11.25		5.51		2.17		5.66		5.78		
XII		14.40		7.11		2.71		7.47		7.17		
XIII		18.43				3.39		9.86		8.89		
XIV		23.59								11.02		
XV										13.66		

times as long as the crenulations (or the teeth) on the distal border of the lateral lobe. The legs have two tarsal claws and at least one forked seta at the distal tip of each tibia. Dorsal abdominal hooks are always absent. Inferior abdominal appendages are acuminate, divergent, setose and always longer than the superiors.

SUMMARY OF NYMPHAL CHANGES

The more salient changes are summarized in table 2. In addition, the following should be noted.

TABLE 2. Summary of Nymphal Changes

Instar	Antennal Segments	Tarsal Segments	Wing Buds	Cercoids	Lateral Spines	Lateral Setae	Mental Setae
I	3	1	X	X	X	1	X, 1
II	3	1	X	X	X	1	1
III	4	1	X	X	X	2	4, 3
IV	5	2	X	X	On 9 only	4, 5	5, 7
V	6	2	X	X	On both 8 and 9	5, 6	7
VI	7	3	P	X	P	6, 7	7
VII	7	3	P	P	P	7, 8	8, 9
VIII	7	3	P	P	P	?	?
IX	7	3	P	P	P	9	12
X	7	3	P	P	P	?	?

X = Absent.
P = Present.

Head:

1. Head width/eye width decreases from 13 in I to 6 in X.

2. Antennal segments increase from 3 in I and II, 4 in III, 5 in IV, 6 in V, and 7 in all later stages. Measurements indicate that the third segment gives rise by divisions to 3 and 4 during the increase from 3 to 4, 4 to 5, and 6 to 7 segments, but the increase from 5 to 6 segments results from a division of the fifth or most distal segment. This is the same method by which the seven-segmented condition was reached in *Erythemis simplicicollis* (Bick, 1941). However, it differs from the data given by Calvert (1934) for *Anax junius*, by Lincoln (1940) for *Aeshna tuberculifera*, and the general statement of Tillyard (1917). All of these agree that the seven-segmented condition is reached as follows: the third segment gives rise by division to 3 and 4 when the increase is from 3 to 4, 4 to 5, and

5 to 6 segments, but the increase from 6 to 7 segments results from a division of the 6th or most distal segment.

3. There is an increase in the number of small dark antennal bands from two in I to four in II, five in IV, V, VI, and six in VII through X.

Labium:

1. Lateral setae increase from one in I to nine in IX.

2. Mental setae increase from none or one in I to 12 in IX.

3. Distal border of lateral lobe (fig. 3) is rather deeply and irregularly toothed in instars I and II, is crenulate in III through V and thereafter is very slightly undulate.

4. Setae at distal border of lateral lobe (fig. 3) are absent in I; 3 are present in II, 8 in III and IV, 13 in V, 16 in VI, and 18 in VII. They are at first equally spaced but are not present on every tooth. In V and VI there is one large forked and one small forked seta (when viewed at 430 ×) at each undulation, and in VII the setae are either single, double or triple at each undulation and all are branched (fig. 3 bcd). I know of no previous work describing such divided labial setae.

5. Setae at medial border of lateral lobe are absent in I and II. A single small one appears near juncture with distal border in III, 3 are present in IV, 6 in V, 7 in VI, and 11 in VII. In contrast to the setae at the distal border these are always simple.

6. Small setae on dorsal surface near base of lateral lobe were absent in instars I through III. A single one was noted in V but not in VI, and three were present in VII.

7. The distal margin of the mentum (fig. 2) is very slightly arched in the first instar and without setae. It becomes progressively more arched and elongate, and the setae become more numerous in succeeding instars. In the seventh instar at least the larger of these setae are branched when viewed at 430 × (fig. 2a). I know of no previous work describing divided setae in this position.

Thorax:

1. Wing buds appeared in VI as very minute projections. In VII they were evident but neither extended beyond the segment bearing them. In IX they extended to the third abdominal segment and in X to the fourth.

2. There is but one tarsal segment in I, II, and III. It is two segmented in IV and V and thereafter is three segmented. The increase from two to three segments is brought about by a division of segment two.

3. One three-branched seta [1] was present on the ventral surface at the most distal portion of each tibia in the first instar. In II and III two are present on both pro and mesotibiae and one on the metatibia. They are either three or four branched. Thereafter a minimum of two, three or four branched setae were present on all tibiae.

4. Divided tarsal setae were absent in instars I through VI. In VII, one trifid and two bifid setae were noted on the most proximal segment of the metatarsus.

5. There are three dark bands on the femora in I through VII. In VIII a single dark band was noted at the distal third and in IX and X there was only one narrow brown band at the proximal portion. Dark bands were noted at proximal and distal portions of the tibiae in I through X. The tarsus first appeared dark tipped in IV and remained so through X.

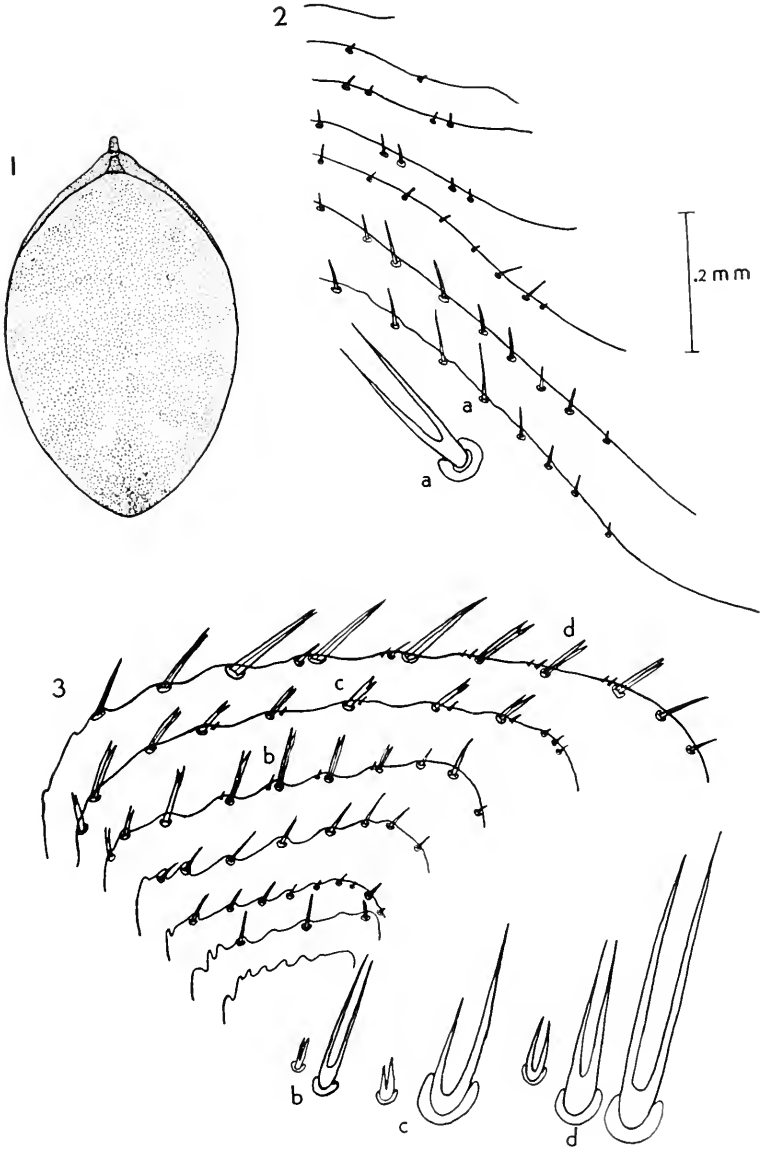
Abdomen:

1. Lateral spines were first noted in IV when they were barely discernible at 100 × as very slight projections measuring .036 mm. on segment 8. They were much more obvious on segment nine in IV and measured .120 mm. In V they were

[1] I am following Calvert (1927) who has designated these divided structures as setae and who utilized them in separating *Orthemis, Tramea, Erythrodiplax* and *Erythemis.*

Explanation of Figures

Fig. 1. Egg. Fig. 2. Distal border of right half of mentum, instars I through VII. Fig. 3. Distal border of left lateral lobe, instars I through VII. a, b, c, d, are enlargements of divided setae at points a, b, c, d, and are more highly magnified than the above.


1
2
.2 mm
a
a
3
b
c
d
b
c
d

still very minute on segment 8 but were evident on both eight and nine thereafter. It was noted that after VII the spines on segment nine extended almost to the tip of the inferior abdominal appendages and that both spines were dark tipped.

2. Lateral abdominal appendages (cercoids) were first noted in VII. They were $\frac{1}{8}$ the length of the inferiors in VIII, and $\frac{1}{3}$ in X.

3. Superior abdominal appendages were small and papilla-like in I through III with prominent terminal setae. Thereafter, the proximal portion was quite wide and the appendage tapered to an acute tip.

DISCUSSION

The distinction between *Tramea* and *Pantala* nymphs is fairly clear as given by Needham (1901), Garman (1927), Needham and Heywood (1929), Byers (1930), Wright and Peterson (1944). However, it is well to consider the applicability of certain of these differences to the early instars of *lacerata*.

It is usually stated that the teeth on the distal border of the lateral lobe are obsolete in *Tramea* and deeply cut in *Pantala*. However, in instars I through IV, the teeth of *lacerata* can hardly be considered obsolete. In I and II they are deep, sharp-pointed and quite irregular. In III and IV they are regular in shape and similar to a fully mature *Pantala* but not as deep. The crenulations are shallow and as described for the fully mature *Tramea* only after VI. In 1941 I noted rather deep, irregular and sharp pointed teeth in instars I through III of *E. simplicicollis*. I rather suspect that this progression from coarse irregular teeth to a smooth or gently undulate distal border is a general trend which will be found in other Libellulinae, with further rearings.

The character—4th antennal joint half as long as the 3d—is frequently used to separate *lacerata* from other U. S. species. This character is, of course, not usable in instars I and II when the antenna is 3 segmented. In III the antenna is 4 segmented and the 4th joint is twice as long as the 3d. In IV, when the antenna is 5 segmented, segments 3 and 4 are subequal. In V the antenna was 6 segmented and the 4th joint was very slightly

shorter than the 3d. In later instars the antenna is 7 segmented, and in instars VI, VII, and VIII segments 3 and 4 are subequal. It is clear that this important antennal character can be used with accuracy only for the fully mature nymphs.

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The Discovery of Archilestes grandis in Eastern Pennsylvania (Odonata)

By Clifford D. Ferris

While collecting specimens in Cobbs Creek Park, Philadelphia, on August 25th, I noticed a large member of the suborder Zygoptera flying among a growth of blackberry (Rubus allegheniensis). I captured the specimen and sent it to Dr. James G. Needham at Cornell University for identification. He informed me that my specimen was *Archilestes grandis,* a form hitherto unknown this far east. Dr. Needham said that it has been taken in Arkansas, Kentucky, and Ohio, and is very common on the west coast. Dr. Philip P. Calvert informed me of a western Pennsylvania record, between McKeesport and Versailles, by Carsten Ahrens, in Entomological News 46: 183, July 1935.

The specimen captured on the 25th was a female. On the next day, I captured a single male. No more specimens were seen until the second week in September. After that, the insect swarmed over a square mile area. By the 6th of October, it had reached the creek itself. At first, the insect was found only around small ponds and springs. On the 6th, *Archilestes* was still depositing eggs. By the 16th, there were still a number left, but they were all aged specimens. The markings on the thorax were dark yellow and the eyes were dark blue. The males showed pruinosity on the end segments of the abdomen. The following week, there were no adults left.

Letter of E. B. Williamson to J. G. Needham Dated February 18, 1928.

Thanks for your Libelluline paper. . . . Of recent years, though, I've grown more and more suspicious of phylogenies based on venational characters—that is, I'm wondering how many times the same character has appeared independently. And I'm sorry too that I haven't a bit of faith in the palaeon-

tological evidence to date. Nor have I much faith in geographical distribution. I'm sure the best we shall ever be able to do is along morphological lines—and this, of course, includes venation.

I am especially "leary" of the palaeontological conclusions based on present material. As I told Kennedy once—just a bit of a fragment and away they [palaeontologists] sail on the wings of the morning. And how it all fits in, every fragment confirming every other fragment, it's too good to be true. . . . I named a Gomphine genus *Archaeogomphus* and Tillyard took one look and said it was the most highly specialized Gomphine he ever saw. Had it turned up as a fossil what would it have been? God only knows—but I think it would have been whatever they needed to fit in with something else. At the present time when systematists are nearly extinct, I think some good generic monographs dealing with what is observable would be a fine thing.

The above was made available through the kindness of Dr. James G. Needham who writes: "I am leaving a volume of Williamson's personal letters with my collection and library to the Cornell University Department of Entomology. They are full of factual observations concerning many species of Odonata and are of some historical interest."

Rectification in the Nomenclature of Colias and Ochlodes (Lep.)

By Jiří Paclt, Lamačská cesta 5, Bratislava 9

There is no evidence that the generic name *Colias* (Κωλιάς) was adopted in the sense of an adjective by Fabricius, the creator of that genus. The old authors like Fabricius were accustomed to baptize many genera and species after mythological beings. In the Greek mythology, the name Colias was attributed to an Aphrodite, and only secondarily to her temple and a promontory in the respective part of Attica (4). There is of course no doubt about the feminine gender of that name (Κωλιάς gen. -άδος, plur. -άδες). Similarly, the generic name *Delias* (Lep.) has not been derived from the adjective δηλιάς, but the origin of it is to be found in the feminine substantive Δηλιάς (gen. -άδος, plur. -άδες), which means "an inhabitant of

Delos." The objection of Mr. Allan (1) that "the termination -ιας was as often as not a masculine one" is incorrect. Masculine ones are only nouns terminating -ίας like κολίας (= a kind of tunny), whereas nouns with the suffix -ιας like Κωλιας are generally feminines.

Mr. Townsend (5) takes me to task for the sentence "When the Greek adjective is used as a substantive [abstract], it takes the neuter gender a s a r u l e (spaced by the writer)" (cf. 3). Myself, I do not consider "as a rule" to be synonymous with "always." Exceptio confirmat regulam. A number of exceptions is known even from the above "rule" to every student of the Greek (e.g., adj. ὠώδης, subst. ὁ ὠώδης). I have emphasized, therefore, that the reference to Thucydides is to be regarded as decisive in the case of *Ochlodes* (3). Now, Mr. Allan wishes to consider the name *Colias* to be derived from the adjective κωλιάς, and concludes logically that, were that rule useful, we should write, e.g., "*Colias croceum.*" Since the adjective in consideration can be used only in connection with a feminine noun (e.g., ἄκρα, γῆ), his criticism falls to the ground. Naturally, the feminine adjectives like κωλιάς, δηλιάς retain their gender when used substantively again. On the other hand, there exist sometimes the corresponding masculine adjectives (δήλιος, and probably also κώλιος.) Mr. Allan's examples κωλιάς ἀνήρ (masc.) and κωλιάς χρῆμα (neut.) are, grammatically, monstrosities. Moreover, the adjective κωλιάς loses any meaning affinity with the yellow or red when applied to another substantive when γῆ (clay)—and Mr. Allan tries to apply κωλιάς to the Greek name of a butterfly. Finally, it may be noted that Gallician authors since Latreille, 1810, used for *Colias* the French name "Coliade" which is of feminine gender like "Déliade" (cf. *Delias*, f.) and "Piéride" (cf. *Pieris*, f.).

According to Mr. Townsend (5), *Ochlodes* is a transliteration of ὀχλώδης, m. or f., as well as of ὀχλῶδες, n. Theoretically, it may be so. But, only one of the three nouns is proven in the ancient literature (Thucydides): τὸ ὀχλῶδες ("τὸ ὀχλώδης" in my article is a lapsus calami).

SUMMARY

The genders of the generic names *Colias* and *Ochlodes* (both Lepidoptera: Pieriididae and Hesperiidae respectively) must be considered to be feminine (the former) and neuter (the latter). Accordingly, we should write, for example, *Colias crocea* (instead of *C. croceus*) and *Ochlodes venatum* (instead of *O. venata*). The arguments of Mr. Townsend (5) and Mr. Allan (1) are far from any power to alter my earlier conclusions (3).

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(3) Paclt, J. 1949. On the gender of the trivial names of two British butterflies. The Entomologist 82: 275.
(4) Pape, W. 1911. Wörterbuch der griechischen Eigennamen. 3rd Ed., pt. 1, Braunschweig.
(5) Townsend, A. C. 1949. The gender of the name Ochlodes. The Entomologist 82: 276.

Comments on Dr. Paclt's Views

I agree entirely with Dr. Paclt in the matter of *Colias*. In fact the feminine gender of that word is so strong that it has attracted the word for "cape" from the usual neuter to agree with it; ἄκρα instead of ἄκρον.

On the other hand I entirely disagree in the matter of *Ochlodes*. Those Greek neuters, used with το as nouns, universally formed abstracts: "the condition of unruliness," etc. When used of actual objects, I believe they took the normal gender of the objects. In the present case it would naturally be the classical gender (normally as in Latin), so one would expect the masculine, to agree with *Papilio*. It should be noted in any case that the ancient and modern Greek words for butterfly are both feminine: ψυχή and πεταλοῦδα.

Wm. T. M. Forbes

Current Entomological Literature

COMPILED BY R. G. SCHMIEDER

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia and the University of Pennsylvania, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the year 1951 unless otherwise noted. Continued papers, with few exceptions, are recorded only at their first installment.

For other records of general literature and for economic literature, see the Bibliography of Agriculture, Washington, and the Review of Applied Entomology, Series A, London. For records of papers on medical entomology see Review of Applied Entomology, Series B.

NOTE: The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the List of periodicals and serials published in our January and June issues. The number of the volume, and in some cases, the part, heft, &c. is followed by a colon (:). References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to Neotropical species, and not so indicated in the title, have the symbol (S).

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ENTOMOLOGICAL NEWS

VOLUME LXIII, 1952

PUBLISHED BY

THE AMERICAN ENTOMOLOGICAL SOCIETY

THE ACADEMY OF NATURAL SCIENCES

PHILADELPHIA, PENNSYLVANIA, U. S. A.

1952

The numbers of ENTOMOLOGICAL NEWS for 1952 were mailed at the Post Office at Lancaster, Pa., as follows:

No. 1—January .....January 23, 1952
No. 2—February .....February 20, 1952
No. 3—March .....March 19, 1952
No. 4—April .....April 7, 1952
No. 5—May .....May 21, 1952
No. 6—June .....June 26, 1952
No. 7—July .....August 11, 1952
No. 8—October .....September 27, 1952
No. 9—November .....October 28, 1952

The date of mailing the December, 1952, number will be announced on the last page of the issue for January, 1953.

ENTOMOLOGICAL NEWS

JANUARY 1952

Vol. LXIII **No. 1**

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PUBLISHED MONTHLY, EXCEPT AUGUST AND SEPTEMBER, BY
THE AMERICAN ENTOMOLOGICAL SOCIETY
PRINCE AND LEMON STS., LANCASTER, PA.
AND
1900 RACE STREET, PHILADELPHIA 3, PA.

Subscription, per yearly volume of ten numbers: $4.00 domestic; $4.30 foreign; $4.15 Canada. Entered as second-class matter April 19, 1943, at the post office at Lancaster, Pa., under the Act of March 3, 1879. Acceptance for mailing at the special rate of postage provided for in paragraphs (d-2), Section 34.40, P. L. & R. of 1948, authorized April 19, 1943.

ENTOMOLOGICAL NEWS

ENTOMOLOGICAL NEWS is published monthly, excepting August and September, by The American Entomological Society at Prince and Lemon Sts., Lancaster, Pa., and the Academy of Natural Sciences, 1900 Race Street, Philadelphia 3, Pa., U. S. A.

PHILIP P. CALVERT, Editor Emeritus. R. G. SCHMIEDER, Editor. Editorial Staff: E. J. F. MARX, M. E. PHILLIPS, J. A. G. REHN, and A. G. RICHARDS.

Subscription price, per yearly volume of 10 numbers: Domestic, $5.00; Foreign, $5.30; Canada, $5.15—U. S. Currency.

SUBSCRIPTIONS, ADVERTISEMENTS: All communications and remittances to be addressed to **ENTOMOLOGICAL NEWS, 1900 Race Street, Philadelphia 3, Pa.**

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ENTOMOLOGICAL NEWS

LXIII

VOL. ~~XLIII~~ JANUARY, 1952 No. 1

Guy Chester Crampton (1881–1951)

Doctor Guy Chester Crampton, distinguished insect morphologist, was found dead in his room at the Hotel Ten Eyck, Albany, New York, on the afternoon of October 31, 1951. He had suffered a heart attack some nine days earlier and was sent to St. Peter's Hospital, Albany, from which he was discharged on October 29th. He was buried in Mobile, Alabama. His sole surviving relative is a half-sister, Mrs. John T. Cochrane (Katharine Crampton Cochrane) of Mobile.

Doctor Crampton was the son of the late Dr. Orson Lucius Crampton and Cleffey B. de la Tourette Crampton. He was born in Mobile on September 21, 1881, and received his early education in the public schools. He then entered Princeton, receiving the A.B. degree in 1904. Later he received the A.M. degree from Cornell (1905) and from Harvard (1920). He studied in various European universities, including Freiburg, Munich, and Berlin, receiving the Ph.D. degree from the last in 1908. In Berlin he was a classmate of the distinguished entomologist, Dr. James McDunnough.

Upon returning to America, he decided to devote his life to research on arthropodan morphology and phylogeny and for this purpose felt that a position as a teacher in one of the leading Departments of Entomology in the country offered the best opportunity. He became an Assistant in Biology at Princeton between 1908 and 1910, and Professor of Zoology and Entomology at Clemson (South Carolina) Agricultural College, 1910–1911. In the spring of 1911 he was called to the then Massachusetts Agricultural College (now the University of Massachusetts) as Assistant Professor of Insect Morphology,

becoming a full Professor in 1915, a position and title he held until his retirement in 1947, when he became Emeritus Professor. Dr. Henry T. Fernald, then Head of the department of entomology at the college, once told the writer that "he brought Crampton here to be the official advertiser of the school in the field of insect morphology." How well this plan succeeded is attested by the more than 100 publications that came from the brain and pen of this most brilliant student. It is very certain that a large part of the high repute enjoyed by the Department among scientists throughout the world is due to the work of Doctor Crampton.

Undoubtedly most of the entomologists whom he trained, and they may be numbered in the hundreds, best remember the friendly and informal discussions with their Professor, not in the lecture rooms but more especially in the laboratories and after classes. To be associated with a man of Dr. Crampton's philosophy and culture was in itself an education, and unquestionably very many of his former students now holding high positions throughout the nation and abroad, owe much of their present success to this influence of a great teacher.

Following his retirement "Crampie," as he was lovingly known to faculty and students alike, spent his winters in Florida, his summers either in Massachusetts or New York. During his lifetime he published a total of 105 papers, virtually all on insect morphology and phylogeny. Only the first two of these were written previous to his coming to Massachusetts. The first, his Ph.D. dissertation, was published in Berlin; the second, a translation and enlargement of this thesis, was one of his outstanding contributions.* His published papers appeared between 1908 and 1944. Nothing was printed during the last seven years of his life, but it may be noted that he had several major papers in various stages of preparation, and just prior to his decease was revising these in anticipation of early publication. It is hoped that some, at least, may be completed and issued posthumously.

* 1909. "A contribution to the comparative morphology of the thoracic sclerites of insects." Proc. Acad. Nat. Sci. Philadelphia, 1909: 3–54, 21 figs., 4 pls.

At the time of his retirement there was established at the University of Massachusetts "The Guy Chester Crampton Research Fund," generously supported by the immediate family of Doctor Crampton and added to by many of his former students. The purpose of the fund is to use the interest to aid deserving and needy students in the biological and physical sciences to defray in whole or in part the cost of publication of original research findings. While entomology, and primarily insect morphology, receives first consideration in the granting of awards, other branches of zoology and botany are likewise eligible for consideration in a definite order and sequence that have been detailed in the "Terms of the Bequest" (Fernald Club Yearbook, 19: 11–12; 1950).

Mrs. Cochrane, heiress and executrix of the estate, has most generously presented Doctor Crampton's collection and library to the University of Massachusetts, in fulfillment of the latter's often expressed wishes and intentions.

Doctor Crampton remained a bachelor throughout his life. He was a member of several entomological societies in America and abroad, and of the leading honorary societies in American universities (Phi Beta Kappa, Phi Kappa Phi, Sigma Xi, Gamma Alpha). Other details of his life and work are given in standard works of reference, including *American Men of Science* and *Who's Who in America*. Throughout his life he was most generous of his time and wealth, and in his passing leaves a host of friends who owe him an unrepayable debt.

CHARLES P. ALEXANDER

On Attempts to Correlate the Presence of Brunner's Organ in Grasshoppers with Habits or Habitats (Orthoptera: Acridoidea)

By JAMES A. G. REHN, Curator of Insects, Academy of Natural Sciences of Philadelphia

In 1938 there was published by Drs. Eleanor H. Slifer and B. P. Uvarov an interesting discussion of "Brunner's Organ; a

Structure found on the Jumping Legs of Grasshoppers (Orthoptera)." [1] This obscure and infrequently mentioned structure has been known for nearly three-quarters of a century, having first been referred to by Brunner von Wattenwyl in 1880,[2] whose comments were quoted in part by Slifer and Uvarov. Briefly the structure in question is usually small and in life a relatively soft tubercle or process, located proximad in the ventral sulcus of the caudal femora, and against which, when in the usual inactive position, the caudal tibiae are closely pressed. They are, as stated by Slifer and Uvarov, found in a very considerable portion of all the members of the superfamily Acridoidea.

Since Brunner's first mention of these structures they have been referred to by a number of authors in the past half century, but they were not specifically named until Slifer and Uvarov applied the name "Brunner's organ" to them, in recognition of that author's original note regarding the same.

In the 1938 paper Slifer and Uvarov gave the results of an investigation of the anatomy and histology of Brunner's organ, and demonstrated it is an innervated structure, apparently having a definite function in connection with the activities of the grasshopper, very probably related in some way to its saltatorial ability. However, their discussion presents no definite conclusions on this point, and, aside from its histological evidence, is of interest largely on account of its review of apparently contradictory evidence on the presence or character of the organ, drawn from a number of genera of grasshoppers. The paper, unfortunately, contains certain statements which either pass along unwarranted assumptions first made by Brunner, or present de novo rather sweeping conclusions on which, in the interest of accuracy, comment is desirable.

It is stated by Slifer and Uvarov in their introductory remarks, after quoting Brunner's original note, that "according to Brunner the occurrence of the structure cannot be correlated with sound-production, for it is present on the femora of both sound- producing and of silent species. On the other hand, it is lacking in

[1] Proc. R. Entom. Soc. London, (A) 13, pp. 111–115, pl. 1.
[2] Verh. K.-K. Zool.-bot. Gesell., Wien, XXIX, pp. 26–27.

those forms ('Proscopiden und Pneumoriden') which have not the hind legs modified for jumping." No further comment is made on the latter part of this quotation from Brunner, other than to reiterate it on page 114.

As a matter of fact members of the Proscopiidae (which is a very distinctive and autochthonous Neotropical family) have their caudal femora as fully modified for jumping as is the case in numerous genera of the Acridinae, Cyrtacanthacridinae, Romaleinae and Pyrgomorphinae. Also that they are fully capable of jumping and do jump appreciable distance is clear to anyone who, like the writer, has had personal acquaintance with the group in nature. They do not jump for long distances or with great accuracy, and sometimes land in a most awkward and peculiar position, but they can and do jump as effectively as many other saltatorial Orthoptera the jumping ability of which has never been questioned. A number of apterous or subapterous terricolous acridids, such as *Phrynotettix, Romalea, Bradynotes,* and *Dactylotum,* to mention a few, are but little more capable jumpers. The proscopids, however, react differently from truly geophilous forms and often land in reversed or similar unusual positions, sometimes holding to a bush by a single pair of tarsal claws. While I personally have never collected those genera, an examination of the markedly swollen proximal section of the caudal femora of the proscopid genera *Stiphra* and *Apioscelis* should demonstrate beyond question that they possess jumping ability. It can be said categorically, and without possibility of controversion, that members of the Proscopiidae can and do jump, and the family cannot be considered by anyone as lacking saltatorial powers or ability. Similarly its members can be found in a broad variety of habitats.[3]

[3] The variety of habitats in which I have personally taken members of the Proscopiidae is evidenced by notes made by me at the time of capture. In Matto Grosso, Brazil, they were found in the low under-cover of dry palm forest and on woody stems of cover in dry forest but not of palms. In a number of localities in Colombia they were taken in grasses in fields, in vine tangles along the edge of low but dense jungle, in low bushes and perched on the tops of the same, in low green plants, on bare ground of openings in scrub forest, in pasture grass, on ground vegetation in heavy

On page 114 of their paper Slifer and Uvarov made the following rather sweeping statements: "Only in a few genera of Catantopinae [i.e. = Cyrtacanthacridinae as used by most American authors] such as *Oxyrrhepes, Leptacris, Rhamphacrida, Acanthoxia* and *Betisca* [now known to equal the much older *Psednura*],[4] the organ is found to be very small in size, often scarcely visible without a binocular microscope. These are insects with extremely elongate body and very narrow posterior femora, living on tall savanna grasses. The usual resting position of these insects is vertical, clinging to a stem of grass, with the metathoracic tibiae tightly pressed against the femora. It is doubtful whether they can jump at all and, in any case, they do so on very rare occasions. It would appear, therefore, that Brunner's organ may undergo some secondary reduction in the species that have lost the habit of jumping."

When one analyzes these dogmatic statements, particularly if one is intimately familiar with grasshoppers in the field and under a variety of conditions on more than a single continent, inconsistencies and unwarranted assumptions are evident. All of the genera above listed in the quotation except *Betisca* are fully alate, and *Betisca* [= *Psednura*] is apterous.

With material of all the above-mentioned genera now before me, I find Brunner's organ present and quite distinct in three species of *Oxyrrhepes* (with material of two of the species in part determined by Uvarov); it is present but quite small in *Leptacris* (material in part determined by Uvarov); it is evident and fair-sized in *Rhamphacrida* (material in part determined by Ramme); small but well formed in *Acanthoxia* (material in part determined by Uvarov).

As to *Betisca* (which should properly be called *Psednura*) I have before me an extensive series, not only of the single species so far described, but of a number of undescribed ones, and a related new genus, all these latter now in press in an extensive

forest, and in coarse grass on otherwise bare hills. Hence it is evident that proscopids occur in a variety of conditions, in some of which their attenuate form would not seem a particular advantage.

[4] See Rehn, Proc. Acad. Nat. Sci. Phila., C, p. 110, footnote 63a, (1948).

study, and in these species Brunner's organ ranges from completely absent to minute but present. However, as true *Psednura* is apterous, if it were unable to jump, as assumed by Slifer and Uvarov, its mode of progression would be rather uncertain. I have asked Dr. K. H. L. Key, of the Australian Commonwealth Scientific and Industrial Research Organization, who has collected all but one of the species of *Psednura* known to me, whether he would be good enough to tell me something about their actions and preferred habitats. With Dr. Key's kind permission I am able to quote relevant parts of his interesting comments as follows:

"With regard to *Psednura* [= *Betisca*] and Brunner's organ, I think your description [in litt.] of the jumping of the Proscopiidae, i.e. that 'they can jump—not very accurately but still effectively—for fair distances,' would cover quite well both the Morabinae [an Australian subfamily of Eumastacidae] and those species of *Psednura* I know well. The latter I would say were better jumpers than the former * * *. When you get them in the hand or in a small container you realize that their jumping is quite forceful. * * * A couple of yards would not be an unusual distance for at any rate the males to pump."

Dr. Key continues as to habitat preferences: "None of the species of *Psednura* I know occur 'on tall savanna grasses,' nor do any occur on savannas. All are inhabitants of heaths, or of dry sclerophyl forest with a low understorey of sclerophyllous heathy shrubs. Within these habitats they occur among plants of the families Restionaceae, Cyperaceae and Juncaceae which have thin terete stems, and particularly on species of *Xanthorrhoea* that have the stem underground or only briefly aboveground. The latter genus has been variously classified in the Liliaceae, the Juncaceae, and in a separate family, the Xanthorrhoeaceae. Its leaves are long and terete, and arise as a dense tuft from the ground or from the top of the above-ground stem (popularly known as black-boys or grass-trees).

"*Psednura* will sit closely appressed to the stem or leaf of one of these plants, with the stem between it and the observer. After jumping, it will land on another stem and immediately

—almost in one movement—swing itself round to the far side of the support, which sways under the impact. * * * One may sometimes find *Psednura* on a shrub in heathy country, but it may have gone there following disturbance. There is no doubt about its very close relation to the group of plants I have mentioned. In this respect it differs from species of *Moraba* found in heath. These are usually on shrubs, and in spite of their elongate form seem to show no preference for the type of plant to which they might be thought to be adapted—rather the reverse." [5]

Taken as a whole there is the implied assumption in the Slifer and Uvarov paper that grasshoppers with "extremely elongate bodies and very narrow posterior femora" do not have well developed saltatorial powers, which from my own field experience of fifty years with these insects on three continents is an unwarranted generalization, sweeping and aside from the facts. In truth grasshoppers of this type are usually exceedingly active and elusive.

Recently I made a tabulation relative to the degree of development of Brunner's organ in one hundred and thirty-nine genera of Acridoidea, selected broadly from the four families (exclusive of the Tetrigidae) into which the family is now generally divided. The genera examined represented the following groups and in the given numbers: Pneumoridae, 3; Proscopiidae, 9; Eumastacidae, 25; Acrididae; Pyrgomorphinae, 6; Cyrtacanthacridinae, 57; Romaleinae, 6; Oedipodinae, 19; Acridinae, 14. In these Brunner's organ was completely absent in the genera of the Pneumoridae and Proscopiidae which were examined, and weakly evident in some members of the genus *Psednura* and absent in others. There is no correlation of presence or absence with apterism or a fully alate condition, nor with slender, strict form or a robust squat body. A tabulation by known habitats was equally lacking in correlated evidence. In graminicolous genera such as *Paropomala, Eremiacris* and *Prorocorypha,* and in hygrophilous ones such as *Leptysma, Opshomala* and *Cornops,* Brunner's organ is equally developed, and all can jump as well

[5] This last comment is in line with my own experience with certain species of Proscopiidae.

as fly, after the usual switch around the grass stem has failed to discourage the pursuer. While ten genera representing two families and three of the subfamilies of the Acrididae are known to be thamnophilous in habits, and four of the ten are apterous and one brachypterous and hence unable to fly, all have Brunner's organ well developed. These genera are: Eumastacidae, Tanaocerotinae, *Tanaocerus*; Morseinae, *Morsea* and *Psychomastax*; Acrididae, Acridinae, *Boötettix, Ligurotettix* and *Goniatron*; Acrididae, Romaleinae, *Taeniopoda*; Acrididae, Cyrtacanthacridinae, *Clematodes, Aeoloplides* and *Hypochlora.* Similarly three genera, representing the eumastacid subfamily Episactinae (1) and the acridid subfamilies Romaleinae (1) and Cyrtacanthacridinae (1), which live in low ground cover, with the first and last apterous, have Brunner's organ well marked,[6] and the same is true of three acridid genera (2 Acridinae and 1 Cyrtacanthacridinae) which live in low ground cover in pineland or semi-arid districts.[7] Similarly the lianas-inhabiting euthymid cyrtacanthacridid *Rhicnoderma,* which is apterous, and a dendrophilous genus of the same subfamily, *Dendrotettix,* which is fully alate or subapterous in the same species and in the same population, have Brunner's organ equally marked. All of nineteen oedipodid genera examined,[8] which are geophilous in habits and all alate, and the alate acridid *Acrolophitus* and ten apterous geophilous genera of the Cyrtacanthacridinae [9] agree in possessing well-marked Brunner's organs. In short, except for the members of the Pneumoridae and of the Proscopiidae are species of the genus *Psednura,* the affinities of which are being comprehensively discussed elsewhere, all of the genera examined by

[6] These are: Eumastacidae, Episactinae, *Gymnotettix*; Acrididae, Romaleinae, *Brachystola;* Acrididae, Cyrtacanthacridinae, *Gymnoscirtetes.*

[7] Acrididae, Acridinae, *Radinotatum* and *Pedioscirtetes*; Acrididae, Cyrtacanthacridinae,*Conalcaca.*

[8] These are: *Arphia, Chortophaga, Encoptolophus, Camnula, Hippiscus, Tropidolophus, Dissosteira, Platylactista, Derotmema, Mestobregma, Trachyrhachis, Rehnita, Trepidulus, Trimerotropis, Circotettix, Hadrotettix, Cibolacris, Coniana* and *Anconia.*

[9] These are: *Bradynotes, Argiacris, Bufonacris, Papipappus, Moluchacris, Punacris, Incacris, Crites, Elysiacris* and *Tropidostethus.*

me show evident Brunner's organs, regardless of habitat or systematic unit represented. The above listed habitat assignments are largely made from personal field acquaintance with the genera mentioned, often from scores of observations.

It is thus clearly evident to me that the presence or absence of Brunner's organ is not controlled by either the general form or habitat of given genera, and that it is absent or suppressed in certain primitive families and in the very aberrant *Psednura,* but is present in the great bulk of the Acridoidea. There is no correlation with alar development, as they are present in apterous and in alate genera occurring in approximately or exactly similar habitats.

Three Cave-Dwelling Millipeds

By Ralph V. Chamberlin

The present paper deals with three species of millipeds occurring in caves in Texas and New Mexico where the specimens examined were collected by O. G. Babcock and Dr. F. C. Bishopp. Of the three species, one was previously known, while the other two represent new genera as diagnosed below. The types are for the present retained in the author's collection at the University of Utah.

Genus **ECLYTUS,** new

A genus of Cambalidae belonging in the group that lack eyes. The body is constricted into a distinct neck back of the head as in *Odochurus* and *Pharodere.* Collum with lower part of anterior border free, with antenna on each side folded beneath it, like *Odochurus* and differing from *Pharodere* in lacking lateral striations. Metazonites with series of longitudinal striae. Metatergites elevated, crossed over entire length by a series of keels or carinae of which there are six, these including a paramedian pair between each of which and the poriferous keel is a single well developed keel, there being no true secondary or reduced carinae. None of the carinae projecting beyond caudal

margin on any of the segments. Carinae present on penult tergite. Segments typically near forty in number.

Generotype: *Eclytus speobius* sp. n.

Eclytus speobius sp. n.

Color of preserved specimens yellow to pale brown.

Antennae with second joint clearly longest, the sixth next in length.

Collum large, longer than the three following tergites taken together.

Anterior margin below forming an even curve with the lateral margin, the caudal corner sub-rectangular; surface of collum smooth.

Second segment striate below, the dorsal keels present but reduced in height. On the succeeding tergites the keels are sharply elevated and complete; segments strongly striate below. Keels well developed on the penult tergite.

Last tergite longer than the two preceding taken together, but shorter than three; caudally rounded and exceeded by the anal valves. Anal valves inflated, meeting in a groove at the middle. Anal scale transverse, the long caudal margin slightly obtusely notched at the middle and weakly convex on each side.

Number of segments, 41–43.

Diameter, up to 1.8 mm.

Localities: Texas: Sutton Co., Sonora. Many specimens taken deep in Wyatt cave, mostly noted as in complete darkness, in September and October, 1924, and June and July, 1926 (F. C. Bishopp and O. G. Babcock); several also taken in Felton Cave on July 19, 1928 by Babcock.

Genus **SPEORTHUS**, new

A genus of Polydesmidae related closely to *Speodesmus* which it resembles in lacking series of elevated areas or tubercles on the tergites. It differs from that genus in having the dorsal setae more irregularly arranged, these tending to form five series instead of three. It differs also in lacking the aberrant, caudally

broad and strongly setose anal scale of the other genus, this scale in the present genus being of the more usual form.

Generotype: *Speorthus tuganbius* sp. n.

Speorthus tuganbius sp. n.

Pale or colorless throughout.

Head above and down the front clothed with short setae which are densest on lower part of face and sparse above. Antennae distally clavate; the third joint longest; sixth joint thick and of nearly uniform diameter distad of the constricted base and with a patch of sensory cones on upper side at distal end as in *Speodesmus.*

Collum with margin laterally rounded, convex anteriorly and slightly convex or nearly straight caudally.

Other tergites without distinct transverse sulcus. Anterior tergites with setae in three series, the others with setae in approximately five series; setae arising from short slight keels or laterally compressed granules. Lateral keels with four setiferous serrations or teeth in front of that at caudal corner.

Anal tergite projecting well beyond the anal valves, the cauda not deflexed.

Anal scale caudally truncate, the short caudal margin with a tubercle at each end bearing a long seta, the margin between tubercles slightly obtuse at middle; sides diverging forward and flaring out more strongly at anterior end.

Length: 8 mm.

Locality: New Mexico: Carlsbad Caverns. Several females were taken April 24, 1924, about fifty yards from west entrance, the location being "almost dark except for subdued light in the afternoon." O. G. Babcock, collector.

Speobius echinourus Loomis

Locality: Texas: San Marcos County. Two females, now badly fragmented and apparently this species were taken on July 26, 1932, in Wonder Cave about 75 feet from the entrance. F. C. Bishopp, collector.

The original types of this species were described from caves in the adjoining Kerr County.

List of Titles of Publications Referred to by Numbers in Entomological Literature in Entomological News.

1. American Midland Naturalist. Notre Dame, Indiana.
2. American Museum Novitates. New York, N. Y.
3. American Naturalist. Garrison-on-Hudson, New York.
4. Annals of Applied Biology. London.
5. Annals of the Entomological Society of America. Columbus, Ohio.
6. Annals and Magazine of Natural History. London.
7. Annales Academia Brasileira Sciencias. Rio de Janeiro.
8. Anales del Instituto de Biologia Mexico. Mexico City.
9. Anatomical Record. Philadelphia.
10. Arkiv för Zoologie. K. Svenska Vetenkapsakademien i. Stockholm.
11. Arquivos de Higiene e Saude Publica. São Paulo.
12. Biological Bulletin. Woods Hole, Massachusetts.
13. Bios, Rivista Biol. Geneva.
14. Boletin de Entomologia Venezolana. Caracas.
15. Boletin del Museo de Historia Natural "Javier Prado." Lima, Peru.
16. Boletin do Museu Nacional do Rio de Janeiro. Brasil.
17. Bull. Acad. Sci. (Izvestia Akad. nauk) U S S R (S. biol.).
18. Bulletin of the Brooklyn Entomological Society. New York.
19. Bulletin of Entomological Research. London.
20. Bulletin of the Museum of Comparative Zoology. Cambridge, Mass.
21. Bulletin of the Southern California Acad. of Sciences. Los Angeles.
22. C. r. Acad. Sci. (Doklady Akad. nauk) U S S R. Leningrad.
23. Canadian Entomologist. Guelph, Canada.
24. Canadian Journal of Zoology. Ottawa, Canada.
25. Ecological Monographs. Durham, North Carolina.
26. Ecology. Durham, North Carolina.
27. Entomologica Americana. Brooklyn Ent. Society, New York.
28. Entomologist's Monthly Magazine. London.
29. Entomological Record and Journal of Variations. London.
30. The Entomologist. London.
31. Florida Entomologist. Gainesville, Florida.
32. Frontiers. Philadelphia, Pennsylvania.
33. Great Basin Naturalist. Provo, Utah.
34. Iowa State College Journal of Science. Ames, Iowa.
35. Journal of Agricultural Research. Washington, D. C.
36. Journal of Animal Ecology. London.
37. Journal of Economic Entomology. Geneva, New York.
38. Journal of the Elisha Mitchell Science Society. Chapel Hill, N. C.
39. Journal of Entomology and Zoology. Claremont, California.
40. Journal of Experimental Biology. London.
41. Journal of Experimental Zoology. Philadelphia, Pennsylvania.
42. Journal of Heredity. Baltimore, Maryland.
43. Journal of the Kansas Entomological Society. Lawrence, Kansas.
44. Journal of Morphology. Philadelphia, Pennsylvania.
45. Journal of the New York Entomological Society. New York.
46. Journal of Parasitology. New York.
47. Journal of the Tennessee Academy of Sciences. Nashville, Tenn.
48. Journal of the Washington Academy of Sciences. Washington, D. C.
49. Memorias do Instituto Oswaldo Cruz. Rio de Janeiro.
50. Microentomology. Stanford University, California.
51. The Microscope. London.
52. Mosquito News. Albany, New York.
53. Nature. London.
54. Nature. Washington, D. C.
55. Le Naturaliste Canadien. Quebec.

56. Natural History. New York.
57. Occasional Papers, Mus. of Zool., Univ. of Michigan. Ann Arbor.
58. Ohio Journal of Science. Columbus, Ohio.
59. Opinions and Declarations. Intern. Com. Zool. Nomencl. London.
60. Pan-Pacific Entomologist. San Francisco, California.
61. Parasitology. London.
62. Proceedings of the Academy of Natural Sciences. Philadelphia.
63. Proceedings of the Biological Society of Washington. Wash., D. C.
64. Proceedings of the California Academy of Science. San Francisco.
65. Proceedings of the Entom. Soc. of Washington. Washington, D. C.
66. Proceedings of the Hawaiian Entomological Society. Honolulu.
67. Proceedings of the National Acad. of Sciences. Washington, D. C.
68. Proceedings of the Royal Entomological Society of London. Ser. A.
69. Proceedings of the Royal Entomological Society of London. Ser. B.
70. Proceedings of the Royal Entomological Society of London. Ser. C.
71. Proceedings of the U. S. National Museum. Washington, D. C.
72. Proceedings of the Zoological Society of London. London.
73. Psyche, A Journal of Entomology. Boston, Massachusetts.
74. Quarterly Journal of Microscopical Science. London.
75. Quarterly Review of Biology. Baltimore, Maryland.
76. Revista Academia Columbiana de Cien. Exact. Fis. y Nat. Bogotá.
77. Revista Chilena de Historia Natural. Valparaiso, Chile.
78. Revista Instituto Salubridad y Enfermedades Tropicales. Mexico.
79. Revista Sociedad Mexicana de Historia Natural. Mexico City.
80. Science. Washington, D. C.
81. Scientific Monthly. New York.
82. Smithsonian Miscellaneous Collections. Washington, D. C.
83. Transactions of the American Entomological Society. Philadelphia.
84. Transactions of the Amer. Micros. Soc. Menasha, Wisconsin.
85. Transactions of the Illinois State Academy of Sciences. Springfield.
86. Transactions of the Kansas Acad. of Sci. Manhattan, Kansas.
87. Transactions of the Royal Canadian Institute. Toronto.
88. Transactions of the Royal Entomological Society. London.
89. U. S. Dept. of Agric., Farmer's Bulletins. Washington, D. C.
90. U. S. Dept. of Agric., Technical Bulletins. Washington, D. C.
91. University of California Publications in Entomology. Berkeley.
92. University of California Publications in Zoology. Berkeley.
93. University of Kansas, Science Bulletins. Lawrence, Kansas.
94. Ward's Natural Science Bulletin. Rochester, New York.
95. Zoologica. New York.
96. American Journal of Public Health. Boston.
97. American Journal of Tropical Medicine. Baltimore.
98. Annals of Tropical Medicine and Parasitology. Liverpool.
99. Canadian Journal of Research. Section E, Medical Sciences, Ottawa.
100. Evolution. New York.
101. Mitteilungen der schweitzerischen entomologischen Gesellschaft, Bern.
102. Revista de Entomologia. Rio de Janeiro, Brasil.
103. Proceedings of the Royal Society of London.
104. Anales de la Escuela Nacional de Ciencias Biologicas. Mexico.
105. Journal of Cellular and Comparative Physiology. Philadelphia.
106. Redia. Florence, Italy.
107. Annales de la Société Entomologique de France. Paris.
108. Bulletin de la Société Entomologique de France. Paris.
109. Notulae Naturae. Philadelphia.
110. L'Entomologiste. Paris.
111. Revista Brasiliera de Biologia. Rio de Janeiro.
112. Eos, Revista Española de Entomologia. Madrid.
113. Minist. de Agri. de la Nación, Inst. Sanidad Vegetal, Buenos Aires.

Current Entomological Literature

COMPILED BY R. G. SCHMIEDER

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia and the University of Pennsylvania, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the year 1951 unless otherwise noted. Continued papers, with few exceptions, are recorded only at their first installment.

For other records of general literature and for economic literature, see the Bibliography of Agriculture, Washington, and the Review of Applied Entomology, Series A, London. For records of papers on medical entomology see Review of Applied Entomology, Series B.

NOTE: The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the List of periodicals and serials published in our January and June issues. The number of the volume, and in some cases, the part, heft, &c. is followed by a colon (:). References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to Neotropical species, and not so indicated in the title, have the symbol (S).

Papers published in ENTOMOLOGICAL NEWS are not listed.

GENERAL—Ball, C. R.—Nomenclature and taxonomy. [Biologia] 2: 295. **Beall, G.**—A coordinated study of the migration of the monarch butterfly: A plea for information from local naturalists. [Lep. News] 5: 37–40. **Biakonoff, A.**—Lambertus Johannes Toxopeus. [Lep. News] 5: 36 (Obit.). **Blake, D. H.**—Two old coleopterists. [Col. Bull.] 5: 49–54 (F. H. Chittenden, E. A. Schwarz). **Brien, P.**—Auguste Lameer, 1864–1942. [Les Nat. Mons et du Borinage, Bull. Mens.] 32 (1949): 69–71 (Obit., portr.). **Chauvin, R.**—Sur un modèle de psychromètre adapté a l'étude du microclimat. [Bull. Soc. Zool. Fr.] 124: 320–21, 1949. **Cole, A. C.**—Insects from Bikini Atoll, Marshall Islands. [47] 26: 246–48. **Collart, A.**—Armand d'Orchymont. Notice biographique. [Bull. Inst. Roy. Belg.] 26 (37): 1–20 (Portr. and bibliogr.), 1950. **DeBach, P., C. A. Fleschner and E. J. Dietrick**—A biological check method for evaluating the effectiveness of entomophagous insects. [37] 44: 763–66. **Gaul, A. T.**—A glossary of terms and phrases used in the study of social insects. [5] 44: 473–84. **Knowlton, G. F. and N. T. Packer**—Insect control and pollination of the alfalfa seed crop in the Delta tract, Utah. [Utah State Agr. Expt. Sta. Mimeo. Ser.] 76: 1–12. **La Rivers, I.**—Some fossil insects from a Nevada hot springs deposit. [21] 50: 81–85, ill. (Orth., Col.). **Lewart, R. M.**—The role of the insect in civil defense. [52] 11: 121–22. **Mahler, F.**—Wie gelangt Gordius in den Leib der Heuschrecken? [Arch. Hydrobiol.] 45: 395–96. **McMahon, J. P.**—Phoresy. (See under Diptera.) **Mensil, L. P.**—Notice sur Joseph Villeneuve de Janti avec liste bibliographique.

[Bull. Inst. Roy. Belg.] 26 (7): 1–22 (Portrait), 1950. **Mullins, L. J. and W. J. Nickerson**—A proposal for serial number identification of biological species. [Biologia] 2: 211–13. **Pittioni, B.**—Das Problem der Formbildung. Ein Deutungsversuch mit hilfe der Klimaökologischen Formel. (Hym., Bombidae). [Bonner Zool. Beitr.] 1: 254–61. **Sailer, R. I.**—Concerning a recent paper on the insects and related arthropods of Arctic Alaska. [26] 32: 729–30. **Thompson, W. R.**—The specificity of host relations in predaceous insects. [23] 83: 262–69. **von Frisch, K.**—Christian Konrad Sprengel und die heutige Blumentheorie. (Quotation from the article in [Naturwiss.] 31: 226–29 (1943).) [Biologia] 2: 242–44 (Chron. Bot. 12: 242–44). **Way, M. J., P. M. Smith and B. Hopkins**—The selection and rearing of leaf-eating insects for use as test subjects in the study of insecticides. [19] 42: 331–54, ill. **Womble, W. H.**—Differential systematics. [80] 114: 315–22. **Williams, J. R.**—Biological control. (See under Coleoptera.)

ANATOMY, PHYSIOLOGY, MEDICAL—Brown, A. W. A. et al.—Symposium on the development of resistance of insects to insecticides. 81st Ann. Rpt. Ent. Soc. Ont. 33–50. **Busnel, R. G. et A. Drilhon**—Sur les ptérines de la chrysalide de Pieris brassicae L. [Bull. Soc. Zool. Fr.] 124: 21–23, 1949. **Butler, C. G.**—The importance of perfume in the discovery of food by the worker honeybee (Apis mellifera L.). [Proc. Roy. Soc. Ser. B] 138: 403–13. **Butt, F. H.**—Feeding habits and mechanism of the Mexican bean beetle. [Mem. Cornell Univ. Exp. Sta.] 306: 1–32, ill. **Chang, Peh-I**—The action of DDT on the golgi bodies in insect nervous tissue. [5] 44: 311–26, ill. **Chaudonneret, J.**—A propos du corps jugal des Thysanoures. [Bull. Soc. Zool. Fr.] 124: 164–67, ill., 1949. **Chen, P. S.**—A comparative study of the oxygen consumption of the three lethal mutants "ltr," "lgl," and "lme" of Drosophila melanogaster. [Z. Vererbungslehre] 84: 38–70. **Clark, A. M. and C. J. Mitchell**—Radiosensitivity of haploid and diploid Habrobracon during pupal development. [41] 117: 489–98. **Clark, E. W. and G. H. Ball**—The free amino-acids in the whole bodies of culicid mosquitoes. [46] 37 (no. 5, sect. 2): 29 (Abstract). **Deschamps, P.**—Note sur la cellulase chez les larves des insectes xylophages de la famille des Cerambycides. [Bull. Soc. Zool. Fr.] 124: 103–08, 1949. **Dias, E.**—Chagas disease in the United States. [46] 37 (no. 5, sect. 2): 31 (Vectors and hosts, abstract). **Dobrovsky, T. M.**—Postembryonic changes in the digestive tract of the worker

honeybee (Apis mellifera L.). [Mem. Cornell Univ. Exp. Sta.] 301: 1–45, 12 pls. **Gibson, C. L. and W. F. Ascoli**—The relationship of Culicoides (Dipt., Ceratopog.) to the transmission of Onchocerca virus. [46] 37 (no. 5, sect. 2): 30 (Abstract). **Hadorn, E. and H. K. Mitchell**—Properties of mutants of Drosophila melanogaster and changes during development as revealed by paper chromotography. [67] 37: 650–65. **Harrington, N. J. and R. W. Koza**—Effect of X radiation on the desoxyribonucleic acid and on the size of the grasshopper embryonic nuclei. [12] 101: 138–50. **Herskowitz, I. H. and W. J. Burdette**—Some genetic and environmental influences on the incidence of a melanotic tumor in Drosophila. [41] 117: 499–520. **Hinton, T., D. T. Noyes and J. Ellis**—Amino acids and growth factors in a chemically defined medium for Drosophila. [Physiol. Zool.] 24: 335–53. **Holway, R. T., W. A. Mitchell and A. A. Salah**—Studies on the seasonal prevalence and dispersal of the Egyptian housefly. I. The adult flies. [5] 44: 381–98. **Howe, R. W.**—The movement of grain weevils through grain. [19] 42: 125–34. Studies on beetles of the family Ptinidae. V. The oviposition rate of Ptinus tectus under natural conditions. *Ibid.* 445–53. **Kadner, C. G. and F. M. La Fleur**—The vitamin requirements of Phaenicia sericata larvae (Diptera: Calliphoridae). [Wasmann Jour. Biol.] 9: 129–36. **Krijgsman, B. J. and Krijgsman-Berger, N. E.**—Physiological investigations into the heart function of arthropods. The heart of Periplaneta americana. [19] 42: 143–55. **Lees, A. D.**—Recent advances in science. Entomology: The egg coverings of insects and other arthropods. [Science Progress] 39: 706–12. **L'Hélias, C.**—Expériences de ligatures chez la larve d'Apis mellifica. [C. R. Soc. Biol.] 145: 233–34. **Light, S. F. and F. M. Weesner**—Further studies on the production of supplementary reproductives in Zootermopsis (Isoptera). [41] 117: 397–414. **Ludwig, D.**—Composition of the blood of Japanese beetle (Popillia japonica) larvae. [Physiol. Zool.] 24: 329–34. **Mitchell, D. F. and C. Epling**—The diurnal periodicity of Drosophila pseudoobscura in southern California. [26] 32: 696–708. **Musgrave, A. J.**—Histophysiology and insecticide action. 81st Ann. Rept. Ent. Soc. Ont.: 26–33. **Okay, S.**—Sur les pigments des ailes postérieures rouges, bleues et jaunes des Acrididae. II. [Bull. Soc. Zool. Fr.] 124: 11–15, 1949. **Oughton, J.**—"Tagging" root maggot flies (Hylemya spp., Anthomyidae) by means of radioactive phosphorus. 81st Ann. Rpt. Ent. Soc. Ont.: 91–92. **Park,**

T. and M. B. Frank—"Paddle": A sex-linked, recessive gene of Tribolium castaneum Herbst. [3] 85: 313–18. **Polhemus, M. S. and O. W. Park**—Time factors in mating systems for honey bees. [37] 44: 639–642. **Pradhan, S. and S. C. Bhatia**—Specific susceptibility to HCN and the amount of HCN recovered from fumigated insects. [19] 42: 399–418. **Rawle, S. G.**—The effects of high temperature on the common clothes moth, Tineola biselliella (Humm.). [19] 42: 29–40. **Rees and Onishi**—Mospito terminalia. (See under Diptera.) **Richard, G.**—Les trachées de la patte de Calotermes flavicollis Fab. [Bull. Soc. Zool. Fr.] 124: 49–52, 1949. La répartition des sensilles sur les pattes du Calotermes flavicollis. *Ibid.* 77–84, ill. **Rockstein, M. and L. Levine**—Enzymes in insects. Acid phosphatase. [5] 44: 469–72. **Roeder, K. D. and E. A. Weiant**—The effect of concentration, temperature, and washing on the time of appearance of DDT-induced trains in sensory fibers of the cockroach. [5] 44: 372–80. **Roth, L. M. and E. R. Willis**—Hygroreceptors in Coleoptera. [41] 117: 451–87, ill. **Sieburth, J. F., M. G. Bonsall and B. A. McLaren**—A simplified biological assay method using the cockroach, Periplaneta americana (Linn.), for protein utilization. [5] 44: 463–68. **Slifer, E. H.**—Some unusual structures in Locusta migratoria migratorioides and their probable function as thermoreceptors. [Proc. Roy. Soc. Ser. B] 138: 414–37, ill. **Stemler, F. W. and W. A. Hiestand**—Rapid acclimatization of insects to anoxia, with special reference to the housefly [80] 114: 440–41. **Weaver, N. and K. A. Kuiken**—Quantitative analysis of the essential amino acids of royal jelly and some pollens. [37] 44: 635–38. **Wigglesworth, V. B.**—Source of the moulting hormone in Rhodnius. [53] 168: 558.

ARACHNIDA AND MYRIOPODA—Bonnet, P.—Difficultés de nomenclature chez les Aranéides. II. La question Araneus-Epeira. [Bull. Soc. d'Hist. Nat. Toulouse] 85: 176–84, 1950. **Causey, N. B.**—New genera and species of millipeds—Paraiulidae (Juloidea). [Proc. Arkansas Acad. Sci.] 3: 45–52, ill., 1950. On Eurymerodesmidae, a new family of Diplopoda (Strongylosomidea), and a new Arkansas species of Eurymerodesmus. *Ibid.* 4: 69–71. The milliped assembly Zinaria butlerii isongen. (Xystodesmidae). *Ibid.* 4: 73–88 (k). **Chamberlin, R. V.**—On eight new southern millipeds. [Great Basin Nat.] 11: 19–26. Records of American millipeds and centipeds collected by Dr. D. Elden Black in 1950. *Ibid.* 27–35. **Eads, R. B.**—New mites of the genus Androlaelaps Berlese. [46] 37: 212–16, ill. **Eads,**

R. B. and B. G. Hightower—A new Neoichoronyssus from the pack rat, Neotoma micropus (Laelaptidae). [65] 53: 295–98, ill. **Exline, H.**—Tegenaria agrestis (Walck.), a European Ageninid spider introduced into Washington state. [5] 44: 308–10, ill. **Fisher, F. E.**—The Entomophthora attacking citrus red mite. [31] 34: 83–88. **Grandjean, F.**—Formules anales, gastronotiques, géitales et aggénitales du développement numérique des poils chez les Orinates. [Bull. Soc. Zool. Fr.] 124: 201–25, 1949. **Gregson, J. D.**—Notes on the spring activity of the Rocky Mountain wood tick, Dermacentor andersoni (Ixodidae). [Proc. Soc. Brit. Col.] 47: 4–7. **Hyland, K. E., Jr.**—Observations on the chigger mite Trombicula (Eutrombicula) splendens Ewing. [5] 44: 297–301. **Leeson, H. S.**—The recorded distribution of the tick Rhipicephalus sanguineus (Latr.). [19] 42: 123–24. **Lombardini, G.**—Canestriniidae dell'America del Sud (Acarina). [Arthropoda, B. Aires] 1: 279–90, 1950. **Münchberg, P.**—Ein zweiter Beitrag über den in den U.S.A. eine odonaten-parasitische Larvenphase aufweisenden Arrenurus-Arten (Ordnung: Hydracarina). [Arch. Hydrobiol.] 45: 378–88. **Musfeldt, I. W.**—A report on mites infesting the muskrat (Ondatra zibethica osoyoosensis in British Columbia). [23] 83: 279–80. **Sengbusch, H. G.**—Notes on some New York Oribatid mites. [95] 36: 155–62, ill. **Strandtman, R. W. and O. E. Hunt**—Two new species of Macronyssidae, with notes on some established genera (Acarina). [46] 37: 460–70.

SMALLER ORDERS—Bick, G. H.—The nymph of Libellula semifasciata Burm. [65] 53: 247–50. **Buchholz, K. F.**—Zur Paarung und Eiablage der Agrioninen (Odonata). [Bonner Zool. Beitr.] 1: 262–75, ill. **Fraser, F. C.**—A revision of the Chlorocyphidae, addenda with key to the Platycypha and Chlorocypha and descriptions of new species (Odonata). [Bull. Inst. Roy. Belg.] 26 (18): 1–22, ill., 1950. **Gaul, A. T.**—Termites. (See under General.) **Light and Weesner**—Isoptera. (See under Anatomy.) **Münchberg, P.**—Odonata. (See under Arachnida.) **Needham, J. G.**—Three new species of North American dragonflies with notes on related species (Odonata). [83] 76: 1–12, ill. **Spencer, G. J.**—Upon the mating habits of Thermobia domestica (Thysanura). [Proc. Ent. Soc. Brit. Col.] 47: 40–42. **Walker, E. M.**—The Odonata of the Northern Insect Survey. [23] 83: 269–79. **Yie, Shi-Tao**—The biology of Formosan Panorpidae and morphology of eleven species of their immature stages. [Mem. Coll. Agric. Nat. Taiwan Univ.] 2 (4): 1–111, ill.

ORTHOPTERA—Lordello, L. G. E.—Contribuição ao conhecimento cromossômico dos Orthoptera do Brasil. I. Observações sôbre a espermatogênese de Hyperophora sp. (Tettig, Phan.). [Dusenia] 2: 131–36. **Mahler, F.**—(See under General.) **Okay, S.**—(See under Anatomy.) **Ray-Chaudhuri, S. P. and G. K. Manna**—Chromosome evolution in wild populations of Acrididae. Part I. On the occurrence of a supernumerary chromosome in Aiolopus sp. [Proc. Indian Acad. Sci.] 33: 55–61, ill. **Rosas Costa, J. A.**—Acerca de un interesante desove de Acrididae. [Arthropoda, B. Aires] 1: 381–82, ill. **Slifer, E. H.**—(See under Anatomy.)

HEMIPTERA—Allen, W. R.—The Funkhauser collection of Membracidae. [5] 44: 485–87. **Bobb, M. L.**—Life history of Ochterus banksi Barber (Ochteridae). [18] 46: 92–100, ill. **Brooks, G. T.**—A revision of the genus Anisops (Notonectidae). [93]34: 301–519. **Carayon, J.**—Ecologie et regime alimentaire d'Hemipteres Henicocephalidea africains. [108] 56: 39–44. **Dias, E.**—Triatoma. (See under Anatomy.) **Drake, C. J.**—New American chinch bugs (Lygaeidae). [48] 41: 319–23, ill. New gerontogenous Hydrometridae. [21] 50: 101–05. New neotropical water-striders (Veliidae). [Great Basin Nat.] 11: 37–42. **Drake, C. J. and F. C. Hottes**—Stridulatory organs in Saldidae. [Great Basin Nat.] 11: 43–46, ill. **Elkins, J. C.**—The Reduviidae of Texas. [Texas Jour. Sci.] 3: 407–12. **Jensen, D. D. and G. F. Knowlton**—The Psyllidae of Utah. [Utah State Agr. Expt. Sta. Mimeo. Ser.] 380: 1–5. **Knowlton, G. F.**—Another biting leafhopper. [18] 46: 112. **La Rivers, I.**—Two new Ambrysi from South America (Naucoridae). [65] 53: 288–93 (k). **Ossiannilsson, F.**—On the shape of the second abdominal sternum of the males as a specific character in the genus Macrosteles Fieb. (Auchenorh.). [Opusc. Ent.] 16: 109–11. **Rao, V. P.**—Synonymy of Semelaspidus artocarpi (Green) (Coccidae). [65] 53: 261–62. **Rychman, R. E.**—Recent observations of cannibalism in Triatoma (Reduviid.). [46] 37: 433–34.

LEPIDOPTERA—Anon.—Henry Jerome Turner. [Lep. News] 5: 36 (Obit.). **Beall, G.**—A coordinated study of the migration of the monarch butterfly: A plea for information from local naturalists. [Lep. News] 5: 37–40. **Berger, A.**—Catalogues raissones de la Faune Entomologique du Congo belge. I. Papilionidae. [Ann. Mus. Congo Belg. C.] ser. II (II), vol. 8, fasc. 1: 1–104, ill., 1950. **Bourgogne, J.**—Morphologie externe et appareil génital d'un exemplaire gynandromorphe de Zygaena achilleae Esp.

(Lep. Zygaen.). [Bull. Soc. Zool. Fr.] 124: 67–74, ill., 1949. L'appareil génital femelle de quelques Hepialidae. *Ibid.* 284–91, ill. **Box, H. E.**—New species and records of Diatraea Guild. from northern Venezuela (Pyral.). [19] 42: 379–98, ill. **Busnel et Drilhon**—(See under Anatomy.) **Fleming, H.**—A new genus and species of Lithosiinae (moths) from Rancho Grande, north-central Venezuela. [95] 36: 183–84, ill. **Freeman, T. N.**—Northern Canada and some northern butterflies. [Lep. News] 5: 41–42 (map). **Gray, P. H. H.**—An apparatus for incubating Lepidopterous larvae or pupae in nutrition and environment tests. [Lep. News] 5: 35. **Hardy, G. A.**—Notes on the life history of February highflyer Hydriomena nubilofasciata Pack. F. vulnerata Sweet (Geom.). [Proc. Ent. Soc. Brit. Col.] 47: 25–26. **Kirkwood, C. W.**—A new moth of the genus Apicia from Arizona. [21] 50: 99–100, ill. **Kleinschmidt, O.**—Ueber Vanessen und andere Tagfalter aus China. [Bonner Zool. Beitr.] 1: 276–85, ill. **MacKay, M. R.**—Descriptions of larvae of several species of the genus Zale (Phalaen.). [23] 83: 245–61, ill. **Remington, C. L., et al.**—Geographic subspeciation. A symposium. [Lep. News] 5: 17–35. Including: I. Introduction: A general outline of subspeciation, by **C. L. Remington,** pp. 17–20. II. Subspeciation among sphingid moths of the West Indies, by **M. M. Carey,** pp. 20–23. III. Holarctic butterfly speciation and subspeciation, especially in North America, by **A. B. Klotz,** pp. 24–27. IV. Subspeciation in European Lepidoptera, by **B. P. Beirne,** pp. 27–28. V. Subspeciation in the microlepidoptera, by **E. Munroe,** pp. 29–31. VI. The subspeciation of Speyeria atlantis, by **L. P. Grey,** pp. 31–35. **Shaw, J. P.**—Collecting in British Guiana. [29] 63: 165–67. A new subspecies of Mitoura siva Edwards. [21] 50: 96–98, ill. **Tilden, J. W.**—Microlepidoptera associated with Baccharis pilularis. II. Tortricidae, Phaloniidae, Gelechiidae. [Wasmann Jour. Biol.] 9: 239–54. **Viette, P. V. L.**—Lépidoptères de L'Isle de Paques. [Bull. Inst. Roy. Belg.] 26 (39): 1–7, 1950. Contribution à l'étude du genre Incurvaria Hw. [110] 7: 53–57 (k).

DIPTERA—Alexander, C. P.—New or insufficiently known crane-flies from the nearctic region (Tipulidae). Part XIV. [18] 46: 85–91. **Breland, O. P.**—The immature stages of Aedes infirmatus with notes on related species. [5] 44: 362–71, ill. **Brown, A. W. A., D. S. Sarkaria and R. P. Thompson**—Studies on the responses of the female Aedes mosquito. Part I. The search for attractant vapours. [19] 42: 105–14. **Costa Lima, A. da**—Duas espécies

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Reviews

Insect Resistance in Crop Plants. By Reginald H. Painter. xi + 520 pp. 67 figs. Macmillan Company, New York, 1951. $8.50.

With our ever-increasing human population, the war between insects and man for possession of an adequate food supply continues and is yearly intensified. There is great publicity over the new insecticides and our private and governmental agencies are pouring millions of dollars into research leading toward the production of newer and yet more potent ones. Some of these are now so deadly that operators applying them are forced to wear special masks and protective clothing. And there is no end to this activity in sight.

Professor Painter does not decry the use of insecticides. What he does point out is that, in some instances, effective insecticides have not yet been developed, whereas the discovery and breeding of strains resistant to insect injury have been the sole means of saving certain crops. He also makes the point that in basic crops having a small margin of profit, or in economically backward communities where the cost of insecticides is almost prohibitive, the production and use of insect-resistant strains offers an economically sound approach to the problem of an adequate food supply.

Quite wisely, the author has not spread his text over too wide a field; thus, the introductory chapters carry the reader into the subject by means of generalized discussions, at the same time being amply illustrated with particular examples from a wide variety of crop plants. Then five crops are taken up in great detail, so that one can gain insight into the ramifications of the problem; these crops are wheat, corn, cotton, the sorghums, and potatoes. Chapter IX, on "Methods and problems in breeding for resistance to insects in crop plants," is a most valuable addition to the work.

In the opinion of the reviewer, this is one of the most "usable" books to appear, and certainly the most useful in the field. Each chapter has its own detailed table of contents as well as a full bibliography. The last sixty-odd pages are devoted to a special bibliography broken down into topics not dealt with in the text. These cover such items as a series of cereals and legumes, various garden and truck crops, fiber crops, sugar cane, tea, coffee, tobacco, cacao, and similar items, cultivated fruits and nuts, citrus and other tropical and subtropical fruits, various berries, grapes, ornamental plants, forest trees, a section on natural resistance of wood to termites, and additional references to papers on subjects covered in the various chapters which appeared after these were set up. The book also is adequately indexed.

The present work is recommended reading for the general biologist, particularly the plant breeder and geneticist, as well as one primarily interested in the control of insect pests. It is so organized that it would serve as a completely adequate textbook, and the extensive bibliography it contains is a necessity for anyone doing work in the field. The text is well organized and readable, items not always true of similar works. The author's approach to his problem is sound and his conclusions tempered with an ever-present regard for the genetic backgrounds of the plant and insect materials considered.—W. H. Camp.

A Field Guide to the Butterflies of North America, East of the Great Plains. By Alexander B. Klots. Houghton Mifflin Company, Boston, (Peterson Field Guide Series), 1951. Pp. xvi + 349. $3.75.

The publication of this superb little manual marks the beginning of a new era for people interested in North American Butterflies. Where Holland's *Butterfly Book* make it relatively simple for a person to collect and identify butterflies within the limits of the knowledge of the early '30's, Klots' *Field Guide* will make it possible for the amateur to study these insects scientifically. Within the covers of Dr. Klots' book a student can learn the rudiments of butterfly taxonomy, morphology, ecology, and metamorphosis. He can gain a passing acquaintance with every butterfly found in eastern North America and he can learn how to collect and preserve these butterflies.

All of the important species found in the area covered are figured either in color or black and white. The colored plates, paintings by Marjorie Statham, are, on the whole, excellent;

the black and white photographs, although some are better than others, are all good. One of the finest features of the work is the "field guide" style of identification aid. The salient identifying characters of each species are indicated both in the explanation of the figure, and by pointers on the plate itself. The range of the species is also given in the plate explanation, along with the locality of the specimen figured.

An interesting and valuable feature of the book is a short section for "teachers and nature leaders" which I hope will be carefully considered by those at whom it is aimed. Too many Scout leaders and nature counselors, content with having their students merely catch a few specimens and place them in Riker Mounts, make no attempt to foster a study of the fascinating biology of the creatures which are being collected.

Other outstanding features of the book are a wealth of life history information, keys to the more confusing groups, a list of "Casual and Stray Species and False or Dubious Records," a section on literature and collections, and a checklist of species found in the area covered.

The individual species treatment consists of a brief description of the insect, comments on similar species telling how to distinguish them from the species in question, a brief description of the larva and its habits, a list of the known foodplants, the number of broods and their approximate dates, a summary of the species range, and a list of subspecies giving a short description, the type locality when known, and the range.

Many small errors have crept into the work and in places the generic treatment may cause confusion; however this is to be expected in the first edition of a work of this scope. Some comment has been made and, undoubtedly, more will be made on Dr. Klots' choice of generic names. If he publishes a hundred revisions of his book he will never be able to satisfy everyone, and I don't think that he should try. Personally I feel that a slightly more conservative treatment of the names might well have been used, but I find nothing confusing or harmful in Dr. Klots' selections. The beginner couldn't care less whether *cybele* is placed in genus *Argynnis* or *Speyeria* and the more advanced student is aware of the issues involved and can make up his own mind.

In my opinion, the only major fault of the book is the author's unrestrained use of common names. It is unfortunate that Dr. Klots did not break with precedent and omit the common names, which are of dubious worth and often tend to confuse.

This book is of inestimable value to the amateur and will certainly be found on every specialist's shelf.—Paul R. Ehrlich

Notice. The December 1951 issue of Entomological News was mailed at the Post Office at Lancaster, Pa., on January 9, 1952.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Miridae (Capsidae)—American species wanted, with locality labels, in exchange for British species. D. Leston, F.R.E.S., 6 Frognal Rise, London N. W. 3, England.

Wanted—Entomological microscope in good condition; Spencer, Bausch & Lomb, or other standard make. David G. Shappirio, 4811 17th St., N.W., Washington 11, D. C.

Coleoptera—Large quantities of Cicindelidae, Buprestidae, Lucanidae, Cerambycidae wanted in exchange for all families of Coleoptera from Ill., Ind. and Mo. Joseph B. Hayes, 1905 N. Pulaski Rd., Chicago 39, Ill.

American Sarcophagidae—wanted for identification. H. R. Dodge, P.O. Box 185, Chamblee, Georgia.

German lepidopterist wishes to correspond and receive live material (eggs and pupae) in exchange for dried imagoes. Johannes Reichel, Koenigsberg, Krs. Wetzlar 16, Germany.

For exchange—The periodic Cicada, T. septendecim. Desire Lepid., espec. Papil., Sphing. & Speyeria. Also Col., espec. Ceramb. & Lucan. John W. Morris, 2704 Genesee St., Syracuse 9, N. Y.

Cynipid and Itonidid galls—American species wanted; purchase or exchange for British species. Fresh or dried. D. Leatherdale, F.R.E.S., Old Woodstock, Oxford, England.

Wanted—Reprints or papers concerning insects taken in Alaska for inclusion in list of Alaskan insects. R. H. Washburn, Alaska Experiment Station, Palmer, Alaska.

Conopidae of the World wanted. Will pay 10¢ to $1.00 for pinned and labelled specimens. S. Camras, 4407 N. Milwaukee Ave., Chicago 30, Illinois.

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ENTOMOLOGICAL NEWS

FEBRUARY 1952

Vol. LXIII No. 2

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PUBLISHED MONTHLY, EXCEPT AUGUST AND SEPTEMBER, BY
THE AMERICAN ENTOMOLOGICAL SOCIETY
PRINCE AND LEMON STS., LANCASTER, PA.
AND
1900 RACE STREET, PHILADELPHIA 3, PA.

Subscription, per yearly volume of ten numbers: $5.00 domestic; $5.30 foreign; $5.15 Canada. Entered as second-class matter April 19, 1943, at the post office at Lancaster, Pa., under the Act of March 3, 1879. Acceptance for mailing at the special rate of postage provided for in paragraphs (d-2), Section 34.40, P. L. & R. of 1948, authorized April 19, 1943.

ENTOMOLOGICAL NEWS

ENTOMOLOGICAL NEWS is published monthly, excepting August and September, by The American Entomological Society at Prince and Lemon Sts., Lancaster, Pa., and the Academy of Natural Sciences, 1900 Race Street, Philadelphia 3, Pa., U. S. A.

PHILIP P. CALVERT, Editor Emeritus. R. G. SCHMIEDER, Editor. Editorial Staff: E. J. F. MARX, M. E. PHILLIPS, J. A. G. REHN, and A. G. RICHARDS.

Subscription price, per yearly volume of 10 numbers: Domestic, $5.00; Foreign, $5.30; Canada, $5.15—U. S. Currency.

SUBSCRIPTIONS, ADVERTISEMENTS: All communications and remittances to be addressed to **ENTOMOLOGICAL NEWS, 1900 Race Street, Philadelphia 3, Pa.**

MANUSCRIPTS and all communications concerning same should be addressed to **R. G. Schmieder, Zoological Laboratory, University of Pennsylvania, Philadelphia 4, Pa.**

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ENTOMOLOGICAL NEWS

VOL. XLIII FEBRUARY, 1952 NO. 2

Some Records of Alaskan Acridoidea (Orthoptera)

By JAMES A. G. REHN, Curator of Insects, Academy of Natural Sciences of Philadelphia

In the Autumn of 1950 two small but interesting series of Alaskan grasshoppers were sent to me for identification and, in view of the scarcity of information relative to Orthoptera from that territory, the results of their examination are here presented. One series, sent to me by Dr. George H. Plumb, Assistant Entomologist of the Connecticut Agricultural Experiment Station, was secured by Dr. H. J. Lutz, of the Yale Forestry School; the other was largely secured and sent to me by Dr. Richard H. Washburn, Entomologist of the Alaska Agricultural Experiment Station of the University of Alaska at Palmer, Alaska. I have been privileged to retain the material secured by Dr. Lutz in the Academy series, as well as duplicate material from that sent by the Alaska Agricultural Experiment Station. One of the species here discussed was unreported previously from Alaska.

TETRIGIDAE

Tetrix granulata (Kirby)

Palmer; May 27 and June 18, 1950; (R. H. Washburn); 2 ♀; [Alaska Exper. Sta. and A.N.S.P.].

For the present at least, after the comparison of representative Old World series, I prefer to regard *granulata* of Kirby as distinct from the Palearctic *subulata,* under which the former was placed by Hebard.[1] I regard the case as less simple than

[1]Tech. Bull. 284, No. Dakota Agr. Coll., p. 27 (1936).

he stated, and believe that, until we have a better understanding of all the Palearctic forms related to *subulata,* it is most advisable to permit *granulata* to stand for the North American representative of the *subulata* species-group. The present material is fully in agreement with extensive representations from various parts of Canada, both east and west, and from the northern United States.

Hebard has reported this species from as far north as Dawson, Yukon, Canada,[2] and Fort Yukon, Alaska[3].

ACRIDIDAE

Acridinae

Neopodismopsis[4] **abdominalis** (Thomas)

Fairbanks; July 25, 1850; 1 ♀; [Alaska Exper. Sta.].

This is the first record of this species from Alaska. Fairbanks represents one of the two extreme northern points from which the species is now known. In 1930 Hebard[5] reported a single female of this species from Fort Rae, Great Slave Lake, Mackenzie, Canada, taken July 6, 1927, by R. H. Bedford, which is the other extreme point from which I have seen the species, which ranges southward in the Cordilleran region to New Mexico, and broadly eastward across Ontario. The most northern British Columbian specimen known to me is a female, in the Academy series, from Besa River, one mile south of Neve's Cabin, Upper Peace River District, taken August 4, 1922, at 4,000 feet elevation, by Miss Josephine deN. Henry.

Chorthippus longicornis (Latreille)

Circle; July 23, 1950; 1 ♂; [Alaska Exper. Sta.].

I also have before me, in the Academy series, an immature male taken at Fort Yukon, Alaska, June 1916, by J. A. Kusche.

[2] Proc. Acad. Nat. Sci. Phila., LXXX, p. 221 (1928).

[3] Proc. Acad. Nat. Sci. Phila., LXXVII, p. 46 (1925).

[4] I am using the name *Neopodismopsis* of Bey-Bienko in a generic sense only tentatively, as I think its proper status will be found to be that of a subgenus under *Chrysochraon.*

[5] Proc. Acad. Nat. Sci. Phila., LXXXII, p. 383 (1930).

Weber has reported this species from Fairbanks, Alaska,[6] but the two localities here given are slightly more northern.

Cyrtacanthacridinae

Melanoplus mexicanus (Saussure)

Fairbanks; July 25, 1950; 4 ♂, 5 ♀; [Alaska Exper. Sta. and A.N.S.P.].

Circle; July 23, 1950; 1 ♂, 1 ♀; [Alaska Exper. Sta.].

Big Delta; July 18, 1950; (R. H. Washburn); 2 ♂, 7 ♀, 1 juv.; [Alaska Exper. Sta. and A.N.S.P.].

Buffalo Center, Big Delta; August 4, 1950; (H. J. Lutz); 7 ♂, 3 ♀; [A.N.S.P.].

Bodenburg Butte; July 17, 1950; (H. J. Lutz); 3 ♂, 6 ♀, 8 juvs.; [A.N.S.P.].

Palmer; September 2–15, 1950; (R. H. Washburn); 1 ♂, 5 ♀, 1 juv. (Sept. 2); [Alaska Exper. Sta. and A.N.S.P.].

Near junction of Moose Pass-Hope Highway and Moose Pass-Kenai Highway (lat. 60° 32′ N., 149° 32′ W.), elev. 1,800 feet; August 26, 1950; (H. J. Lutz); 1 ♂, 5 ♀, 1 juv.; [A.N.S.P.].

I am referring these specimens to *mexicanus* without further specification, as that species appears to break up into a number of regional subspecies, aside from its gregarious migratory (*spretus*) phase. The exact determination of these subsidiary entities, for some of which names are already available, and the critical mapping of their respective distributional areas are matters for future study. Scudder's *Melanoplus alaskanus* has been regarded as an extreme condition of *M. bruneri*, but that is incorrect, and the name probably applies to a northwestern subspecies of *mexicanus*.[7] It is probable that previous Alaskan reports of *bruneri* really refer to the present species, the two frequently being confused.

Notes with the Bodenburg Butte series state the species was

[6] Entom. News, LX, p. 121 (1949).

[7] Hebard (Proc. Acad. Nat. Sci. Phila., LXXX, pp. 281–282 (1928)) has given a concise and fully warranted discussion of the situation relative to the use of the name *alaskanus*.

there "abundant in sage brush and grass," while those from Buffalo Center are noted as having been "abundant on grass flats."

All of the adults here listed have reddish, pinkish or pinkish-buff caudal tibiae, except the single male from near the junction of the two highways, which has them in part muddy glaucous. Occasionally some have the tibiae reddish or pinkish only distad and infuscate proximad.

The adult material here listed can be grouped in two series on the basis of alar length; in one the alar organs, when in respose, exceed the apices of the caudal femora by a distance equal to, or nearly equal to, the length of the pronotum, while in the other these organs either do not exceed the femoral apices or at most by a very slight distance. All Big Delta and Buffalo Center individuals have the more ample flight organs, but several have them slightly shorter than the others from those localities. The Fairbanks series has three males long-winged, and one definitely in the shorter category, while of the five females but one is definitely in the long-winged grouping. All the other specimens here recorded have the alar organs of the shorter (or more normal) type, although the Palmer series has them rather longer than those from Circle, Bodenburg Butte or from the junction of the highways. It is possible these longer winged individuals indicate areal population pressure producing a *spretus* phase.[8]

The male individuals in the present series show a fair degree of variation in their external genitalia, but not more than is to expected from any representation of this species from equally diverse habitats. The male subgenital plate varies somewhat in its length, but it is never of the relatively distinctive *bruneri* type, and the apex is always markedly notched.

The material from Circle and Fairbanks is from near the northern limit of the distribution of this widely-ranging species. However, there are in the Academy series a single adult male,

[8] The comments of the late J. R. Parker relative to the direct effect of food on wing length in this species, written nearly twenty-five years ago, are well worth reading in retrospect. They were quoted by Hebard in 1928 (Proc. Acad. Nat. Sci. Phila., LXXX, pp. 283–284).

three adult females and nine immature individuals taken at Fort Yukon, Alaska (at lat. 66° 32′ N.), June 1916, by J. A. Kusche, which is, as far as known, the most extreme northern point for *M. mexicanus*.

Melanoplus fasciatus (F. Walker)

Fairbanks; July 25, 1950; 1 ♀; [Alaska Exper. Sta.].

Big Delta; July 18, 1950; 1 ♂; [Alaska Exper. Sta.].

I have also seen a female of this species taken at Rampart House, Yukon, Canada, August 25–29, 1912, by J. M. Jessup, in the Academy series, and a pair, in the same collection, from Cameron Bay, Great Bear Lake, Mackenzie, Canada, taken August 12, 1937, by T. N. Freeman, which probably represent the most northern known records for the species. Hebard had already reported it from Lake Sarah, Great Slave Lake, Mackenzie, Canada.[9]

A New Subgenus of Ambrysus from South America (Hemiptera: Naucoridae)

By Ira La Rivers, University of Nevada, Reno

PICROPS subgenus novum

The salient features of subgeneric importance separating *Picrops* from the subgenus *Ambrysus* can be summarized in the couplet—

Metatibia ventrally with more than 3 distal, transverse rows of spines, the terminal row longest, each row decreasing in length proximally; male possessing a short, lateral process on the sixth tergite ..... *Picrops*

Metatibia ventrally with 3 or less such rows; male lacking a short, lateral process on the sixth tergite ..... *Ambrysus*

At present, *Picrops* is known only from the single species, described below.

[9] Proc. Acad. Nat. Sci. Phila., LXXXII, p. 396 (1930).

Ambrysus usingeri species novum

General appearance: Quite markedly angular, with a tendency toward slimness for the genus; size, 9.0–9.5 mm. long, 5.0–6.0 mm. wide; dorsum moderately mottled in color, the lighter areas being pale yellow, the darker regions varying from brown-to-black, with an occasional deep reddish tinge; venter generally dull yellowish with no conspicuous mottling.

Head: Dorsally markedly triangular in form, the front margin (including eyes) broadly rounded; the posterior margin less sinuate in its insertion into the anterior edge of pronotum, but more in the shape of a very broad, rounded "V"; a deep reddish suffusion is often present in the eyes and along the front of the vertex; the centrum between the eyes may be yellowish with only faint and weak, small, pale brown markings, or may be entirely medium-brown with only a narrow border along the inner margin of each eye still showing in the background yellow color, 1.20 mm. long and 2.25 mm. wide. Eyes slightly protuberant, much darker than rest of head; shaped like an isosceles triangle, inner and outer margins being subequal and much longer than the hind margin (in the ratio of, respectively, 18::19::12); hind margins of eyes bordered by a well-developed chitinous bar which protrudes as a prominent angle at the postero-lateral corner of eye, and is a unique development, *Ambrysus melanopterus* being the only other member of the genus with even a suggestion of this protrusion. Labrum somewhat deeply semi-circular, with only a suggestion, at times, of any tendency to develop a point at the tip, length-to-width 23::33 (69%); deep reddish-brown in color, with a definite lighter, yellowish area at central base; mouthparts color of the yellowish area on labrum, or even lighter. Head ratios are:

1) total length to width (including eyes), 30::50 (60%)
2) outer eye-length to inner eye-length, 19::18 (95%)
3) anterior distance between eyes to posterior distance, 16::30 (53%)
4) posterior length of eye to anterior distance between eyes, 12::16 (75%)
5) posterior distance between eyes to greatest length of head posterior to this line, 47::18 (38%).

Pronotum: Angular in general form, flat, quite narrow, well-mottled with light-to-dark reddish-brown on a yellow background, in the more contrastingly mottled specimens with a

Ambrysus (*Picrops*) *usingeri*, × 6

pronounced suffusion of reddish along pronotal edges and in anterior portion of disc; posterior edge of pronotum conspicuously and characteristically with the wide, uniformly light-colored band, bordered anteriorly with the similarly character-

istic thin, black line; pronotal edges with two distinguishable darker areas anteriorly and posteriorly; postero-lateral angles sharp and abrupt, a line drawn through them coinciding approximately with the posterior thin, black transverse line, the angles markedly exceeding a right angle (varying between 100° and 120°); edges smooth, non-serrate, even under high magnification, lateral curvature weak, most pronounced in anterior half, becoming flat in posterior quarter (per cent of curvature, expressed in terms of straight-line distance between anterior and posterior lateral angles and greatest vertical distance between this baseline and line-of-curvature, is 10–12% (av. 13::120)); viewed cephalad or caudad, region of posterior angles slightly but definitely reflexed, thence rising abruptly, along posterior margin, over wing insertions, and continuing as a moderately plane surface to opposite side of pronotum, the curvature there being reversed; surface coarsely and shallowly punctate, the punctures becoming pit-like in the anterior central part behind greatest penetration of head and elongated, but never actually attaining a rugose condition so commonly seen in many species of the genus. Venter dull yellowish, occasionally with a roseate tinge along sides, and irregularly equipped with moderately long, yellow hair; ventral keel rounded posteriorly, rising anteriorly to a sharp point between procoxae.

Scutellum: Generally lighter at corners and in middle than over remainder of surface, although in dark specimens only the posterior angle may be lighter; surface rough, minutely punctulate; in pinned specimens in which the pronotum is in normal position, i.e., approximately on a plane surface with remainder of body, the ratio of the three sides, anterior and two laterals, is 58::41::42.

Hemelytra: Surface rough, minutely granulose, color a mottling of light and dark browns, the latter becoming black in dark specimens; membrane quite unicolorous; embolia narrow (length-to-width, 116::37 = 32%), light yellow in anterior two-thirds, darker in posterior part; line of color change perpendicular to the long axis of the body; hemelytra exposing lateral edges of connexiva which are yellow with a prominent

dark reddish-brown spot at the postero-lateral angles, conspicuously but minutely serrate along the edges, and strongly spined at the postero-lateral angles; the brown spot on each connexivum bears a series of yellow hairs which are much longer and more prominent than those arising elsewhere on the connexivum; hemelytra just attaining abdominal tip in length.

Venter: The prothoracic venter has been discussed above. Entire venter opaque-yellow, that of the abdomen minutely and densely clothed with a fine pelt of short, yellow hairs, the meso- and meta-sterna only thinly clothed with longer, yellow hairs; connexival spines well-developed on all segments except I, which completely lacks a spine; the spines increase almost imperceptibly in size from segments II to IV; the angle-of-curvature along the connexival edge from spine to anterior angle is even, with no abrupt deflection of the outline inward under the shadow of the preceding connexival spine; female subgenital plate well-rounded along the median line, becoming almost tubular in the posterior one-third, and narrowing quite markedly from base-to-apex; apex is strongly and angularly incised, the angle at base of incision approximately a right angle, while the lateral, terminal angles bordering the incisure are slightly more than right-angulate; male genitalia lacking the genital hook or process so typical of *Ambrysus,* and possessing a projection on the right side of tergite VI.

Legs. Prolegs: Coxa elongate-globular, yellow, occasionally weakly tinged with rose color on posterior surface, smooth; trochanter well-developed, smooth, yellow, with mat of short yellow hairs on anterior edge; femur smooth, yellow, widest near proximal end, narrowing rapidly to distal end, and with characteristic short, very dense mat of hairs along front border which serves as a resting groove for the tibia when closed against femur. Although the femur has the characteristic elongate-globular, swollen appearance of the genus (i.e., strongly incrassate), it is much slenderer, ratio of length to greatest width being 87::38 (44%) to 90::43 (48%), measured over the ventral surface; tibia very long and slender, smooth, yellow,

curved most strongly in distal portion where, with the single tarsal segment, it forms a continuous, curved, grasping instrument—combined tibia-tarsus—when closed, distinctly overlapping the union of femur and trochanter.

Mesolegs: Coxa long, narrow, dull yellowish, still somewhat globular, well-furred with very short, dense, yellow pile; greatest length of coxa lying parallel to median axis of body; trochanter large, distinct, smooth, yellow; femur very long, narrow, smooth, yellow, posterior edge sparsely beset with moderately long yellow hairs, most conspicuous towards base; ratio of length to median width of ventral surface is 92::10 (11%); length 2.55 mm.; tibia yellow, long, narrow, strongly beset with numerous reddish spines, arranged in series along the four rounded "angles" formed by the dorso-ventral compression of the tibia; distal end ventrally equipped with three transverse rows of spines set in a solid row across the width of tibia, each row overlapping the following, the last row set in the end of tibia; ratio of length to median width, 116::7 (6%); tarsus slender, smooth, yellow, three-segmented, terminating in two large, almost colorless claws.

Metalegs: Coxa swollen, globular, well-furred with short pile, dull yellowish; trochanter well-developed, smooth, yellow; femur long, narrow, smooth, yellow, ratio of length to median width 142::18 (13%), from ventral view, slightly narrower in middle than at either end, 3.0 mm. long; tibia thickly beset with brownish-red spines as in mesotibia, but spines longer, more prominent, and more evidently unequal in size, long and short spines alternating; at distal end, several transverse series of spines set in rows across width of tibia, 8 series being evident under strong magnification, the terminal series largest and widest, each series decreasing slightly in size until the 8th consists of a sole bristle; a very conspicuous, dense mat of very long yellow hairs arising from inner side; ratio of length to median width 187::9 (5%); tarsus slim, smooth, yellow, three-segmented, with two series of small, yellow spines and a dense mat of longer, yellow hairs beneath, terminating in pale yellowish claws.

Distribution: see types.

Type locality data: BRAZIL: *Rio Purus* (Lago Berury Region), (ix)35, A. M. Olalla.

Location of types: Holotypic male, allotype, one paratype (from type locality), one paratype (BRITISH GUIANA: *Honey Camp Creek,* 24(x)37, S. Harris) and one paratype (DUTCH GUIANA: *Republiek Coropina Creek,* 17(iv)44, D. C. Geijskes) in the Snow Museum, University of Kansas, Lawrence; one paratype each (from type locality) in the collections of Robert L. Usinger (Berkeley, California) and the writer (Reno, Nevada); one paratype (FRENCH GUIANA: *Cayenne,* no other data) in the Paris Museum, France.

The Cayenne specimen was found by Dr. Usinger in the Paris Museum where Noualhier, many years ago, had given it the manuscript name "Tapinocoris planisternis." A general discussion of group relationships within the genus *Ambrysus* is forthcoming in a paper now in press.

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Observations on the Habits of Certain Syrphids (Diptera)

By J. W. TILDEN, San Jose State College, San Jose, California

Eupeodes volucris Osten Sacken

This species seems to reach its greatest numbers early in the season. Larvae were taken in March and early April. Reared adults emerged in the laboratory in April. No parasites were reared from this species.

Scaeva pyrastri (Linn.)

This species reaches its peak late in April, with reared adults emerging as late as May 16. A parasite, *Diplazon laetatorius* (Fabr.), was reared from this fly.

Notes on Habits

These observations form a part of the work done on the insect associates of *Baccharis pilularis* D. C. (Compositae). The aphid, *Aphis helichrysi* Kalt., was the species used as food for laboratory observations on these syrphids. The habits of both the above species were quite similar, but unless otherwise stated, the observations pertain to *Scaeva pyrastri* (Linn.).

Oviposition was observed frequently in the field. The female hovers over the plants, dropping from time to time to inspect the branches. After locating an aphid colony, the female may feed on the honeydew. She may then oviposit either on the same or upon a nearby colony. Oviposition takes place usually during a brief pause as the fly hovers over the colony with down-curved abdomen, the egg partially extruded, and the egg is deposited during a brief landing on the tip of the plant.

Eggs are usually laid on the terminal buds. The egg is glistening white, elongated and pointed, fusiform, and is often partially embedded in the plant tissue. The presence of small syrphid larvae in an aphid colony may be suspected by the presence of the empty egg shell at the tip of the branch, and this simplifies the search for larvae.

Eggs are laid singly, but other females may oviposit in the same colony, or the same female may return and lay another egg later, which accounts for finding more than one egg in a single colony of aphids. Since cannibalism is common among syrphid larvae, usually only one of these eggs survives, the first to hatch eating the smaller larvae or the unhatched eggs.

Clausen (1940, pp. 394–395) gives two to three days as the normal hatching time of syrphid eggs. However, such eggs of *Scaeva* as were observed to hatch required four to six days. Many did not hatch at all.

The manner of larval feeding is not so simple as has been at times described, nor is the finding of prey entirely haphazard in spite of the blindness of the larvae. The larva has two pairs of papillae, one somewhat lateral to and the other slightly above, the mouth. Unpublished work by Carl E. Ludwig indicates

that these papillae are innervated, and that they are sense organs. They appear to be tactile in nature.

In feeding, the larva touches the anterior end of the body where these organs are located, to the surface of the plant. This process is repeated until some object, such as a living animal, an egg, or a cast skin, is located. This seems to produce a stimulus that incites the larva to feed, because the mouth hooks are then extended and the possible prey seized. The body wall of the prey is punctured and the mouth hooks are intruded. They are then moved with a sweeping motion toward the mouth of the larva. In most cases the prey is not lifted at first, but it is usually elevated near the end of the feeding. The extent of elevation is not the same in every case, and the most extreme lifting seems to occur while the larva endeavors to rid itself of the now empty skin of the victim.

As the body fluids are ingested, their course can be observed by watching the light line that marks the dorsum of the larva, and which is nearly transparent. Not only juices, but scraps of more solid flesh are swallowed, together with small bubbles of air. After the soft parts of the prey are removed, the mouth hooks can be seen to enter every part of the victim's body, even the coxae and the head capsule, until every available bit of tissue has been scraped away.

As the body of the prey is emptied, it telescopes against the head of the syrphid and at times to some extent enters its mouth. The mouthooks continue to act until only an empty shell of the victim remains. A certain amount of fluid is regurgitated by the syrphid and enters the body of the victim and flows through all of the body cavities, and is then reingested. This operation strongly suggests that extra-oral digestion may occur.

When the soft parts of the prey have been eaten, the crumpled exoskeleton protrudes from the syrphid's mouth, giving a grotesque effect. At last the skin of the prey is cast off by vertical movements of the anterior end of the syrphid's body.

Exuviae are often investigated and rejected when found to be empty. Any small animal may be eaten when encountered; the syrphid larvae are by no means selective in choice of food.

Chrysopid larvae experimentally introduced into vials containing syrphid larvae were in each case eventually eaten. Eggs of various species of insects were also attacked, including eggs of various moths and also of syrphids. Likewise, spider eggs seemed to be relished. Search for food is methodical and the syrphid gradually inspects every part of the twig on which it is placed.

The evident fact that aphids are the food most frequently eaten seems to be due to the place selected by the female fly for oviposition. How greatly this selection is based upon the feeding of the female upon the honeydew deposited by the aphids is not known, but whether correct in fact or not, it is tempting to infer that this trophobiosis is a factor in food selection by these flies. In any case, selection would appear to rest with the adult rather than with the larva, which is able to eat any available food of suitable size.

Some data on the number of aphids eaten by a single larva were obtained. Normal exuviae of aphids will not be confused with exoskeletons of prey, because of the contorted appearance of the latter. One larva ate 73 aphids, some of them quite small, in twenty-four hours. An inspection of the branch showed that but one aphid had been overlooked. This was a last instar larva of *Scaeva*, that pupated without further feeding. A much smaller larva of *Eupeodes*, in the penultimate instar, ate 23 aphids in 24 hours. A very small larva, instar unknown, ate 16 aphids in 24 hours. These latter figures seem to be a normal daily consumption, since many aphids remained available.

Development of the larvae under conditions of abundant food is rapid. First instar larvae taken on April 1 molted on April 3 and April 6 and pupated on April 10. Adults (*Eupeodes*) emerged on April 17 and 18. This checks well with the larval period of 9 to 10 days and the pupal period of 9 days given by Clausen (op. cit., p. 394). Larval life is similar in length in both *Scaeva* and *Eupeodes*, but *Scaeva* has a longer pupal period, in each case ten days.

In locomotion of the larvae three factors are involved. Firstly,

the body is capable of considerable extension and contraction and the slender tapering anterior end is hooked around objects and the remainder pulled forward. The mouthhooks may or may not be used as aids. This movement comprises the type referred to as "looping."

Secondly, the ventral projections function as prolegs. The anal pair often grasps a twig or leaf while the anterior part of the body investigates everything within its reach. If a suitable object is encountered, the cephalic end of the body fastens on to it and the looping movement is executed as usual.

Thirdly, viscous secretions from the anal disc are used to adhere to surfaces. It is by this means that the larvae are able to climb smooth objects. They were frequently observed to climb glass surfaces, but the process is more difficult for them than movements among foliage.

Aphids on *Baccharis* are quite temporary, due to the failure of new growth early in the season. For this reason, syrphids leave it early, and the plant is devoid of syrphids much of the year. Other plants with more continuous infestations of aphids form a reservoir from which *Baccharis* becomes reinfested with resumption of growth, and syrphids follow the aphids. The syrphids seem not to be adjusted phenologically to maintaining their yearly cycle on the aphids of *Baccharis* alone. The persistent habits of syrphid larvae in feeding, their general acceptance of many sorts of food, and their tendency to reduce competition by feeding on their competitors, all give clues as to why these flies are so successful. This is amply born out by their great numbers and evident dominance among the predators on aphids.

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Notes and News in Entomology

Under this heading we present, from time to time, notes, news, and comments. Contributions from readers are earnestly solicited and will be acknowledged when used.

The Class Insecta Enlarged by the New Jersey Legislature. After January 1, 1952, the term "insect" may be legally used in New Jersey to designate a member of any of the following classes of animals provided it is "destructive, constitutes a liability and may be classed as a pest,"—*Onychophora* (Peripatus); *Crustacea* (lobsters, crayfishes, shrimps, crabs, sowbugs); *Palaeostracha* (horseshoe-crabs); *Arachnida* (scorpions, spiders, mites); *Pycnogonida* (marine arachnid-like arthropods); *Tardigrada* (bear animalcules); *Pentastomida* (worm-like parasitic arthropods); *Diplopoda* (millipedes); *Pauropoda* (minute centipede-like arthropods); *Chilopoda* (centipedes); *Symphyla* (small arthropods); *Myrientomata* (small elongate arthropods); and of course the class *Hexapoda* or insects. As if this were not enough—the word insect after January 1, 1952, in New Jersey also means "nematodes and other worms, or any other invertebrates which are destructive, constitute a liability, and may be classed as pests."

The occasion for this sweeping change in classification is an act relating to the manufacture, distribution and sale of insecticides, fungicides, and other economic poisons, approved July 17, 1951 and known as "The Economic Poison Act of 1951" (Chapter 316. Laws of 1951), which is administered by the New Jersey Agricultural Experiment Station.

The exact wording of the section defining an insect is as follows:—"The term 'insect' means a small invertebrate animal having the body more or less obviously segmented, for the most part belonging to the class insecta, comprising six-legged, usually winged forms, and includes beetles, bugs, flies, and to other classes of arthropods whose members are wingless and usually have more than six legs, including spiders, mites, ticks, centipedes, and wood lice, also nematodes and other worms, or any other invertebrates which are destructive, constitute a liability, and may be classed as pests."

According to this definition, lobsters, crabs, shrimps and "sowbugs" if destructive, are insects. If not destructive they remain lobsters, crabs, shrimps and "sow-bugs."—H. B. Weiss.

A Method of Storing Spiders and Insects in Alcohol

The preservation of spiders and insects in alcohol has long been one of the curator's chief worries. Even though the vials are inspected every three to six months, a few usually become dry and the specimens are ruined. After being confronted with the task of filling a thousand vials the author felt a new system should be found to eliminate this time consuming process. Consequently, while on a tour through various museums during the summer of 1950 a special effort was made to study the techniques of curating alcoholic collections. The collections were of two general types: collective, where a number of vials are placed in one jar, and separate, where each vial is kept singly on a rack, or in a tray or by some other means.

The collective system, in which one or two layers of small shell vials were packed in a wide-mouthed jar, seemed to be the most practical for the storage of large numbers of vials. At the California Academy of Sciences the small vial consists of an open glass tube with a plug of cotton in the center and one at each end; the specimen is contained at one end and the lable at the other. The U. S. National Museum uses long shell vials plugged with cotton and stored in wide-mouthed jars of alcohol. Neither of these two systems allows for the maximum usage of space.

The writer has found that wide-mouthed jars $3\frac{3}{8}'' \times 4''$ high will hold forty 15×45 mm. shell vials in two layers. These jars, the same size as those in which many brands of peanut butter are sold, are obtainable at approximately one dollar per dozen from the wholesaler. The cardboard containers in which the jars are sold are very convenient for the storage of the jars.

Another practical size jar is a small mayonnaise jar $2\frac{3}{8}'' \times 4''$ which will hold sixteen 15×45 mm. shell vials.

A thin layer of cotton on the bottom of the jar and between layers will prevent breakage. If well packed, these jars can be shipped through the mails.

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Current Entomological Literature

COMPILED BY R. G. SCHMIEDER AND J. W. H. REHN

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia and the University of Pennsylvania, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the year 1951 unless otherwise noted. Continued papers, with few exceptions, are recorded only at their first installment.

For other records of general literature and for economic literature, see the Bibliography of Agriculture, Washington, and the Review of Applied Entomology, Series A, London. For records of papers on medical entomology see Review of Applied Entomology, Series B.

NOTE: The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the List of periodicals and serials published in our January and June issues. The number of the volume, and in some cases, the part, heft, &c. is followed by a colon (:). References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to Neotropical species, and not so indicated in the title, have the symbol (S).

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Reviews

THE SUCKING LICE. By G. F. Ferris. Memoirs of the Pacific Coast Entomological Society. San Francisco, California, 1951. Vol. 1. ix + 320 pp., 124 figs. $6.00.

Professor Ferris has truly done a magnificent piece of work in his latest monograph. In brief, it may be said that this will be the definitive monograph on the Anoplura for many years to come, in conjunction with his "Contributions Towards a Monograph of the Sucking Lice." In the field of insect ectoparasitology, it meets its equal only in Dr. F. L. Werneck's "Os Mallofagos de Mamiferos."

The first fifty pages are devoted to a comprehensive survey of the morphology of the order based on three representative species. This section is based upon the able work of C. J. Stojanovich. Following this is a brief survey of the taxonomic status of the group and the views of Dr. Ferris on maintaining the Anoplura as a separate order from the Mallophaga. A new system of family classification is established, and with our present knowledge of the group, it seems to be quite acceptable.

Most of the remainder of the book consists of a review of the families, subfamilies, genera, and species of the order. Each family is briefly characterized; then generic and specific keys are given. An outstanding feature of the book is that the type species of each genus is illustrated by a one or two page plate. There are also illustrations, in the same fine detail, of the species of economic importance, so this book should be of interest to

the economic entomologist as well as to the taxonomist. Each species is listed with a partial synonomy (the entire one may be found in the earlier works of Dr. Ferris), followed by brief notes on hosts, distribution, and various taxonomic details. The final section consists of a host list and a concise essay on the zoogeography.

For students of evolution, the section on "The Problem of the Pediculi of Man" should be of great interest. Dr. Ferris' definition of the species is in essence comparable to those stated by such workers as A. E. Emerson and Sewall Wright. His treatment of *Pediculus humanus* Linnaeus is to consider it as a single species, with no division into subspecies for the so-called "head" and "body louse." From the comprehensive evidence presented, it seems at best, these two forms might be the extremes of a cline. Lice from any one relatively isolated population of man do present certain differences analogous to the host differences. But when lice from another population are examined, they possess their own slight variations, and also exhibit, within the normal range of variation, features of other groups. As the author points out, the entomologist has the same difficulties in the nomenclature within this species as the anthropologist has with man. The most puzzling situation of all exists in *Pediculus pseudohumanus* Ewing, described from a New World monkey, subsequently recorded from various neotropical Indians (including "dried head from Ecuador") and natives of Tahiti, and the Marquesan Islands. Is this form a distinct species, and if so, how did it acquire the peculiar distribution; or is it the result of random fixation of small isolated populations of *P. humanus* culminating in accidental similarity?

Though the bibliography is considered as closed July 1, 1951, several papers issued prior to that date are inadvertently omitted (Büttiker,[1] Sasa,[2] and Dubinin[3]). Dubinin's Russian paper is of special interest, as it contains the first report of a fossil Anopluran, *Neohaematopinus relectus* Dubinin, recorded from *Citellus glacialis* Vinogradov, a frozen Pleistocene fossil from the Indigirka River Basin of Siberia (64° 2′ N., 142° 0′ E.). Careful comparisons of the figures of this species with that of *N. laeviusculus* (Grube) from a closely related extant species, *Citellus eversmanni* (Brandt), show no good morphological criteria for their separation. If we use the definitions of the "New Systematicists," they would be considered as one distinct species due to the presumed genetic continuity of approximately one

[1] Büttiker, W. 1949. Acta Tropica 6: 158–60, 6 figs.

[2] Sasa, M. 1950. Jap. J. Expt. Med. 20: 715–17, 2 figs.

[3] Dubinin, V. B. 1948. Akad. Nauk SSSR Doklady (Nov. Ser.) 62: 417–20, 3 figs.

million years. If presumably genetic distinctions can be demonstrated, a better term might be "chronocline" as used by Huxley.[4]

In a recent paper by Brinck[5] several interesting points are brought up which are not considered by Dr. Ferris. The distribution of a species may be homotopic or heterotopic, i.e., present throughout the host range, or occurring in only part of the host range. Data are presented for several species to verify these assertions. A further point that Brinck makes is that a eurytopic species has far greater evolutionary potentialities than a stenotopic species, though further evidence is necessary for the verification of this hypothesis.

"The Sucking Lice" fulfills a long vacant gap in the field of entomology, and Dr. Ferris is to be congratulated upon accomplishing this goal in such a fine manner.

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University of Chicago

Elements of Plant Protection. By Louis Pyenson. John Wiley and Sons, Inc. New York, Chapman and Hall Limited, London, England. 1951. $4.96.

This volume is a text book on the elements of plant protection. It is sketchy, and at least from an entomological standpoint, incomplete. For instance, the word "phytotoxicity" does not appear either in the glossary or the index. Neither does the word "toxicity," yet the problem of phytotoxicity in relation to insecticides used for insect control is extremely important.

At most, it is a good outline for a course in plant protection, touching as it does, on mammals, plant diseases, birds, insects, other arthropods, and other things affecting plants. After exhausting it as an outline, one would start building the course on outside material.

One criticism I have of the book is that Mr. Pyenson succeeded in making the simple complicated. Take as an example the sentence "A diseased plant may be defined as one that is continuously being irritated by a causal factor that upsets the normal activity of cells or organs so as to produce visible evidence of disease in the form of characteristic symptoms."

Farther along he states "No plant species or variety exists that is free from disease." I sincerely wish that plant pathology were far enough advanced to make such a statement.—Douglass Burnett, Jr.

[4] Huxley, J. S. 1939. Bijdr. Dierk. 27: 491–520.

[5] Brinck, Per. 1948. Opuscula Ent. 1948: 129–56, 3 figs.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Miridae (Capsidae)—American species wanted, with locality labels, in exchange for British species. D. Leston, F.R.E.S., 6 Frognal Rise, London N. W. 3, England.

Wanted—Entomological microscope in good condition; Spencer, Bausch & Lomb, or other standard make. David G. Shappirio, 4811 17th St., N.W., Washington 11, D. C.

Coleoptera—Large quantities of Cicindelidae, Buprestidae, Lucanidae, Cerambycidae wanted in exchange for all families of Coleoptera from Ill., Ind. and Mo. Joseph B. Hayes, 1905 N. Pulaski Rd., Chicago 39, Ill.

American Sarcophagidae—wanted for identification. H. R. Dodge, P.O. Box 185, Chamblee, Georgia.

German lepidopterist wishes to correspond and receive live material (eggs and pupae) in exchange for dried imagoes. Johannes Reichel, Koenigsberg, Krs. Wetzlar 16, Germany.

For exchange—The periodic Cicada, T. septendecim. Desire Lepid., espec. Papil., Sphing. & Speyeria. Also Col., espec. Ceramb. & Lucan. John W. Morris, 2704 Genesee St., Syracuse 9, N. Y.

Cynipid and Itonidid galls—American species wanted; purchase or exchange for British species. Fresh or dried. D. Leatherdale, F.R.E.S., Old Woodstock, Oxford, England.

Wanted—Reprints or papers concerning insects taken in Alaska for inclusion in list of Alaskan insects. R. H. Washburn, Alaska Experiment Station, Palmer, Alaska.

Conopidae of the World wanted. Will pay 10¢ to $1.00 for pinned and labelled specimens. S. Camras, 4407 N. Milwaukee Ave., Chicago 30, Illinois.

ENTOMOLOGICAL NEWS

MARCH 1952

Vol. LXIII **No. 3**

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PUBLISHED MONTHLY, EXCEPT AUGUST AND SEPTEMBER, BY
THE AMERICAN ENTOMOLOGICAL SOCIETY
PRINCE AND LEMON STS., LANCASTER, PA.
AND
1900 RACE STREET, PHILADELPHIA 3, PA.

Subscription, per yearly volume of ten numbers: $5.00 domestic; $5.30 foreign; $5.15 Canada. Entered as second-class matter April 19, 1943, at the post office at Lancaster, Pa., under the Act of March 3, 1879. Acceptance for mailing at the special rate of postage provided for in paragraphs (d-2), Section 34.40, P. L. & R. of 1948, authorized April 19, 1943.

ENTOMOLOGICAL NEWS

ENTOMOLOGICAL NEWS is published monthly, excepting August and September, by The American Entomological Society at Prince and Lemon Sts., Lancaster, Pa., and the Academy of Natural Sciences, 1900 Race Street, Philadelphia 3, Pa., U. S. A.

PHILIP P. CALVERT, Editor Emeritus. R. G. SCHMIEDER, Editor. Editorial Staff: E. J. F. MARX, M. E. PHILLIPS, J. A. G. REHN, and A. G. RICHARDS.

Subscription price, per yearly volume of 10 numbers: Domestic, $5.00; Foreign, $5.30; Canada, $5.15—U. S. Currency.

SUBSCRIPTIONS, ADVERTISEMENTS: All communications and remittances to be addressed to **ENTOMOLOGICAL NEWS, 1900 Race Street, Philadelphia 3, Pa.**

MANUSCRIPTS and all communications concerning same should be addressed to **R. G. Schmieder, Zoological Laboratory, University of Pennsylvania, Philadelphia 4, Pa.**

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ENTOMOLOGICAL NEWS

VOL. XLIII MARCH, 1952 No. 3

A New Species in the Genus Amerocnemis (Hymenoptera: Psammocharidae) from North America with a Key to the Males of the Americas and Photomicrographs of the Genitalia of the N.Sp.

By R. R. DREISBACH, Midland, Michigan

Banks erected the genus *Amerocnemis* for four South American species.

This genus is closely allied to Priocnessus and like that genus has a very large broad clypeus, but unlike that genus has the front margin of the clypeus only very slightly raised above the labrum, while Priconessus has it raised very much above the labrum and the mouth parts. It is distinct from all the other genera of the Cryptocheilinae by reason of the elongate, narrow body, and superficially looks like the genus Auplopus (Auplopodinae) in the shape of the body but the species are much larger in size and the first abdominal segment has the sides straight and not hour-glass shaped. It also resembles Poecilopompilus (Batazonus) of the Psammocharinae by reason of the broad clypeus and by the light colored areas of the thorax of most of the species.

The species are long and narrow-bodied; claws toothed; no spines under last joint of posterior tarsi neither on ventral surface nor on the sides; spines at tip of front tibiae all of one size; clypeus very large, truncate in front and lying very close to the labrum; ocelli very large; labial and maxillary palpi slender; ocellar triangle is completely raised above the vertex; propodeum with the apex almost on a plane with the base and very hairy;

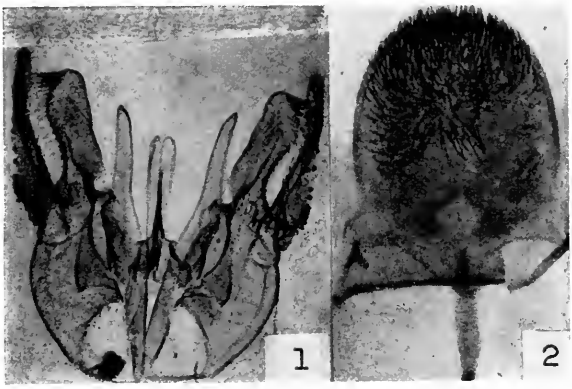
very few spines on the legs; wings very long and reach the tip of abdomen or are just short of the tip; basal vein basad of the transverse in the fore wings and like the genus Priocnessus the cubitus in rear wings meets the median vein before subdiscoidal; marginal cell very large and very long, its distance from wing tip is only about two-thirds of its length; the three cubital cells are very long, the third is shorter and broader than the others; the first recurrent vein meets the second cubital cell almost at the tip, and the second recurrent meets the third cubital cell before the middle. The first pair of claws are split in this genus.

All the previously described species have been from South America but in the Harvard collection there is a new species from Barro Colorado Island in the Canal Zone. The description of this species follows.

Amerocnemis nigricans n. sp. Figs. 1, 2

Holotype male: Black, clypeus, face, inner orbits to above the antennae, front of first antennal joint, posterior edge and sides of pronotum, and tegula yellowish white, with the legs shading from black on femora to reddish on the tibiae and tarsi; head, thorax, and fore part of first two pair of coxae covered with long, loose, white hair, longest on the fore coxae, fore edge of pronotum and on the propodeum; a few long whitish hairs on first tergite, and a few scattered ones on the first four ventrites, with two heavy patches on the fifth and sixth ventrals, reminiscent of the genus Anoplius; under the long hairs of head and thorax are rather long closely appressed white hairs; clypeus is rather long, truncate in front and with a black spot in center; when seen from the side, the clypeus has a large bulge at base and slopes to front, the whole ocellar triangle is completely visible above the eyes, as well as the antennal fossae, eyes very wide, four to five times as wide as the posterior orbits; when seen from in front, the inner orbits are parallel, the antennae are located above clypeus by about two-thirds the length of first antennal joint, vertex level with the eyes, ocellar triangle entirely above the vertex; anterior ocellus less than one-half its diameter from the laterals and these slightly farther apart than

their distance to eye margin; a depression between each lateral ocellus and the eyes, and a sulcus in front of anterior ocellus which becomes a line as it approaches the antennal fossae; antennae reddish but slightly darker on dorsal, basal joints, with the second joint black; the first joint is yellow in front and black on the basal dorsal half, the front with a large bump; the first four and last two antennal joints have their respective lengths as 10:2:12:14:10:12; pronotum very short, transverse and about one-third of dorsal surface yellowish white; mesonotum with the side edges turned up as a ridge their whole length and



FIGS. 1, 2. *Amerocnemis nigricans* n. sp.

with a raised line each side inside this turned-up edge which fades out just before the posterior edge; propodeum very long and sloping very slightly with the apex on almost the same plane as the base; wings yellowish all over, veins and stigma honey-yellow; marginal cell exceedingly long as are the three cubital cells; marginal cell three times as long as its distance to wing tip; second and third cubital cells very long, of about the same length but the third much broader at base than at apex, second cell long and narrow; the comparative lengths of the three cubital cells on the cubitus are 40:35:35; the third intercubital vein is parallel to the second intercubital for its basal half and then bends forward toward the marginal vein; the second re-

current vein meets the third cubital cell at apical sixth, and the first recurrent meets the second cubital cell about basal third; basal vein is much basad of the transverse vein in fore wings and is bowed outward as in the genus Halictus in the bees, while the cubitus in rear wings meets the median before the subdiscoidal; abdomen long and black, slightly shining; fore coxae long and rather slender, second pair the shortest and thickest, while the third pair has a rather deep linear pit on the posterior surface; fore femora and tibiae very slender, the other two, pair much thicker and the tibiae much longer; fore tibiae with a few spines on sides and ventral surface, the last two pair with shorter but more numerous spines; tarsi with numerous fine spines the last joints of one and two with a few on ventral surface but the last pair with none; the claws of first pair are split, those of the last two pair with a large sharp tooth; the comparative lengths of the three tibiae are as 30 : 60 : 80; the ratio of the lengths of the joints of the last legs are as 70 : 80 : 60 : 30 : 20 : 10 : 20; longer spur of posterior tibiae is one-half as long as its metatarsal joint.

Length: head and thorax 7.30 mm., abdomen 9.9 mm., fore wing 14.5 mm., rear wing 11.25 mm., genitalia length 1.59 mm., width 1.19 mm., subgenital plate length 1.62 mm., width 1.00 mm.

Holotype male: Barro Colorado Is., Canal Zone, Nov. 7, M. Bates (MCZ).

The following key adopted from Banks' paper will separate the American forms in the males:

1. Pale reddish brown spot above antennae to ocelli; antennae with groups of three joints black and three yellowish; mesonotum with median pale stripe; abdomen not plainly banded. *longulus* Banks
1. Black mark above antennae and over ocelli; antennae largely black above if abdomen banded, antennae reddish above if abdomen not banded. 2
2. Whole vertex and front dark colored; abdomen entirely black pronotum with posterior border yellowish-white as well as the tips of the side of pronotum. *nigricans*, n. sp.
2. Abdomen banded, antennae dark above. 3

3. Abdomen with segments dark at base, pale across tip; mesonotum with large pale spot in middle, propodeum with large pale spot each side; hind femora dark above. *brasiliensis* Banks

3. First and second abdominal segments not plainly banded; mesonotum with two pale lines, united behind; propodeum with an interrupted dark line each side; hind femora not dark above. *argentinica* Banks

The type of the genus *A. bequaerti* Banks is the only female known and its male is unknown.

Literature Reference

Banks, N. 1946. Bull. Mus. Comp. Zool. 96, No. 4, pp. 464, 499–503.

The Occurrence of Mass Flight Movements in Hexagenia Occulta (Ephermeroptera)

By Herman G. Cooke, Department of Biology, Hampton Institute, Hampton, Virginia

For more than ten years, the writer has been deeply interested in the behavior pattern manifested in the order of mayflies. During this time several flight movements have been observed and the period of their greatest emergence recorded. In a previous investigation [1] a detailed description was presented on the mating flights of *Stenonema vicarium,* with particular reference to the life history of the nymph. In a later study,[2] involving the habits of *Isonychia christina,* it was revealed that a similar tendency toward shyness displayed in the performance of the adults found noteworthy expression in the behavior of the nymphs. Comments were also made with regards to the lofty height to which they frequently ascended which made observation possible only with the greatest degree of difficulty.

[1] Cooke, Herman G. 1940. Observation on the mating flight of mayflies, *Stenonema vicarium.* Ent. News 51: 12.

[2] Cooke, Herman G. 1942. Mating flights of Isonychia mayflies (Ephermeroptera). Ent. News 53: 249.

In a more recent study,[3] involving the influence of weather conditions on the activities of *Hexagenia atrocaudata,* it was found that low temperature served as a limiting factor in both the flight movements of the adults and the emergence of the nymphs. As a result of these findings a desire to seek a further understanding of the behavior of the species and of the underlying phylogenetic relationships prompted the presentation of this paper.

Methods

The methods used in the study were somewhat similar to those employed in the investigation of members of the other genera, the chief difference being occasioned by the environmental habits of the nymph. The most distinguishing characteristics of the immature stage of the genus Hexagenia is its tendency to lead an independent aquatic life, confined to a sand or mud-bottom burrow. Species adjustmented to situations of this nature afford great difficulty in collecting and can be encountered only by means of dredging. In some locations the method is often time consuming and has other definite limitations.

Subimagoes were occasionally seen emerging directly from the surface of the water without ascending on to rocks, stones or debris along the edge, to shed their nymphal skins. Unfortunately for the writer, the sequence of events took place so rapidly that he was unable to gain a sound judgement of the manner by which the transformation was accomplished. Tiensuu,[4] in his description of *Polymitarcys ladogensis,* a closely related European species of the family Ephemeridae, reported a similar incident of emergence.

Bottles of water collected from the Susquehanna River, which harbored the nymphs of *H. occulta,* gave a hydrogen-ion concentration of *7.7,* apparently a most favorable medium for the

[3] Cooke, Herman G. 1947. Swarm behavior of *Hexagenia atrocaudata* in relation to temperature and relative humidity (Ephermeroptera). Ent. News 58: 221.

[4] Tiensuu, L. 1935. On the Ephemeroptera-fauna of Laatokan Karjala (Karelia Ladogensis). Suomen Hyoteistieteellinen Aikakauskirja 1: 3.

growth and development of the species. The greatest collections of adults were made at twilight. During this time the swarm of insects were so thickly suspended in the air that one could gather a mass of living creatures from three to five centimeters deep in the bottom of a net with a single stroke.

Observation of Flight Movements

On August 28, 1947, at 6:00 P.M., with a temperature of 81° F., three *Hexagenia occulta* males were seen patrolling over the northern bank of the Susquehanna River, about a mile above the Conowingo Dam, near Conowingo, Maryland. At sundown, countless numbers of this species suddenly appeared springing with increasing fury from the shrubbery overhanging the bank of the river. The average height to which they ascended during swarming ranged from five to twenty feet above the ground. One of the most striking features in the performance observed was in the manner by which operations were conducted. Each male maintained its position, flying almost in a single spot, except when attracted by an approaching insect foreign to its group, or a member of the opposite sex. An imaginary zone circumscribed the outer borders of the huge company. Beyond this limit ardent males were seen eagerly returning to resume their places in the midst of the swarm. As the performance reached its peak, the boundaries disappeared and general flight activity became dispersed over the entire area. Both the vertical zigzag-like movements and the deep rhythmic undulations which were so highly characteristic of the behavior of *H. atrocaudata* were absent or inconspicuous in these maneuvers.

Numerous couples of these insects were observed in copulation, and, in some instances, collections were made before they could separate. At times, individuals were seen uniting in a vertical plane. Perhaps this position was due either to a hasty procedure on the part of the male in clutching, or an attempt by the female to elude her attacker.

During the greater part of the day thousands of specimens found shelter by clinging firmly to the under-surface of the leaves of bushes along the shore. They sat closely, side by side,

with their heads directed inward and at right angles to the central axis of the leaf. When disturbed, they immediately took to the air. Some made feeble attempts to mate with any member whom they could reach, while others struck nervously about in a state of disorder and confusion. The incident lasted for about one minute, after which the insects resettled in their former positions on the leaves.

Although weather conditions were recorded at a most favorable level for the last two weeks of August 1948, flight movements were greatly reduced in comparison with those stated for the same period during the previous year. Lyman [5] referred to such variations as cyclic trends in the population of *Hexagenia*. The writer has also reported similar fluctuations for alternating years in this genus.

The following table gives favorable temperature, wind velocity and general weather conditions [6] for certain days during one week when observations were made:

Date	Temperature (Fahrenheit)	Wind Velocity m.p.h.	Weather	Activity
August 26	90°	5.7	Clear	Slight
August 27	88°	4.5	Clear	No Activity
August 28	87°	4.8	Clear	No Activity
August 29	84°	7.0	Clear	Slight

On August 29, 1949 at sundown, with a temperature of 78° F., heavy flight movements again appeared in the same area. In addition to the densely suspended adults, waves of clumsy flying subimagoes, mixed among the group, circled briefly above and around the observer before settling upon him in great numbers, and in their escape many of them left their subimaginal skins firmly adhering to his clothes. Heaps of carcasses strewn over the shrubs and rocks served as a reminder of the specimens which had emerged and perished during the current season.

[5] Lyman, Earl F. 1944. Emergence, swarming and mating in *Hexagenia*. Ent. News 55: 207.

[6] Records of temperature, wind velocities and other weather conditions were obtained through the courtesy of the U.S. Weather Bureau at Philadelphia, Pa. All readings are given for 7:30 P.M., Eastern Standard Time.

Attention is called to the fact that during the last week of August and the first week of September 1950, only a few scattered remnants of companies of mayflies were encountered. However, range of temperature and weather conditions recorded was at a most favorable level. For instance, during the week of August stated above the temperature mounted to an all-time high of 96° F., with an average of 85° for the next seven consecutive days. As a comparison, during the same week of the two previous alternating years, flight movements reached a period of their greatest abundance.

Discussion

Several incidents of striking interest have been cited to the writer by eye-witnesses with regard to mass flight movement of these insects serving as a hazard to travelers and workers operating in the above area. An article released in an edition of the *Baltimore Sun* newspaper [7] lends added significance to the study. It revealed that on August 26, 1947, at 7:15 P.M., a mass flight of mayflies appeared swarming over the Pennsylvania Railroad along the banks of the Susquehanna River so densely suspended that they resembled a mid-winter snow drift. The report further stated that the fragile creatures hurled their tiny bodies upon the trolley power line (over the track) in such countless numbers that they formed a complete insulation around it. Because of this sudden blockage of the current, an electric train en route through the area was stalled for several hours.

As a compensation for the tendency toward shyness exhibited by *Isonychia* while in flight, *Hexagenia* demonstrated a more highly tolerant disposition toward its environment. Berner,[8] in his recent study of mayflies, remarked; "I have not observed the mating flights of *Isonychia*. As far as I have been able to ascertain there are only a few scattered notes describing

[7] August 27 edition of the *Baltimore Sun*. This news report was confirmed by the Bureau of Information of the Pennsylvania Railroad in Baltimore, Md.

[8] Berner, L. 1950. *The Mayflies of Florida*, Vol. IV, No. 4.

the mating of some of the species of this genus." According to the experience of the writer, in his study of *Isonychia,* it is reasonable to believe that the paucity of observations recorded on actual mating among different species of this genus is due either to the lofty height to which they frequently ascend, or to their keen sense of detecting disturbances in the surrounding environment. In some instances it appears to be a combination of both factors.

In a former paper involving major families of the order of mayflies, Spieth [9] made a comparative study pointing out the phylogenic relationship among the different genera of each group. On the one hand, he used the mouthparts and gills of nymphs, while on the other, he employed the wing venation and genitalia of adults. The results in both cases were found to be consistent. The degree of resemblance recorded between the species of *Hexagenia* and those of *Polymitarcus* indicates that they were derived from related stock. By the same token, I should like to call attention to the similarity in the method of emergence between members of these two genera, as described in an earlier paragraph of this paper.

Finally, in addition to the phylogenic data mentioned, mating flights reveal a technique, which is not only unique for the particular genus, but also, as far as I have been able to observe, species specific for the individuals by which the movements are being performed.

The writer wishes to express his graditude to Dr. N. Rumner of the University of Pennsylvania for contributing an analysis of the river water.

To Users of "Current Entomological Literature"

The editor of the NEWS has on hand a number of reprints of the "List of titles of publications referred to by numbers in Entomological Literature in Entomological News." Anyone may obtain a copy, while the supply lasts, by sending 10 cents in stamps to the editor.

[9] SPIETH, H. 1933. The Phylogeny of Some Mayfly Genera. Jour. New York Ent. Soc., Vol. XLI, September.

Notes on Leptothorax bradleyi Wheeler and L. wheeleri M. R. Smith (Hymenoptera: Formicidae) [1]

By E. O. Wilson, Department of Zoology and Entomology, University of Tennessee

Distributional data published up to the present for the closely related species *Leptothorax bradleyi* and *L. wheeleri* have outlined ranges which appeared to be mutually exclusive. When I recently examined specimens of this complex from two localities in Alabama, I considered that they might approach intergrades between the two species, thus indicating that the two were actually subspecies. However, when representative specimens were borrowed from most of the collections which have been made of these forms, it was quickly established that the Alabama material was typical *bradleyi*. Furthermore, the ranges of the two species were found to overlap through at least three states, definitely establishing them as distinct species. The following paper consists of the new distributional data and additional significant descriptions.

Workers of the two species are most easily distinguished on the basis of sculpturing, but they also differ in alitrunk profile, in proportions of the propodeal spines, and in size. In the descriptions given below only the characters useful in comparison are emphasized.

Leptothorax wheeleri M. R. Smith

L. wheeleri M. R. Smith, Ann. Ent. Soc. Amer., Vol. 22, p. 547, fig. 1 (1929). Workers and queens.

Worker. Ten workers representing all available records showed the following measurements: alitrunk length 0.90 mm.–1.13 mm., mean 1.04 mm.; head length 0.83 mm.–1.02 mm., mean 0.91 mm.; distance between the tips of the propodeal

[1] Appreciation is expressed to Dr. M. R. Smith, Dr. Arnold Van Pelt, Dr. A. C. Cole, and Mr. H. T. Vanderford for the loan of most of the material used in this study.

spines 0.28 mm.–0.37 mm., mean 0.30 mm.; length of propodeal spines 0.17 mm.–0.22 mm., mean 0.18 mm. (All measurements with maximum error of ±0.01 mm.) Alitrunks were measured in profile from the dorsal base of the pronotal collar to the dorsum of the junction with the petiole; heads were measured in profile from the anterior edge of the clypeus to the extreme occipital border.

Dorsum of head covered by longitudinal rugae, the interspaces coarsely punctate; the rugae extend forward past the fronto-clypeal suture as the clypeal carinae. Alitrunk coarsely rugo-reticulate. Petiole with distinct rugulae, fainter than those of the alitrunk. Postpetiole with a few faint rugulae, the interspaces punctate, the surface opaque.

Alitrunk arcuate in profile, rising to its highest point at the pronotum.

Localities. Specimens were examined from the following localities: Mississippi State College (M. R. Smith); Starkville, Miss. (M. R. Smith); War Trace, Tenn. (H. T. Vanderford); Greenbriar Cove, Great Smoky Mts. Nat. Park, Tenn. (A. C. Cole); Wilmington, N. C. (H. T. Vanderford); Dalton, Ga. (H. T. Vanderford); Gainesville, Fla. (T. H. Hubbell). Smith also recorded this species from Adaton, Miss., and L. G. and R. G. Wesson recorded it from South Central Ohio (Amer. Mid. Nat., Vol. 24, p. 96).

Leptothorax bradleyi Wheeler

L. bradleyi Wheeler, Psyche, Vol. 20, p. 113 (1913). Holotype worker.

Worker. Ten workers representing all of the available records showed the following measurements: alitrunk length 0.83 mm.–0.93 mm., mean 0.89 mm.; head length 0.70 mm.–0.80 mm., mean 0.74 mm.; distance between the tips of the propodeal spines 0.25 mm.–0.28 mm., mean 0.27 mm.; length of the propodeal spines 0.08 mm.–0.15 mm., mean 0.13 mm.

Alitrunk evenly flattened in profile.

Sculpturing of the head similar to that in *L. wheeleri.* The entire mesonotum except for the margins finely rugulo-reticulate, giving a granulose appearance at magnifications of 36 × and less.

The posterior edge of the pronotum similar to mesonotum, but the anterior half rugo-reticulate. This reticulum merges with the posterior rugulo-reticulum, and the latter decreases in size anteriad until its interspaces are distinguished only as broad punctures within the coarser, anterior reticulum. The margins of the mesonotum longitudinally rugose. The reticulum of the basal face of the propodeum fades posteriad into coarse punctulation. The petiole punctate, opaque; sculpturing of the postpetiole irregular, with very shallow punctures, feebly shining to subopaque.

The colorations of *L. bradleyi* and *L. wheeleri* are nearly identical, a rich ferruginous red. In most of the *bradleyi* workers examined the posterior margins of the gastric segments are distinctly infuscate; this condition is absent in *wheeleri*.

Queen. Alitrunk length 1.33 mm.; head length 0.86 mm. Differing from the worker in the usual characters separating these two castes, in sculpturing, and in proportions of the propodeal spines. Mesonotal scutum and scutellum evenly flattened in profile, the posterior third of the scutellum sloping downward somewhat. The propodeal spines blunt and dentiform. Notaulices and parapsidal furrows absent.

Head covered by relatively coarse, longitudinal rugae (approximately thirty would be cut by a line drawn transversely across the center of the head); rugae variable in size, frequently anastomosing; the interspaces punctate. Central portion and collar of pronotum granulose, the pleural arms rugoreticulate, with the two zones of sculpturing meeting abruptly. Mesothoracic scutum and epipleurites with finer, more evenly longitudinal rugae (approximately forty would be cut by a line drawn transversely across the center of the scutum). Scutellum with smaller, less regular, and indistinct rugae. Anterior margin of the propodeum rugose, the remainder granulose. Sides of the alitrunk mostly granulose, with a few marginal rugae. Petiole and postpetiole with numerous shallow, confluent punctures and a few indistinct longitudinal rugae; their surfaces feebly shining. The gaster without sculpturing, glabrous.

This queen differs very little from the cotype queen of *L.*

wheeleri loaned to me by Dr. Smith. It can be distinguished from Smith's specimen on the basis of the following characters: distinct transverse rugae present between the propodeal spines in *wheeleri,* absent in *bradleyi;* petiole and postpetiole opaque in *wheeleri,* feebly shining in *bradleyi*; propodeal spines fairly well developed in *wheeleri,* dentiform in *bradleyi*; and smaller size of *bradleyi.* Otherwise the two closely resemble one another in sculpturing, flattening of the alitrunk, infuscation of the posterior margins of the gastric segments (absent in *wheeleri* workers), and general habitus under low magnification. This convergence of characters seems to indicate that the queen caste has diverged more slowly than the worker caste. If this is true, it appears that the *bradleyi* worker more closely approaches the ancestral form, in weaker sculpturing, flattening of the alitrunk, coloration, etc.

Male. Alitrunk length 1.23 mm.; head length 0.52 mm. Antennae 12-jointed, with the funicular segments gradually diminishing in size distally and not forming a distinct club. Notaulices (Mayrian Furrows) present and distinct, converging directly behind the center of the mesonotum. Wings with greatly reduced venation, the following veins occurring in the forewing: Sc + R, R_1, Rsf_1, Rs + M, Rsf_5, Mf_1, M +CuA, A, cu-a. Mf_5, CuA, and A distad to cu-a present but faded and indistinct. In one of the two specimens examined a small crossvein (2r?) extends from Rsf_5 almost to the stigma. (See Brown and Nutting, Trans. Amer. Ent. Soc., Vol. 75, pp. 113–132, for a discussion of homology.) Hindwing with two very faint, basal abscissae. Costal, median, submedian, and cubital cells present in the fore wing; discoidal cell absent.

Most of head covered by longitudinal rugulae, the interspaces punctate, a condition approaching that of the worker; rugae of occiput indistinct, with a transverse trend. Most of the alitrunk covered by longitudinal rugulae, but these are finer and more closely set than those of head; interspace punctulations not apparent. Propodeum covered by shallow, confluent punctures. Petiole, postpetiole, and gaster shining, largely free from sculpturing. All of body except appendages jet black. Scape and

femora dark brown; funiculus and distal portion of legs light brown. Wings faintly iridescent.

Localities. Specimens were examined from the following localities: Bay Minette, Ala. (E. O. Wilson); Tuscaloosa, Ala. (E. O. Wilson and Ben Sanders, Jr.); Hoschton, Ga. (H. T. Vanderford); Gainesville, Fla. (A. Van Pelt); Lake Placid, Fla. (T. C. Schneirla). The type locality is Billy's Island, Okefenokee Swamp, Ga.

Knowledge of the biology of the two species is limited at present to scanty nesting data. Smith found the several colonies comprising the type series of *L. wheeleri* in crevices and cavities of solid deciduous trees and under the bark of rotten pine stumps. Hubbs found his Florida *wheeleri* in galleries in a stick of solid pine firewood. The Wessons (Amer. Mid. Nat., Vol. 24, p. 96) found this species "in galleries in the hardened, weathered logs on old deserted and tumbledown log cabins exposed to the sun. Two other colonies were found on large oak trees where they were nesting in dead stobs." Most of the other specimens of both species have been collected as strays. My two colonies of *L. bradleyi* were found by chipping away the thick bark of living pines. Both were in flat, well defined galleries in the bark about three to five feet above the ground. The Tuscaloosa nest was carefully dissected, and what probably represents the bulk of the colony was collected; this contained one dealate queen, 42 workers, two males, and a small number of worker larvae and pupae.

Eclomus nom. nov. (Diplopoda)

Eclomus nom. nov. is proposed to replace *Eclytus* Chamberlin 1952 (Ent. News, vol. 63, no. 1, p. 10) which is preoccupied by *Eclytus* Holmgren 1855 (K. Vet.-Akad. Handl., n.f., vol. 1, p. 127). Called to my attention through the courtesy of Dr. G. Stuart Walley.

R. V. Chamberlin

The Identity of the Milliped Genus Fontaria Gray (Polydesmida: Xystodesmidae)

By Richard L. Hoffman

Fontaria, the earliest described genus now included in the family Xystodesmidae (Fontariidae of several authors), was proposed by J. E. Gray in 1832 (in Griffith's edition of "Cuvier's Animal Kingdom," vol. 15, p. 787, pl. 135, fig. 1). The text description is very brief, consisting only of a few words relating to the color, number of segments, and lack of ocelli. The drawings on Plate 135, however, are very good considering the early date of their execution. They show the entire animal in dorsal aspect, a ventral view of the 7th segment of the male, and a front view of the head.

The generotype of *Fontaria,* by monotypy, is *Julus virginiensis,* Drury (1770, Illus. Nat. Hist., vol. 1, pl. 43, fig. 8), or a species so identified by Gray (we have no assurance that both authors were dealing with the same species). Drury's original description, a drawing only, cannot be associated with any known species or genus. My first idea was to regard it as unidentifiable and unoccupied, and credit Gray with the first use of the name. At the suggestion of Dr. E. A. Chapin, however, I think it better to adopt a somewhat more conservative attitude. Dr. Chapin advises me (*in litt.*) concerning Drury's species: "In other groups workers have followed the first reviser and accepted his conclusions." In the lack of any definite information concerning the original Drury type specimen, this policy seems reasonable.

A considerable number of diverse types have been described under the name *Fontaria;* most of these have been properly recognized by the proposal of numerous generic names since 1895. However, the proper allocation of *Fontaria* has never been made, despite the fact that all necessary information has been available since 1944. Several earlier attempts have been made, rather unsuccessfully.

For many years the name *Fontaria virginiensis* was applied to the North American species now known as *Zinaria butleri*

(McNeill). This usage dates from H. C. Wood in 1865 (Proc. Amer. Philos. Soc., ser. 2, vol. 13, p. 221); the error in this case was pointed out by Chamberlin in 1943 (Bull. Univ. Utah, Biol. Ser., vol. 8, no. 2, p. 16), who observed that characters given in Pocock's redescription of the Gray type specimen did not obtain in the genus to which the name *Fontaria* was applied by Wood.

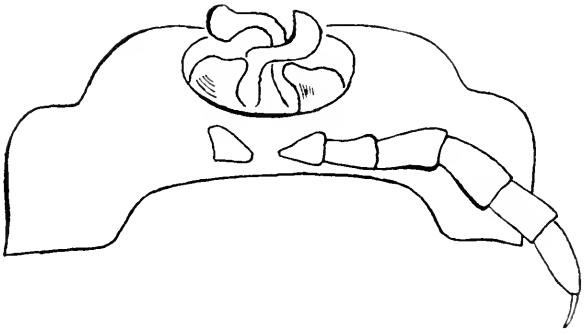


FIG. 1. Gray's illustration of the male genitalia of *Fontaria virginiensis*, redrawn from his figure 1b, plate 135 of the volume cited in the text.

In 1931 (Zoölogica, vol. 30, lief. 3/4, p. 69) Attems gave a diagnosis of *Fontaria* which was based in part on specimens figured but not identified. Chamberlin, in the paper cited above, recognized that the Attems figures represented a species that is not congeneric with the type of *Fontaria*, but he failed to realize that it was the species named *Fontaria acutidens* by Attems in 1909 (Ark. Zool., vol. 5, no. 3, p. 30) and later placed in the genus *Japonaria* by Verhoeff. Chamberlin renamed the species represented by the figures (under the unwarranted impression that Attems had called it *virginiensis*—which he neither did nor implied) and placed it in a new genus *Grayaria*—which is obviously a synonym of *Japonaria*, which has seven years priority.

Obviously the solution of this puzzle is contingent upon the proper allocation of the name *Fontaria* on the basis of the redescription of its type species by Gray. Fortunately, it now is possible to do this with considerable assurance.

In 1909, in the diplopod volume of the Biologia Centrali-Americana, Pocock gave a short but valuable description of Gray's type specimen, which, when taken in connection with the original drawings, gives a fairly accurate idea of the attributes of the genus *Fontaria*. Until 1944, however, no American form was known which corresponded well to what was known of that genus. In that year Loomis (Psyche, 1944, vol. 51, p. 173) described *Stelgipus agrestis* as a new genus and species, and unintentionally thus made known the long lost *Fontaria*. A specimen of "*Stelgipus*" at hand matches Pocock's description in all details, and agrees very well with Gray's illustrations. I believe it cannot be questioned that *Stelgipus* is a synonym of *Fontaria*. For those interested in the matter I provide herewith a reproduction of the Gray drawing of the gonopods of *virginiensis*. As shown, they might apply to the four genera *Sigmoria, Tucoria, Cleptoria,* or *Stelgipus,* but the spined condition of the sternites, mentioned by Pocock, eliminates all but the last.

I do not wish to imply synonymy of *virginiensis* and *agrestis*. These two names cannot be finally settled until the type of the former is re-examined, or until future work shows *Fontaria* to be a monotypic genus.

Notes and News in Entomology

Under this heading we present, from time to time, notes, news, and comments. Contributions from readers are earnestly solicited and will be acknowledged when used.

"Billion Pounds of Pesticides Produced during '51–'52 Season."—This is the headline in the Nat. Agr. Chem. Assn. *News*. That much of this is made up of insecticides (in addition to fungicides, herbicides, wood preservatives and rodenticides) may be concluded from other figures (R. B. Friend in Amer. Scientist, Jan., 1952) : 160 million pounds of calcium and lead arsenates, 47 million of DDT, etc., recorded for recent years.

Recent congressional hearings are a reflection of the concern of the public as to how much of these chemicals and of the newer

(*Continued at bottom of next page*)

Eutreta sparsa found on Chrysanthemum (Tephritidae)

By Franklin S. Blanton, Lieutenant Colonel, Medical Service Corps, U.S.A.

During the writer's recent stay at Cornell University, Dr. W. E. Blauveldt of the Department of Entomology gave him two specimens of *Eutreta sparsa* Wied. that were reared from galls on *Chrysanthemum* in greenhouses located on Long Island.

This fly belongs to the family Tephritidae formerly known as Trypetidae, and it normally breeds in galls on golden rod. There are a great many notorious pests belonging to this family, which are usually called fruit flies. Entomologists and many fruit growers are very familiar with the names of such genera as *Anastrepha, Dacus, Ceratitis* and *Rhagoletis.*

Chrysanthemum is no doubt an incidental or accidental host for *Eutreta sparsa* but it is possible that this fly will cultivate a taste for *Chrysanthemum* especially in the absence of golden rod. After all, the writer prefers steak, but manages to get along quite well on frankfurters.

Notes and News

(*Continued from preceding page*)

ones, with their fascinating trade names and abbreviations, may be present on the dinner table. Meanwhile, in defense of entomologists, it may be pointed out that they too are not entirely happy. Dr. Friend, for example, although he finds that chemical insecticides are absolutely necessary for high production of crops, has "always considered that chemical control of insect pests is a last resort. Other methods based more upon ecology would be preferred . . ." (*l.c.*, p. 138). And V. B. Wigglesworth, of Cambridge, England, speaks in a similar vein (Advancement of Sci. 7: 161): "We need more not less entomological research. By all means let us use insecticides when we can do no better. But we should regard them, as C. B. Williams has emphasized more than once, as an admission of failure, to be replaced by the more subtle and more remunerative methods of biology as soon as these can be worked out."—R. G. S.

Current Entomological Literature

COMPILED BY R. G. SCHMIEDER AND J. W. H. REHN

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia and the University of Pennsylvania, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the year 1951 unless otherwise noted. Continued papers, with few exceptions, are recorded only at their first installment.

For other records of general literature and for economic literature, see the Bibliography of Agriculture, Washington, and the Review of Applied Entomology, Series A, London. For records of papers on medical entomology see Review of Applied Entomology, Series B.

NOTE: The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the List of periodicals and serials published in our January and June issues. The number of the volume, and in some cases, the part, heft, &c. is followed by a colon (:). References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to Neotropical species, and not so indicated in the title, have the symbol (S).

Papers published in ENTOMOLOGICAL NEWS are not listed.

GENERAL—Bailey, S. F.—Dudley Moulton. [60] 27: 145–47. **Beebe, W.**—Migration of insects (other than Lepidoptera) through Portachuelo Pass, Rancho Grande, North-central Venezuela. [95] 36: 255–66. **Freeman, T. N.**—Some problems of insect biology in the Canadian Arctic. Trans. Roy. Soc. Canada 45: 208 (Abstract). **Hemming, F.**—The problem of stability in specific nomenclature, with special reference to cases where type material is no longer in existence. [Jour. Soc. British Ent.] 2: 1–15. **Hering, E. M.**—Biology of the leaf miner. Pp. iv–420, ill., Dr. W. Junk, 's-Gravenhage, 1951. **Mackerras, I. M.**—Marine insects. [Proc. Roy. Soc. Queensland] 61: 19–29. **Penn, G. H.**—A brief chronology of the history of entomology in Louisiana. [Proc. Louisiana Acad. Sci.] 14: 72–87. **Rockwood, L. P.**—Notes on insects associated with polyphyllus in the Pacific northwest. [60] 27: 149–56. **Vappula, N. A.**—Finnish entomological literature published in 1949 including economic entomology and control of insect pests. [Ann. Ent. Fennici] 17: appendix, 1–17. **Walz, A. J.**—Rearing the greenbottle fly on dog biscuits. [60] 27: 191–92.

ANATOMY, PHYSIOLOGY, MEDICAL—Anon.—Insect physiology and applied entomology. [53] 168: 974–75 (Report of papers at meeting of Assoc. Appl. Biol.). **Bodenstein, D.**—The hormones in molting and metamorphosis. [9] 111: 441 (Abstract). **Boettiger, E. G.**—Stimulation of the flight muscles of the fly. [9] 111: 443 (Abstract). **Brown, F. A., Jr.**—Regulation of distal retinal pigment cells

of the Crustacean compound eye. [9] 111: 442 (Abstract). **Bunker, H. P. and B. B. Speicher**—Inheritance of physiological activity in Habrobracon. [Genetics] 36: 545 (Abstract). **Burdette, W. J.**—Administration of diethylstilbestrol to the tu-36a strain of Drosophila melanogaster. [Genetics] 36: 545–46 (Abstract). **Burgess, L. E., E. H. McNeil, J. D. Solomon and D. T. Rolfe**—A preliminary study of the riboflavin-like effect of a pterine isolated from the egg of a grasshopper. [9] 111: 535 (Abstract). **Chang, S. L. and F. E. Richart, Jr.**—Studies on Anopheline larvae. I. The anatomy and function of the so-called 'Notched Organs' of Nuttall and Shipley on the thorax of larvae of Anopheles quadrimaculatus. [Journ. Nat. Mal. Soc.] 10 (4): 287–292, ill. **Chefurka, W. and C. M. Williams**—Biochemical changes accompanying the metamorphosis of the blood of the Cecropia silkworm. [9] 111: 516–17 (Abstract). **Collins, M. S.**—Variations in the fat body of Reticulitermes flavipes. [9] 111: 477 (Abstract). **Dias, E. e A. C. Chandler**—Molétias humanas transmitidas por hemipteros sugadores. [49] 47: 403–22, ill. Human diseases transmitted by parasitic bugs. *Ibid.* 423–41. **Downs, W. G. and E. Bordas**—Anopheles aztecus, malaria, and malaria control in the Valley of Mexico. [Journ. Nat. Mal. Soc.] 10 (4): 350–58. **Drees, O.**—Verhaltungsphysiologische Untersuchungen über instinktive Verhaltungsweisen bei Salticiden. [Zool. Anz.] Suppl. 15: 186–92. **Dunmore, L., Jr.**—Caste differences in toleration of drying in Reticulitermes flavipes. [9] 111: 513 (Abstract). **Dutt, M. K.**—Studies on chromosome behavior in Chrotogonus sp. (Acrid., Prygom.). [Proc. Zool. Soc. Bengal] 3: 108–17. **Edmondson, M.**—Induction of sterility mutations in ultraviolet-treated polar cap cells of Drosophila. [Genetics] 36: 549 (Abstract). **Fair, G. M., S. L. Chang and F. E. Richart, Jr.**—Studies on Anopheline larvae. II. The mechanism involved in the flotation of larvae of A. quadrimaculatus on a water surface. [J. Nat. Mal. Soc.] 10 (4): 293–305, ill. **Farnsworth, M. W.**—Effects of the homozygous Minute-IV deficiency on the development of Drosophila. [Genetics] 36: 550 (Abstract). **Friedler, G. and D. T. Ray**—Androgenesis and mutation in the wasp Mormoniella. [9] 111: 475 (Abstract). **Gardner, E. J.**—Genes producing a maternal effect in Drosophila melanogaster. [Genetics] 36: 551 (Abstract). **Gaul, A. T.**—A relation between temperature and wing beats. [18] 46: 131–33. **Gaulden, M. E.**—

Prolonged visible change produced by heat in the chromatin of living grasshopper neuroblasts. [Genetics] 36: 551–52 (Abstract). **Gowen, J. W. and J. Stadler**—Irradiation effects on viability of Drosophila melanogaster. [9] 111: 497 (Abstract). **Groot, H., S. Renjifo and C. Uribe**—Trypanosoma ariarii n. sp. from man, found in Columbia. [Amer. J. Trop. Med.] 31 (6): 673–91, ill. (Triatoma expts.). **Hardy, G. H.**—The reticulation theory of wing venation theory in Diptera. [Jour. Soc. British Ent.] 4: 27–36, ill. **Harnly, M. H.**—Size of parts present vs. number of parts present in the development of Drosophila melanogaster. [41] 118: 21–36. An optimum-temperature hypothesis for the heat reaction curves of Drosophila melanogaster. *Ibid.* 37–69. **Hartung, E. and W. Hartnett**—A study of the relation of various dietary factors to tumor incidence in Drosophila melanogaster. [9] 111: 500 (Abstract). **Hassenstein, B. and W. Reichardt**—Funktionsanalyse der Bewegungsperzeption einen Käfers (Col., Chlorophanus sp.). [Naturwiss.] 38: 507. **Hinton, H. E.**—The structure and function of the endocrine glands of the Lepidoptera. [Proc. Trans. South London Ent. Nat. Hist. Soc.] 1950–51: 124–60, ill. **Hopla, C. E.**—Experimental transmission of Tularemia by the tropical rat mite. [Amer. J. Trop. Med.] 31 (6): 768–82, ill. **Howe, R. W. and H. D. Burges**—Studies on beetles of the family Ptinidae. VI. The biology of Ptinus fur and P. sexpunctatus. [19] 42: 499–511 (Food, temp., diapause). **Hurlbert, H. S., R. M. Altman and C. Nibley, Jr.**—DDT resistance in the Korean body lice. [80] 115: 11–12, 1952. **Islas, S., F.**—Breve estudio morfologico del imago de la mosca prieta de los citricos (Homoptera: Aleyrodiidae). [8] 22: 313–22, ill. **Laidlaw, W. B. R.**—A preliminary enquiry into the influence of solar radiation on insect environment, with special reference to the relation between pest epidemics and fluctuation in solar radiation. [Jour. Soc. British Ent.] 2: 17–80. **Lenz, F.**—Mittelbare Geschlechter-Findung bei Dipteren. [Zool. Anz.] Suppl. 15: 285–89. **Levenbook, L. and C. M. Williams**—Mitochondrial cytochrome C and wingbeat frequency of flies. [9] 111: 515 (Abstract). **Levitan, M.**—Response of the chromosomal variability in Drosophila robusta to seasonal factors in a Southwest Virginia woods. [Genetics] 36: 561–62 (Abstract). **Luce, W. M.**—Reduction in facet number in full-eyed (reverted Bar) Drosophila to X-rays. [Genetics] 36: 563 (Abstract). **Luce, W. M., H. Quastler and H. B. Chase**—Reduction in facet number in bar-eye

Drosophila by X-rays. [Genetics] 36: 488–99. **Ludwig, D.**—Changes in the distribution of nitrogen during the embryonic development of the Japanese beetle, Popillia japonica. [9] 111: 446 (Abstract). **Nuorteva, P.**—Experimentelle Untersuchungen über die Nährpflanzenwahl einer oliophagen Zikade, Aphrophora alni (L.) (Cercopidae). [Ann. Ent. Fennici] 17: 10–17. **Ketchell, M., N. Feder and H. A. Schneiderman**—The effects of temperature, oxygen pressure, and metabolic inhibitors on in vitro spermatogenesis in the Cecropia silkworm. [9] 111: 518 (Abstract). **Kloft, W.**—Vergleichende Untersuchungen an einigen Cocciden und Aphiden. [Zool. Anz.] Suppl. 15: 290–96 (Effects on host plants). **Koch, A.**—Untersuchungen über Wachstumsaktivatoren. [Zool. Anz.] Suppl. 15: 51–58. **Mackensen, O.**—Viability and sex determination in the honey bee (Apis mellifera L.). [Genetics] 36: 500–09. **Manna, G. K.**—Multiple sex-chromosome mechanism in a reduviid bug, Conorhinus rubrofasciatus. [Proc. Zool. Soc. Bengal] 3: 155–61. **Merrell, D. J.**—Selective mating in laboratory populations of Drosophila. [Genetics] 36: 565 (Abstract). **Mickey, G. H. and J. Blount**—Somatic polyploidy in Drosophila melanogaster treated with cold shock. [9] 111: 466–67 (Abstract). **Mittler, S.**—Variation in tumor formation in D. melanogaster reared on yeasts that do not require vitamins or amino acids. [Genetics] 36: 567 (Abstract). **Musgrave, A. J. and J. J. Miller**—A note on some preliminary observations on the effect of the antibiotic terramycin on insect symbiotic micro-organisms. [23] 83: 343–45. **Passano, L. M.**—The X organ-sinus gland neurosecretory system in crabs. [9] 111: 502 (Abstract). The X organ, a neurosecretory gland controlling molting in crabs. *Ibid.* 559 (Abstract). **Philip, C. B. and G. M. Kohls**—Elk, winter ticks and Rocky Mountain spotted fever: A query. [Public Health Rpts.] 66 (50): 1672–75. Plague infection in Lincoln County, Washington. *Ibid.* 1680. **Plus, N.**—Courbes de multiplication du virus de la sensibilité au CO_2 chez la Drosophila. [C. R. Acad. Sci.] 233: 1489–91. **Rainey, R. C.**—Weather and the movements of locust swarms: a new hypothesis. [53] 168: 1057–60. **Ray, D. T.**—Hatchability of fertilized and unfertilized eggs of the wasp Mormoniella as shown by the Nujol technique and its relation to sex determination. [9] 111: 472–73 (Abstract). **Robinson, H. S.**—The effects of light on night-flying insects. [Proc. Trans. South London Ent. Nat. Hist. Soc.] 1950–51: 112–23. **Rothenbuhler, W. C., J. W. Gowen**

and O. W. Park—Androgenesis in gynandromorphic honey bees (Apis mellifera L.). [Genetics] 36: 573 (Abstract). **Sarkaria, D. S., S. Bettini and R. L. Patton**—A rapid staining method for clinical study of cockroach blood cells. [23] 83: 329–32, ill. **Schmidt, E. L. and C. M. Williams**—An analysis of the metamorphosis hormone of Lepidoptera by the method of tissue culture. [9] 111: 517–18 (Abstract). **Schneiderman, H. A., N. Feder and M. Ketchell**—The cytochrome system in relation to in vitro spermatogenesis in the Cecropia silkworm. [9] 111: 518 (Abstract). **Smith, M. V. and G. F. Townsend**—A technique for mass-marking honeybees. [23] 83: 346–48. **Stalker, H. D.**—Diploid parthenogenesis in the cardini species group of Drosophila. [Genetics] 36: 577 (Abstract). **Tahmisian, T. N.**—The response of Melanoplus differentialis cells to X irradiation before and after induction. [9] 111: 574 (Abstract). **Tassoni, J. P.**—The nitrogen to protein conversion factors for the pupae of the moth, Telea polyphemus Cramer. [9] 111: 446 (Abstract). **Welsh, J. H.**—New evidence concerning the source and action of the eyestalk hormone. [9] 111: 442 (Abstract). **White, M. J. D.**—Supernumerary chromosomes in the Trimerotropine grasshoppers. [Genetics] 36: 582–83 (Abstract). **Whiting, A. R.**—Absence of mutagenic effect of heavily irradiated host on the parasitic wasp Habrobracon. [9] 111: 565 (Abstract). **Whiting, P. W.**—X-ray induced eye color mutations in chalcidoid wasps. [9] 111: 476 (Abstract). **Williams, C. M.**—Endocrine control of the complete metamorphosis of insects. [9] 111: 441 (Abstract). **Van der Kloot, W. and C. M. Williams**—Instinctive movement patterns in the cocoon-spinning of the Cecropia silkworm. [9] 111: 516 (Abstract).

ARACHNIDA AND MYRIOPODA—Boyce, H. R. and E. J. LeRoux—A note on dipterous predators of the European red mite Metatetranychus ulmi (Koch). [23] 83: 332. **Drees, O.**—(See under Anatomy.) **Gowda, B. N. Bole**—The chromosome study in the spermatogenesis of two lynx-spiders (Oxyopidae). [Proc. Zool. Soc. Bengal] 3: 95–107. **Levi, H. W. and L. R.**—Report on a collection of spiders and harvestmen from Wyoming and neighboring states. [95] 36: 219–37.

SMALLER ORDERS—Dunmore, L.—Isoptera. (See under Anatomy.) **Edmunds, G. F.**—New species of Utah Mayflies. I. Oligoneuridae (Ephemeroptera). [65] 53: 327–41, ill. **Gardner, A. E.**—The early stages of Odonata.

[Proc. Trans. South London Ent. Nat. Hist. Soc.] 1950–51: 83–88, ill. **Henson, H.**—On the wings of Forficula auricularia (Dermaptera). [68] 26: 135–42. **Hornuff, L. E.**—A further study of Aphylla williamsoni Gloyd (Odonata, Aeschnidae). [Proc. Louisiana Acad. Sci.] 14: 39–44. **Hurlbert, et al.**—Siphonaptera. (See under Anatomy.) **Knowlton, G. F.**—Corrodentia in bee hives. [18] 46: 134. **Tilden, J. W.**—A note on the manner of feeding of Agulla adnixa Hagen (Raphidiodea). [60] 27: 192.

ORTHOPTERA—Dutt, M. K.—(See under Anatomy.) **La Rivers, I.**—New Nevada Orthoptera records for the 1949 collecting season. [60] 27: 173–80. **Manna, G. K.**—(See under Anatomy.) **Rainey, R. C.**—(See under Anatomy.)

HEMIPTERA—Bailey, N. S.—The Tingoidea of New England and their biology. [27] 31: 1–140. **Bodenheimer, F. S. and A. Harpaz**—Holometabolic development in the males of Coccoidea. [Bull. Res. Council Israel] 1: 133–35. **Boudreaux, H. B.**—The insect family Aphididae in Louisiana. [Proc. Louisiana Acad. Sci.] 14: 14–22. **Bradley, G. A.**—A field key to the species of Cinara (Aphid.) of Canada east of the Rockies. [23] 83: 333–35. **Dias e Chandler**—(See under Anatomy.) **Drake, C. J.**—New water striders from insular America (Veliidae). [65] 53: 338–40. **Drake, C. J. and R. F. Hussey**—Concerning some American Microvelia (Veliidae). [31] 34: 137–45 (*). **Eastop, V. F.**—Diurnal variation in the aerial density of Aphididae. [68] 26: 129–34. **Fiedler, C.**—Revision der Rüsslergattung Cleogonus (Curc., Cryptorrh.) [6] 4: 1201–18. Die Rüsslergattung Rhinochenus und Blaborhinus. *Ibid.* 1102–20. **Flock, R. A.**—A new species of Haplaxius, with a key to California species. [60] 27: 169–70 (Cixiidae). **Herring, J. L.**—The aquatic and semiaquatic Hemiptera of northern Florida. Part 4: Classification of habitats and keys to the species. [31] 34: 146–61. **Hottes, F. C.**—A method for taking aphids in flight. [60] 27: 190. **Islas, S., F.**—(See under Anatomy.) **Kloft, W.**—(See under Anatomy.) **Nuorteva, P.**—(See under Anatomy.) **Penn, G. H.**—Additional records of aquatic Hemiptera in Louisiana. I. Nepidae, Hydrometridae and Naucoridae. [Proc. Louisiana Acad. Sci.] 14: 67–71. **Sibley, L. M.**—A study of Reduviids in Louisiana. [Proc. Louisiana Acad. Sci.] 14: 88–93.

LEPIDOPTERA—Clark, A. H. and L. F.—The butterflies of Virginia. [82] 116 (7): i–vii, 1–239, ill. **Hering, E. M.**—(See under General.) **Hinton, H. E.**—(See under

Anatomy.) **Rawson, G. W., J. B. Ziegler and S. A. Hessel**—The immature stages of Mitoura hesseli R. and Z. (Lycaenidae). [18] 46: 123–30, ill. **Robinson, H. S.**—(See under Anatomy.) **Torre y Callejas, S. L. de la**—A new butterfly from Cuba (Nymphalidae). [65] 53: 336–37, ill. **Van der Kloot and Williams**—(See under Anatomy.) **Vazquez, G., L.**—Un nuevo psiquido mexicano del genero Oiketicus (Psychidae). [8] 22: 323–33, ill.

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EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Miridae (Capsidae)—American species wanted, with locality labels, in exchange for British species. D. Leston, F.R.E.S., 6 Frognal Rise, London N. W. 3, England.

Wanted—Entomological microscope in good condition; Spencer, Bausch & Lomb, or other standard make. David G. Shappirio, 4811 17th St., N.W., Washington 11, D. C.

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American Sarcophagidae—wanted for identification. H. R. Dodge, P.O. Box 185, Chamblee, Georgia.

German lepidopterist wishes to correspond and receive live material (eggs and pupae) in exchange for dried imagoes. Johannes Reichel, Koenigsberg, Krs. Wetzlar 16, Germany.

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ENTOMOLOGICAL NEWS

APRIL 1952

Vol. LXIII **No. 4**

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PUBLISHED MONTHLY, EXCEPT AUGUST AND SEPTEMBER, BY
THE AMERICAN ENTOMOLOGICAL SOCIETY
PRINCE AND LEMON STS., LANCASTER, PA.
AND
1900 RACE STREET, PHILADELPHIA 3, PA.

Subscription, per yearly volume of ten numbers: $5.00 domestic; $5.30 foreign; $5.15 Canada. Entered as second-class matter April 19, 1943, at the post office at Lancaster, Pa., under the Act of March 3, 1879. Acceptance for mailing at the special rate of postage provided for in paragraphs (d-2), Section 34.40, P. L. & R. of 1948, authorized April 19, 1943.

ENTOMOLOGICAL NEWS

ENTOMOLOGICAL NEWS is published monthly, excepting August and September, by The American Entomological Society at Prince and Lemon Sts., Lancaster, Pa., and the Academy of Natural Sciences, 1900 Race Street, Philadelphia 3, Pa., U. S. A.

PHILIP P. CALVERT, Editor Emeritus. R. G. SCHMIEDER, Editor. Editorial Staff: E. J. F. MARX, M. E. PHILLIPS, J. A. G. REHN, and A. G. RICHARDS.

Subscription price, per yearly volume of 10 numbers: Domestic, $5.00; Foreign, $5.30; Canada, $5.15—U. S. Currency.

SUBSCRIPTIONS, ADVERTISEMENTS: All communications and remittances to be addressed to **ENTOMOLOGICAL NEWS, 1900 Race Street, Philadelphia 3, Pa.**

MANUSCRIPTS and all communications concerning same should be addressed to **R. G. Schmieder, Zoological Laboratory, University of Pennsylvania, Philadelphia 4, Pa.**

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ENTOMOLOGICAL NEWS

VOL. XLIII APRIL, 1952 No. 4

The Caddisfly Genus Molannodes in North America

By HERBERT H. ROSS, Illinois Natural History Survey, Urbana, Illinois

Among the very interesting results of the activities of the Arctic Health Research Center has been the discovery of the unusual caddisfly genus *Molannodes* in Alaska. Previous to this, the genus was known only from northern Europe, where it is represented by two closely related species, *zelleri* McLachlan and *steini* McLachlan, which exhibit some intergradation between the very slight characters which serve to separate them. The Alaska material represents a new species for which the name *bergi* is proposed.

The present species is a close relative of *zelleri*, differing in having the lateral aspect of the clasper wider, shorter, and projecting directly posteriad or even slightly ventrad, whereas in *zelleri* the clasper is narrower, longer, and curves distinctly dorsad at tip. In addition the present species has a preapical mesal tooth on the clasper. These differences are not great, and indicate that the Alaska and European species arose from a holarctic ancestor of relatively young geologic age.

Whether the fracture of the range of this ancestor into American and European fragments is the result of climatic shifts during substages of the Wisconsin glaciation, or dates back to pre-Wisconsin isolating factors it is impossible to say. We have too little information on the full range of *zelleri* and only one record of *bergi*. It is quite possible that *bergi* may extend westward into Asia, although it has not been reported from there. During the last glaciation of the western mountains,

it is highly likely that *bergi* existed in the unglaciated section of northwestern Alaska, which region is only a short distance from the Matanuska Valley where *bergi* was collected.

The genus *Molannodes* is a close relative of *Molanna,* which is widspread over the Holarctic region. *Molannodes* differs from *Molanna* in that the front wing has the base of M3 atrophied, with the result that M3 appears as a branch of Cula; and R5 is fused only for a very short distance with M1 + 2. In the front wing of *Mollana* M3 is fully present, often fused for a distance with Cula, and R5 is fused for at least half its length with M1 + 2.

Molannodes bergi new species

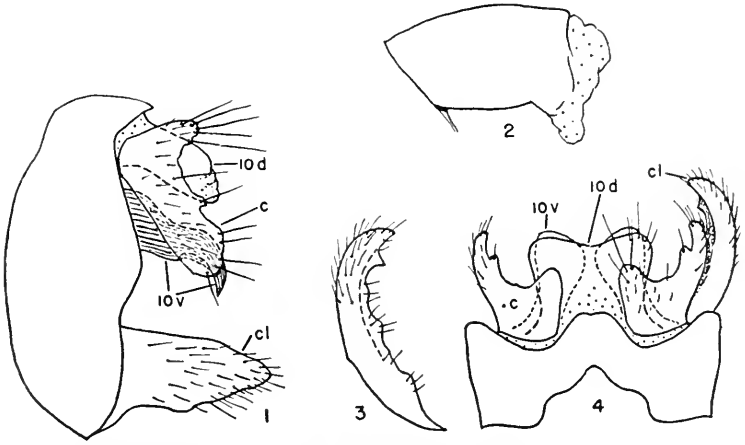
Male.—Length from tip of head to apex of folded wings, 8.5 mm. Head, thorax, apex of abdomen, and coxae and base of femora, dark brown, remainder of body and appendages light brown. Wings light brown. Structure typical for genus. Palps filiform. Spur count of legs 2–4–4.

Genitalia as in figs. 1 to 4. Ninth segment nearly annular, reduced to a narrow strap on venter. Clasper short and fairly deep, its lateral aspect pointed at apex, its ventral aspect, fig. 3, curved mesad at apex and having a preapical tooth on mesal margin. Cercus short but very deep, its dorsal corner produced into a blunt extension, its ventral portion produced into a long, tongue-like projection. Tenth tergite apparently divided into two tiers of processes connected only at extreme base. The dorsal tier is composed of a single plate, slightly incised at apex; the ventral tier is composed of a pair of flat, straplike, twisted ribbons which arise beneath the base of the dorsal plate, twist and turn mesad of the cerci, and end in a sharp point. Aedeagus, fig. 2, simple and tubular, with a membranous apex.

Female.—Similar in size, color, and general structure to male. Genitalia simple, the subgenital plate being simple, nearly as wide as long, and nearly rectangular in shape.

Holotype, male.—Paradise Lake, near Wasilla, ALASKA, June 26, 1950, Clifford O. Berg. *Allotype,* female, and male and 3 female *paratypes,* same data as for holotype. Deposited in the

collection of the Illinois Natural History Survey, with paratypes deposited in the collections of the University of Michigan Museum and the U.S. National Museum.



FIGS. 1–4. Male genitalia of *Molannodes bergi* n. sp. 1, lateral aspect; 2, aedeagus, lateral aspect; 3, clasper, ventral aspect; 4, dorsal aspect, right clasper omitted. *c*, cercus; *cl*, clasper; 10*d*, tenth tergite, dorsal plate; 10*v*, tenth tergite, ventral tier of processes.

Regarding the circumstances surrounding the collection of this interesting species Dr. Berg writes: "The collection was made entirely at Paradise Lake, four miles northeast of Wasilla, a village that is well known throughout the Matanuska Valley. It was a sunny, warm afternoon, and I have noted that the caddisflies were abundant in the sedges and grasses on shore, where I was collecting by sweeping. Absence of other species in the vial shows that none were collected there (I made no attempt to separate them into species), so the caddisflies I noted must have been a relatively pure stand of Molannodes."

A Fourth Earwig for Missouri, with further Notes on another Species (Dermaptera)

By Richard C. Froeschner, Iowa State College

In addition to the three species listed in the author's 1944 paper on the earwigs of Missouri (Ent. News 55: 181–3) a fourth form, *Euborellia annulipes* (Lucas), has been collected on several occasions. Specimens furnished by Dr. K. C. Sullivan of Harris Teachers' College in St. Louis had been collected in 1940 by members of one of his classes during a field trip into Forest Park. They were found among discarded plant material which had been dumped out-of-doors. The author took a few individuals in the city greenhouses in the same park in 1944. This St. Louis material had been collected on several dates during March and April. In addition, one specimen was found in the student collection at the University of Missouri. It bore the data, "Columbia, Mo., May 16, 1948, H. Mallow."

Euborellia annulipes (Lucas) is a cosmopolitan species belonging to the Labiduridae, the third earwig family for Missouri. Labiduridae runs to Labiidae in the author's first paper (*loc. cit.*) but may be separated therefrom by having the first antennal segment at least as long as fourth, fifth and sixth segments united. *Euborellia* Burr has the head behind the eyes slightly longer than the length of an eye. *E. annulipes* (Lucas) is almost always wingless; body dark brown to black, legs and venter yellowish, femora and tibiae often ringed with fuscous; antennae 14–16 segmented, one or two segments in apical fourth usually pale; length of body 9–11 mm.

Labia minor (Linnaeus), the only one of the three originally listed species appearing in subsequent collecting, is now known to extend its season into November. The following counties have been added to the local distribution of this species: Atchison, Butler, Pike (W. S. Craig) and Scott.

The Dipterous Family Canaceidae in the United States

By Marshall R. Wheeler, Austin, Texas

There are four known species of this family in the United States, one of them undescribed. No key for the recognition of these species has been published and distributional data for the described species is very meager. The following key to the genera and species has been prepared from actual specimens and is followed by a discussion of the known distribution and a description of the new species, *Canaceoides texensis.*

All of the species of Canaceidae are associated with sea coast regions and are most often taken by sweeping among barren rocks which are occasionally wetted by sea spray or high tide. The group has long been placed with the Ephydridae and the Zoological Record still includes them in that family. They are deserving of family rank, however, and have been so treated by Curran (1934) and by Brues and Melander (1945). The family characters described in these publications are partially incorrect for our species of *Canaceoides* but are applicable to those of *Canace.*

Key to the U. S. Genera and Species of Canaceidae

1. A single pair of frontal bristles present, aligned with the anterior ocellus; acrostichal hairs absent; no prescutellar bristles.....Genus Canaceoides Cresson.....2

Several pairs of convergent frontals present, anterior to ocelli and arranged along the margins of the large frontal triangle; acrostichals well developed; prescutellars present .....Genus Canace Haliday.....3

2. Disc of scutellum with a pair of bristles in addition to the usual 4 marginals; anterior notopleural bristle present as a small hair; mostly dark species.....*Canaceoides nudata* (Cresson)

Scutellum with only the 4 marginals, the disc bare; anterior notopleural absent; more or less whitish pruinose species .....*Canaceoides texensis* n.sp.

3. Frontal triangle dull pollinose, not at all shining; more than two large upturned buccal bristles, the lower one not aligned with the regular facials; fore femora without a series of short spines

on inner apical surface. . . . CANACE *sensu strictu* (the genotype, *Canace nasica* Haliday, from Europe, belongs here)

Frontal triangle shining; the lowermost of the two upturned buccal bristles about in line with the facials; fore femora armed with a row of short, stout spines on inner apical surface . . . . . "Canacea" group (see discussion below) 4

4. Face densely silvery pollinose; fore femora with 4–6 stout spines; front weakly produced between antennal bases . . . . . *Canace macateei* Malloch

Face dull golden yellow; fore femora with 8–12 stout spines; front rather strongly produced between antennal bases . . . . . *Canace aldrichi* Cresson

DISCUSSION AND DISTRIBUTION

CANACE Haliday

1839. Ann. Nat. Hist., 3: 411.
Genotype: *Ephydra nasica* Haliday.

Malloch (1924) first described a species of this genus from the United States but in his title the generic name was spelled *Canacea* and his introductory sentence states that "The genus *Canacea* is distinguished from other Ephydridae by the presence of a complete anal cell in the wing," thus giving rise to considerable speculation as to whether this constitutes erection of a new genus.

Cresson (1924) states that *Canacea macateei* ". . . is the genotype of Malloch's? genus *Canacea,* which is not congeneric with *Canace*. . . ." Curran (1934), however, states that he was ". . . informed by Mr. Malloch during a conversation several years ago that '*Canacea*' was a slip of the pen, that he had no intention of establishing a new name, and that he was extremely doubtful that his species differed generically from *Canace* Haliday." Curran states further that he can find nothing in the descriptions to warrant the recognition of *Canacea.*

Cresson (1936), nonetheless, in describing a new species allied to *macateei,* states that in his opinion *Canacea* was introduced validly, though apparently unintentionally, and held that should this group (i.e., the species keying to the "Canacea" group of the above key) prove to warrant recognition, then *Canacea* Malloch, 1924, might be used.

It is the writer's opinion that in view of Malloch's statement, cited by Curran, that *Canacea* was a *lapsus,* the spelling should be emended to *Canace,* the intended form. The fact that the species concerned may actually be generically different has no bearing on this matter of the name. Such an interpretation seems to be in accord with Opinions 26, 27, 41, 63 and others of the International Commission on Nomenclature.

Canace macateei Malloch, 1924. Proc. Ent. Soc. Wash., 26: 52.

Described from a large series from Jekyl Island, Georgia. Cresson (1924) states that he had specimens from several eastern states as well as one from California. Dr. A. H. Sturtevant has specimens from Georgia and Massachusetts, and has identified specimens in the Cornell collection from Kingsville, Texas. The writer has taken specimens from several points along the Texas coast.

Canace aldrichi Cresson, 1936. Tr. Am. Ent. Soc., 62: 264.

Described from five specimens from Palo Alto and Redwood City, California. The writer and Dr. Sturtevant have taken a number of specimens at several coastal localities in southern California.

CANACEOIDES Cresson

1934. Tr. Am. Ent. Soc., 60: 221.
Genotype: *Canace nudata* Cresson.

In establishing this genus Cresson indicated that it might be the same as *Procanace* Curran, 1934, which name was, however, preoccupied by *Procanace* Hendel, 1913, for a Formosan species. Curran (*op. cit.*) substituted *Neocanace* Curran for *Procanace* Curran *nec* Hendel. The writer is not in a position to confirm or deny the synonymy.

Nocticanace Malloch (1935), from the description, is very likely the same as *Canaceoides* and its type, *N. peculiaris* Malloch, from the Marquesas Islands, is apparently quite similar to *C. texensis,* n.sp., described below. A footnote to Malloch's

article indicates that it was first issued in February, 1933, as Publication 7 of the Pacific Entomological Survey, and hence Malloch's name has priority should the identity of the two be clearly established.

Canaceoides nudata (Cresson), 1926.

Canace nudata Cresson, 1926. Tr. Am. Ent. Soc., 52: 257.

Described from 13 specimens from Los Angeles County, California. Cresson (1934) reports that 42 specimens from Hawaii seem to be conspecific. He also states that this species may be the same as *Procanace* (i.e., *Neocanace*) *panamaensis* Curran (1934. Proc. Calif. Acad. Sci., 21: 161).

The writer has taken several specimens along the coast of southern California.

Canaceoides texensis, sp. nov.

Front gray pollinose, narrowed anteriorly; about 3 large orbital bristles on each side, curving over eyes, and 1–2 smaller hairs alternating with the bristles. One pair of large, proclinate frontal bristles, their bases nearly level with the anterior ocellus, slightly nearer the ocellus than the nearest eye margin. One pair of divergent ocellars and about 6–8 small scattered hairs on the ocellar area. Inner and outer verticals well developed; postvertical bristles absent.

Face, cheeks and clypeus whitish pruinose, nearly snowy white except for pink areas below and in front of lowest point of eyes. Face broadly carinate between antennae, flattened below and lacking bristles. Bucca greatly broadened below and behind eyes, bearing 4 bristles, the 1st directed forward toward mouth, the others turned up over the eyes, the middle one smaller. Proboscis dark gray pollinose, the palpi elongate, yellowish and bearing one strong terminal bristle.

Mesonotum grayish pollinose dorsally, becoming whitish pruinose over pleurae and humeri. Acrostichal hairs and prescutellar bristles absent. Four pairs of dorsocentrals, the 1st

pair presutural and with 5–8 small hairs laterally and anteriorly to them. Scutellum with 4 marginals, the basal pair arising rather far up on the disc, all 4 of about equal length, the disc otherwise bare. One strong humeral and several scattered hairs on humeri, anterior notopleural absent, posterior notopleural a little stronger than humeral. Presutural and alars well developed. Mesopleura with 3 bristles, one directed dorsally, one posteriorly and one ventrally, plus small scattered hairs; sternopleura with one dorsal bristle and a row of small hairs. Halteres pale yellow.

Abdomen uniformly grayish pollinose, somewhat whitish in certain aspects. Legs gray pollinose; fore femora without a series of spines along inner apical surface; all metatarsi as long as the combined distal tarsal segments of each leg.

Wings uniformly grayish, veins dark. Costa reaching 4th vein; costal margin spinose. Interval between apices of 2nd and 3rd veins about $\frac{4}{5}$ that between 3rd and 4th; the latter veins parallel at their apices (somewhat diverging in *nudata*); posterior crossvein slightly less than $\frac{1}{2}$ length of last section of 5th vein; 2nd section of 4th vein about $\frac{1}{2}$ length of 3rd (last) section.

Body length, male: 2.2 mm. (in pinned specimen); wing: 1.8 mm. Female larger than male; body length up to 2.7 mm.

Types.—Holotype male (deposited in the collection of the Calif. Acad. Sciences) and two *paratype* females (author's collection) collected by the writer near Galveston, Texas, Sept., 1950. Dr. Sturtevant has identified a specimen from Brazoria Co., Texas, in the collection of the University of Kansas (female, Aug. 10, 1928, R. H. Beamer) as this species.

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A New Species of the Genus Euplaniceps (Hymenoptera: Psammocharidae) from California with Microphotographs of the Genitalia of the Two Males of the Genus

By R. R. Dreisbach, Midland, Michigan

This specimen turned up in a small collection of spider wasps forwarded by P. A. Arnaud, Jr. There is no question as to its location in this genus, since Bradley's paper gives a very excellent description of the genus and keys to the various genera of the tribe as well as keys to the species. Bradley states that the only male known in this genus is *Euplaniceps sausseri* (Kohl), from Chile. The writer has a series of this species in both sexes, and microphotographs of the genitalia and subgenital plate are shown in the plates. Bradley's key to the males (p. 85) locates this male in the genus exactly, but it is probable that his key to the females would have to be modified to the extent that his statement that the wings are banded (p. 83, couplet 1b) would have to be eliminated since the wings of this male are hyaline with no trace of bands. Since the spurs of *E. sausseri* (Kohl) in the male are white, he suggested that this character might be distinctive or vary with the species. Since the spurs in this species are dark, it will be seen that it varies with the species.

Evans' key is incorrect in stating that in the tribe Aporini the propodeum of the male is excavated behind and the sides of the concavity project backward in short vertical ridges. Neither of the two males in this genus has that character, but the propodeum is flat behind, not excavated, and with no ridges, corners

smooth. There are other genera also that do not have a propodeum of that character.

This extends the range of this genus from South America to California.

Euplaniceps aquilonaris n.sp.

Holotype male: Black; face, antennal joints, thorax and legs slightly sericeous in reflected light, much more so at outer posterior corners of propodeum, black in incident light; no upright hair anywhere except a very few on mouth parts; when seen from the sides, the eyes are short, reaching from base of clypeus to much below vertex, their length two-thirds the length from vertex to tip of clypeus, the whole front above eyes, and clypeus flat, posterior orbits about one-third width of eye; the part just back of antennal fossae the highest, but not as a ridge; when seen

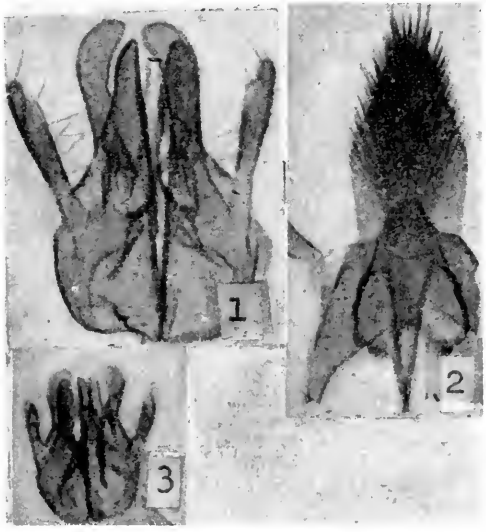

FIG. 1. *Euplaniceps sausseri* (Kohl). Gen. × 80. FIG. 2. *Euplaniceps sausseri*. Subg. × 76. FIG. 3. *Euplaniceps aquilonaris* n.sp. Gen. × 95.

from in front, the inner orbits are parallel, the front is shining, the middle interocular distance is two-thirds the transfacial distance, head as wide as high, ocellar triangle slightly above vertex; ocelli in a low triangle, the lateral ones about two-thirds as far apart as their distance to eyes; antennae rather thick for size of insect, about as long as head and thorax; relative lengths of first four and last two joints are 1.5 : 0.5 : 0.5 : 1.0 : 0.8 : 1.2, the third joint as wide as long; antennae above the clypeus about the length of third antennal joint; clypeus one-half as long as wide, pronotum transverse behind; relative length of pronotum, thorax, scutellum, and postscutellum are 3.0 : 2.2 : 1.5 : 0.5; propodeum in a smooth curve with the appressed silvery pubescence at outer corners just barely visible in side view, posterior surface flat and outer corners smooth; thorax as well as rest of body shining; wings almost hyaline, slightly cloudy; marginal cell very small and very narrow, its distance to wing tip twice as long as its length; second cubital cell very short, about three times as long on cubital vein as on marginal, first and second recurrent veins almost parallel, the pocket of third discoidal cell about in the middle between these veins; the first recurrent vein is just apicad of the first intercubital vein and the second recurrent vein is just beyond middle of the second cubital cell; basal vein basad of transverse vein in fore wings, rises vertically and then bends forward sharply; only the posterior tibiae with spines, and a few there; tarsi with only very short spines; longer spur of posterior tarsi almost nine-tenths as long as its metatarsal joint; claws symmetrical, the claw of fore pair bent in deeper curve than those of the last two pairs, which are almost straight, all with a very small tooth; genitalia very small, much smaller than *E. sausseri,* with about the same characters.

Length: Head and thorax 1 :85 mm., abdomen 1.60 mm., fore wing 3.0 mm., rear wing 2.3 mm., genitalia length 0.20 mm., width 0.13 mm.

Holotype male: Stanford Univ., Santa Clara Co., CALIFORNIA, IX–29–50, P. H. Arnaud, Jr. (MCZ).

This is a very small species. The subgenital plate has somewhat the same shape as that of *sausseri.* It was lost as it was so

very small that it disappeared in transferring from one alcohol solution to the next.

The two known males of this genus may be separated as follows:

1. Wings hyaline, only slightly colored, no bands; spurs dark; a very small species, about 3.5 mm. long, genitalia 0.20 mm. long × 0.13 mm. wide. California.....*aquilonaris* n.sp.
1. Wings dark with a white crossband about two-thirds toward tip; spurs light; a larger species, about 6.5 mm. long, genitalia 0.53 mm. long × 0.33 mm. wide, subgenital plate 0.66 mm. long × 0.20 mm. wide. Chile.....*sausseri* (Kohl)

The small size of the genitalia of the new species can be judged from the fact that it is magnified more than *E. sausseri* (95 to 80) and yet it is much smaller.

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Notes on Stamford Bloodsucking Flies (Diptera)

By Stanley W. Bromley, Ph.D., Bartlett Tree Research Laboratories, Stamford, Conn.

Observations over a period of four years were made on the bloodsucking flies attracted to a tethered pony in North Stamford, Connecticut. Approximate numbers of the Diptera observed were tabulated and are herewith presented to show the relative abundance of the species concerned.

Blood-sucking Diptera Collected or Observed on Tethered Pony, North Stamford, Conn. 1944–1947 (incl.)

I. April and May	
Black flies, mostly *Simulium hirtipes*	75,000
Mosquitoes, *Aedes* spp.	50
II. June	
June fly, *Tabanus lasiophthalmus* Macq.	750
Early horse fly, *Tabanus carolinensis* Macq.	12

Deer fly, *Chrysops callida* O. S.	85
Deer fly, *Chrysops celer* O. S.	75
Deer fly, *Chrysops wiedemani* Kirby	44
Deer fly, *Chrysops inda* O. S.	10
Deer fly, *Chrysops cuclux* Whitney	8
Deer fly, *Chrysops carbonaria* Walker	6
Deer fly, *Chrysops frigida* O. S.	2
Deer fly, *Chrysops dimmocki* Hine	2
Mosquitoes, *Aedes* spp.	150
III. Early July	
Gray horsefly, *Tabanus typhus* Whitney	220
Little horsefly, *Tabanus sparus* Whitney	180
Red horsefly, *Tabanus affinis* Kirby	55
Hine's horsefly, *Tabanus hinei* Johnson	14
Large cattle fly, *Tabanus recedens* Walker	5
Deer fly, *Chrysops univittatus* Macq.	33
Deer fly, *Chrysops vittata* Wied.	28
Deer fly, *Chrysops geminata* Wied.	25
Deer fly, *Chrysops nigra* Macq.	15
IV. Late July	
Dark horsefly, *Tabanus trispilus* Wied.	167
"Gray back" *Tabanus superjumentarius* Whitney	72
Lined horsefly, *Tabanus lineola* Fabr.	58
Small horsefly, *Tabanus pumilus* Macq.	50
Blackish-gray horsefly, *Tabanus coffeatus* Macq.	20
Black horsefly, *Tabanus atratus* Fabr.	10
"Greenhead," *Tabanus costalis* Wied.	8
"Big Greenhead," *Tabanus americanus* Forster	4
V. August	
Brown cow fly, *Tabanus sackeni* Fairchild	400
Dusk cow fly, *Tabanus orion* O. S.	8
Black horsefly, *Tabanus atratus* Fabr.	5
Stable fly, *Stomoxys calcitrans* L.	5,000
VI. September	
Fall cow fly, *Tabanus acteon* O. S.	8
Dusk cow fly, *Tabanus orion* O. S.	4
Black horsefly, *Tabanus atratus* Fabr.	4
Stable fly, *Stomoxys calcitrans* L.	5,000
VII. October	
Stable fly, *Stomoxys calcitrans* L.	2,000

The most troublesome were the black flies. These made the animal frantic, kicking and plunging through shrubbery in an effort to brush off the tormentors. The deer flies, *Chrysops*, attacked the pony's ears for the most part. The medium-sized Tabanids attacked the belly and legs, the large Tabanids the back and neck. The swarms of stable flies, *Stomoxys calcitrans*, were also troublesome but were not as demoralizing as the Simuliids.

Many Tabanids have beautifully colored eye-patterns of greens, gold and reds in life. These colors fade after death. Two species have the entire eye surface brilliant green and are called "greenheads." These are *T. costalis* and *T. americanus*.

Our largest horsefly, if we except *T. americanus*, the great black *Tabanus atratus* Fabr., prefers cattle to horses, usually attacking black cows such as Aberdeen Angus or the black portions of Holsteins. *T. atratus* will select a spot on the cow's back out of reach of the swishing tail and gorge on the animal's blood so that it looks like a ripe plum. The orange-banded black *Tabanus cinctus* Fabr. also prefers cattle. *Cinctus* is of the same color pattern as *Mydas clavatus* and *Campsomeris 4-maculata*. All three are mimetic of the large powerful spiderwasp *Pompilius atrox*.

The yellow and black-banded *Tabanus zonalis* Kirby found in the northern part of the state attacks horses. It is mimetic of a large yellow-jacket wasp such as *Vespa arenaria* or *V. vidua*.

Tabanids which habitually attack human beings are: most of the deer flies, *Chrysops* spp.; the beach "greenhead," *T. nigrivittatus*, abundant in the salt marshes and along beaches where they bite bathers; *T. nivosus* O. S. (July 10–20, 1929), and *T. reinwardtii* (Aug. 1, 1929).

Most of the Tabanids are diurnal and are active in bright sunlight. Some species are largely crepuscular, such as *T. orion* and *T. giganteus* which are dusk fliers. *T. orion* is attracted to electric lights.

The June fly, *T. lasiophthalmus*, is the most abundant of the genus in southern New England, attacking horses and cattle in swarms in June. It is the earliest species to appear in the spring

and is usually accompanied by *T. carolinensis* in lesser numbers. *T. sackeni,* the brown cow fly, is abundant in August, during certain seasons, on both cattle and horses.

The large Tabanid attacking cattle and horses or flying around automobiles in the early part of the season (June and early July) is *T. recedens* Walker.

Tabanus americanus, the big "Greenhead," is rare in New England. It is the largest species of *Tabanus* not only in the United States but in the entire world. I have a dried specimen the body of which measures 38 mm. in length with a wing expanse of 55 mm. In life, a gorged specimen would be much larger and in actual bulk probably the largest Dipteron in this country. The original host of *T. americanus* was undoubtedly the white-tailed deer; in fact the first one I ever saw in Connecticut was in a swamp in Weston which was frequented by this game animal. I once saw one on a cow in Darien. In Florida where this species is one of the most abundant Tabanids in the early spring, it attacks deer, wild turkeys, dogs, hogs and human beings.

Other Stamford Tabanids not recorded from the pony are *Tabanus nigrescens* P. de B. (July 17 to Aug. 4, 1931), a black species which I have found alighting on black macadam road pavements in the sun and *T. aurilimbus* Stone which is closely allied to *affinis.* My only Stamford specimen is dated July 14, 1946. *T. vivax* O. S. I have dated July 10, 1929.

Notes and News in Entomology

Under this heading we present, from time to time, notes, news, and comments. Contributions from readers are earnestly solicited and will be acknowledged when used.

Bees' Dances Direct the Flight of the Swarm

The amazing discoveries of KARL VON FRISCH [1] have established that a honey-bee is capable of informing its hive-mates

[1] VON FRISCH, K. Bees, their vision, chemical senses, and language. Pp. viii + 119, ill. Cornell University Press, Ithaca, N. Y., 1950. The

of the existence of a source of nectar. The "language" used is a peculiar "dance" that by its direction and by its rhythm gives accurate information on the direction and on the distance of this nectar from the hive. And now we learn of an even newer discovery: MARTIN LINDAUER, working at the Zoological Institute of the University of Munich, reports [2] an additional use that bees make of their language, that of directing a swarm to its new home.

As is well known, a swarm of bees that has settled down, let us say, on the limb of a tree near the hive from which it has come, will hang on to the limb for several hours to several days. Then it will fly off to some more or less distant place that is suitable as a permanent home. By what means the scout bees that have located the new site are able to direct the entire swarm to fly there has until now been a dark secret. Also, since different scout bees locate many different sites, which of these sites will be the one actually selected for occupancy?

LINDAUER found that not long after the swarm has formed its cluster, dancing bees may be seen on the cluster. It was also evident that these dancers were not bees that had visited flowers but that they were returned scouts; their bodies were covered, often, with soot, or with brick dust or mortar dust, depending on the particular kind of situation that they had been exploring. Their dances were like those described by VON FRISCH but were long continued, for upwards of five minutes and even for an hour.

It is noteworthy that at first various dancers will indicate different directions and distances. Each scout will "report" on

original reports may be found in *Oesterr. Zool. Zeitschr.*, Vol. 1 (1946), in *Die Naturwiss.*, Vol. 35 (1948), and *Experientia*, Vol. 5 and 6 (1949, 1950). Translations by D. ILSE of much of the work are in *Jour. Animal Behavior*, Vol. 1, Nos. 4 (1947) and 9 (1951). There is a brief report of the 1946 paper by SCHMIEDER in *Ent. News*, 58: 152–54 (1947). The film by v. FRISCH "The dances of the bees" and accompanying manual by T. C. SCHNEIRLA is for sale by Wilmer Films, P.O. Box 231, New York 25, N. Y.

[2] LINDAUER, M. 1951. Bienentänze in der Schwarmtraube. *Die Naturwissenschaften*, 38: 509–513, ill.

the particular place that she has found so that many (in one case eleven) different prospective nesting sites may be "promoted" at one time. Soon, however, a remarkable thing happens: A scout may be seen to stop its dance and run after another dancer in the manner common to bees who are taking note of a dancing bee. Later on, this scout may be found to have resumed dancing, but it is now dancing the other bee's dance! Still other scouts may also in this way come to change their dance so that more and more of the dancing going on indicates a certain direction and distance. Finally, all the dancers are "urging" the same nesting site, and it is then, and not until then, that we may expect the early departure of the swarm. At such a time, from five to ten bees are actively dancing on the cluster, while the total number of the dancing group averages well over a hundred. These dancers (scouts) plus the bees that have been in contact with them number well over a thousand, and it is these, who know the location, that lead and direct the swarm, and it is they, probably, that are seen flying forwards and backwards among the bees during the progress of the flight.

The riddle that still perplexes LINDAUER and that the bees have not yet divulged is: How do the scouts come into accord with each other and decide upon a certain one from among many prospective nesting sites that they have individually discovered? How is agreement attained?

Interesting observations are included on the activities of the scouts at the proposed site during their repeated visits; on what happened when another swarm arrived at the site first; and on what happened along the way to a swarm that took off while two groups of scouts were still indicating different sites, and how this swarm had again to form a cluster until unanimity was attained.

R. G. SCHMIEDER.

Current Entomological Literature

COMPILED BY R. G. SCHMIEDER AND J. W. H. REHN

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia and the University of Pennsylvania, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the year 1951 unless otherwise noted. Continued papers, with few exceptions, are recorded only at their first installment.

For other records of general literature and for economic literature, see the Bibliography of Agriculture, Washington, and the Review of Applied Entomology, Series A, London. For records of papers on medical entomology see Review of Applied Entomology, Series B.

NOTE: The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the List of periodicals and serials published in our January and June issues. The number of the volume, and in some cases, the part, heft, &c. is followed by a colon (:). References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to Neotropical species, and not so indicated in the title, have the symbol (S).

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Reviews

EXPERIMENTAL DESIGNS. By William G. Cochran and Gertrude M. Cox. 454 pp. John Wiley and Sons, New York, 1950. $5.75.

THE DESIGN AND ANALYSIS OF EXPERIMENTS. By Oscar Kempthorne. 631 pp. John Wiley and Sons, New York, 1952. $8.50.

Often the research worker in biology is faced with the necessity of analyzing his results statistically, and thus finds it desirable to plan his experiments in such a manner that the results are capable of accurate and efficient analysis. For experimenters with this problem, *Experimental Designs* could prove a valuable reference book.

The first three chapters are general in nature, and discuss points to be considered in setting up experiments, and some of the theory underlying their analysis. The remaining chapters enumerate a large number of types of designs, discussing the advantages and disadvantages of each, telling when they may be effectively used, and explaining the analysis of each plan in detail. Some knowledge of the analysis of variance is assumed, but the mathematical treatment is not exceptionally complicated. The examples given are largely biological in nature.

Professor Kempthorne's book has been published as a companion volume. Where Cochran and Cox are concerned with the analysis of specific experimental plans, Kempthorne treats the theoretical considerations behind the selection of the plans. A broader range is covered, and the theory includes more possible experimental cases. Thus, least squares, linear hypothesis theory, and factorial experiments are treated in some detail.

Although the discussion does not involve advanced mathematics it does require some familiarity with mathematical methods and ability to understand the significance of a theoretical treatment. It is thus of special interest to those with some statistical or mathematical training. For the biologist with such training this book may be recommended as containing extremely valuable and interesting information.—GEORGE B. SAUL, 2ND.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

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ENTOMOLOGICAL NEWS

MAY 1952

Vol. LXIII No. 5

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PUBLISHED MONTHLY, EXCEPT AUGUST AND SEPTEMBER, BY
THE AMERICAN ENTOMOLOGICAL SOCIETY
PRINCE AND LEMON STS., LANCASTER, PA.
AND
1900 RACE STREET, PHILADELPHIA 3, PA.

Subscription, per yearly volume of ten numbers: $5.00 domestic; $5.30 foreign; $5.15 Canada. Entered as second-class matter April 19, 1943, at the post office at Lancaster, Pa., under the Act of March 3, 1879. Acceptance for mailing at the special rate of postage provided for in paragraphs (d-2), Section 34.40, P. L. & R. of 1948, authorized April 19, 1943.

ENTOMOLOGICAL NEWS

ENTOMOLOGICAL NEWS is published monthly, excepting August and September, by The American Entomological Society at Prince and Lemon Sts., Lancaster, Pa., and the Academy of Natural Sciences, 1900 Race Street, Philadelphia 3, Pa., U. S. A.

PHILIP P. CALVERT, Editor Emeritus. R. G. SCHMIEDER, Editor. Editorial Staff: E. J. F. MARX, M. E. PHILLIPS, J. A. G. REHN, and A. G. RICHARDS.

Subscription price, per yearly volume of 10 numbers: Domestic, $5.00; Foreign, $5.30; Canada, $5.15—U. S. Currency.

SUBSCRIPTIONS, ADVERTISEMENTS: All communications and remittances to be addressed to **ENTOMOLOGICAL NEWS, 1900 Race Street, Philadelphia 3, Pa.**

MANUSCRIPTS and all communications concerning same should be addressed to **R. G. Schmieder, Zoological Laboratory, University of Pennsylvania, Philadelphia 4, Pa.**

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Henry Fox

ENTOMOLOGICAL NEWS

VOL. LXIII MAY, 1952 NO. 5

Henry Fox (1875–1951)

Henry Fox was born February 18, 1875, at Germantown, Philadelphia, the youngest son of William and Elizabeth Ellen (Saylor) Fox. From boyhood two interests were important factors in his life: one, animal life, from which developed not only his professional career, but also the many ramifications of his purely personal investigations; the other, a liking for history, which later served as a "side pursuit," to use his own words in describing this collateral activity. While his earlier chief biological activity was comparative vertebrate morphology, he later (circa 1908) changed to entomology, which thus became, and remained, the chief field of his researches. However, through his life there continued the same broad interest in the animal and plant worlds which had first kindled his enthusiasm; his love of birds and of our native flora, and his concern for the preservation of our wild life, gave him a breadth of mind now all too rare with present-day biologists.

Graduating from historic Germantown Academy in 1895, Fox entered the University of Pennsylvania and received from it successively the degrees of B.S. in Biology in 1899, M.A. in 1903, and Ph.D. in 1905. During these years at the University of Pennsylvania he held in succession a Harrison Scholarship, a University Scholarship, and a Harrison Fellowship. Having completed the required academic courses for the doctor's degree, he continued in absentia work on his research project and dissertation while holding various positions elsewhere. These embraced a laboratory assistantship in Biology at the University of Wisconsin (1902–03), Professor of Chemistry at Temple University (1903–05), and Instructor in

Natural Science at the Northeast High School in Philadelphia (1905–07). Research work in the summer vacations was carried on at the Marine Biological Station at Wood's Hole, Mass. (1901–02), at Harvard Medical School (1905), and at the Biological Station of the Brooklyn Institute of Arts and Sciences at Cold Spring Harbor, New York (1906–07).

My acquaintance with Henry Fox dated from the years of his graduate studentship at the University of Pennsylvania, when he occasionally visited the Academy of Natural Sciences, used its library, and then established friendships with members of the Academy staff which endured through his life, or the lives of those who passed before him.

From 1907 to 1912 Dr. Fox was Professor of Biology at Ursinus College, Collegeville, Pennsylvania, at the same time teaching general biology at Temple, in the Summer School of the University of Pennsylvania, or the Medico-Chirurgical College in Philadelphia, the latter now merged with the Medical School of the University of Pennsylvania, as well as summer class work in economic entomology at the Ambler, Pennsylvania, Agricultural School for Women. During this period he worked for some time at the University of Pennsylvania Medical School in conjunction with Dr. Leo Loeb on an investigation of the poison glands of the Gila Monster (*Heloderma suspectum*), the results of which were published in 1913 by the Carnegie Institution of Washington.

In 1908 his interests, which previously had been chiefly in the field of vertebrate anatomy and embryology, began to concentrate upon insects; in that year while on summer vacation in southern New Jersey he gave increasing attention to the tiger beetles (Cicindelidae) and the long- and short-horned grasshoppers (Orthoptera) of that area, their distribution, ecology, and specific adaptability. From this work came his first two entomological publications, one on the Cicindelidae of northern Cape May County, the other describing two new species of long-horned meadow grasshoppers (of the genus *Conocephalus* as now understood) from the salt marsh areas of coastal New Jersey. A corollary of this work was the rediscovery, near the now abandoned railroad station of Swain,

of the Southern Yellow Orchid (*Gymnadeniopsis integra*), a species which had not been found in New Jersey for many years, although described from that state by Nuttall in 1818. The remainder of Dr. Fox's active life and researches, when teaching duties permitted, was largely devoted to insect investigations of various types, both in the field and in the laboratory.

The years from 1912 to 1918 were devoted to field insect investigations for the Bureau of Entomology, first at Lafayette, Indiana (1912–13), next at Charlottesville, Virginia (1913–16), and last at Clarksville, Tennessee (1916–18). These covered a variety of problems, such as the severe and widely spread outbreak of Army-worm (*Leucania unipuncta*) in Virginia in 1914–15; and in the same state, studies on the Rough-headed Cornstalk Beetle (*Eutheola nigriceps*), a serious corn pest, the life-history of which was then first made known; and in 1916–18, an investigation of the factors responsible for the spread of the mosaic disease of the tobacco plant.

In 1918 Dr. Fox accepted the appointment as Professor of Biology at Mercer University, Macon, Georgia, in which teaching activity he remained until 1925. Knowing Mercer was a sectarian institution, when he accepted his appointment, Dr. Fox made particular inquiry as to whether full academic freedom in the teaching of his subject—Biology—would be guaranteed, and received the personal assurance of the President that such was the policy of the University. However, the Fundamentalist campaign, particularly in the South and chiefly in denominational educational establishments, was steadily growing in strength during the years Dr. Fox was attached to Mercer. In spite of the efforts of the President of the University and a number of the members of the University's Board of Trustees, the situation became so acute, and pressure from non-educational sources became so strong—with biology logically selected as the "whipping boy"—that a committee of the Trustees reported that Dr. Fox's expressed views (being those of any broadly trained biologist) were utterly at variance with those held by the general run of Georgia Baptists. Despite the efforts of the President of the University and of the more

moderate members of the Board of Trustees to sustain Dr. Fox's personal rights for religious freedom, and his academic right to teach biology as presented elsewhere, extreme members of the Board threatened to close the University unless Dr. Fox resigned or was dismissed. Maintaining the assurance of freedom of thought and liberty in teaching matters given him when he assumed his post in 1918, Dr. Fox declined to resign. The President, who later himself resigned, did not comply with the Board's instructions to dismiss Dr. Fox, and the latter remained officially in possession of his Mercer post until early in 1925, when he accepted that of Associate Entomologist at the Japanese Beetle Laboratory of the U. S. Bureau of Entomology, first at Riverton, New Jersey, and later at Moorestown in the same state. During each summer of the years he was attached to Mercer University Dr. Fox had served as a field investigator for the Bureau of Entomology, tracing the steady spread of the Japanese beetle (*Popillia japonica*) from its original point of introduction in this country at Riverton, New Jersey, to various other localities in the states of New Jersey, Pennsylvania, Delaware, and Maryland.

While in Georgia Dr. Fox took active part in the formation of two state scientific societies, one the Georgia Academy of Sciences formed in 1922, of which he was Secretary-Treasurer until he left the state in 1925, and the other the Georgia Society of Naturalists formed in 1921, of which he served as President through 1923. During the same years he continued and elaborated his favorite studies on eastern North American grasshoppers, adding greatly to our knowledge of their distribution in Georgia and adjacent states, as well as discovering a new species, named in his honor *Melanoplus foxi* by the late Morgan Hebard.

From 1925 to 1935 Dr. Fox's work at the Japanese Beetle Laboratory covered a wide variety of subjects relating to that important insect. These ranged from the spread and establishment of the beetle, to its climatic adaptability, the fluctuations in its abundance from year to year, and the nature and influence of disease and other natural agencies as possible means for eventual control.

On his final retirement from government service in 1935 Dr. Fox established his residence at Ocean View, in Cape May County, New Jersey, in a region where he had spent much of his younger years in field studies, and the biota of which had always held a particular spot in his affections. However, the greater part of nearly every year from 1935 to 1943 he passed in New York City, serving as an emergency instructor in Biology at New York University, continuing during these times studies on the local Orthoptera and also on his long-time subject the Japanese Beetle. In 1943 he completely retired from teaching work, and except for a World War II emergency instructorship in science at the nearby Woodbine, New Jersey, High School, the remainder of his life was spent almost entirely at his Ocean View home, not, however, in placid retirement but largely in personal investigations of local biotic matters of interest to him. Through the adjacent country he was known as one to consult on insect identifications, bird study, local plant life, wild life conservation, and the many other types of queries which come to one of his interests and background. He often acted as the leader or guide on field trips in parts of Cape May County sponsored by several of the nature study organizations found within the county in recent years.

In 1906 Dr. Fox married Adelaide Townsend Godfrey, of Ocean View, daughter of Jesse S. and Emily C. (Van Gilder) Godfrey. Mrs. Fox pre-deceased her husband by a few months. One daughter, Emily Elizabeth, is now the wife of Dr. George Alfred Clark, Assistant Professor of Philosophy at Lafayette College, Easton, Pennsylvania, to whom I am indebted for the loan of a biographical manuscript prepared by Dr. Fox a few years past.

My last letter from Dr. Fox was written in October, 1951, and in it he mentioned that he continued to make short trips, often on his bicycle, but that he had found it necessary to limit them to lesser distances than in former years. His death occurred on November 5, 1951, at the Bendette Tomlin Hospital in Cape May Court House.

Henry Fox published thirty-one original contributions, one dealing with plants, three with aspects of vertebrate morphology

and toxicology, the remainder on insects, with fifteen of the total dealing entirely with the Orthoptera, which for much of his life were his greatest interest. Of the latter papers five were of particular interest, as they supplied either the original descriptions of the two new and interesting meadow grasshoppers (*Conocephalus*) from the salt marshes of New Jersey, or assembled important summaries of Orthopteran faunistics for localities or areas which he knew well. The four of the latter category were: "Data on the Orthopteran Faunistics of Eastern Pennsylvania and Southern New Jersey," published in 1914 in the Proceedings of the Academy of Natural Sciences of Philadelphia; "Notes on Orthoptera and Orthopteran Habitats in the Vicinity of Lafayette, Indiana," published in 1915 in the Proceedings of the Indiana Academy of Sciences; "Field Notes on Virginia Orthoptera," issued in 1917 in the Proceedings of the U. S. National Museum, and "A Revised Annotated List of the Dermaptera and Orthoptera of New Jersey," issued in 1928 as Circular no. 138 of the New Jersey Department of Agriculture.

Dr. Fox's membership in the Academy of Natural Sciences of Philadelphia dated back to October, 1901, and he was elected a member of the American Entomological Society in April, 1926. These relationships were maintained through the remainder of his life. In addition to membership in a number of societies of more local character, and in others of national scope in his more active professional years, he was a member of the American Association for the Advancement of Science.

In all aspects of his life Henry Fox was the traditional scholar, quiet, painstaking with details, careful in his analysis of the work of others, observant, tolerant, and with, deep-seated, the traditional American regard for freedom of thought and belief. From a friendship of fifty years, from many contacts due to our common interest in the Orthoptera and problems connected with these insects, there emerges the picture of a kindly, gentle, brilliant and thoughtful man, in whom the love of nature was deep and abiding, together with the belief there was always something new to be learned from the woods or

fields. In the last years of his life his occasional visits to Philadelphia always brightened one's day, as with him came some new experience or some observation accumulated in the months between, or a revival of some incident in one's years past which in memory turned back the clock.

James A. G. Rehn

Oeneis oslari Skinner, Rediscovered (Lepid.: Nymphalidae)

By F. Martin Brown, Fountain Valley School, Colorado Springs, Colorado

For fifteen or more years Mr. Cyril F. DosPassos has been urging me to find for him *Oeneis oslari* Skinner. Dr. Skinner described the species, now considered a race of *daura* Strecker, on the basis of two pairs collected by the late Mr. Ernest Oslar of Denver. The type was taken in the early fall at the head of Deer Creek Canyon. I discussed this capture with Mr. Oslar before he died and learned that it was made above the canyon head at about 9,600 feet elevation. Of the dozen or more Deer Creeks in Colorado the one involved is that just south of Morrison in Jefferson County. This is Front Range country, an area that entomologically I know rather well. For years I have searched it for *oslari* without success.

This spring Dr. Walfred Reinthal of Norman, Oklahoma, brought to me a series of *Oeneis* that he had collected on the western slope of the Continental Divide in July around Gothic, Colorado. Most of these were cleary *uhleri* Edwards. A number of them were unusual in that there was a very well developed median band on the underside of the hindwings. I remembered that the Rev. Bernard Rotger, now of Pagosa Springs, Colorado, had mentioned some time ago that he had what he believed to be two *oslari* taken very early in the year. I asked the Padre to lend me his *oslari* and Mr. DosPassos to lend me his photographs of the type of *oslari* to compare with Dr. Rein-

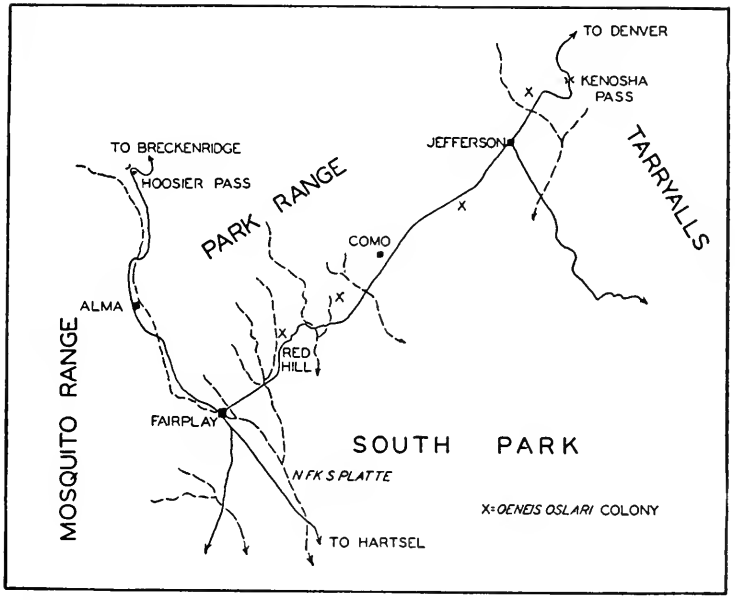
thal's material. My hunch did not pay off. The odd, banded *uhleri* were not *oslari.*

While Parde Bernard was visiting me early this June we discussed his capture of *oslari.* He told me that he had taken the species on two occasions ten years apart very early in the spring near Fairplay, Colorado. He described the locality so well that three days later, after an early morning drive of a hundred miles, Dr. Richard Fox, his son and daughter, and I found it and by nine o'clock had made a capture. By noon the four of us had taken about twenty-five *oslari,* both males and females. That afternoon I introduced the Fox family to Bruce's classical collecting grounds at Hall Valley where they collected the next day, while I returned to South Park to learn what I could about the habits and range of the *Oeneis.*

All together I spent three and a half days combing the South Park area for *oslari.* In that time I located four colonies. It is perfectly obvious now why none of us looking for butterflies has run upon the species before. It is only due to Padre Bernard's wide interest in insects that the true situation was discovered. He found the first specimens while looking for beetles! *Oeneis oslari* shares with *Boloria freija* subspecies the distinction of being the first of the mountain butterflies to be on the wing. Unlike *freija* its period of flight must be very short and its altitudinal range very narrow. The figured map shows the locations of the four stations where I collected the insect. Doubtlessly future years will expand the number of stations.

Those who search for the species may profit from what I learned. First, although I searched in the foothills of the Mosquito, Park and Tarryall ranges, I found the species only in the Park Range that forms the northern boundary of South Park. There are several areas in the Mosquito Range where it very well may fly but on the basis of vegetation I believe I was a little late for the species (June 11–14). I found no place in the Tarryalls that fits my present concept of the ecological niche occupied by *oslari.* Second, the insect flies just as the aspen (*Populus tremuloides*) is leafing-out. At no place where the

leaves were more than a half inch wide did I find it, nor did I find it where the leaf buds had not broken. A second temporal clue may be found in the wild iris (*Iris missouriensis*). Wherever *oslari* was flying the iris was budded but the buds were still tight, approximately a week or ten days from blooming. A grass that I could recognize but not name was present wherever



I found the beast and absent in most of the localities where I did not find it. This may well be the food-plant. Third, the moisture requirements seem to be quite limited. The species flies only on the semi-arid grass-lands that are found on the slopes of the low hills in the Park. There must be enough moisture to allow aspen, iris and shrubby cinquefoil (*Dasyphora fruticosa*) to grow yet the area must be dry enough to allow a good stand of white sage (*Artemisia scopulorum*). Fourth, there seems to be a very definite soil preference, probably directly related to the food-plant grass. At each of the productive stations the soil is derived from sedimentary rocks, either the

Denver Formation (Tertiary), the Pierre Shale (Cretaceous) or Maroon Formation (Permian). While there were unproductive stations on the sediments (eight out of twelve), all twenty stations located on soils derived from crystalline rocks or the glacial tills, Wisconsin (?), were unproductive. A station was presumed to be unproductive if in twenty minutes I had not stirred up a specimen of *oslari*.

The behavior of the beast is not too helpful for the collector! It rarely flies unless disturbed. On our first day of collecting (June 11) I thought this quite likely due to the fact that we were working during intermittent snow squalls. The sun rarely shone brightly for more than ten or fifteen minutes and the temperature seemed not much above freezing. Only the upper few inches of the soil had thawed. Ranchers in the neighborhood told me that the snow had been off the ground about three weeks. No one in his right mind would have looked for butterflies that day! On the following day the forenoon was brilliantly clear. Still the butterflies did not rise and fly unless I approached too close. In fact the only way I could locate one was by walking endlessly through the grass and flushing each specimen. It then flew ten or twenty feet and settled. This flight, like that of many of the related *Oeneis* and *Eumenis ridingsi* Edwards, is more like that of a Noctuid than that of a butterfly. It is often an erratic spiral progress rarely higher than two feet from the ground. Usually the beast does not get enough altitude to allow a good stroke of the net! When the animal alights, it disappears, so good is its camouflage. The striated black and white underside blends perfectly with the dry gray straws of grass, the lichens, the sage, and the year-old cow chips. It vanishes when it alights on the latter and leans over to expose the entire underside of the wings. Fully half of the specimens captured refused to rise as a net was dropped over them and one had to dig around beneath it to capture the specimen.

The very early emergence of this species, fully a fortnight before any other *Oeneis* would think of flying, suggests that it passes the winter as a pupa. There is just not time enough in the short period from the disappearance of snow to the appearance of the butterfly to allow a last instar larva to finish-off,

pupate and transform. If this is so, and I can see no other explanation, then an occasional individual, favorably placed, may emerge in the fall as a rare "second brood." Four of these fell to Mr. Oslar and became the types of the race that bears his name.

A New Subspecies of Otocryptops gracilis (Wood) from the Eastern United States, together with Remarks on the Status of Otocryptops nigridius (McNeill) and a Key to the Species of the Genus now Known to Occur East of the Rocky Mountains (Chilopoda: Scolopendromorpha: Cryptopidae)

By Ralph E. Crabill, Jr., Department of Entomology, Cornell University

That *Otocryptops* is one of the most primitive genera of the Scolopendromorpha is abundantly evident, not only from its obvious structural proximity to the fundamental *Cryptops*-form but also from the characteristic distributional discontinuities evident in most of its component species. It is no longer surprising, therefore, to discover the same species in widely separated regions of the globe, particularly in North America and eastern Asia, two regions which show numerous other faunal as well as floral similarities. Thus, *sexspinosus, rubiginosus,* and *melanostomus* are known from the the New World, the first two from Alaska and all three from eastern Asia, a characteristic pattern of dispersal.

In contrast to this pattern, the American *gracilis*[1] had been recorded from no area other than California until in 1943 Chamberlin reported its presence in Houston, Texas.[2] With the recognition of a new subspecies on the eastern coast of this continent, the species may be seen to approximate more closely the distributional discontinuities encountered in other members of the genus.

[1] Wood: Journ. Acad. Nat. Sci. Phila., ser. 2, V, p. 38 (1862).
[2] Chamberlin: Proc. Biol. Soc. Wash., LVI, p. 97 (1943).

Considering the distributional pattern of *gracilis,* as we now know it, one may hazard the guess that the species was once distributed widely across the area now comprising the United States in preglacial times and that the various glaciations destroyed the intervening populations, leaving *at least* three relict communities, one in California, and one on the Gulf coastal plain perhaps cut off by the long glacial fingers that accompanied the Sierra Nevada mountains for practically their entire length, and one on the lower eastern elevations of the Appalachians.

It is possible that there is still a *gracilis* population continuum between Texas and California and that the forms of both areas are consubspecific. At any rate there is little doubt in my mind but that the new eastern subspecies has long been effectively isolated from the more western populations, probably by the recurrent glaciations.

I should like to express my gratitude to Dr. Joseph Bequaert of the Museum of Comparative Zoology at Harvard University for his kindness in lending me the paratype of the new subspecies as well as specimens of the nominate subspecies; to Mr. Richard L. Hoffman of Clifton Forge, Virginia, in particular for the gift of the type, and in general for his constant consideration in enriching my collection with southeastern centipedes; and also to the many assiduous collectors who have contributed their time and efforts so generously on my behalf.

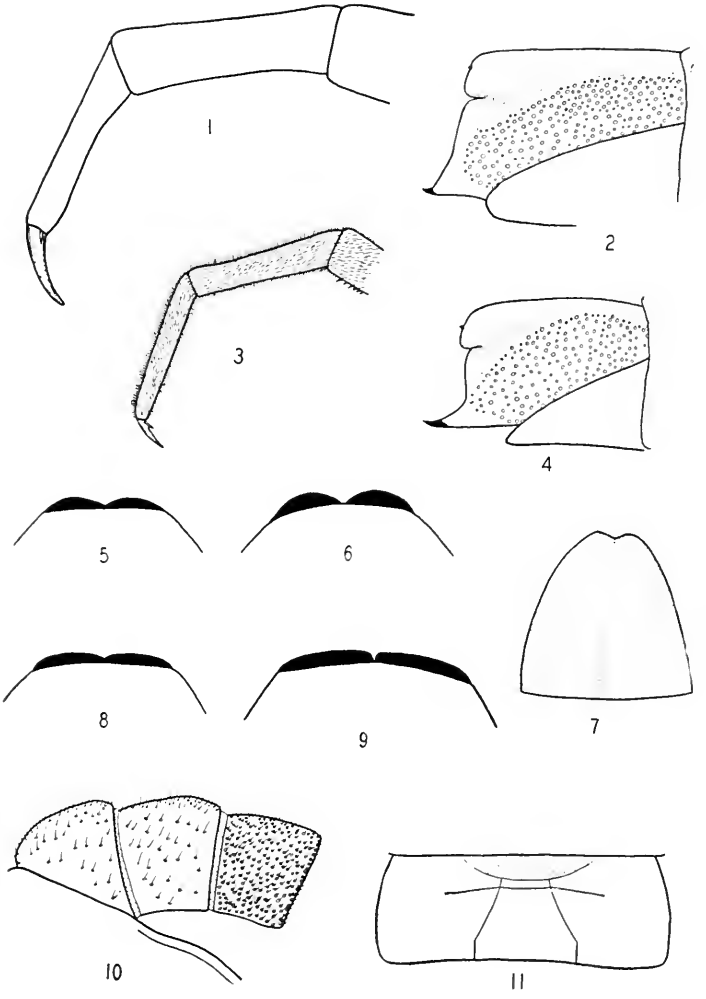
Otocryptops gracilis peregrinator new subspecies

The absence of longitudinal paramedian sulci on the second tergite, and the hirsute ultimate prefemur of the eastern *peregrinator* will serve to differentiate it from the Californian nominate subspecies of *gracilis.*

Type—♀; Charlottesville, Virginia. March 9, 1949. (R. L. Hoffman.) [Author's collection, C–324.]

Female. Length 40 mm. The new subspecies differs from the nominate geographic race in the following features:

General body color light orange-yellow. Second tergite entirely without complete longitudinal paramedian sulci (*cf. gracilis,* fig. 11); third tergite with paramedian sulci incomplete,



FIGS. 1–11

1. *Otocryptops scxspinosus;* ultimate leg tarsal segments. 2. *O. g. gracilis;* right coxopleuron. 3. *O. nigridius;* ultimate leg tarsal segments. 4. *O. g. peregrinator;* right coxopleuron. 5. *O. g. peregrinator;* prosternum. 6. *O. g. gracilis;* prosternum. 7. *O. nigridius;* twenty-third sternite. 8. *O. scxspinosus;* prosternum. 9. *O. nigridius;* prosternum. 10. *O. nigridius;* proximal antennal articles. 11. *O. g. gracilis;* second tergite.

All figures drawn from females. Localities: figs. 1, 3, 7, 8, 9, 10, Sevier County, Tennessee; figs. 2, 6, 11, Santa Cruz, California.

these extending anteriorly from the posterior margin for only one-half the length of the tergite. Distinct lateral tergital marginations beginning on tergite seven (or six), the marginations being generally less distinct than those of the nominate subspecies. Prosternal anterior thickened border thinner than that of the nomniate form (figs. 5, 6). Two apical tibial spines on legs one through nineteen, one on legs twenty and twenty-one, none on the penultimate and ultimate legs; ventral tarsal spines only on legs one through twenty-one. Coxopleural process distinctly longer than that of the nominate form (figs. 2, 4). Pilosity of ultimate leg evident on femur, tibia and tarsus as in the nominate form, but in addition the prefemur densely hirsute, less so dorsally, more so laterally and ventrally, the ventral pilosity extending proximally to the level of the ventral spinous process.

Paratype—♀; Woodside, MARYLAND. (J. E. Benedict.) [In collection of the Museum of Comparative Zoology at Harvard University.]

Female. Length 40 mm. Differing from the type is no important respects. General color very dark due to the obvious age of the specimen. Ultimate legs missing.

Otocryptops nigridius (McNeill) [3]

In his celebrated monograph of the Scolopendromorpha [4] Kraepelin questioned the validity of McNeill's species, suggesting that it was a synonym of *sexspinosus* (Say).[5] In 1930 [6] Attems, unable to include the species in the roster of known North American forms due to its insufficient description, suggested tentatively that it was a synonym of Say's species. Considering the paucity of material in museums generally and the very inadequate original description, it is not surprising that these two astute workers were perplexed.

Relative to their mutual lack of paramedian tergital sulci and their mutual possession of lateral cephalic margins as well as a

[3] McNEILL: Proc. U. S. Nat. Mus., X, p. 333 (1887).
[4] KRAEPELIN: Mt. Mus. Hamburg, XX, p. 72 (1902).
[5] SAY: Journ. Acad. Nat. Sci. Phila., II, p. 112 (1821).
[6] ATTEMS: Das Tierreich, lief. 54, p. 260 (1930).

host of other significant morphological features, it is clear that *nigridius* and *sexspinosus* are more closely related to each other than either is to any other species of the genus. So wide is the latitude of intraspecific variation in all members of the genus in general and in *nigridius* and *sexspinosus* in particular that, lacking a sufficient series to study, it is quite logical to suppose the former to be perhaps a color variant of the latter. However, despite the magnitude of variation in either one of these species in any one locality, it is possible to cite several constant morphological differences that will adequately distinguish one from the other.[7] That *nigridius* is a subspecies or even a genetical anomoly of *sexspinosus* seems to be excluded by the following considerations relative to the geographical distribution of each:

1. If the smaller, darker *nirgridius* were a genetical chance aberration, we could expect it to appear throughout the range of *sexspinosus* but such is not the case for the latter is widespread especially throughout temperate North America, whereas *nigridus* is known to occur only in the midwest (Indiana) and in the unglaciated regions of the Appalachians and their immediate environs. Consequently since the two forms are not everywhere sympatric, it would seem that the possibility of McNeill's species' being a genetical chance anomaly of *sexspinosus* is ruled out.

2. If the two forms were subspecies, we should not expect them both to inhabit the same locality, or if they did, we should expect to discover morphological intergradations between them, but such intergradations are not apparent for I have good series of both forms from Tuscaloosa, Alabama; Clemson, South Carolina; Highlands, North Carolina; and Sevier County, Tennessee, none of which shows any overlap, even though in each case all of the material was taken on the same day, at the same elevation and even in the same immediate area.

The smaller, darker bluish-green tinged *nigridius* may be most easily distinguished from the larger, lighter orange-red *sexspinosus* not only by its general color habitus but also by the aggregations of bluish or purplish tiny blotches that pepper the

[7] Within certain limits color, body length, ultimate leg length and the shape and proportions of the ultimate pedal sternite undergo a striking degree of variation in the same sex and *in the same locality*.

former species, these blotches being especially striking on the otherwise immaculate white ventral leg areas. Other features characteristic of *nigridius* that will differentiate it from *sexspinosus* are the following:

In any locality the *average* size of *nigridius* is less than that of *sexspinosus*. The first and second antennal articles are sparsely hirsute as contrasted with the densely hirsute third article, whereas in *sexspinosus* only the first antennal article is sparsely hirsute (fig. 10). (Next to color this character is the most constant; I have not observed it to vary in any specimen in the East.) Anterior prosternal margin straighter in *nigridius* (cf. figs. 8, 9). Very shallow but distinct longitudinal excavations usually present on some of the mid-body tergites, a shallow median excavation often present on the proximal third of the ultimate pedal sternite (fig. 7). The supracoxal pleural sclerites tend to be more numerous, segment ten frequently with four substigmatal sclerites, whereas specimens of *sexspinosus* from the same locality (Sevier County, Tennessee) show but a single substigmatal sclerite. Ultimate legs of both sexes densely or subdensely pilose,[8] the prefemur glabrous, whereas the entire ultimate leg of either sex of *sexspinosus* is glabrous except for an occasional solitary seta in rare cases (figs. 1, 2).

Besides those mentioned above, I have examined many specimens of *nigridius* from the following localities: Virginia, Stoney Point; Charlottesville; Botetourt County; Grayson County; Pittsylvania County; Rockingham County. Alabama, Fayette. Kentucky, Magoffin County. South Carolina, Florence.

Otocryptops sexspinosus (Say)

An examination of specimens ranging from northern Florida up the Appalachians and the Atlantic coastal plain shows them

[8] It seems impossible to correlate sex with any external morphological feature in *Otocryptops* in one hundred per cent of the cases. Although it is true that in any one locality there is an apparent tendency for the male ultimate leg to be shorter and more robust (and more densely hirsute in the case of *nigridius*) than that of the female, it is also true that a certain percentage of the males will not conform to these rules. So far as I know, the examination of the concealed genito-anal segments remains the only sure method of determining sex in the genus.

to be apparently conspecific, the variations being in size and relative proportions as is usual in the genus. The southern specimens average considerably larger in size due to the longer growing season.

Otocryptops rubiginosus (Koch)

At present unknown from either the eastern or western United States, this species is apparently common in the midwest and in Alaska. I have examined specimens from the following localities: Nebraska, Barada; Rulo; Barnston. Kansas, Geary County; Pottawatomie County; Riley County. Illinois, Rock Island; Galesburg. Iowa, Boonesboro (sic); Davenport. Attems also reports the species from Minnesota.[9]

Key to the Species of *Otocryptops* Now Known to Occur East of the Rocky Mountains

1a. No tergite with complete longitudinal paramedian sulci...2
1b. Complete longitudinal paramedian sulci beginning on tergite two, three, or four.....3
2a. First antennal article sparsely hirsute and contrasting markedly with second densely hirsute article; general body color orange shading to dark orange-reddish, no blue or purplish splotches present anywhere on body, ventral leg areas immaculate white.....*serpinosus* (Say)
2b. First and second antennal articles sparsely hirsute and contrasting markedly with the densely hirsute third article; general body color very dark, sordid red suffused with a greenish hue, all parts of the body with very distinct localized aggregations of tiny bluish or purplish splotches, the ventral leg areas always distinctly peppered with tiny bluish or purplish splotches, never immaculate white.....
.....*nigridius* (McNeill)
3a Cephalic plate with a well-defined lateral margin; sternites entirely without median longitudinal sulci.....
.....*rubiginosus* (Koch)
3b Cephalic plate without a lateral margin; sternites with well-defined median longitudinal sulci; second tergite entirely without complete sulci, third tergital sulci incomplete anteriorly; ultimate leg prefemur densely hirsute.....
.....*gracilis peregrinator* new subspecies

[9] Attems: loc. cit.

Nabis ferus L. (Hemiptera: Nabidae) Biting a Human

By W. W. Judd, Department of Zoology, University of Western Ontario, London, Ontario

On Sept. 27, 1950 a woman in London, Ontario, reported feeling a sensation "like a bee sting" on the upper right region of the chest. When removed from the clothing, the insect that caused the bite proved to be a macropterous specimen of *Nabis ferus* L. as identified by keys in Blatchley (1926) and Britton (1923). The affected area of the skin was a circular, pink, inflamed patch about one-half inch in diameter encompassing three red puncture holes raised up on papillae the size of pinheads. Two days later, Sept. 29, the inflamed area had faded while the marks of the three bites remained.

Blatchley (1926) refers to the predaceous habits of the bugs of the family Nabidae, pointing out that they feed upon plant lice and soft-bodied larvae, and Matheson (1950) reports that *Nabis capsiformis* Germar, a species which is cosmopolitan in the tropics, is known to attack humans. Knowlton (1950) records that three species of *Nabis*, including *N. ferus*, were seen feeding on insects and Roberts and Knowlton (1951) report that *Nabis alternatus* (Parshley) bit humans at Logan, Utah.

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Notes and News in Entomology

Under this heading we present, from time to time, notes, news, and comments. Contributions from readers are earnestly solicited and will be acknowledged when used.

Entomologists and Simplified Spelling

Professor Samuel S. Haldeman during his lifetime (1812–1880) had many different intellectual interests. In addition to his descriptions of new species of Coleoptera, his published papers included titles on shells, spiders, crustaceans, annelides, geology, chemistry, archaeology and various miscellaneous subjects such as the smelting of iron, literary criticism, school readers, poetry, etc. He was, in addition, deeply interested in philology and wrote more papers on this subject than on the other subjects of his interest. He helped to found the American Philological Association and was its first vice-president, 1874–1876, and its president, 1876–1877.

In Philadelphia at the Atlas Hotel, August 14–17, 1876, there was held an International Convention of the American Philological Association over which Professor Haldeman presided and at which he gave an eloquent address on the importance of spelling reform. On the fourth day of the convention the Spelling Reform Association was organized with Haldeman as one of its vice-presidents. At the annual meeting of the Spelling Reform Association in Baltimore in 1877 there was adopted a phonetic alphabet devised in part by Haldeman. In "The Plowshare" for 1877, a little magazine published in New York City and devoted to the promotion of spelling reform, there are twenty-two suggested alphabets and modes of spellings including two credited to S. S. Haldeman whose proposed alphabets included not only phonetic spellings but new characters as well.

Another entomologist and exponent of simplified spelling, but so far as I know, not a deviser of new alphabets, was Major Ronald Ross, F.R.S., C.B., professor of tropical medicine at the University of Liverpool, and responsible for the

greatest discovery in the history of malaria, for which he was honored by two Nobel prizes. While stationed in India he demonstrated the part played by mosquitoes in the transmission of malaria, which discoveries were published 1897–1899. Dr. C. W. Larison, a physician of Ringoes, New Jersey, founded the "Jurnal ov Orthoepi & Orthografi" in January 1885, and continued to edit and publish this magazine for twenty-six years. It was devoted to simplified spelling and printed with phonic types. As time went on the types, which had to be cast on order, became worn and various persons contributed cash so that new types could be purchased. One of these contributors was Major Ross who in 1904 sent Dr. Larison two guineas ($10.20) for the type fund.—H. B. Weiss.

Nomenclature Notice

At the Congress to be held at Copenhagen in 1953, certain proposed amplifications, clarifications and extensions to the International Code of Zoological Nomenclature are to be considered. The secretary, Mr. Hemming, must prepare comprehensive reports on the problems involved and wishes to elicit expressions of opinion from interested specialists. The issues involved in each case as well as preliminary suggestions have been set forth by Mr. Hemming in papers published in the *Bull. of Zool. Nomenclature*, Vol. 7. The subjects dealt with are as follows:

1) Emendation of zoological names: proposed substitution for Article 19 of simple, clear-cut rules (Commission's Reference Z.N.(S.) 356).

2) Clarification and amplification of the rules relating to the naming of families and lower categories of suprageneric rank (Z.N.(S.) 357).

3) Proposed introduction of rules for regulating the naming of Orders and higher categories (Z.N.(S.) 360).

4) Species to be accepted as the type species of a nominal genus, the name of which was published in a generic synonymy, if names so published are to be treated as possessing nomenclatorial availability (Z.N.(S.) 387).

5) Application to be given to a trivial name which, when first published, was applied to a particular species or specimen but

which is stated also to be a substitute name for some previously published name (Z.N.(S.) 361).

6) Neotypes: question whether this class of type specimen should be officially recognized and, if so, under what conditions (Z.N.(S.) 358).

7) The means to be devised for securing stability in zoological nomenclature (Z.N.(S.) 359).

It is hoped that museums, other institutions, and many individual scientists will furnish answers to the questions specifically asked in the concluding paragraph of each of the seven papers enumerated above regarding the action that is thought desirable. Of those who are thus willing to give their assistance and advice it is asked that they will observe the following procedure: If comments are furnished on more than one problem they should be on separate sheets of paper. Each comment should be clearly marked with the commission's Reference Number as indicated in the list. Comments should be typewritten on one side of the paper, with wide margins, and furnished in duplicate. Comments should be mailed to Mr. Francis Hemmin, 28 Park Village East, Regent's Park, London, N.W.1., England, and should reach him not later than July 31, 1952.

Current Entomological Literature

COMPILED BY R. G. SCHMIEDER AND J. W. H. REHN

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia and the University of Pennsylvania, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the year 1952 unless otherwise noted. Continued papers, with few exceptions, are recorded only at their first installment.

For other records of general literature and for economic literature, see the Bibliography of Agriculture, Washington, and the Review of Applied Entomology, Series A, London. For records of papers on medical entomology see Review of Applied Entomology, Series B.

NOTE: The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the List of periodicals and serials published in our January and June issues. The number of the volume, and in some cases, the part, heft, &c. is followed by a colon (:). References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to Neotropical species, and not so indicated in the title, have the symbol (S).

Papers published in ENTOMOLOGICAL NEWS are not listed.

GENERAL—Graham, A. R.—A slide heater for clearing minute insect specimens. [23] 84: 61–63. **Riley, H. P.**—Ecological barriers. [3] 86: 23–32. **Ross, H. H.**—Facets of insect surveys. [23] 84: 55–59. **Thompson, W. R.**—The philosophical foundations of systematics. [23] 84: 1–16. **Weiss, H. B.**—William Procter, 1872–1951. [45] 59: 217–19, 1951.

ANATOMY, PHYSIOLOGY, MEDICAL — **Andrewartha, H. G.**—Diapause in relation to the ecology of insects. [Biol. Reviews] 27: 50–107. **Anon.**—Influence of antibiotics on the growth of silkworms. [Current Science, India] 20: 313, 1951. **Burnett, T.**—Effects of temperature and host density on the rate of increase of an insect parasite. [3] 85: 337–52 (Hym., Chalcid. and Tenthred.), 1951. **Cook, P. M.**—Observations on giant fibers of the nervous system of Locusta migratoria. [74] 92: 297–305, ill., 1951. **Cooper, M. I. and G. Fraenkel**—Nutritive requirements of the small eyed flour beetle Palorus ratzeburgi Wissman (Tenebr.). [Physiol. Zool.] 25: 20–28. **Durand, M. C.**—Sensibilité de la chromatine aux hydrolyses acides et enzymatiques dans la spermatogenese de Gryllus bimaculatus. [Bull. Biol. Fr. Belg.] 85: 419–21, 1951. **Fernando, H. E.**—The anatomy and histology of the alimentary canal of a myrmelionid larvae. [Ceylon Jour. Sci., B] 24: 27–45, ill., 1951. **Fernando, W.**—Notes on the alimentary canal and malpighian tubules of the firefly (Luciola mauretanica). [Ceylon Jour. Sci., B] 24: 49–59, ill., 1951. **Fisk, F. W. and G. F. Shambaugh**—Protease activity in adult Aedes aegypti mosquitoes as related to feeding. [58] 52: 80–88. **Gregerman, R. I. and G. Wald**—The alleged occurrence of adrenalin in the mealworm. [J. Gen. Physiol.] 35: 489–93, 1951. **Hausman, S. A.**—The scent-producing organ of the male monarch butterfly. [3] 85: 389–91, ill., 1951. **Hoyle, G.**—High blood potassium in insects in relation to nerve conduction. [53] 169: 181–82. **Jenni, W.**—Beitrag zur Morphologie und Biologie der Cynipide Pseudocoila bochei Weld, eines Larvenparasiten von Drosophila melanogaster Meig. [Acta Zoologica] 32: 177–254, ill., 1951. **Le Gare and Hovanits**—Population studies. (See under Lepidoptera.) **Levitan, M.**—Selective differences between males and females in Drosophila robusta. [3] 85: 385–88, 1951. **Lühmann, M. und O. Drees**—Ueber die Temperaturabhängigkeit der Atmung sommerschlafender Blattkäfer. [Zool. Anz.] 148: 13–22. **Mainx, F.**—Die Verbreitung von Chromosomendislokationen in natürlichen Populationen von Liriomyza urophorina (Dipt., Agromy.). [Chromosoma] 4: 521–34, ill., 1951. **Petit, C.**—Le role de l'isolement sexuel dans l'évolution des populations de Drosophila melanogaster. [Bull. Biol. Fr. Belg.] 85: 392–418, 1951. **Proctor, N. K.**—The effects of various cations on insect muscle. [Physiol. Zool.] 25: 28–33. **Ramsey, J. M.**—A case of myiasis by Musca domestica in a laboratory assistant. [58]

52: 61. **Richards, A. G.**—Studies on arthropod cuticle. VII. Patent and masked carbohydrate in the epicuticle of insects. [80] 115: 206–08. **Sacktor, B.**—The cytochrome C oxidase of the house fly, Musca domestica L. [J. Gen. Physiol.] 35: 397–407, 1951. **Salt, R. W.**—Some aspects of moisture absorption and loss in eggs of Melanoplus bivittatus (Say). [24] 30: 54–82. **Schaller, F.**—Die "Copula" der Collembolen (Springschwänze). [Die Naturwiss.] 39: 48. **Schreiber, G. e J. Pellegrino**—Análise citológica e cariométrica da ação da colchicina sôbre a espermatogênese dos hemípteros. [Mem. Inst. O. Cruz] 49: 513–42, ill., 1951. **Schuh, J. E.**—Some effects of colchicine on the metamorphosis of Culex pipiens Linn. [Chromosoma] 4: 456–69, ill., 1951. **Shihata, A. M. El-T. A. and E. M. Mrak**—The fate of yeast in the digestive tract of Drosophila. [3] 85: 381–83, 1951. **Stephens, J. M.**—Disease of codling moth larvae produced by several strains of Bacillus cereus. [24] 30: 30–40. **Steyn, J. J.**—The effect of low calcium, phosphorus or nitrogen on the life cycle of the red scale (Aonidiella aurantii). [J. Ent. Soc. S. Africa] 14: 165–70, 1951. **Šulc, K.**—On the repugnatorial stink-glands in the beetles of the gn. Cantharis, Coleoptera. [Bull. Intern. (Acad. Tcheque Sci.)] 50 (1949): 79–100, ill., 1951. **Truxal, F. S.**—The comparative morphology of the male genitalia of the Notonectidae. [43] 25: 30–38, ill. **Twinn, C. R.**—A review of studies of blood-sucking flies in northern Canada. [23] 84: 22–28. **Weiss, H. B.**—The death feint of Diplotaxus liberta Germ. (Col., Lamell.). [45] 59: 245–47. **Williams, D. D.**—Temperature effects on the prevalence on male and female Drosophila melanogaster Meigen. [45] 59: 213–16, 1951.

ARACHNIDA AND MYRIOPODA—Archer, A. F.—A study of Theridiid and Mimetid spiders with the description of new genera and species. [Geol. Surv. Alabama, Mus. Paper] 30: 1–40, ill., 1950. **Baker, E. W. and G. W. Wharton**—An introduction to Acarology. Pp. xiii + 465, 374 figs. Macmillan Co., New York, 1952. $10.00. **Bohart, R. M.**—Acarina. (See under Hymenoptera.) **Caporiacco, L. de**—Studi sugli Aracnidi del Venezuala raccolti dalla Sezione di Biologia (Univ. Centr. del Venez.). I Parte: Scorpiones, Opiliones, Solifuga y Chernetes. [Acta Biol. Venezuelica, Caracas] 1 (1): 1–46, 1951. **Cleat, N. D.**—Growth in the laboratory of economically important Oribatid mites. [53] 169: 180–81. **Eads, R. B. and B. G. Hightower**—A new mite

of the genus Neoichoronyssus (Laelaptidae). [65] 54: 32–35, ill. **Forman, B.**—The spiders of Aberdeenshire. [Scottish Naturalist] 63: 137–55. The harvestmen (Phalangida) of Aberdeenshire. *Ibid.* 156–58, 1951. **Nesbitt, H. H. J.**—A taxonomic study of the Phytoseiinae (Family Laelaptidae) predaceous upon Tetranychidae of economic importance. [Zool. Verhand., Leiden] No. 12: 1–64, ill. **Pritchard, A. E. and E. W. Baker**—The false spider mites of California (Phytoptipalpidae). [91] 9 (1): 1–94, ill., 1951. Price $1.00, from Univ. of California Press, Berkeley 4, Cal. **Sellnick, M.**—Phauloppia gracilis sp. n. (Acarina, Oribat.) from the Bermuda Islands. [6] ser. 12, 5: 205–08. **Viets, K.**—Meeresmilben (Halacaridae, Acari) von den Aleuten. [10] 1: 511–18, 1951. **Wallace, H. K.**—On the natural history and identification of spiders. [Quart. J. Florida Acad. Sci.] 14: 251–54. **Womersley, H.**—The scrub-typhus and scrub-itch mites (Trombiculidae: Acarina) of the Pacific region. Part I, text of 436 pp., 4 figs.; Part II, 240 pp., 120 pls. Cr. 4to. Paper covers. Price £A3/3/–, plus postage. (Published as Vol. X of the Museum Records, by the South Australian Museum, Adelaide.) **Zumpt, F. and P. M. Patterson**—Further notes on Laelaptid mites parasitic on vertebrates. A preliminary study of the Ethiopian fauna. [J. Ent. Soc. S. Africa] 14: 63–93 (k), ill., 1951.

SMALLER ORDERS—Denning, D. G.—Descriptions of several new species of caddis flies (Trichoptera). [23] 84: 17–22, ill. **Eichler, W.**—Mallophagen-Synopsis. XV. Genus Pseudomenopon. [Zool. Anz.] 148: 30–40. **Emerson, K. C.**—A new species of Goniodes (Mallophaga). [43] 25: 29. **Fernando, H. E.**—Neuroptera. (See under Anatomy.) **Gisin, H.**—Neue Forschungen über Systematik und Oekologie der Collembolen. [Die Naturwiss.] 38: 549, 1951. **Hincks, W. D.**—The Dermaptera of the New Hebrides. [6] ser. 12, 5: 200–04. **Schaller, F.**—Collembola. (See under Anatomy.) **Traub, R.**—Records and descriptions of fleas from Peru (Siphonaptera). [65] 54: 1–22, ill. **Wagner, J.**—Aphaniptera. [Beitr. Fauna Perus, Jena] 2: 201–03, 1951.

ORTHOPTERA—Ferreira, A. D. et al.—Gafanghotos no sul do Brasil. [Bol. Fitosanit.] 4 (1947–50): 1–113 (8 papers by various authors), 1951. **Princis, K.**—Neue und wenig bekannte Blattarien aus dem Zool. Mus. Kopenhagen. [Spolia Zool. Mus. Hauniensis) 12: 1–72, ill., 1951. **Salt, R. W.**—(See under Anatomy.)

HEMIPTERA—Cabellero, C.—Notas biologicas y economicas sobre la conchuela negra (Saissetie oleae). [Agr. Tec. Chile] 11: 54–63, 1951. **China, W. E. and J. C. M. Carvalho**—The Cyrtopeltis-Engytatus complex (Miridae). [6] ser. 12, 5: 158–66, ill. **Costa Lima, A. da, C. A. Campos Seabra e C. R. Hathaway**—Estudo dos Apiômeros (Reduviidae). [Mem. Inst. O. Cruz] 49: 273–442, ill., 1951. **Drake, C. J.**—Two new Microvelia Westwood (Veliidae). [18] 47: 13–15. **Ferris, G. F.**—Some miscellaneous Coccoidea. [50] 17: 2–5, ill. **Lowe, A. E.**—Evidence of the overwintering of greenbugs in southwestern Kansas. [43] 25: 3–4. **McKenzie, H. L.**—Miscellaneous Diaspid scale studies. Scale studies, Part VII. [Bull. Dept. Agric., California] 40: 1–3 (*), ill. *Id.* Scale studies, Part VIII. *Ibid.* 105–09 (*), ill., 1951. **Penner, L. R.**—A new Bostaera from Florida (Delphac.). [43] 35: 1–3. **Porter, T. W.**—Three new species of Hebridae from the Western Hemisphere. [43] 25: 9–12, ill. **Rao, V. P. and G. F. Ferris**—The genus Andaspis MacGillivray. [50] 17: 17–32, ill. **Ruppel, R. F. and D. M. DeLong**—Some new species of Mexican Dikrella (Cicadell.). [58] 52: 89–95. **Schreiber e Pellegrino**—(See under Anatomy.) **Steyn, J. J.**—(See under Anatomy.) **Truxal, F. S.**—(See under Anatomy.)

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DIPTERA—Alexander, C. P.—New or insufficiently known crane-flies from Chile. Part III. [Agr. Tec. Chile]

11: 5–19, ill., 1951. **Bick, G. H.**—The ecology of the mosquito larvae of New Guinea. [Pacific Sci.] 5: 392–431, 1951. **Hering, E. M.**—Trypetidae. [Beitr. Fauna Perus, Jena] 2: 117–83, 1951. **Kessel, E. L.**—Metaclythia, a new genus of flat-footed flies, and the description of a new species (Clythiidae). [Wasmann Jour. Biol.] 9: 347–50, 1951. **Kröber, O.**—Tabanidae, Therevidae, Conopidae. [Beitr. Fauna Perus, Jena] 2: 184–94, 1951. **Lengensdorf, F.**—Lycoriidae. [Beitr. Fauna Perus, Jena.] 2: 195–200, 1951. **Mandl, K.**—Cicindelidae. [Beitr. Fauna Perus, Jena] 2: 204–14 ,1951. **Melander, A. L.**—The North American species of Tethinidae. [45] 59: 187–212, 1951. **Mohan, B. N.**—Sexual behavior of Anopheles fluviatilis in captivity. [53] 169: 280. **Pratt, H. D. and E. L. Seabrook**—The occurrence of Culex iolambdis Dyar in Florida and Puerto Rico, with a description of the larva. [65] 54: 27–32, ill. **Reinhard, H. J.**—Muscoid flies of the genus Chaetophlepsis. [43] 25: 13–21 (k*). New genera and species of muscoid Diptera. [18] 47: 1–12. **Roback, S. S.**—New species of Sarcophagini. [48] 42: 45–49, ill. **Sack, P.**—Syrphidae. [Beitr. Fauna Perus, Jena] 2: 63–116, 1951. **Shewell, G. E.**—New Canadian blackflies (Simuliidae). [23] 84: 33–42, ill. **Smith, M. E.**—A new northern Aedes mosquito, with notes on its close ally, Aedes diantaeus. [18] 47: 19–28. **Steyskal, G. C.**—Australasian stilt-legged flies (Tylidae) in the U. S. National Museum. [71] 102 (3294): 161–80 (k*). **Twinn, C. R.**—(See under Anatomy.) **Wilkins, O. P. and O. P. Breland**—The larval stages and the biology of the mosquito, Orthopodomyia alba Baker. [45] 59: 225–40, ill., 1951. **Wirth, W. W.**—The status of the genus Parabezzia Malloch (Heleidae). [65] 54: 22–26, ill.

COLEOPTERA—Balthasar, V.—Scarabaeidae laparostici. [Beitr. Fauna Perus, Jena] 2: 322–44, 1951. **Bechyne, J.**—Liste provisoire des Eumolpides de Bolivie et observations diverses sur les espèces de l'Amérique du Sud. [Ent. Arbeiten, Mus. G. Frey] 2 (2): 227–352 (k*), 1951. **Bernhauer, M.**—Staphylinidae. [Beitr. Fauna Perus, Jena] 2: 267–82, 1951. **Borchman, F.**—Meloidae, Lagriidae, Alleculidae, und Nilionidae. [Beitr. Fauna Perus, Jena] 2: 300–14, 1951. **Breuning, S.**—Revision du genre Phytoecia Muls. (Ceramby.). [Ent. Arbeiten Mus. G. Frey] 2 (2): 353–460, 1951. **Bridwell, J. C.**—A new genus of Bruchidae affecting Hibiscus in Argentina. [48] 42: 49–50. **Cartwright, O. L.**—A new Megasoma from Arizona (Scara-

baeid.). [65] 54: 36–38. **Doesburg, P. H. van**—Passalidae. [Beitr. Fauna Perus, Jena] 2: 315–21, 1951. **Fattig, P. W.**—The Elateridae or click beetles of Georgia. Emory University Bulletin, No. 10. Pp. 1–25. Emory University, Georgia, Dec. 10, 1951. **Fernando, W.**—(See under Anatomy.) **Kleine, R.**—Lycidae. [Beitr. Fauna Perus, Jena] 2: 283–94. **Kult, K.**—Revision of the genus Clivina, Latr., from the Oriental Region (Carabidae). [Acta. Soc. Ent. Cechosl.] 48: 16–32, 1951. **Kulzer, H.**—Fünfter Beitrag zur Kenntnis der Tenebrioniden. [Ent. Arbeiten Mus. G. Frey] 2 (2): 461–573, 1951. **Kuschel, G.**—Cylinrorhininae aus dem Britischen Museum (Curcl., 8 Beitr.). [6] ser. 12, 5: 121–37 (S). **Liebke, M.**—Carabidae truncatipennis. [Beitr. Fauna Perus, Jena] 2: 215–66, 1951. **d'Orchymond, A.**—Palpicornia. [Beitr. Fauna Perus, Jena] 2: 295–99, 1951. **Redlinger, L. M. and B. R. Wilson**—Angoumois grain moth in the corn belt. [43] 25: 22–23. **Šulc, M. K.**—(See under Anatomy.) **Straneo, S. L.**—Sur la tribu des Metiini (Antarctiini Auct.). [Rev. Fr. Ent.] 18: 56–88 (k*). **Vaurie, P.**—Revision of the genus Calendra (formerly Sphenophorus) in the United States and Mexico (Curcul.). [Bull. Amer. Mus. Nat. Hist.] 98 (2): 31–186.

HYMENOPTERA—Bohart, R. M.—The California species of mite-bearing Stenodynerus (Vespidae). [65] 54: 38–53 (k*), ill. **Burnett, T.**—(See under Anatomy.) **Caltigairone, L.**—Observaciones sobre Arrenoclavus koehleri (Blanch.) (Chal., Encyrt.). [Agr. Tec. Chile] 11: 20–34, ill., 1951. **Haskins, C. P.**—Note on a gynandromorph in Amblyopone australis Erichson (Formic.). [45] 59: 221–24, ill., 1951. **Hurd, P. D., Jr.**—Revision of the nearctic species of the Pompilid genus Pepsis. [Bull. Amer. Mus. Nat. Hist.] 98 (4): 259–334. **Jenni, W.**—(See under Anatomy.) **Lanham, U. N.**—A subgeneric classification of the New World bees of the genus Andrena. [91] 8 (5): i–iv, 183–237, 1951. **Martin, J. C.**—A new Braconid from Mexico. [23] 84: 30–31. **Michener, C. D.**—A new genus of Panurgine bees from Arizona (Andrenidae). [43] 25: 24–28. **Olberg, G.**—Beobachtungen über die Lebensweise der Lehmwespe Odynerus (Hoplopus) spinipes. [Natur und Volk] 81: 111–15, ill. **Stevens, O. A.**—Native bees. [North Dakota Agr. Expt. Sta. Bimonthly] 13: 72–80, 1950, 14: 27–31, 59–64, 105–12, 1951 (the last of 11 installments giving names, descriptions and habits of N. D. bees). **West, A. S.**—Notes on Leconte's sawfly. [23] 84: 59–61, ill.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

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American Sarcophagidae—wanted for identification. H. R. Dodge, P.O. Box 185, Chamblee, Georgia.

German lepidopterist wishes to correspond and receive live material (eggs and pupae) in exchange for dried imagoes. Johannes Reichel, Koenigsberg, Krs. Wetzlar 16, Germany.

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Cynipid and Itonidid galls—American species wanted; purchase or exchange for British species. Fresh or dried. D. Leatherdale, F.R.E.S., Old Woodstock, Oxford, England.

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Conopidae of the World wanted. Will pay 10¢ to $1.00 for pinned and labelled specimens. S. Camras, 4407 N. Milwaukee Ave., Chicago 30, Illinois.

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ENTOMOLOGICAL NEWS

JUNE 1952

Vol. LXIII No. 6

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PUBLISHED MONTHLY, EXCEPT AUGUST AND SEPTEMBER, BY
THE AMERICAN ENTOMOLOGICAL SOCIETY
PRINCE AND LEMON STS., LANCASTER, PA.
AND
1900 RACE STREET, PHILADELPHIA 3, PA.

Subscription, per yearly volume of ten numbers: $5.00 domestic; $5.30 foreign; $5.15 Canada. Entered as second-class matter April 19, 1943, at the post office at Lancaster, Pa., under the Act of March 3, 1879. Acceptance for mailing at the special rate of postage provided for in paragraphs (d-2), Section 34.40, P. L. & R. of 1948, authorized April 19, 1943.

ENTOMOLOGICAL NEWS

ENTOMOLOGICAL NEWS is published monthly, excepting August and September, by The American Entomological Society at Prince and Lemon Sts., Lancaster, Pa., and the Academy of Natural Sciences, 1900 Race Street, Philadelphia 3, Pa., U. S. A.

PHILIP P. CALVERT, Editor Emeritus. R. G. SCHMIEDER, Editor. Editorial Staff: E. J. F. MARX, M. E. PHILLIPS, J. A. G. REHN, and A. G. RICHARDS.

Subscription price, per yearly volume of 10 numbers: Domestic, $5.00; Foreign, $5.30; Canada, $5.15—U. S. Currency.

SUBSCRIPTIONS, ADVERTISEMENTS: All communications and remittances to be addressed to **ENTOMOLOGICAL NEWS, 1900 Race Street, Philadelphia 3, Pa.**

MANUSCRIPTS and all communications concerning same should be addressed to **R. G. Schmieder, Zoological Laboratory, University of Pennsylvania, Philadelphia 4, Pa.**

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ENTOMOLOGICAL NEWS

VOL. LXIII JUNE, 1952 No. 6

Some Notes on the Habits and Parasites of Native Wood-Roaches in Ohio (Orthoptera: Blattidae)

By L. R. EDMUNDS, Department of Zoology and Entomology, The Ohio State University, Columbus, Ohio

During the months, December through April of 1950–51, a series of 459 wood-roach egg capsules was collected from wooded areas in Franklin and Delaware Counties, Ohio. These egg cases were collected in a variety of places, such as under boards and in piles of cut fire wood, but by far the largest numbers were found under the loose bark of fallen dead trees. The adult roaches seem to have certain places in which they congregate and thus in a small area the writer found as many as 184 egg cases deposited within a few feet of each other under the bark of a tree. The capsules sorted readily into two size groups. The larger capsules, some 429 in number, are believed to be those of *Parcoblatta pensylvanica* (DeGeer), the only large native roach known to occur in these counties. The smaller capsules, 30 of them, are very likely those of *Parcoblatta virginica* (Brunner), which is known to be plentiful in the area investigated. According to Dr. Edward S. Thomas, of the Ohio State Museum, *Ischnoptera deropeltiformis* (Bruner) has been taken in Franklin County, but is quite rare.

The collected wood-roach ootheca were incubated in glass tumblers covered with white organdy, held in place by a rubber band. The tumblers containing the egg sacs were placed in an outdoor insectary and were checked daily.

The Pennsylvania wood-roach, *P. pensylvanica*, is one of the common insects inhabiting the woods of Ohio. Records from

the Insect Collection of the Department of Zoology and Entomology of The Ohio State University, and from The Ohio State Museum show that these insects have been collected in fifty counties, widely scattered over the state.

The biology and life history of this roach have been worked out to a considerable degree in St. Louis County, Missouri, by Rau (1940), who states that the enemies of the wood-roach seem to be few in number. However, some additional interesting facts have been noted by the writer in field studies in Franklin and Delaware Counties, Ohio, and are summarized as follows.

Pennsylvania wood-roach adults and nymphs are commonly found in old buildings bordering on wooded areas, in piles of cut or fallen timber, and under the loose bark on dead trees. They usually run rapidly when the cover under which they are hiding is removed by the collector. In the adult stage, the male is fully winged and capable of flight, while the flightless female has short wings which normally do not extend to the tip of the abdomen. During the mating season in the spring, the males have been observed flying in the evenings. They are positively phototactic at this time, and often come to lights. Due to this habit they are sometimes attracted at night to lighted windows or lights around houses, a considerable distance from wooded areas. The females may invade homes bordering on wooded areas. Although it is not uncommon to find wood-roaches in homes near woods and at campsites, they are not as annoying as the domestic roaches, and do not have the characteristic roach odor. The over-wintering stage of the Pennsylvania wood-roach is the nymph, which can be collected in the woods during the winter months. These nymphs range in size from very small to some that are in the last nymphal instars. No live adult roaches were collected in the winter months by the writer. Some of the larger nymphs mature in early spring and begin to produce egg-capsules in May. The female roach carries the flat yellow-brown ootheca protruding from her posterior end for two or three days before dropping it with no attempt to conceal it. However, the

ootheca are sometimes rather difficult to find because of the secretive habits of the adults, and because after deposition, they seem to deepen in color and resemble their background of dirt and bark. The average number of eggs in each capsule is thirty-two; these eggs are usually viable and the nymphs emerge in from 30 to 40 days. The young roaches on hatching are white, and it is several hours before they assume the dark brown color characteristic of older nymphs.

The over-wintering egg capsules when collected under natural conditions are often found to be broken and empty. The ootheca were sorted under a binocular microscope soon after they were collected, and the damaged capsules were separated from those that were complete and normal in appearance. This sorting was done to make it easier to observe parasite emergence, as special attention could then be given to the normal appearing capsules. All of the egg capsules were incubated for several months, some of them for over a year, and within this period of time not a single wood-roach nymph was observed to emerge from them. Many parasites did emerge from some of the egg cases, and these were captured and preserved in vials of alcohol. Only one parasite emerged from the small capsules, *Hyptia harpyoides* Bradley. The following data refer to the parasites from the larger capsules.

For identification, these parasites were sent to C. F. W. Muesebeck of the Division of Insect Identification. The determinations of the hymenopterous parasites were made by B. D. Burk and Luelle M. Walkley, and the dipterous parasites by C. W. Sabrosky and W. W. Wirth.

A total of 1,213 parasitic Hymenoptera were obtained. Evaniidae emerged from 30 egg capsules, one individual from each capsule. These parasites were identified as *Hyptia thoracica* (Blanchard), and specimens of an undescribed species of *Hyptia*. The remaining Hymenoptera emerged in large numbers from other parasitized ootheca, 262 specimens from 11 egg capsules were identified as *Systellogaster ovivora* Gahan, and 921 specimens of an undescribed species belonging to the genus *Syntomophyrum* emerged from ten egg capsules. This latter

TABLE I. Compiled Data on Natural Parasitism of Wood-Roach Egg Capsules in Franklin and Delaware Counties, Ohio, for Years 1950 and 1951

Date Collected	Egg Capsules Collected	Parasitism by Evaniidae	Other Parasites	Capsules Showing Previous Emergence*
10–29–50	4	0	1	1
3–18–51	58	11	2	1
3–23–51	26	7	1	3
3–28–51	36	0	0	0
4–20–51	140	5	7	3
4–21–51	6	0	0	0
4–27–51	184	7	4	4
5–5–51	3	0	1	0
5–7–51	1	1	0	0
Total	459	31	16	12

* Capsules showing previous emergence are not included in the percentage of parasitism as stated in the body of the paper.

new species is being described by B. D. Burk at the U. S. National Museum.

The dipterous parasites were identified as *Cocnosia basalis* Stein, of which one specimen emerged from a single capsule, and a species of *Megaselia* of which four specimens emerged from a capsule.

A study of the accumulated data on parasite emergence (see Table I) from all capsules of both sizes shows that 12.4% of the capsules collected during the winter months were parasitized. The evaniids alone parasitized 6.7% of the over-wintering wood-roach ootheca in Ohio. This is a much higher percentage of parasitization than had been previously suspected.

Acknowledgments are made to Dr. Carl Venard of The Ohio State University and to Dr. Edward S. Thomas of The Ohio State Museum for their assistance in this study; also to Charles A. Triplehorn, Richard D. Alexander, and Elbert A. Sleeper of the Department of Zoology and Entomology of The Ohio State University for their contributions of egg capsules.

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Thiodia Hb. as not a North American Genus (Lepidoptera, Tortricidae)*

By NICHOLAS OBRAZTSOV, Sea Cliff, Long Island, N. Y.

In the American entomological literature *Thiodia* Hb. is mentioned as a genus which is usually known among European entomologists as *Semasia* (Stph.) H.-S. or *Phaneta* Stph. The genus *Thiodia* was established in 1825 by Hübner for two species, *citrana* Hb. and *sulphurana* Hb. (= *Pyrausta rhododendronalis* Dup.), a Tortricid and a Pyralid. Stephens (1852) recognized only the first of both species as *Thiodia* Hb. and considered the genus as monotypic. Apparently it was Walsingham (1897) who first enlarged the idea of this genus; he selected *citrana* Hb. as the genotype of *Thiodia* Hb. Fernald (1902) considered *Thiodia* as a genus with several North American species. Heinrich (1923) published a revision of Nearctic Eucosmini and conceived of *Thiodia* as a smaller and more or less natural group of species. However, he has noted that all the North American species of this genus differ from the genotype of *Thiodia* Hb. in the general shape of the valvae and in superficial characters, and found that for the American species "the form of genitalia in (*Ioplocama*) *Thiodia formosana* Clemens is much more representative."

*Contribution from the Entomological Division of the Zoological Collection of the Bavarian State, Munich.

In the Palearctic fauna we find a series of species which are similar in their characters to *citrana* Hb., the genotype of *Thiodia* Hb. This group of species, but not the American species, is the very same genus *Thiodia* Hb. The American species are closely related to *Eucosma* Hb. while the Palearctic *Thiodia* have more resemblance to *Rhyacionia* Hb. in their genitalia. The correct generic name for the Nearctic species, called *Thiodia* Heinr. (non Hb.), is *Phaneta* Stph. 1852. (Genotype: *Cochylis pauperana* Dup.); this name has priority for *Calosetia* Stt. 1859 (Genotype: *Tortrix nigromaculana* Hw.), and *Ioplocama* Clem. 1860 (Genotype: *Iopl. formosana* Clem.). The genus *Eriopsela* Gn. 1845 (Genotype: *Olethreutes quadrana* Hb.) does not belong to the synonymy of *Phaneta* and is an independent one; it differs from *Phaneta* chiefly in the female genitalia (cf. Pierce & Metcalfe, 1922, p. 67, t. XXIII; Obraztsov, 1946, p. 39).

Genus **Thiodia** Hb. 1825.

Genotype: *Agapeta citrana* Hb. 1822.

Synonymy.—*Agapeta* (part.) Hübner, Syst.-alph. Verz., 1822, p. 59; *Thiodia* Hübner, Verz. bek. Schm., 1825, p. 391; *Cochylis* (part.) Treitschke, Schm. Eur., VII, 1829, p. 233; *Grapholitha* (part.) Treitschke, *op. cit.*, X (3), 1835, p. 120; *Dichrorampha* (part.) Guenée, Ann. Soc. Ent. France, (2) III, 1845, p. 186; *Catoptria* (part.) Guenée, *ib.*, p. 189; *Semasia* (part.) Herrich-Schäffer, Syst. Bearb. Schm. Eur., IV, 1851, p. 244; *Botropteryx* Caradja, Iris, XXX, 1916, p. 63 (Genotype: *Grapholitha sulphurana* Chr. 1888); *Rhyacionia* (part.) Pierce & Metcalfe, Genit. Brit. Tortr., 1922, p. 81; *Eucosma* (part.) Meyrick, Rev. Handb. Brit. Lep., 1927, p. 545, 551.

Fore wing smooth; termen more or less straight; male without costal fold, but on the upper surface near the base of vein A_{2+3} with a fovea full of androconial scales; 12 veins; R_1 from middle of cell; R_2 from cell halfway between R_1 and R_3; R_4 and R_5 separate, the latter to termen; no internal vein of cell; M_2, M_3 and Cu_1 approximate at termen; Cu_2 straight, from or from before 2/3 of cell.

Hind wing with 8 veins; R and M_1 approximate, rarely anastomosed or stalked; M_3 and Cu_1 stalked; in male on the

upper surface of wing near the base of internal vein of cell a tuft of long hairs.

Male genitalia with valvae simple; no distinct neck incurvation; cucullus sharply defined, but scarcely separate, with a more or less developed basal knoll and pollex; sacculus simple, not heavy spined; processus basalis (costal hook) of valva developed; no harpe (clasper). Uncus short, weak, pointed; socii short, finger like, at base fusing with uncus; gnathos weakly chitinized. Aedeagus straight or curved, moderate, more or less pointed and finely toothed distally; cornuti a cluster of elongate spines.

Female genitalia as moderately long, narrow ovipositor; ductus bursae moderately long, sometimes with a fine cuticular sculpture; lamina dentata two stout thorns.

The wing venation is like *Phaneta* Stph., but R_2 of fore wing is not approximated to R_1; as a rule the hind wing veins M_3 and Cu_1 approximate, at most stalked, but not tending to unite. The male sexual characters, a fovea of fore wing at base of vein A_{2+3} and a tuft of hairs near the base of cell of hind wing, are absent in *Phaneta* and constant in all the species of *Thiodia*. The fovea mentioned is likewise present in male of *Foveifera* Obr. and in many species of *Gypsonomoides* Obr. and *Hendecaneura* Wlsm. In the male genitalia, *Thiodia* differs from *Phaneta* in the pointed uncus fusing with the socii and in the shape of the valvae; *Phaneta* has no pollex. Especially typical of *Thiodia* is its long ovipositor.

The genus is a derivative of *Rhyacionia* Hb.

The genus *Thiodia* Hb. was fully characterized by Kennel, 1916 (p. 531) and by Obraztsov, 1946 (p. 40), but both authors erred in their statement of a costal fold in the hind wing of the male.

Illustrations.—1) Venation of wings: Kennel, 1908, t. II fig. 53.

2) Fovea of fore wing: Kennel, 1908, t. II fig. 54; 1916, t. XX fig. 36a.

3) Male genitalia: Pierce & Metcalfe, 1922, t. XXVIII (*citrana*); Heinrich, 1923, t. 2 fig. 16.

4) Female genitalia: Pierce & Metcalfe, 1922, t. XXVIII (*citrana*).

List of Palearctic Species

mirana (Car.)
mirana Caradja, Iris, XXX, 1916, p. 62 (*Semasia*).—Sibiria m. or.

citrana (Hb.)
citrana Hübner [Samml. eur. Schm., Tortr., 1796–99, t. 29 fig. 185; non bin.], Syst.-alph. Verz., 1822, p. 59 (*Agapeta*); ? *messingiana* (part.) Lederer, Wien. Ent. Monatschr., III, 1859, p. 399.—Europa; Asia c. & m. oc.

spp. **major** Rebel, Ann. Hofmus. Wien, XVIII, 1903, p. 321 (*Semasia*).—Peninsula Balcanica.

spp. **sardiniana** Schawerda, Zschr. Österr. Ent.-Ver., XXI, 1936, p. 79 (*Semasia*).—Sardinia.

sulphurana (Chr.)
sulphurana Christoph, Horae Soc. Ent. Ross., XXII, 1888, p. 311 (*Grapholitha*).—Ucraina m.; Rossia or.; Armenia.

caradjana Kenn.
caradjana Kennel, Pal. Tortr., 1916, p. 533, t. XX fig. 40 (*Thiodia*).—Armenia.

anatoliana Kenn.
anatoliana Kennel, Pal. Tortr., 1916, p. 532, t. XX fig. 39 (*Thiodia*).—Armenia; Persia s.; ? Libanon.

placidana (Stgr.)
placidana Staudinger, Berl. Ent. Zschr., (1870) 1871, p. 281 (*Grapholitha*).—Rossia m. or.; Armenia.

tscheliana (Car.)
tscheliana Caradja, Acad. Rom. Mem. Sect. Stiint., (3) IV (8), 1927, p. 392 (*Semasia*).—China s.

lerneana (Tr.)
lerneana Treitschke, Schm. Eur., X (3), 1835, p. 120 (*Grapholitha*).—Europa c.m.; Gallia m. or.

(?) **azukivora** Mats.
azukivora Matsumura, 6000 Ill. Ins. Jap., 1931, p. 1076, fig. (*Thiodia*).—Japonia.

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Swarming of Blacus sp. in California (Hymenoptera: Braconidae)

By Paul H. Arnaud, Natural History Museum, Stanford University, California

Published observations on the swarming of *Blacus* males are comparatively few and all, so far, appear to be limited to the European literature. The following note is the first North American record of the swarming habit of *Blacus* males. The writer's brief observations began on the high foggy morning of June 5, 1948 when a dancing swarm of insects was noted in his backyard at Redwood City, San Mateo Co., California. A few swishes of the net resulted in the capture of 35 specimens, about half of the swarm. Specimens sent to Mr. C. F. W. Muesebeck [1]

[1] I am indebted to Mr. C. F. W. Muesebeck of the Bureau of Entomology and Plant Quarantine, Washington, D. C., for the original generic determination and references to literature. He explained that *Blacus* is unrevised in North America. Specimens were then forwarded to Mr. A. W. Stelfox of Dublin, Ireland, to whom I am also indebted, for their comparison with certain of the European species in his collection. He indicated the specimens were not representative of any European species he possessed but believed them to be "closely related to *ruficornis* Nees and *tripudians* Hal.," species which have been reported swarming. This *Blacus* is, therefore, probably not introduced, but native to California.

were kindly identified as males of an undescribed species of *Blacus*. This was the only time that these small blackish wasps were observed swarming in 1948. In 1949, at the same location, the swarming *Blacus* males were noted on many early evenings between the dates of April 28th and June 26th. Those swarmings were noted most frequently above or to the sides of a between the dates of April 28th and June 26th. These swarmprobably did not contain more than a hundred individuals, and they occupied the space of a sphere approximately two feet in diameter, which would move rapidly up and down. On windy evenings, the swarm when caught in a gust of wind would momentarily be blown a foot or two to one side after which it would reform quickly into its original position. At no time were any large females noted flying about or entering into the swarms, as has been noted by Benson (1944).

In the British literature, the swarming of *Blacus* was first noted by Haliday (1836) with his original description of *Blacus tripudians*. Since this first observation, the following English and Irish records have been seen by the writer. Marshall (1889) reported *B. ruficornis* Nees swarming, Donisthorpe (1936) reported *B. paganus* Hal. swarming, and Stelfox (1941) and Benson (1944) reported *B. tripudians* Hal. swarming.

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Unusual Catches in Light Traps

By S. W. Frost, The Pennsylvania State College

During the operation of approximately 20 light traps over a period of 5 years numerous specimens of Euplexoptera and Pselaphidae have been taken. The Euplexoptera *Labia minor* (L) were especially surprising, for these insects shun light, hide during the day, and seldom spread their range by means of flight. However, they are scavengers, are known to wander at night, and when abundant their appearance at light traps might not be unusual. Euplexoptera have been taken from three different localities sometimes as many as 10 specimens on a single night. Evidently they were not attracted by the light.

Two species of Pselaphidae, still unidentified, were taken in considerable numbers chiefly from one trap operated at Martinsburg, Pennsylvania. This trap was located in an open area without trees or shrubs in the vicinity. It was placed close to a factory processing sweet corn with a pond impounding waters highly charged with starches. Pselaphidae are generally difficult to obtain and usually collected one or two at a time. They avoid light and are generally found beneath decayed leaves, in rotten logs, in sphagnum, or in ants' nests. The collection of over 200 specimens from light traps chiefly during June is noteworthy. These insects are minute, difficult to separate from the thousands of larger insects taken in traps, and many may have been overlooked. Their presence is difficult to explain.

This introduces the question of accidental catches in light traps. Certain insects that feign death, such as the Curculionidae and Elateridae, are frequently found in light traps and it is felt that these captures are often accidental. This could happen only when a trap is hung upon a tree or bush where such insects occur. On windy nights the insects may be dislodged and thus gain entrance to the traps.

Scavengers such as roaches, even the wingless forms, are occasionally found in light traps. They are apparently in search of food and wander into the traps. In the tropics, where roaches are a real problem, I have often watched them skirt the edge of

lighted areas in search of dead insects that in turn have been attracted to lights.

Spiders and light bodied insects are sometimes drawn into the suction type of light traps. Small insects may be taken even when these traps are operated during the day or on nights when the lights are turned off. Obviously they were not attracted by the light.

Formica sanginea subintegra Emery Raiding Its Own Subspecies

On August 16, 1951, while preparing a picnic supper at North Park, Allegheny Co., Pennsylvania ("North Carolina" Picnic Area), I noticed a *Formica sanguinea* raid in progress at an ant-nest near the picnic shelter. There were many couples and small groups of ants locked in combat over an area averaging roughly three feet in diameter. On looking closer I found that these ants were not *sanguinea* versus *Formica fusca* as might be expected, but that *sanguinea* was fiercely fighting *sanguinea*. Coming from the nest entrances were *sanguinea* workers carrying pupae and larvae. The loaded workers were proceeding southeastwardly from the raided nest. This nest lacked a mound, the entrances leading under a few scattered stones. Only these entrances, the fighting ants, and a hardly noticeably size-uniformity of the pebbles in the area marked the presence of an ants' nest.

Following the line of raiding ants, I found the nest from which they had begun their raid. It was approximately 150 feet from the first nest, and (as the picnic shelter is located on the top of a knoll) about 40 feet lower in elevation. This nest was a mound approximating 18 inches across and 10 inches high on the downhill side.

No adults were found being transported along the path of the raid. Nor were any individuals of *fusca* noted either along this line or at the site of the first nest. At this time a few *fusca* were found on the nest from which the raid came.

Nine ants were collected at the site of the raid. Because of the duties attendant upon picnicing, further observations were curtailed. The time during which the raid was observed was between 5:30 and 6:00 P.M.

Dr. Marion R. Smith of the Bureau of Entomology and Plant Quarantine, who kindly identified the nine specimens as *Formica subintegra* Emery, has written to me that this is the common form of *sanguinea* in eastern states and Canada at low elevations and in warm situations.

On September 11, I returned to the area where the raid had been discovered. The nest that had been raided was no longer occupied. Neither *subintegra* nor *fusca* individuals were in the immediate vicinity. Overturning stones and digging in the area likewise did not disclose any ants. Going to the second nest, I broke it open, and was surprised at the preponderance of *fusca* individuals. Both this species and *sanguinea* poured out in large numbers, but a rough count of the ants as they ran about over the broken section of the nest showed that the *fusca* individuals there outnumbered the *sanguinea* by at least fifteen to one. I refrained from damaging the nest further, as I hope to make observations on it this coming year.

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Notes and News in Entomology

Under this heading we present, from time to time, notes, news, and comments. Contributions from readers are earnestly solicited and will be acknowledged when used.

A New Vitamin Discovered in Insect Nutrition: There is nothing particularly novel about discoveries of general interest being made with insects but none the less there is a certain amount of gratification to entomologists each time another ex-

ample comes along. In the past there have been such important discoveries as the chromosome mechanism of sex determination worked out by C. E. McClung, the development of much of modern genetics with *Drosophila* by T. H. Morgan and his many followers, and the discovery of the cytochrome enzyme systems by D. Keilin. One may say that McClung and Morgan were general zoologists who happened to find it convenient to use insects as their experimental animals, but Keilin was an orthodox entomologist who made his discovery incidentally to studying the nature of the red color in the "organe rouge" of *Gastrophilus* larvae.

Recently, incidentally to the study of the nutritional requirements of the mealworm, *Tenebrio molitor*, G. Fraenkel discovered another vitamin in the B series.[1] Tentatively, this was called B_T, with the "T" standing for *Tenebrio*. Subsequently, B_T has been identified as carnitine, a quarternary nitrogen compound with the empirical formula of $C_7H_{15}O_3N$.[2, 3] Carnitine has been known for a good many years as a chemical extractable from muscle, but its physiological significance was and still is unknown. It had not previously been suspected of being a vitamin.

By definition, a vitamin is an organic chemical which must be supplied to an animal in very small amounts. It follows that the animal in question is unable to synthesize the compound for itself. And, further, it is scarcely to be called surprizing that some animals can synthesize some of these chemicals whereas other species cannot do so. Bacteria, yeast, and plants in general synthesize and use these compounds; animals use them too but vary greatly in their ability to synthesize them. Thus, nicotinic acid (or niacin to use its currently favored name which seeks to divorce the holy vitamins from association with habit-forming weeds) is a vitamin for dogs, pigs, and man but not for rats or hamsters. Insects in general do not require vitamin C

[1] Fraenkel, G. Arch. Biochem. + Biophysics, 34: 457–467. 1951.
[2] Fraenkel, G. Arch. Biochem. + Biophysics, 34: 468–477. 1951.
[3] Carter, H. E., P. K. Bhattacharyya, K. B. Weidman and G. Fraenkel. Arch. Biochem. + Biophysics, 35: 241–242. 1952.

(ascorbic acid) in their diet but they have plenty in their tissues; presumably they synthesize it although this has not been directly demonstrated as yet.

With the above preamble, it is interesting to consider where carnitine is found. It occurs in muscle, commercial beef extracts showing 1.5 to 3%, and to a less extent in other tissues such as liver, heart, lungs and intestines. Blood is a relatively poor source but milk is a good source (and during the search for B_T carnitine was first concentrated from whey). Eggs have very little. Most plant and vegetable tissues are poor sources except yeast and wheat germ both of which are fairly good. It would seem, then, that carnitine is rather widely distributed, and that it reaches its highest concentration in muscle.

Tests with various organisms show that carnitine is required by *Tenebrio molitor*, *T. obscurus* and *Palorus ratzeburgi* but not by *Tribolium confusum* or *Dermestes vulpinus*. It is not required by rats, guinea pigs, chickens or several protozoa or bacteria tested. In short, it is at present known as a dietary requirement (= vitamin) for only the above named three closely related beetles. A similarly restricted requirement for linoleic acid and vitamin E by only three species of the moth genus *Ephestia* was shown by Fraenkel and Blewett some years ago.[4] These seem to be cases of generally necessary compounds that are vitamins for only a few species which have lost the ability to synthesize them. There is as yet no satisfying answer to the question why some species have lost the ability to synthesize necessary compounds but such cases surely emphasize the desirability of using a large variety of insects before generalizing on physiological processes within the class.

A. G. Richards

[4] Fraenkel, G. + M. Blewett. Jour. Exp. Biol., *22*: 172–190. 1946.

List of Titles of Publications Referred to by Numbers in Entomological Literature in Entomological News.

1. American Midland Naturalist. Notre Dame, Indiana.
2. American Museum Novitates. New York, N. Y.
3. American Naturalist. Garrison-on-Hudson, New York.
4. Annals of Applied Biology. London.
5. Annals of the Entomological Society of America. Columbus, Ohio.
6. Annals and Magazine of Natural History. London.
7. Annales Academia Brasileira Sciencias. Rio de Janeiro.
8. Anales del Instituto de Biologia Mexico. Mexico City.
9. Anatomical Record. Philadelphia.
10. Arkiv för Zoologie. K. Svenska Vetenkapsakademien i. Stockholm.
11. Arquivos de Higiene e Saude Publica. São Paulo.
12. Biological Bulletin. Woods Hole, Massachusetts.
13. Bios, Rivista Biol. Geneva.
14. Boletin de Entomologia Venezolana. Caracas.
15. Boletin del Museo de Historia Natural "Javier Prado." Lima, Peru.
16. Boletin do Museu Nacional do Rio de Janeiro. Brasil.
17. Bull. Acad. Sci. (Izvestia Akad. nauk) U S S R (S. biol.).
18. Bulletin of the Brooklyn Entomological Society. New York.
19. Bulletin of Entomological Research. London.
20. Bulletin of the Museum of Comparative Zoology. Cambridge, Mass.
21. Bulletin of the Southern California Acad. of Sciences. Los Angeles.
22. C. r. Acad. Sci. (Doklady Akad. nauk) U S S R. Leningrad.
23. Canadian Entomologist. Guelph, Canada.
24. Canadian Journal of Zoology. Ottawa, Canada.
25. Ecological Monographs. Durham, North Carolina.
26. Ecology. Durham, North Carolina.
27. Entomologica Americana. Brooklyn Ent. Society, New York.
28. Entomologist's Monthly Magazine. London.
29. Entomological Record and Journal of Variations. London.
30. The Entomologist. London.
31. Florida Entomologist. Gainesville, Florida.
32. Frontiers. Philadelphia, Pennsylvania.
33. Great Basin Naturalist. Provo, Utah.
34. Iowa State College Journal of Science. Ames, Iowa.
35. Journal of Agricultural Research. Washington, D. C.
36. Journal of Animal Ecology. London.
37. Journal of Economic Entomology. Menasha, Wisconsin.
38. Journal of the Elisha Mitchell Science Society. Chapel Hill, N. C.
39. Journal of Entomology and Zoology. Claremont, California.
40. Journal of Experimental Biology. London.
41. Journal of Experimental Zoology. Philadelphia, Pennsylvania.
42. Journal of Heredity. Baltimore, Maryland.
43. Journal of the Kansas Entomological Society. Lawrence, Kansas.
44. Journal of Morphology. Philadelphia, Pennsylvania.
45. Journal of the New York Entomological Society. New York.
46. Journal of Parasitology. New York.
47. Journal of the Tennessee Academy of Sciences. Nashville, Tenn.
48. Journal of the Washington Academy of Sciences. Washington, D. C.
49. Memorias do Instituto Oswaldo Cruz. Rio de Janeiro.
50. Microentomology. Stanford University, California.
51. The Microscope. London.
52. Mosquito News. Albany, New York.
53. Nature. London.
54. Nature. Washington, D. C.
55. Le Naturaliste Canadien. Quebec.

56. Natural History. New York.
57. Occasional Papers, Mus. of Zool., Univ. of Michigan. Ann Arbor.
58. Ohio Journal of Science. Columbus, Ohio.
59. Opinions and Declarations. Intern. Com. Zool. Nomencl. London.
60. Pan-Pacific Entomologist. San Francisco, California.
61. Parasitology. London.
62. Proceedings of the Academy of Natural Sciences. Philadelphia.
63. Proceedings of the Biological Society of Washington. Wash., D. C.
64. Proceedings of the California Academy of Science. San Francisco.
65. Proceedings of the Entom. Soc. of Washington. Washington, D. C.
66. Proceedings of the Hawaiian Entomological Society. Honolulu.
67. Proceedings of the National Acad. of Sciences. Washington, D. C.
68. Proceedings of the Royal Entomological Society of London. Ser. A.
69. Proceedings of the Royal Entomological Society of London. Ser. B.
70. Proceedings of the Royal Entomological Society of London. Ser. C.
71. Proceedings of the U. S. National Museum. Washington, D. C.
72. Proceedings of the Zoological Society of London. London.
73. Psyche, A Journal of Entomology. Boston, Massachusetts.
74. Quarterly Journal of Microscopical Science. London.
75. Quarterly Review of Biology. Baltimore, Maryland.
76. Revista Academia Columbiana de Cien. Exact. Fis. y Nat. Bogotá.
77. Revista Chilena de Historia Natural. Valparaiso, Chile.
78. Revista Instituto Salubridad y Enfermedades Tropicales. Mexico.
79. Revista Sociedad Mexicana de Historia Natural. Mexico City.
80. Science. Washington, D. C.
81. Scientific Monthly. New York.
82. Smithsonian Miscellaneous Collections. Washington, D. C.
83. Transactions of the American Entomological Society. Philadelphia.
84. Transactions of the Amer. Micros. Soc. Menasha, Wisconsin.
85. Transactions of the Illinois State Academy of Sciences. Springfield.
86. Transactions of the Kansas Acad. of Sci. Manhattan, Kansas.
87. Transactions of the Royal Canadian Institute. Toronto.
88. Transactions of the Royal Entomological Society. London.
89. U. S. Dept. of Agric., Farmer's Bulletins. Washington, D. C.
90. U. S. Dept. of Agric., Technical Bulletins. Washington, D. C.
91. University of California Publications in Entomology. Berkeley.
92. University of California Publications in Zoology. Berkeley.
93. University of Kansas, Science Bulletins. Lawrence, Kansas.
94. Ward's Natural Science Bulletin. Rochester, New York.
95. Zoologica. New York.
96. American Journal of Public Health. Boston.
97. American Journal of Tropical Medicine. Baltimore.
98. Annals of Tropical Medicine and Parasitology. Liverpool.
99. Canadian Journal of Research. Section E, Medical Sciences, Ottawa.
100. Evolution. New York.
101. Mitteilungen der schweitzerischen entomologischen Gesellschaft, Bern.
102. Revista de Entomologia. Rio de Janeiro, Brasil.
103. Proceedings of the Royal Society of London.
104. Anales de la Escuela Nacional de Ciencias Biologicas. Mexico.
105. Journal of Cellular and Comparative Physiology. Philadelphia.
106. Redia. Florence, Italy.
107. Annales de la Société Entomologique de France. Paris.
108. Bulletin de la Société Entomologique de France. Paris.
109. Notulae Naturae. Philadelphia.
110. L'Entomologiste. Paris.
111. Revista Brasiliera de Biologia. Rio de Janeiro.
112. Eos, Revista Española de Entomologia. Madrid.
113. Minist. de Agri. de la Nación, Inst. Sanidad Vegetal, Buenos Aires.

Current Entomological Literature

COMPILED BY R. G. SCHMIEDER AND J. W. H. REHN

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia and the University of Pennsylvania, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the year 1952 unless otherwise noted. Continued papers, with few exceptions, are recorded only at their first installment.

For other records of general literature and for economic literature, see the Bibliography of Agriculture, Washington, and the Review of Applied Entomology, Series A, London. For records of papers on medical entomology see Review of Applied Entomology, Series B.

NOTE: The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the List of periodicals and serials published in our January and June issues. The number of the volume, and in some cases, the part, heft, &c. is followed by a colon (:). References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to Neotropical species, and not so indicated in the title, have the symbol (S).

Papers published in ENTOMOLOGICAL NEWS are not listed.

GENERAL—Berland, L.—Pierre Lesne (1871–1949). [107] 20: 1–16 (Obituary, bibliography, portrait), 1951. **Fenton, F. A.**—Field crop insects. ix + 405 pp. Macmillan Co., New York, 1952. $5.75. **Lindberg, H.**—Odo Morannal Reuter (1850–1950). In memory of the 100th anniversary of his birth. [Comment. Biol., Helsingfors] 12: V–VIII (portrait), 1951. **Nielsen, A.**—The torrential invertebrate fauna. [Oikos] 2: 176–96, 1950. **Roeder, K. D.**—Insects as experimental material. [80] 115: 275–280. **S[chøyen], T. H.**—Ivar Trägårdh. [Norsk Ent. Tidsskr.] 8: 230–31 (Obituary), 1951. **Viette, P.**—Sur la nomenclature des "types." [110] 7: 150–53. **Whittaker, R. H.**—A study of summer foliage insect communities in the Great Smoky Mountains. [25] 22: 1–44.

ANATOMY, PHYSIOLOGY, MEDICAL—Alam, S. M.—The skeleto-muscular mechanism of Stenobracon deesae Cameron (Braconidae, Hymenoptera). An ectoparasite of sugarcane and juar borers of India. Part I. Head and thorax. [Aligarh Muslim Univ. Publ., Zool. Ser.] On Indian Insect Types III: 1–74, 1951. Price: Rs.5/8. **Armstrong, G., F. R. Bradbury and H. Stander**—The penetration of insect cuticle by isomers of benzene hexachloride. [4] 38: 555–66. **Balazuc, J.**—Teratology. (See under Hemiptera.) **Barlet, J.**—Morphologie du thorax de Lepisma saccharina L. (Thysanura). I. Squelette externe et endosquelette. [Bull. Am. Soc. Ent. Belg.] 87: 253–71, 1951. **Barnett, H. C. and E. C. Knoblock**—Chemical and biologi-

cal studies on DDT resistance of lice. [U. S. Armed Forces Med. Jour.] 3 (2): 297–304. **Bayreuther, K.**—Extrachromosomale feulgenpositive Körper (Nukleinkörper) in der Oogenese der Tipuliden. [Die Naturwiss.] 39: 71. **Berger, P.**—Le mécanisme de la photoreception dans l'oeil composé de l'Abeille. [C. R. Acad. Sci.] 234: 1208–09. **Berger, P. et J. Segal**—La discrimination du plan de polarization de la lumière par l'oeil de l'Abeille. [C. R. Acad. Sci.] 234: 1308–10. **Bernheimer, A. W., E. Caspari and A. D. Kaiser**—Studies on antibody formation in caterpillars. [41] 119: 23–35. **Buddenbrock, W. v.**—Vom Farbensinn der Tiere. Pp. 1–80, ill., Kosmos, Stuttgart, 1952. (Insects, pp. 7–23; spiders, 22–24.) **Carayon, J.**—Les fécondations hémocoeliennes chez les Hémiptères Nabidae du genre Prostemma. [C. R. Acad. Sci.] 234: 1220–22. **Carpentier, F. et J. Barlet**—Les sclérites pleuraux du thorax de Campodea. [Bull. Inst. Roy. Sci. Nat. Belg.] 27 (47): 1–7, 1951. **Dalmat, H. T.**—Longevity and further flight range studies on the blackflies (Diptera, Simuliidae), with the use of dye markers. [5] 45: 23–37. **Dreyfus, A., E. Nonato, M. E. Breuer e C. Pavan**—Cromosomas politênicos em vários órgãos de Rhynchosciara angelae N. and P. (Dipt.: Mycetoph.). [111] 11: 439–50, ill., 1951. **Fish, W. A.**—Embryology of Phaenicia sericata (Meigen) (Diptera: Calliphoridae). Part IV. The inner layer and mesenteron rudiments. [5] 45: 1–22. **Flanders, S .E.**—Ovisorption as the mechanism causing worker development in ants. [37] 45: 37–39. **Hassanein, M. H.**—The effects of infection with Nosema apis on the pharyngeal salivary glands of the worker honey-bee. [68] 27: 22–27, ill. **Herter, K.**—Weitere Untersuchungen über den Temperatursinn von Warmblüter-Parasiten. [Zool. Anz.] 148: 139–55. **Hoffman, R. A., A. R. Roth, A. W. Lindquist and J. S. Butts**—Absorption of DDT in houseflies over an extended period. [80] 115: 313–13. **Kästner, A.**—Zur Entwicklungsgeschichte des Prosoma der Solifugen. [Zool. Anz.] 148: 156–68. **Le Berre, J. R.**—Contribution à l'étude du déterminisme de l'envol du Doryphore, Leptinotarsa decemlineata. [C. R. Acad. Sci.] 234: 1092–94. **Legay, J. M.**—Expériences de jeûne absolu au cours du dernier âge de la vie larvaire chez Bombyx mori. [C. R. Acad. Sci.] 234: 885–88. **Marcus, H.**—La conexion de la fibra muscular con el tendon en Acromyrmex silvestri. [Folia Universitaria] 5: 115–16, 1951. Una glandula endocrina y la formacion de la casta trabajadora de

hormigas. *Ibid.* 75–82. **Mittler, S.**—Influence of nutrition upon appearance of tumors in Tu^{50j} stock of Drosophila melanogaster. [50] 115: 271–72. **Moffett, J. O.**—Effect of iodine on the longevity of caged bees. [37] 45: 135. **Pryor, M. G. M.**—On the abdominal appendages of larvae of Trichoptera, Neuroptera, and Lepidoptera, and the origins of jointed limbs. [74] 92: 351–74, ill., 1951. **Robinson, H. S.**—On the behaviour of night-flying insects in the neighborhood of a bright source of light. [68] 27: 13–21, ill. **Rossi, L.**—La membrana di tensione superficiale e la locomozione di alcuni invertebrati aquatici. [Natura, Milano] 42: 81–89, 1951. **Ruttner, F.**—Zur Genetik der Honigbiene (Apis mellifica): ihre Probleme und Möglichkeiten. [Portugalia Acta Biol.] Ser. A. (1949–51): 231–57. **Séguy, E.**—Larves hématophages de Diptères. [110] 7: 93–94, 1951. **Stammer, H. J. und Fr. Wachek**—Ein neuer insektenparasitischer Nematode, Carabonema hasei (n.g., n.sp. (Carabonematidae n. fam.). [Zool. Anz.] 148: 185–93. **Stern, C. and A. M. Hannah**—The sex combs in gynanders of Drosophila melanogaster. [Portugaliae Acta Biol.] Ser. A. (1949–51): 798–812. **Sussman, A. S.**—Tyrosinase and the respiration of pupae of Platysamia cecropia L. [12] 102: 39–47. **Thomas, J. G.**—A comparison of the pterothoracic skeleton and flight muscles of male and female Lamarckiana species (Orth., Acrididae). [68] 27: 1–12, ill. **Valadarez-da-Costa, M. et R. Jacquot**—Effets d'une surcharge en tryptophane sur le développement et la coloration de l'oeil des mutants v et vbw de Drosophila melanogaster en fonction du taux protidique du milieu. [C. R. Acad. Sci.]234: 1214–16. Influence du taux protidique du milieu sur le développement de Drosophila melanogaster mutants v et vbw. *Ibid.* 995–96.

ARACHNIDA AND MYRIOPODA—Kästner, A.—Solpugida. (See under Anatomy.) **Schenkel, E.**—Spinnentiere aus dem westlichen Nordamerika, gesammelt von Dr. Hans Schenkel-Rudin. [Verh. Naturf. Gesell. Basel] 62: 24–62 (*), ill., 1951. **Torres, C. M., H. Lent e L. F. Moreira**—Acarinose das vias respiratórias do canário (Serinus canarius L.) por Sternostoma tracheacolum Lawrence 1948. [111] 11: 399–406, ill., 1951.

SMALLER ORDERS—Barlet, J.—Thysanura. (See under Anatomy.) **Becker, G.**—Beobachtung der Kopulation bei Calotermes flavicollis Fabr. (Isoptera). [Zool. Anz.] 148: 270–73. **Carpentier et Barlet**—Campodea. (See under Anatomy.) **Freeman, J. A.**—Occurrence of Collembola in

the air. [87] 27: 28. **Gisin, H.**—Neue Forschungen über Systematik und Oekologie der Collembolen. [Die Naturwiss.] 38: 549, 1951. **Herter, K.**—Siphonaptera. (See under Anatomy.) **Marcus, H.**—Observaciones morfologicas en Dinjapyx marcusi. [Folia Universitaria] 5: 83–106, ill., 1951. La locomotion de Dinjapyx marcusi. *Ibid.* 107–14. **Nielsen, A.**—(See under General.) **Pryor, M. G. M.**—Trichoptera, Neuroptera. (See under Anatomy.) **Timmermann, G.**—Revision der bei Seeschwalben schmarotzenden Kletterfederlinge der Gattung Quadraceps (C. u. M.). (Mallophaga). [Zool. Anz.] 148: 87. The species of the genus Quadraceps (Mallophaga) from the Larinae. With some remarks on the systematics and the phylogeny of the gulls. [6] 5: 209–22, ill.

ORTHOPTERA—Chopard, L.—Orthoptéroïdes. [Faune de France] 56: 1–359, ill. **Knowlton, G. F.**—Grasshoppers and related Orthoptera. Records and notes largely from Utah. Part I. [Utah Agr. Exp. Sta. Mimeo Ser.] 386: 1–6. **Kuitert, L. C. and R. V. Connin**—Biology of the American grasshopper in the Southeastern United States. [31] 35: 22–33. **Thomas, J. G.**—(See under Anatomy.) **Valcarce, A. C. and G. F. Knowlton**—Utah grasshoppers—Melanoplus. Part II. [Utah. Agr. Exp. Sta. Mimeo Ser.] 386: 7–10.

HEMIPTERA—Balazuc, J.—La tératology des Hémiptères et groups voicins. [107] 20: 17–66, ill., 1951. **Blanchard, E. E.**—Tres nuevos himenopteros utiles para la agricultura. [Rev. Invest. Agr., B. Aires] 2: 57–64, ill., 1948. **Carayon, J.**—La fécondation hémocoelienne chez Prostemma guttula (Hemip., Nabidae). [C. R. Acad. Sci.] 234: 1317–19. (See also under Anatomy.) **Carvalho, J. C. M.**—Mirídios neotropicais, XXXIX: Sôbre duas espécies novas do Brasil. [Comment. Biol., Helsingfors] 12 (7): 1–6, 1951. **Doutt, R. L.**—A comparative study of spermatozoa in relation to the classification of mealybugs. [66] 14: 391–96. **Drake, C. J. and R. F. Hubbell**—An undescribed shore bug from Mexico (Saldidae). [57] No. 536: 1–3, 1951. **Eastop, V. F.**—A sound production mechanism in the Aphididae and the generic position of the species possessing it. [30] 85: 57–61. **Essig, E. O. and F. Abernathy**—The aphid genus Periphyllus. A systematic, biological and ecological study. 166 pp., ill. Cambridge University Press, University of California Press, Berkeley 4, Cal., 1952. Price, $3.00. **Evans, J. W.**—Some notes on the classification of leaf-

hoppers (Jassoidea) with special reference to the nearctic fauna. [Comment. Biol., Helsingfors] 12 (3): 1–11, 1951. **Heslop-Harrison, G.**—The number and distribution of the spiracles of the adult Psyllid. [6] 5: 248–60. **Herter, K.**—(See under Anatomy.) **Kormilev, N. A.**—Notas Hemipterológicas. [Acta Zool. Lilloana] 9: 495–503 (*) (Pent., Arad., Elam.), 1950. Notas Hemipterológicas. II. [Dusenia] 3: 51–56 (Pent.,* Arad.*). Notas sobre Hemipteros bolivianos. [Folia Universitaria] 5: 35–45, 1951. **Lent, H.**—Triatominae das Regiões oriental, australiana, etiópica e paleárctica, com descrição de uma nova espécie (Reduviid.). [111] 11: 425–29, ill., 1951. **Metcalf, Z. P.**—Phylogeny of the Homoptera Auchenorhyncha. [Comment. Biol., Helsingfors] 12 (1): 1–14, 1951. **Müller, H. J.**—Ueber das Schlüpfen der Zikaden (Homoptera auchenorrhyncha) aus dem Ei. [Zoologica, Stuttgart] 37 (4 Lief.) (Heft 103): 1–40, 14 pls., 1951. **Soliman, A. A.**—Morphological features as a means for detecting the different stages of the aphid Myzus persicae Sulz. [Bull. Soc. Fouad I d'Ent.] 35: 193–204, 1951. **Tuthill, L. D.**—Records and descriptions of some Micronesian Psyllidae. [Pacific Sci.] 5: 273–78, 1951. **Usinger, R. L.**—A revised classification of Pacific Island Cyrtorhinus with a new species from Fiji (Miridae). [Comment. Biol., Helsingfors] 12 (8): 1–5 (k*), 1951. **Wagner, B.**—Beitrag zur Phylogenie und Systematik der Cicadellidae (Jassidae) Nord u. Mitteleuropas. [Comment. Biol., Helsingfors] 12 (2): 1–44, 1951. **Wygodzinsky, P.**—Contribuição ao conhecimento do genero Heniartes Spinola, 1837. [Arq. Mus. Nac., Rio de Jan.] 41: 9–74, 1948.

LEPIDOPTERA—Bernheimer, et al.—(See under Anatomy.) **Field, W. D.**—Moths of the genera Mulona Walker and Lomuna, a new and closely related genus (Arctiidae, Lithosiinae). [71] 102 (3298): 221–30, ill. A revision of Eurema Hübner subgenus Teriocolias Röber (Pieridae). [Acta Zool. Lilloana] 9: 359–74, ill., 1950. **Freeman, H. A.**—Notes on Megathymus yuccae, with the description of a new subspecies (Megathym.). [Field and Lab., Dallas] 20: 29–33. **Hayward, K. J.**—Catálogo sinonímico de los ropalóceros argentinos excluyendo Hesperiidae. [Acta Zool. Lilloana] 9: 85–281, 1950. Las especies y formas argentinas del genero Adelpha (Nymphalidae). *Ibid.* 375–93. **Janse, A. J. T.**—The moths of South Africa. Gelechiadae. Vol. 5. Pt. 3, pp. 173–300. Pretoria, 1951. Price, 12/6. Plates 89–136, Price, 17/6. (Publ. by Transvaal

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Review

AN INTRODUCTION TO ACAROLOGY. By E. W. Baker and G. W. Wharton. The Macmillan Co., New York. 1952. xiii plus 465 pages, 377 figures. $10.00.

This is the book that has been so long awaited by both beginning and established Acarologists. It has been written by two young men, both excellently qualified for the job, and they have done it well.

The book is divided into eight chapters. Chapter I, the Introduction, devotes 35 pages to a discussion of the history of Acarology, methods of collecting, preparation for study and a brief survey of the external and internal morphology of the mites. Vitzthum in his magnus opus on the Acarina devoted over 400 pages to this phase but Baker and Wharton have presented the salient points in fewer than 40 pages remarkably well.

The following seven chapters are primarily taxonomic. The chapter headings are respectively: The Suborder Onychopalpida, The Suborder Mesostigmata, The Suborder Ixodides, The Suborder Trombidiformes, Hydrachnellae, The Suborder Sarcoptiformes, and Orbatei.

The authors give a general discussion of each suborder and follow this with a key to the families and in most instances also to the subfamilies. Each family is treated as follows: a brief morphological diagnosis, one or more figures of representative species, a list of the genera with their genotypes, a general discussion of the family which reviews what is known of the biologies and economic and medical importance of the included species, and finally the pertinent references to the literature.

The book is copiously illustrated with line drawings. The majority of the illustrations are borrowed from contemporary authors and in all but a very few cases, the figure appears on the same page as the textual matter discussing it. A most happy arrangement.

Baker and Wharton have combined some groups (i.e., Liponissinae and Dermanyssinae) and raised others to family rank that have been generally regarded as subfamilies at the most. There are those who will object to this but after all, that is a matter of small concern as the relationships are still indicated.

Perhaps the item of greatest hope to users of this book will be the keys to families and subfamilies. Probably Baker and Wharton innocently believe their keys are workable! As a matter of fact, for a great many species they are, but the collector of mites will find plenty of specimens that will run to their proper family only by intuitive guidance through the dichotomous maze.

If we believe in the gradual evolution of species we must realize that it is impossible ever to arrive at a classification consisting of clearly defined categories. Keys to families are, therefore, difficult approximations in any group; in the Acarina they are nearly impossible. The authors, therefore, must be given a lot of credit for fashioning keys that do work at least part of the time.

All in all this is a fine book. One of which both the publisher and the authors may well be proud. It is cloth bound and published on fine quality paper. The frontispiece is a color plate of one of the more bizarre red mites.

The book should do much both to stimulate and assist in the pursuit of acarological knowledge.

R. W. Strandtmann,
Texas Technological College,
Lubbock, Texas

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Coleoptera—Large quantities of Cicindelidae, Buprestidae, Lucanidae, Cerambycidae wanted in exchange for all families of Coleoptera from Ill., Ind. and Mo. Joseph B. Hayes, 1905 N. Pulaski Rd., Chicago 39, Ill.

American Sarcophagidae—wanted for identification. H. R. Dodge, P.O. Box 185, Chamblee, Georgia.

German lepidopterist wishes to correspond and receive live material (eggs and pupae) in exchange for dried imagoes. Johannes Reichel, Koenigsberg, Krs. Wetzlar 16, Germany.

For exchange—The periodic Cicada, T. septendecim. Desire Lepid., espec. Papil., Sphing. & Speyeria. Also Col., espec. Ceramb. & Lucan. John W. Morris, 2704 Genesee St., Syracuse 9, N. Y.

Cynipid and Itonidid galls—American species wanted; purchase or exchange for British species. Fresh or dried. D. Leatherdale, F.R.E.S., Old Woodstock, Oxford, England.

Wanted—Reprints or papers concerning insects taken in Alaska for inclusion in list of Alaskan insects. R. H. Washburn, Alaska Experiment Station, Palmer, Alaska.

Conopidae of the World wanted. Will pay 10¢ to $1.00 for pinned and labelled specimens. S. Camras, 4407 N. Milwaukee Ave., Chicago 30, Illinois.

Anisoptera—Nearctic sp. wanted for exchange, espec. Ophiog., Arigom., Aeschna, Neurocor., Somatoc., Cordulia, Dorocor., Leucor. R. D. Cuyler, N. C. State College, Raleigh, N. C.

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ENTOMOLOGICAL NEWS

JULY 1952

Vol. LXIII No. 7

CONTENTS

PUBLISHED MONTHLY, EXCEPT AUGUST AND SEPTEMBER, BY
THE AMERICAN ENTOMOLOGICAL SOCIETY
PRINCE AND LEMON STS., LANCASTER, PA.
AND
1900 RACE STREET, PHILADELPHIA 3, PA.

Subscription, per yearly volume of ten numbers: $5.00 domestic; $5.30 foreign; $5.15 Canada. Entered as second-class matter April 19, 1943, at the post office at Lancaster, Pa., under the Act of March 3, 1879. Acceptance for mailing at the special rate of postage provided for in paragraphs (d-2), Section 34.40, P. L. & R. of 1948, authorized April 19, 1943.

ENTOMOLOGICAL NEWS

ENTOMOLOGICAL NEWS is published monthly, excepting August and September, by The American Entomological Society at Prince and Lemon Sts., Lancaster, Pa., and the Academy of Natural Sciences, 1900 Race Street, Philadelphia 3, Pa., U. S. A.

PHILIP P. CALVERT, Editor Emeritus. R. G. SCHMIEDER, Editor. Editorial Staff: E. J. F. MARX, M. E. PHILLIPS, J. A. G. REHN, and A. G. RICHARDS.

Subscription price, per yearly volume of 10 numbers: Domestic, $5.00; Foreign, $5.30; Canada, $5.15—U. S. Currency.

SUBSCRIPTIONS, ADVERTISEMENTS: All communications and remittances to be addressed to **ENTOMOLOGICAL NEWS, 1900 Race Street, Philadelphia 3, Pa.**

MANUSCRIPTS and all communications concerning same should be addressed to **R. G. Schmieder, Zoological Laboratory, University of Pennsylvania, Philadelphia 4, Pa.**

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ENTOMOLOGICAL NEWS

VOL. LXIII JULY, 1952 No. 7

On Three New Eurymerodesmid Millipeds and Notes on Paresmus impurus (Wood)

By NELL B. CAUSEY, Fayetteville, Arkansas

From southern Missouri into Mississippi and westward into Texas and Oklahoma, eurymerodesmids, next after pseudopolydesmids, are the most abundant of the polydesmoid millipeds; while xystodesmids, which are so abundant in the Atlantic Coast states, are relatively rare. Unlike the pseudopolydesmids, in these states sympatric species of eurymerodesmids are not uncommon and species tend to be limited as to distribution, often to as few as five or six counties. The taxonomy is difficult, for there is considerable individual variation in some species in the two most used characters, the male gonopods and the marginal lobes of the gonopodal opening. The female vulvae, which also are of taxonomic importance in this group, have been neglected by taxonomists.

The type specimens will be deposited in the collection of the Academy of Natural Sciences of Philadelphia.

Family EURYMERODESMIDAE

Genus **EURYMERODESMUS** Brolemann 1900

Eurymerodesmus compressus, n. sp. Figs. 1–4

Gonopods distally flattened in the vertical plane as in *E. wellesleybentoni;* distinguished from that species by the small setose pyramids with black apices between the odd numbered legs, 11 through 25. Gonopodal opening widened disto-laterad as in *E. amplus* Causey 1952, but without the disto-lateral lobes

of that species. Easily distinguished from related species by the long sickle-shaped vulvae of the female.

Male holotype.—Dorsum mottled dark olive, with an uninterrupted black line; lateral margins of keels and cephalic margin and keels of collum orange; antennae and distal half of legs dark; venter and base of legs creamy. Caudal angles of keels 2 through 13 rounded to right, becoming increasingly acute 14 through 19.

Outer mandibular process larger than in most species. Coxae of first legs with small conical process on distal margin; processes of coxae of second legs larger than in other species. Sterna between legs 4 through 25 moderately setose and, except for the ninth, with a pair of tubercles, the tubercles larger and with black apices between the odd numbered legs. Sternum of ninth legs with deep V-shaped excavation, but with no raised lobes.

Gonopodal opening (fig.1) widened at the disto-lateral angles, with the distal margin closely adjacent to the spiracles and overhung by the sternum of the ninth legs; in *E. goodi* Causey 1952 the gonopodal opening is also overhung by the sternum. At about the middle of the lateral margin there is a medial, thickened strut; in lateral view this strut forms the apex of a triangular lobe, with the margin concave on both sides of the apex. Margin setose in front and laterad as far back as the struts; less setose inside the disto-lateral angles and across the distal margin and on the overhanging sternum. Laterad the pleurite above the opening is finely wrinkled as usual in a triangular area.

The gonopods (fig. 2) are curved and laterally compressed as in *E. wellesleybentoni* but are shorter and stouter. The ends turn slightly laterad and rest against the middle of the cephalic surface of the ninth coxae. The seminal canal passes along the inner curvature, but not so near the margin as in *E. wellesleybentoni,* and opens at the apex. There are the usual three rows of setae; the medial row, the only one indicated in fig. 2, consists of about 12 setae; the lateral row is longer, and the dorsal row is much longer and connects with the thickly setose prefemur.

Length 35 mm., *width* 6.2 mm.

Type locality.—Arkansas, Union Co., Junction City; 16 males, 2 females, October, 1950. Other collections in the same locality consist of 1 female May 10, 1950, and 11 males January 16, 1952, all collected by the Rev. H. M. Bevel; and 1 female May, 1950, at Three Creeks by Dr. Dwight Moore. *E. spectabilis* Causey 1950, a smaller species, occurs in the same general locality.

Female paratype.—Colors and pattern as in male; sterna without tubercles and almost glabrous; caudal angles of keels as in male.

Vulvae (figs. 3 and 4) conspicuously elongated and sickle-like, with the apices crossed *in situ*. The caudal valve (*c*) is acute and much longer than the smaller cephalic valve (*a*); the proximal cephalic surface of both valves are setose and wrinkled, but otherwise they are glabrous. The operculum (*o*) is small and setose, and the neckpiece (*n*), which forms a complete, scleritized ring, is greatly enlarged on the caudal surface.

Length 34 mm., *width* 5 mm.

Eurymerodesmus wellesleybentoni, n. sp. Fig. 5

A species similar in size and shape of gonopods to *E. angularis* Causey 1951; distinguished from it by differences in color pattern, in the details of the gonopodal opening, and the laterally compressed apex of the gonopods. In this last character it resembles the larger *E. compressus*.

Male holotype.—Dorsum mottled dark olive, with an uninterrupted black line; lateral margins of keels and cephalic margin and keels of collum orange; legs and antennae dark; venter creamy.

With the usual small processes on mandibles and coxae of second legs. Small setose lobes on sternites of fifth, sixth, seventh, ninth, eleventh, and thirteenth legs; sternites between remaining legs, except the last four, setose. Excavation between ninth legs deep and rectangular, about twice as wide as the lobes. Caudal angles of keels 15 through 19 acute.

Gonopodal opening with the usual anterio-medial constriction. Laterad the margins flare slightly, turn abruptly at the disto-lateral angles, and end abruptly at the lateral limit of the coxal openings. There is no formed margin along the caudal region of the opening. About the middle of the lateral margins is a small strut on the mesial surface. The margin is thickly setose anteriorly and laterad as far back as the struts; it is less setose on the mesial surface caudad of the struts and across the caudal surface. In lateral view the margin is horizontal, falling away perpendicularly at the coxal opening; it is finely wrinkled in a broadly triangular area with its apex on the segmental suture.

The apex of the gonopods is compressed laterally, so they appear much less robust in ventral view than as shown in figure 5, the mesial view. *In situ* they are subparallel, closely appressed to the ninth coxae, with the apices resting on the caudal surface of the coxae. The distal half is free of setae, which are in the usual lateral, dorsal, and mesial rows. The seminal canal passes along the inner curvature, very near the surface, and opens at the apex.

EXPLANATION OF FIGURES

Eurymerodesmus compressus, n. sp.

FIG. 1. Outline of gonopodal opening, ventral view; *m,* anterio-medial constriction; *p,* posterio-lateral angle; *s,* strut; *sp,* spiracle; *t,* sternum; *x,* coxa of ninth leg.

FIG. 2. Telopodite of left gonopod, mesial view; setae of lateral and dorsal rows omitted, mesial row indicated.

FIG. 3. Left vulva, cephalic view; *c,* caudal valve; *a,* cephalic valve; *n,* neckpiece; *o,* operculum.

FIG. 4. Same, caudal view.

Eurymerodesmus wellesleybentoni, n. sp.

FIG. 5. Telopodite of left gonopod, mesial view; setae of dorsal row and prefemur omitted.

Eurymerodesmus sanbernadinensis, n. sp.

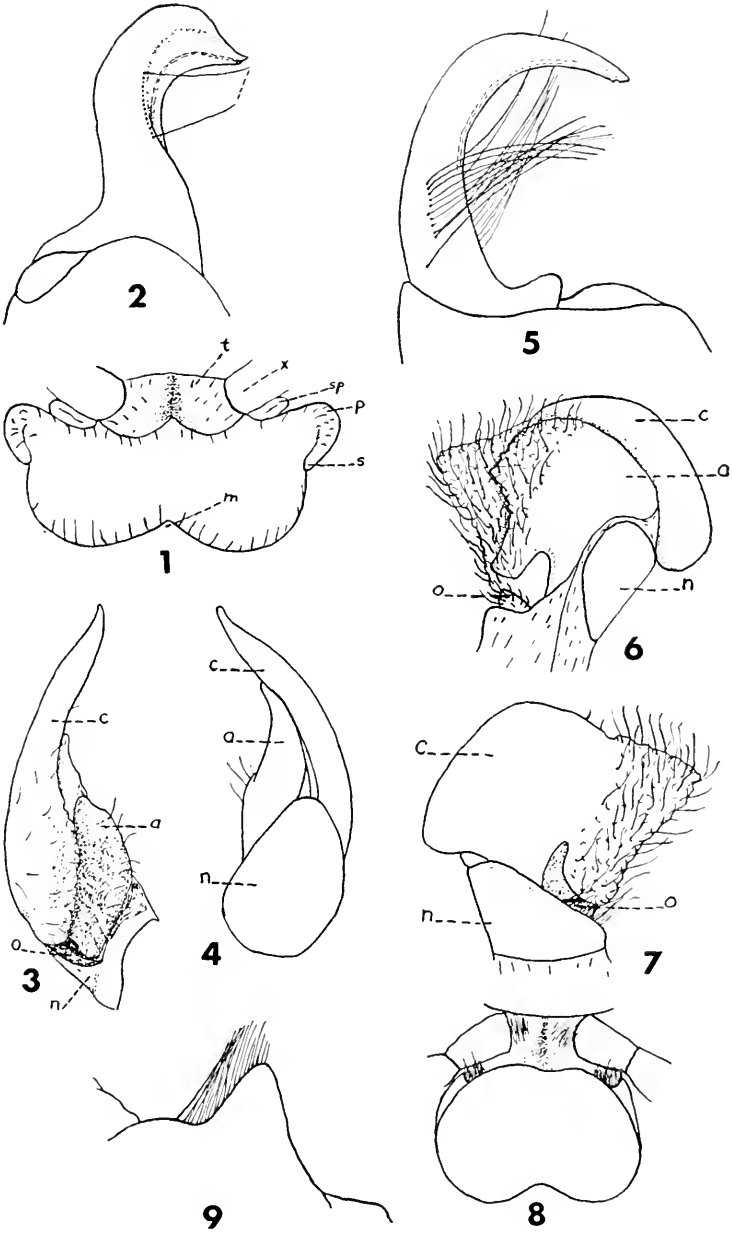
FIG. 6. Right vulva, cephalic view.

FIG. 7. Same, caudal view.

Paresmus impurus (Wood)

FIG. 8. Outline of gonopodal opening, ventral view.

FIG. 9. Marginal lobe, left, lateral view.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Width 3.9 mm.

Type locality.—ARKANSAS, Phillips, Co., Helena; one specimen collected in November, 1951, by Mr. Wellesley Benton, for whom the species is named.

Eurymerodesmus sanbernardiensis, n. sp. Figs. 6 and 7

A smaller species than *E. melacis* Chamberlin and Mulaik 1941, which also occurs in the Gulf Coast area of Texas. Distinguished from *melacis,* in which the valves of the female vulvae are equal and the operculum is exposed, by the unequal valves and the small, covered operculum. Distinguished from *compressus,* in which the valves are unequal and the caudal one is sickle-like, by the subquadrate caudal valve.

Female holotype.—Color not completely developed; dorsum mottled with orange and with an uninterrupted black line; keels orange laterad. Keels relatively small and dorsum highly arched. Sterna glabrous.

Vulvae (figs. 6 and 7) relatively larger than in typical eurymerodesmids. Both valves are wrinkled and setose along the mesial margins and glabrous otherwise. Both the large caudal valve (*c*) and the small cephalic valve (*a*) are irregularly lobate on the proximal mesial margin. The neck piece (*n*) is well developed, but is saddle-shaped, rather than forming a complete ring. The operculum (*o*) is small, setose, and covered by the lobes of the valves.

Length 18.5 mm., *width* 2.5 mm.

Type locality.—TEXAS, Fort Bend Co., banks of San Bernardo River, U. S. highway 59; one gravid female collected January 3, 1952.

Genus **PARESMUS** Brolemann 1900

Paresmus impurus (Wood). Figs. 8 and 9

Polydesmus impurus Wood 1867, Proc. Acad. Nat. Sci. Phila. (1867) :47

The following is from Wood's description of the species:

The male appendages are robust, their blunt distant end is covered with long hairs, and gives origin to two spines, neither

of which is hairy; the larger of these is regularly curved, except at its extreme point, where it is abruptly bent; the other is slender, curved, and acute. The total length of the body and head is about an inch.

A vial in the collection of the Academy of Natural Sciences of Philadelphia is labelled: *Polydesmus impurus* Wood, No. 14210, Dr. Lincecum, probably type. It contains fragments, but no gonopods, of at least one male from which the following notes and the accompanying figures were made in 1950.

Mandibles and coxae of second legs with the usual processes. Sterna between legs 4 through 7 with a pair of tufts of setae; sterna behind gonopods setose and legs finely pubescent. Sternum between ninth legs with U-shaped excavation and setose lobes. Caudal angles of keels 12 through 19 acute.

Gonopodal opening with the usual anterio-medial constriction; caudad the opening is oval. Posterio-laterad the margin continues as triangular lobes (figs. 8, 9), which flare slightly and are about the same height as the lobes between the ninth legs. The caudal surface of the lobes is setose, but no other part of the gonopodal opening bears setae.

Width 3.6 mm.

Type locality.—Texas. The last home of the collector, Dr. Gideon Lincecum, was at Bonham, Washington Co., but he travelled so widely in Texas it is impossible to assign that safely as a specific locality to this species at this time.

The habitat, chiefly under old cow dung, is not unusual for millipeds. In an area that offers little else for cover, several millipeds, perhaps two or three species, may be found under one piece of dung.

Key to Species of *Paresmus* Based on Adult Males

1 (2) Subterminal tooth on concave dorsal surface of telopodite; triangular lobes on posterio-lateral margins of gonopodal opening ..... *P. pulaski* Causey 1950
2 (1) Dorsal surface of telopodite convex and without subterminal tooth 3
3 (8) Telopodite of almost uniform width beyond broad prefemur 4

4 (7) Apex of telopodite bifid, one branch blunt and the other acute 5
5 (6) Marginal lobes horizontal and lateral.....
.....*P. paroicus* Chamberlin 1940.
6 (5) Marginal lobes triangular and posterio-lateral.....
.....*P. impurus* (Wood 1867)
7 (4) Apex of telopodite simple..*P. polkiensis* Causey 1952.
8 (3) Telopodite decreases gradually from broad prefemur to simple, acute apex; longitudinal ridge on dorsal surface; marginal lobes triangular and lateral.....
.....*P. columbus* Causey 1950.

Notice

The Pacific Science Board of the National Research Council announces that the results of its Entomological Survey of Micronesia are to be published by the Bishop Museum, Honolulu in a series entitled "Insects of Micronesia." All groups of insects, and also other terrestrial arthropods, will be included, as far as specialists are available and willing to cooperate in the program. The reports will be published as individual papers, as received, and not in systematic order. The principal basis for the study will be the collections made during the past few years under the auspices of the Board. The field work will be completed during 1952, and much of the material is already mounted and is being sorted for distribution to specialists. Other collections from Micronesia will also be utilized. The project is being organized by Dr. J. Linsley Gressitt, with headquarters at the Bishop Museum, Honolulu 17, T. H. He will be glad to receive offers from specialists to study particular groups, and information about additional collections from Micronesia. The Chicago Natural History Museum, the California Academy of Sciences and the Museum of Comparative Zoology have cooperated in the processing of the Pacific Science Board collections.

A New Species of Xenorhipis from Texas (Coleoptera: Buprestidae)

By Josef N. Knull, Department of Zoology and Entomology, The Ohio State University

Xenorhipis hidalgoensis n. sp.

♀.—Moderately elongate, robust; head and dorsal surface brilliant metallic green; scutellum, area along suture back of scutellum and a patch back of middle along lateral margin of each elytron dark blue. Exposed dorsal segments of abdomen, posterior coxae, meso- and metaepisternum brilliant metallic green. Abdomen and rest of ventral surface dark blue, pubescence of entire insect not conspicuous.

Head deeply depressed between eyes near occiput; surface reticulate, becoming granulose on vertex; antennae extending to near hind angles of pronotum when laid along side, serrate from the fourth segment, third segment longer than second.

Pronotum wider than long, wider at apex than at base; sides rounded in front, then obliquely converging to base; lateral margin inferior in front; anterior margin sinuate, median lobe broad; basal margin truncate; disk somewhat flattened, a small depression each side in front of middle and at base; surface finely reticulate. Scutellum oval, granulose.

Elytra wider than base of pronotum; sides subparallel near base, constricted in front of middle, then subparallel to separately well rounded apices which are not serrate; disk somewhat flattened, a basal depression near outer angle on each elytron; surface coarsely granulate all but umbone.

Abdomen beneath coarsely granulate, pubescence short. Prosternum not lobed, margin truncate.

Length 5.3 mm.; width 1.8 mm.

♂.—Narrow elongate; head and pronotum bronze, elytra with a bronzy reflection, with exception of a metallic blue area along base of elytron and extending along sutural margin, an oblique light line extending from basal depression to middle then turned toward lateral margin. Beneath more brilliant bronze. Antennae pectinate. A large sensory pit on side of metasternum.

Length 5.5 mm.; width 1.6 mm.

Holotype ♀ and *allotype* collected in Hidalgo Co., Texas, March 20, 1952, by D. J. & J. N. Knull. *Paratypes* from same locality, March 18–27, 1952, and April 7, 1950, with same collector data. Type material in collection of author.

This species is closely related to *X. brendeli* Lec. The females can be separated by the entire apices of elytra and the color pattern. The males and females are similarly marked in *brendeli*. The brassy dorsal surface of the males in *hidalgoensis* as well as more finely serrulate apices of elytra will separate them.

Notes on Calendridae (Coleoptera)

By David McComb and G. F. Knowlton. Logan, Utah

Material belonging in this small family gradually has accumulated in the Utah State Agricultural College insect collection. Following a preliminary study, most of the material recorded below was checked by Miss Patricia Vaurie.

Calendra aequalis ochrea Lec. Midvale, Utah, Aug. 7, 1937 (G. F. Knowlton); Logan, Utah, July 23, 1926 (F. Clarke), July 21, 1947 (S. E. Harrison), Aug. 14, 1947 (R. L. Rigby); Mona, Utah, June 5, 1941 (Knowlton—F. C. Harmston); Bear River Bird Refuge, Utah, May 5, 1941 (C. Bruce); Jordan Narrows, Utah, June 13, 1935 (R. C. Roskelley); Provo, Utah, May 1926 (C. Brown).

C. australis australis Chitt. Logan, Utah, June 15, 1932 (B. G. Whitaker); Hurricane, Utah, June 10, 1941 (Knowlton); Corinne, Utah, June 17, 1930 (Knowlton).

C. cicatristriata Fahr. Logan, Utah, June 11, 1931 (Knowlton), Aug. 27, 1947 (B. H. Popov); Riverdale, Idaho, Sept. 16, 1934 (C. F. Smith).

C. gentilis Lec. Farmington, Utah, June 19, 1937 (D. E. Hardy).

C. graminis Lec. Logan, Utah, July 3, 1946 (M. Nielson).

C. mormon Chitt. Logan, Utah, May 16, 1949 (W. W. Bryant); Gilroy, California, June 15, 1942 (D. F. Zamzow);

Stansbury Island, Utah, June 13, 1913 (Titus); Ephraim, Utah, July 6, 1904 (Titus); Moab, Utah, June 1, 1931 (Knowlton).

C. robusta Horn. Provo, Utah, May 1938 (R. Rigby).

C. simplex Lec. Logan, Utah.

C. ulkei Horn. Brigham, Utah, July 17, 1948 (Hardy).

Scyphoporus acupunctatus Gyll. El Paso, Texas, June 20, 1942 (T. O. Thatcher); Sabino Basin, St. Catalina Mtns., Arizona, Aug. 20, 1916 (Clark).

Sitophilus granarius L. Beaver, Utah, June 11, 1943 (Knowlton—P. E. Telford); Huntington, Utah, August 27, 1934, on wheat (Knowlton); Roosevelt, Utah, April 20, 1940, on sweet corn seed (Knowlton); Delta, Utah, Sept. 3, 1932 (Knowlton); Logan, Utah, Oct. 24, 1940 (D. Maughan).

S. oryzae L. On rice at Mauii, Hawaii, April 1, 1946 (C. J. Davis).

Rhodobaenus 13-punctatus Ill. Logan, Utah, Sept. 5, 1948 (W. H. Hanson), May 24, 1948 (B. A. Haws), June 2, 1948 (E. J. Taylor), July 20, 1934 (Thatcher); Beaver Dam, Utah, July 7, 1949 (A. C. Valcarce); Moab, Utah, Aug. 25, 1935 (Knowlton); Ogden, Utah, May 8, 1941 (D. R. Maddock), June 14, 1941 (W. D. Fronk); Smithfield, Utah, July 7, 1937 (Harmston); Petersboro, Utah, June 4, 1938 (Knowlton—Hardy); Plain City, Utah, June 8, 1938 (Knowlton—Hardy); Marysvale, Utah, June 3, 1941 (Knowlton—Harmston).

Unusual Abundance of Lacebugs in New Jersey During Summer of 1951

Ever since the summer of 1946 lacebug populations have been building up in New Jersey on various host plants, culminating during the summer of 1951 in one of the worst infestations that have been noted for years. These infestations were so general over all portions of the state wherever host plants grew that locality records are unnecessary. The azalea lacebug, *Stephanitis pyrioides* Scott, introduced many years ago from Japan, was present in unusual numbers all over central and northern New Jersey in nearly every locality where established plants were

growing. The rhododendron lacebug, *Stephanitis rhododendri* Horv., was likewise abundant on rhododendrons in the same area.

More noticeable than any other species was *Corythucha ciliata* Say, on American buttonwood and European plane. Numerous American buttonwoods as high as fifty feet had every leaf whitened by the feeding of millions of adults and nymphs and anyone standing beneath such trees was soon covered by hundreds of insects. On *Crataegus tomentosa, Corythucha cydoniae* Fitch was unusually plentiful in the central area of New Jersey, occurring also on shadbush.

Mr. Robert J. Sim observed heavy and conspicuous infestations of *Corythucha arcuata* Say on chestnut oak in the Pine Barrens and on white oak in various other areas; *Corythucha pergandei* Heid., generally prevalent on alder; *Corythucha associata* O. & D., common on wild cherry; *Corythucha ulmi* O. & D., in large numbers on American elm at Adelphia in Monmouth County, N. J., this species not having been recorded previously from New Jersey; *Corythucha juglandis* Fitch, plentiful on walnut; *Corythucha celtidis* O. & D., occasionally on hackberry; *Gargaphia tiliae* Walsh, moderate on linden; the eggplant lacebug, *Gargaphia solani* Heid., general and conspicuous on eggplant and horse nettle in the southern part of New Jersey.

It is difficult to account for the unusual abundance of these insects. As exposed feeders they are subject to the attacks of predacious enemies. Years ago I paid close attention to lacebugs, but I do not recall them as having many parasitic enemies. However, according to the U. S. Weather Bureau, the winters of New Jersey since that of 1945–46 have been milder than normal except that of 1947–48 which was a little colder than normal. The winter of 1948–49 was much milder than usual. Most of the species overwinter in the adult stage and a succession of mild winters may have reduced the mortality among overwintering adults so that unusually large numbers were available for feeding and breeding each spring. This may account for the gradual increase in the population every summer culminating in the extremely heavy population of the summer of 1951. During severe and changeable winters the mortality among overwintering adults is considerable.

H. B. Weiss

Pyrota riherdi, a New Species of Meloidae (Coleoptera), from South Texas

By Lawrence S. Dillon, Department of Biology, A. & M. College of Texas

Among a miscellaneous collection of beetles from south Texas received for identification was the very interesting unique specimen described below. The author wishes to express his thanks to Mr. Paul T. Riherd, who collected the fine beetle.

Pyrota riherdi n. sp.

Pale stramineous, the elytra paler, nearly cream-colored; pronotum with a small, round, dark macula each side of middle of disk and a slightly larger, irregular, similar one on extreme side margin above procoxal cavity. Elytra each with two distinct, sharply defined, fuscous vittae, outer one extending from humerus to near apex, the inner one remote from suture, abbreviated, reaching from behind scutellum to middle of elytron, each scarcely one-third as wide as the space between them. Body beneath stramineous, with black markings as follows: mesepisterna with a triangular macula; metasternum at each outer anterior angle with a small macula, metepisterna with a narrow vitta; and first three abdominal sternites broadly black. Apices of femora and of tibiae, and entire tarsi, clouded with fuscous. Antennae fuscous, except the scape, which is dusky.

Head one-sixth wider than long, above arcuate to eyes, finely punctulate and densely, coarsely punctate over entire surface; eyes large, distinctly longer than interocular width, slightly broader than supraocular space. Pronotum one-third longer than wide, sides nearly straight basally, subparallel, very feebly widened to before middle, thence arcuately narrowed to apex, entire surface coarsely punctate (as well as sparsely, finely punctulate), the punctures sparse anteriorly but quite dense on basal half, especially so directly behind the dark discal maculae; basal discal impression small but deep. Elytra having a smooth appearance, not at all rugulose, minutely, densely alutaceous and

finely, evenly punctate except on the very feebly elevated costae. Metatibial spurs rather broad, concave, the outer one just twice as broad as inner. Antennae slightly surpassing elytral base, robust, very feebly tapering from fifth segment to apex; scape reaching slightly beyond middle of eye, slightly arcuate; second segment one-third as long as first; third nearly twice as long as second; fourth to eighth segments each half as long as first; ninth and tenth slightly shorter; eleventh a little longer than third.

Length 12 mm.

Holotype female (?): Edinburg, TEXAS, September 17, 1951, sweeping Rhodes grass (P. T. Riherd) [A. & M. College of Texas].

Remarks: Superficially this species resembles *P. bilineata* Horn, but is amply distinct from it in possessing four maculae on pronotum, having the elytral vittae very fine, the inner one abbreviated, and in its paler elytral coloration. Moreover, the head and pronotum are coarsely, densely punctate, the eye is distinctly longer than the interocular width, the elytra are not at all rugose but are uniformly, finely, and smoothly punctate, and the inner metatibial spur is much broader, being one-half as wide as the outer instead of one-fourth as in *bilineata*.

Correction

The ENTOMOLOGICAL NEWS of February, 1952, page 45 carried the statement, "At the California Academy of Sciences, the small vial consists of an open glass tube . . . ." Dr. E. S. Ross called my attention to the fact that the collection, "consists of shell vials, open at one end, 80 mm. in length and of several diameters. These are cotton-plugged and stored in an inverted position in the jar filled with alcohol. A partition plug of cotton protects delicate or small specimens from contact with the labels." The misstatement was a misinterpretation of notes and sketches by the author.

VINCENT D. ROTH

Current Entomological Literature

COMPILED BY R. G. SCHMIEDER AND J. W. H. REHN

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia and the University of Pennsylvania, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

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Vincent D. Roth

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Reviews

THE INTEGUMENT OF ARTHROPODS. The chemical components and their properties, the anatomy and development, and the permeability. By A. Glenn Richards. University of Minnesota Press, Minneapolis, 1952. Pp. xvi + 441, 65 figs. $6.00.

The title of this book tells what it is about. The average entomologist, however, even though he faithfully looks at the abstracting journals and at entomological periodicals and has some idea of what has been going on, will yet be amazed, upon paging through this book, at the gerat amount of detailed information that is covered and the diversity of the approaches to the study of the cuticle and the epidermis of arthropods that are represented. Professor Richards has reviewed critically and compared the tremendous literature that has accumulated (his bibliography has 1800 references), and he has shown skill and good judgment in sifting out basic information. The result is a balanced presentation organized under three sections dealing respectively with chemical and physical properties, anatomy and development, and with permeability. The further subdivision of the material into 31 chapters has also been very successful and this arrangement, together with the good index (14 pages), makes the book very convenient for reference use.

Although the book is written by a physiologist, there are quite a few anatomical illustrations and this fact points up a change that has come about in physiology. Twenty-five years ago, physiologists would hardly look at their actual material and attended mainly to their instruments and wrote papers illustrated by curves (often described by them as "beautiful") bearing dots of various shapes. Nowadays, even in the general physiology section of scientific meetings one sees many pictures presented, mainly micrographs, ordinary, phase and electron; truly physiology and morphology have re-married!

Professor Richards introduces two new terms: "procuticle," for the inner portion of the cuticle, i.e., the part beneath the epicuticle and which is often divisible into exocuticle and endocuticle; and "tectocuticle" for the cement-layer of Wigglesworth. It may be long before such new terms come into general use, for entomologists, reared on "priority" are loath to accept the new; after about twenty years of use of the term "epidermis" in the better treatises and texts, some recent text-books still adhere to "hypodermis" for the cellular layer of the integument.

One gets the overall impression that the subject of the integument is indeed a very complex one with many ramifications so that little space is allotted to any one topic, and often one would like a far more complete account of the particular subject of a chapter than is given. However, with the help of the fine bibliography, the reader can pursue his own particular interests in detail for he will have been well oriented in the entire field.—R. G. SCHMIEDER.

THE APHID GENUS PERIPHYLLUS. A systematic, biological, and ecological study. By E. O. Essig and Frieda Abernathy. University of California Press, Berkeley and Los Angeles, 1952. Pp. ix + 166, 43 figs. Price $3.00.

The aphids of this genus are maple-infesting, and ten species are described and illustrated in as many chapters. Most amazing are the life histories and the polymorphic forms of which Professor Essig himself says that he "never suspected that any species could possibly have as many distinct kinds of individuals as were found to occur. . . ." Actually there were two forms of males and 15 distinct forms of females, a total of 17 forms. Included are the peculiar "dimorphs" or minute 1st instar young from the fundatrigeniae that remain on the leaves without growing from April or May until the fall when they suddenly begin to grow, molt twice and mature in a few days to give rise to the sexual forms that produce the winter eggs. Of three of the ten species the life-cycles and the forms were worked out in complete detail, a labor that required six years of intensive effort. This is indeed an important contribution to the biology of aphids. —R. G. SCHMIEDER.

DIE SCHMETTERLINGE MITTELEUROPAS. By Walter Forster and Theodor A. Wohlfahrt. Band I/II, Lfg. 1 Bd. 1, pp. 1–32, Bd. 2, pp. 1–32, 4 pls. Franckh'sche Verlagshandlung, W. Keller & Co., Stuttgart, Germany.

This is the first "Lieferung" and contains 64 pages, parts of both volumes. Volume 1 is to include methods, ecology, genetics, systematics and nomenclature, distribution, etc.; volume 2 the systematic treatment of the diurnal Lepidoptera and 30 plates with 3000 figures (all in 4 to 5 colors) from water colors by Dr. Wohlfahrt of actual individual specimens. Price, DM. 10.— per Lieferung for the six Lfgs., and DM. 4.— for the linen

backs for binding. When published complete, DM. 76.—, bound. The entire work will appear during 1952 and 1953.

It is planned to publish also Volumes III (Sphing. and Bombyc.), IV (Noctuidae), and V (Geometr.), each with 30 plates, during 1954, '56, and '58 respectively.

This is the first new work on central European butterflies to appear in 40 years so that it presents a more modern treatment and will be valuable also for the fine colored figures, each one made from a single actual specimen before the artist.—R. G. Schmieder.

Understanding heredity. An introduction to genetics. By Richard B. Goldschmidt. John Wiley and Sons, Inc., New York, 1952. Pp. ix + 228. Price $3.75.

Professor Goldschmidt, one of our foremost geneticists, has here given us an elementary book from which the fundamental facts and theories of genetics may be learned. Although essentially a book for laymen and for workers in fields where some understanding of genetics is desirable rather than for use as a college text, it does employ the standard terminology or vocabulary of genetics.

It is a fine thing to have an elementary and more or less popular account written by an outstanding scientist in the field. Such a man, even when he has to simplify certain of the materials will always be sensitive to his responsibilities and will never over-simplify to the extent of falsification as is sometimes done in popular books. Dr. Goldschmidt warns his readers when he is simplifying or abridging his account and his presentation remains true in essence, and is never misleading.—R. G. Schmieder.

Field crop insects. By F. A. Fenton. Macmillan Co., New York, 1952. Pp. ix + 405.

This book begins with an elementary account of insect distribution and abundance, then gives a very brief introduction to the biology of insects followed by a rather full practical treatment of insecticides and some consideration of other methods of control. The remaining 60% of the volume takes up selected types of insects and their control, grouped into chapters based on feeding habits of the insects and the parts of plants attacked, such as leaf and plant destroyers (chewing), sucking, fruit, soil, and boring insects. The book has a good appearance and its language is straightforward and very clear.—R. G. Schmieder.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being longest in) are discontinued.

Coleoptera—Large quantities of Cicindelidae, Buprestidae, Lucanidae, Cerambycidae wanted in exchange for all families of Coleoptera from Ill., Ind. and Mo. Joseph B. Hayes, 1905 N. Pulaski Rd., Chicago 39, Ill.

American Sarcophagidae—wanted for identification. H. R. Dodge, P.O. Box 185, Chamblee, Georgia.

German lepidopterist wishes to correspond and receive live material (eggs and pupae) in exchange for dried imagoes. Johannes Reichel, Koenigsberg, Krs. Wetzlar 16, Germany.

For exchange—The periodic Cicada, T. septendecim. Desire Lepid., espec. Papil., Sphing. & Speyeria. Also Col., espec. Ceramb. & Lucan. John W. Morris, 2704 Genesee St., Syracuse 9, N. Y.

Cynipid and Itonidid galls—American species wanted; purchase or exchange for British species. Fresh or dried. D. Leatherdale, F.R.E.S., Old Woodstock, Oxford, England.

Wanted—Reprints or papers concerning insects taken in Alaska for inclusion in list of Alaskan insects. R. H. Washburn, Alaska Experiment Station, Palmer, Alaska.

Conopidae of the World wanted. Will pay 10¢ to $1.00 for pinned and labelled specimens. S. Camras, 4407 N. Milwaukee Ave., Chicago 30, Illinois.

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ENTOMOLOGICAL NEWS

OCTOBER 1952

Vol. LXIII **No. 8**

CONTENTS

PUBLISHED MONTHLY, EXCEPT AUGUST AND SEPTEMBER, BY
THE AMERICAN ENTOMOLOGICAL SOCIETY
PRINCE AND LEMON STS., LANCASTER, PA.
AND
1900 RACE STREET, PHILADELPHIA 3, PA.

Subscription, per yearly volume of ten numbers: $5.00 domestic; $5.30 foreign; $5.15 Canada. Entered as second-class matter April 19, 1943, at the post office at Lancaster, Pa., under the Act of March 3, 1879. Acceptance for mailing at the special rate of postage provided for in paragraphs (d-2), Section 34.40, P. L. & R. of 1948, authorized April 19, 1943.

ENTOMOLOGICAL NEWS

ENTOMOLOGICAL NEWS is published monthly, excepting August and September, by The American Entomological Society at Prince and Lemon Sts., Lancaster, Pa., and the Academy of Natural Sciences, 1900 Race Street, Philadelphia 3, Pa., U. S. A.

PHILIP P. CALVERT, Editor Emeritus. R. G. SCHMIEDER, Editor. Editorial Staff: E. J. F. MARX, M. E. PHILLIPS, J. A. G. REHN, and A. G. RICHARDS.

Subscription price, per yearly volume of 10 numbers: Domestic, $5.00; Foreign, $5.30; Canada, $5.15—U. S. Currency.

SUBSCRIPTIONS, ADVERTISEMENTS: All communications and remittances to be addressed to **ENTOMOLOGICAL NEWS, 1900 Race Street, Philadelphia 3, Pa.**

MANUSCRIPTS and all communications concerning same should be addressed to **R. G. Schmieder, Zoological Laboratory, University of Pennsylvania, Philadelphia 4, Pa.**

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PHLEGETHONTIUS CARIBBEUS Cary (above).
PHLEGETHONTIUS SEXTUS JAMAICENSIS Btlr. (below).

ENTOMOLOGICAL NEWS

VOL. LXIII OCTOBER, 1952 No. 8

Phlegethontius caribbeus. A New Sphinx Moth from Haiti, West Indies

By MARGARET M. CARY, Academy of Natural Sciences, Philadelphia

Pursuant of my eight-year study of the distribution of Sphingidae (Hawkmoths), in the Antillean-Caribbean region, I spent ten days in March, 1952, collecting at Petionville, Haiti. At Petionville, which is 1,600 feet above sea level, there is an unobstructed view over plains and seacoast far below as well as over a well-forested region in the foreground. The flora of this hilly foreground is varied and quite representative of other hill and mountain regions of Haiti. Our light, a 100 watt clear bulb, fastened to the porch balustrade, shone out, therefore, over a wide stretch of country. Although it was the dry season, there were during our stay, two good showers, one of which turned into light rain dripping most of the night. There was at no time a large flight of moths, but on the other hand I was never bothered by quantities of common Sphingids.

On the 18th of March, 1952, there was brought to me from the kitchen in a jar a Sphinx moth that I had never seen before, though I have spent a long life studying the Sphingidae of the Western Hemisphere. Except for slight rubbing on one wing, the moth, a female, was in perfect condition. When spread and shown to Lepidopterists both in Jamaica and Philadelphia, it looked to all entirely unique, having absolutely no characteristic of a hybrid. It was a yellow abdominal spotted Phlegethontius and *Phlegethontius sextus jamaicensis* Btlr. is the only yellow-spotted Phlegethontius in Haiti except one doubtful record

without locality of *Phlegethontius afflicta* Grt. To *afflicta* it bore no slightest resemblance.

Putting it in a box with some *Phlegethontius sextus jamaicensis* Btlr. from both Haiti and Jamaica, and *Phlegethontius sextus lucia* Gehlen from Dominica I went to consult the Lepidopterists at the U. S. National Museum in Washington, D. C. Dr. John Fraclemont, though not at present working much with Sphingidae, has a broad knowledge of this family and is an excellent taxonomist. After comparing my specimen with all the yellow abdominal spotted Phlegethontius in the Museum, and after consulting the other Lepidopterists there, we decided that it is quite clearly a new species of Phlegethontius.

Phlegethontius caribbeus sp. nov.

One female, the type, no. 7813 in the collection of the Academy of Natural Sciences of Philadelphia.

Petionville, HAITI (1600 feet), March 18, 1952.

Wing spread 3⅞ inches, slightly smaller than average *Phlegethontius sextus jamaicensis* Btlr. of Haiti and much smaller than average *P. sextus jamaicensis* Btlr. of Jamaica where more lush conditions prevail. Haitian *jamaicensis* average 4¼ inches and Jamaican *jamaicensis* 4¾ inches. Antennae ⅝ inch long, grayish white above and brown below, slender with slight hook, about ¼ inch shorter than the antennae of female *jamaicensis* from Haiti. The color of the upper wing is pale gray suffused and mottled with white, so that in color it resembles a very pale *Phlegethontius quinquemaculatus* Harr. The head and palpi are pale gray. There is a black collar. *Phlegethontius sextus jamaicensis* Btlr. has either a very dark gray-black or brown head with matching palpi. Occasionally *jamaicensis* has a dark line at the collar but in none of many specimens examined a distinct black collar. Thorax of *caribbeus* almost white above with two black tufts where thorax joins abdomen. Abdomen with five pale yellow lateral spots margined black. Abdomen white below with three dark spots. Spots on abdomen of *jamaicensis* are generally six in number and of a bright orange-yellow color.

There are white punctiform spots on dorsum of abdomen in both species.

Upper wings: Above; pale gray with a clearly marked fringe much more noticeable than in *jamaicensis* because black is somewhat extended at vein ends. There is only a suggestion in *caribbeus* of the white notched line near the fringe, so prominent in *jamaicensis,* but the curved black apical line is very prominent in *caribbeus* because it encloses a white area. There is, as in *jamaicensis,* a small white crescentiform spot at the cell end. The darker gray median lines are indistinct and interrupted, as are the distal ones in *caribbeus.* The most distinguishing mark of the upper wings above, however, is a black sharply angled post discal line with small, even scallops from costal margin to bend, and then almost straight. This shows very plainly in the accompanying plate where *caribbeus* is above *jamaicensis.*

Upper wings: Below; much less distinctly marked with the characteristic scalloped lines of *jamaicensis.* Here only two lines spreading apart at upper margin and whitish in between. White apical patch distinct on under side of wing in *caribbeus,* not in *jamaicensis.*

Lower wings above: dark gray black border loses its sharp black line halfway to costal margin and the one distinct white band of *caribbeus* is much broader near costal margin than in *jamaicensis.* There are 3 distinct scalloped median black lines with suffused gray white in between. The upper side of lower wing is rather more suffused, less distinctly marked than in fresh specimens of *jamaicensis.*

Lower wing: Under side of *caribbeus* is very white basad, with two dark irregularly scalloped lines very unlike the evenly and deeply scalloped lines in all *jamaicensis* and in *Phlegethontius quinquemaculatus* Harr.

Since this specimen is a female the sexual armature is not described. Work is being done on the female sexual armature of Sphingidae but has not yet reached a sufficiently definitive stage to warrant dissection of this specimen, the type.

Additions to the List of Dragonflies of Mississippi (Odonata: Anisoptera)

By Minter J. Westfall, Jr., Department of Biology, University of Florida, Gainesville, Fla.

While compiling the distribution records to be published in the forthcoming *Manual of the Dragonflies of North America* by Dr. James G. Needham and the present author, a study was made of the published records for North America. It was noted that very few records could be found for the state of Mississippi, so a list was begun based on specimens in the Cornell University collection and my own collection. In 1950, Dr. George H. Bick published a list of Anisoptera from Mississippi [1] which containd records of fifty species. When Dr. Bick's list was examined it was found to include all but fourteen of the species appearing in my preliminary list.

In the spring of 1951, Mr. Gordon L. Wills asked me to determine adults of Anisoptera for him which he had collected in connection with work on his master's thesis at the University of Mississippi. His collection contained eight more species not in Dr. Bick's list or in my additional list. He has generously permitted his records to be included in this paper. Dr. Needham has recently described a new species, *Gomphus hodgesi*,[2] reporting it from Mississippi and Alabama. Counting *G. hodgesi*, I record here twenty-three species to be added to the 1950 list, making a total of seventy-three. There are undoubtedly additional species which occur in Mississippi, for in the neighboring states of Florida and Alabama according to my preliminary list there have been collected ninety-eight and ninety-five species of Anisoptera respectively. I have records for a number of species of Zygoptera from Mississippi not hitherto reported, but they are not to be included here.

The specimens referred to in this paper are all in the Cornell University collection unless indicated otherwise. The abbre-

[1] Amer. Midl. Nat. 43 (1): 66–78, fig., 1950.
[2] Trans. Amer. Ent. Soc. 76: 8–10, fig., 1950.

viations listed below indicate collectors when immediately following the number of specimens examined; when at the end of the record, following the date, and in parenthesis, they indicate the person who has the specimens when they are not in the Cornell collection.

ALD Mrs. Alice L. Dietrich
GLW Gordon Lee Wills
MJW Minter J. Westfall, Jr.

Cordulegaster diastatops Selys. GEORGE CO.—Lucedale: 1 ♀, ALD, 3/20/30.

Gomphus (Arigomphus) *submedianus* Williamson. LAFAYETTE CO.—Oxford (Four Mile Branch): 1 ♂, GLW, late July 1951 (MJW).

Gomphus (Gomphurus) *fraternus* Say. GEORGE CO.—Lucedale (Dog River): 1 ♀, ALD, 5/20/31—North: 1 ♂, ALD, 4/13/31. PERRY CO.—New Augusta (Leaf River): 1 ♂, ALD, 4/30/31.

Gomphus (Gomphurus) *vastus* Walsh. GEORGE CO.—Merrill (Banks of Pascagoula River): 1 teneral ♂ taken in transformation with exuvium, ALD, 4/8.

Gomphus hodgesi Needham. GEORGE CO.—Lucedale: 1 ♂, ALD, 3/1/32. GREENE CO.—Leaf: 1♂, 5/7/31. In the original description of this species, a photograph of a dorsal view of the male caudal appendages taken by me was used for an illustration. Through an unfortunate error fig. 5 in that paper was also attributed to this species. It is a lateral view of the male caudal appendages of *Gomphus diminutus* shown in dorsal view as fig. 3.

Gomphus lividus Selys. LAFAYETTE CO.—Oxford (Tobitubby Creek and Four Mile Branch): 1 ♂, 2 ♀♀, GLW, late Spring and July 1951 (GLW). This species was said by Mr. Wills to be quite abundant.

Gomphus (Stylurus) *laurae* Williamson. TISHOMINGA CO. —Tishominga State Park: 2 ♂♂, GLW, Summer 1951 (MJW).

Hagenius brevistylus Selys. GEORGE CO.—Lucedale: 2 ♀♀, ALD, 6/2/31.

Gomphaeschna antilope Hagen. GEORGE CO.—Lucedale: 1♂, Mary Alice Dietrich, 4/18/29.

Gomphaeschna furcillata Say. GEORGE CO.—Lucedale: 6♂♂, ALD, 3/3/30, 3/5/30, 3/1/32.

Basiaeschna janata Say. LAFAYETTE CO.—Oxford (Tobitubby Creek): 1 ♂, GLW, early Summer 1951 (GLW).

Macromia georgina Selys. GEORGE Co.—Merrill: 1 ♂, ALD, 6/15/29 (MJW). LAFAYETTE Co.—Oxford (Tobitubby Creek): 1 ♀, GLW, June 1951 (MJW).

Epicordulia regina Hagen. GEORGE Co.—Merrill: 1 ♂, ALD, 7/14/29. LAFAYETTE Co.—Oxford (Minnows, Inc., and Bramlett's Lake): several specimens collected by GLW, late June and early July 1951, 1 ♂ examined by me (GLW).

Somatochlora filosa Hagen. GEORGE Co.—Lucedale: 1 ♂, Ernest, 10/12/31. FORREST Co.—Hattiesburg: 1 ♂, 1 ♀, Bill Thomson, 9/3/41 (MJW).

Somatochlora provocans Calvert. FORREST Co.—Hattiesburg: 1 ♂, Bill Thomson, 8/24/41 (MJW).

Somatochlora tenebrosa Say. LAFAYETTE Co.—Oxford (Four Mile Branch): 1 ♂, GLW, late July 1951 (GLW).

Tetragoneuria williamsoni Muttkowski. GEORGE Co.—Lucedale 2 ♂♂, ALD, 4/23/30.

Cannacria gravida Calvert. JACKSON Co.—Ocean Springs: 2 ♂♂, ALD, 7/13/30, 7/9/31.

Celithemis amanda Hagen. GREEN Co.—Leakesville: 1 ♀, ALD, 4/11/29. PERRY Co.—New Augusta: 1 ♂, ALD, 7/12/29.

Celithemis ornata Rambur. GEORGE Co.—Lucedale: 6 ♂♂, 4 ♀♀, ALD, 4/18/29, 4/5/30, 4/10/30, 5/14/30.

Dythemis velox Hagen. LAFAYETTE Co.—Oxford (Bramlett's Lake): 3 ♂♂, GLW, mid-summer 1951 (GLW).

Nannothemis bella Uhler. GEORGE Co.—Lucedale: 1 ♂, ALD, 4/18/29.

Sympetrum vicinum Hagen. LAFAYETTE Co.—Oxford (Mett's Pond): 3 teneral ♀♀, GLW, Summer 1951 (GLW).

Mr. Wills in his unpublished thesis listed *Gomphus exilis* Selys from Mississippi. I now believe this to be in error, due to my earlier indecision as to whether his specimens were of that species or of *Gomphus flavocaudatus* Walker. Since then I have sent five specimens, 3 ♂♂ and 2 ♀♀ (taken by Mr. Wills at Oxford and now in my collection) to Dr. E. M. Walker for checking. He replies that they are his *flavocaudatus*. He further states that it is likely his species may be considered as a subspecies of *exilis* when more material is available. He could find no differences between the females of *flavocaudatus* and the northern specimens of *exilis*. He did not have the females

of the former species when he described it in 1940.[3] Additional specimens of *flavocaudatus* from Mississippi which Dr. Walker checked for me are as follows: Forrest Co.—Hattiesburg: 2♂♂, Bill Thomson, 4/18/41, 4/11/42 (MJW). Jackson Co.—Cedar Creek: 1♀, ALD. George Co.—Lucedale: 2♀♀, ALD, 4/18/29, 4/5/30. —Merrill: 1♂, ALD, 4/7/29. Perry Co.—New Augusta (Leaf River): 1♂, ALD, 4/30/31. Wayne Co.— Clara: 1♂, ALD, 3/24/32.

A New Cavernicolous Nampabius with a Key to its Northeastern American Congeners (Chilopoda: Lithobiidae)

By Ralph E. Crabill, Jr., Department of Entomology, Cornell University

The present species is of interest because it was collected one-half mile within a cave at Lowmoor, Virginia. Although it cannot be said with absolute certainty that *tubator* is an established cavernicolous centipede, its status as one is strongly suggested by its rather pale color, by its ocelli which, though relatively numerous, are individually smaller than those of related forms, and by the exceptionally large organ of Tömösvary.

Nampabius turbator n. sp.

The new species bears a marked resemblance to the Ithacan *N. fungiferopes* (Chamberlin) in that both evidence a striking poverty of pedal spurs,[1] and both lack even the tiny thirteenth

[3] Ent. News 51: 194–196, plate V, 1940.

[1] In order to establish some degree of uniformity in the presently confused terminology as it pertains to spines, spurs, and setae, I would suggest the adoption of the widely followed concepts of the insect morphologists as outlined in "An Introduction to Entomology" by J. H. Comstock, 9th ed., p. 32, 1940 and in "A Glossary of Entomology" by J. R. de la Torre-Bueno, 1937. Thus, a spur is a *movable multicellular* outgrowth connected to the exoskeleton by a joint. A spine is an *immovable multicellular* outgrowth not connected to the exoskeleton by

tergital productions characteristic of many of their congeners. The two forms are distinct, however, in that *turbator* possesses always two and sometimes three spur series not seen in *fungiferopes,* viz. *dpP, daF,* and *vmF.*[2] In addition, *turbator* is distinctly larger than the typically Liliputian *fungiferopes.*

The system of plectrotaxy[3] employed here was devised by Ribaut and presented by him in 1921[4] in a short but, unfortunately, ignored paper. Because the Ribaut system emphasizes a qualitative investigation of plectrotaxy, it lends itself more readily to a study of variation in the dispersions of serially homologous spurs than does the classical quantitative method of L. Koch and Meinert, which is still used today almost universally.

Type.—♂, Lowmoor, Alleghany Co., VIRGINIA. April 1950. (Richard L. Hoffman; one-half mile within a cave); [in author's collection, C-1398-619].

Total length: 7.5 mm. *Color:* dorsum generally rather pale yellowish-brown, the head, first tergite and posterior extremities slightly darker brown. *Antennae:* 3.5 mm. long; with twenty articles; relatively densely clothed with stiff straight setae; the third to tenth articles weakly areolate, not deeply strikingly sculptured as in *virginiensis. Cephalic plate:* 0.95 mm. long, 0.90 mm. wide; lateral interruptions minute; ocelli small, in number 1–3,2,1; organ of Tömösvary relatively larger than in related species, larger than any ocellus; sparsely clothed with long stiff setae, the longest of which is about 0.10 mm.

a joint. A seta is a *unicellular, movable* outgrowth connected to the exoskeleton by a joint. A spur would be exemplified by the pedal spurs discussed in this paper; the sharp thorn-like outgrowths of the ultimate legs of *Scolopendra* would be termed spines, and the antennal pilosity of most forms would be representative of setae.

[2] *vmF* is lacking in all of my specimens except one; then it is represented by a single spur on the thirteenth pair of legs.

[3] The term *spinulation,* previously used by some, is inappropriate here in as much as it refers to spines. Such a term as *spurulation* is etymologically objectionable, therefore I propose the term *plectrotaxy* (πληκτρόν = calcar = spur) to describe the arrangement and nomenclature of the serially homologous pedal spurs of Lithobiids.

[4] RIBAUT, Soc. D'Hist. Nat. Toulouse XLIX, pp. 312–319, 1921.

Prehensors: prosternal teeth 2–2, their apices steeply reëntrant, the medial diastema widely U-shaped. *Tergites:* sparsely clothed with long and short straight setae, these longest on tergital periphery and especially on tergital posterior corners; the thirteenth tergital corners straight, not produced; the fourteenth tergital posterior margin slightly excised, not bowed posteriorly in a rounded arch as in *michiganensis*. *Legs:* tarsi one through eleven unipartite without a trace of a partial ventral suture or other divisional indication, the twelfth and thirteenth tarsi each with a very weak partial ventral suture, the penultimate and ultimate tarsi completely bipartite, each with a dorsal condyle; legs one through thirteen with three apical claws, legs fourteen and fifteen apparently retaining only the inner (unguiform) pretarsal accessory claw in addition to the pretarsus; coxal pores circular or slightly elliptical, decreasing in size proximally, in number 2,2,2,2; no coxae laterally armed; the penultimate and ultimate femora, tibiae, and tarsi mesally pierced with numerous small pores. *Leg modifications:* the ultimate and penultimate slightly longer and more crassate than those preceding; ultimate without lobes or crests; penultimate tibia disto-dorsally with a small almost spherical (very slightly elliptical) setigerous lobe most resembling that of *virginiensis*, its pedicel short, insensibly merging into the body of the lobe. *Plectrotaxy:* only the following spur series are present, *dpP* (13–15),[5] *daF*(3–10), *daT*(1–11), *vmt*(14–15), *vmP*(14–15), vmF(10–15), *vmT*(3–13).

Allotype.—♀, Lowmoor, Alleghany Co., VIRGINIA. April 1950. (Richard L. Hoffman; one-half mile within a cave): [in author's collection, C-1398-619].

Besides lacking the sexually dimorphic features characteristic of the male, the female allotype differs from the male type in the following particulars.

Length: 9.5 mm. *Gonopods:* basal spurs 2–2, broad, distally rather abruptly though bluntly pointed; claw tripartite, the ven-

[5] The bracketed figures represent spur dispersions, indicating the anterior and posterior limits of the spur series. Thus, *dpP* (13–15) means that the indicated spur occurs on the thirteenth through fifteenth pairs of legs.

tral denticle minute, barely separated from the medial denticle, the dorsal denticle almost as long as and distinctly separated from the medial denticle. *Plectrotaxy:* only the following spur series are present, *dpP*(13–15), *daF*(2–9), *daT*(1–11), *vmt*(14–15), *vmP*(14–15), *vmF*(9–15), *vmT*(3–13).

Key to the Northeastern [6] Species of Nampabius [7]

1a. dmP, dpF, and dpT lacking. Thirteenth tergite not produced 2

1b. *dmP* and *dpF* present, *dpT* present or absent. Thirteenth tergite distinctly but shortly produced 3

2a. *dpP* and *daF* lacking, *vmF* usually lacking ..... *fungiferopes* (Chamberlain).

2b. *dpP, daF* and *vmF* present ..... *turbator* sp. n.

3a. *dpT* present. Prosternal diastema usually U-, less often V-shaped. Male fourteenth tergital posterior margin straight or slightly excised. Antennal articles three through about ten strikingly deeply areolate ..... *virginiensis* Chamberlin.

3b. *dpT* absent. Prosternal diastema usually V-, less often U-shaped. Male fourteenth tergital posterior margin bowed posteriorly in a broad rounded curve. Antennal articles three through ten weakly areolate, the sculpturing detected with difficulty ..... *michiganensis* Chamberlin.

[6] I.e., those states north of North Carolina and east of the Mississippi River.

[7] *Nampabius lundii* (Meinert) (Myriap. Mus. Haunensis III, p. 111, 1886), is not included; it is considered here *species inquirenda.*

The Hawaiian Species of Lagocheirus (Coleoptera: Cerambycidae)

By Lawrence S. Dillon, Department of Biology, A. & M. College of Texas, College Station

For many years the Hawaiian species of *Lagocheirus* has variously gone under the names *obsoletus* Thomson or *araneiformis* Linné. A study of some of the American species, however, reveals the fact that there are numerous, very similar-appearing forms in the genus which can be separated only with close scrutiny, the differences between them being minor, perhaps, yet constant. As several specimens from the Hawaiian Islands were on hand, they were found, after a comparison with the continental forms, to be quite distinct. It is the plan of the author and his wife to begin in the near future a revisional study of the Western Hemisphere components of the tribe Acanthocinini, but meanwhile, it was believed best to publish the description of this new form.

Lagocheirus zimmermani Dillon, spec. nov.

Female: Dark reddish brown to fuscous, densely covered with ashy pubescence, sometimes tinged with dull fulvous; head, sides of prothorax, body beneath, legs, and first and third antennal segments, finely mottled with brown. Head above at occiput broadly fuscous and with a pair of blackish maculae between upper ocular lobes; front along eye margin with two or three blackish points. Pronotum largely pale fulvous, punctures without whitish outlines; disk with a paler fulvous macula before the median and two apical tubercles; apical black bars short, strongly oblique, ending abruptly at apical sulcus, basal black bars broad, extending cephalad of the apex of basal tubercle; on sides behind lateral tubercle a large, quadrate black macula. Scutellum largely blackish pubescent, whitish or fulvescent apically or with a vitta of pale extending to or near base. Elytra with the usual brown basal area poorly indicated, defined posteriorly in part by a common,

transverse, darker brown streak, without circumscutellar dark markings; post-median sutural blackish streaks very fine, usually prolonged, at only a feeble angle with suture, blackish streaks at apical quarter short, absent, or maculiform; apical quarter ashy-brown, not outlined with blackish anteriorly; before humerus a quadrate blackish macula, lateral fuscous area nearly semicircular, in part outlined with pale fulvous; entire elytron with series of blackish tufts and, in addition, with single, long, erect, brown, flying hairs. Tibiae broadly annulate with whitish medially; tarsi fuscous, first two segments ashy pubescent. Antennae with scape ashy pubescent, indistinctly annulate with brownish at base and at apical fourth; third segment with a broad ashy annulus covering most of its surface; fourth (and sometimes fifth) segment biannulate with ashy; rest with a rather narrow, submedian, ashy annulus.

Entire upper surface minutely, densely alutaceous. Head above with several setigerous punctures bordering eye; front impunctate, one-third broader than high; eye with lower lobe erect, two-fifths again as tall as gena, upper lobes separated by a distance slightly greater than one of their widths. Pronotum one and three-quarters times as wide as long, sides slightly tapering to apex, lateral tubercles robust, subacute, with a short, blunt spine apically; disk with five subequal, prominent tubercles, two subapical, three behind middle, the more lateral of which are more or less transverse, with numerous but well spaced, moderately coarse punctures, the basal and apical rows only slightly coarser. Elytra moderately coarsely, densely granulate-punctate in basal brown area, punctures becoming suddenly fine and simple to middle, thence gradually quite sparse to apex; basal gibbosity well indicated, broad, with three rows of tufted tubercles, the sutural and lateral ones composed of but one or two tubercles, the costae only feebly indicated; disk well sprinkled with tufted tubercles, especially apically; apices broadly truncate. Prosternal process not quite half so broad as a procoxal cavity; mesosternal process two-thirds as broad as mesocoxal cavity. Fifth abdominal sternite about one and three-fourths as long as fourth,

apex broadly, deeply emarginate. Antennae about one-fourth again as long as body, the ninth segment surpassing elytral apex; scape extending slightly beyond apex of pronotal lateral tubercle; third segment feebly longer than first; fourth one-ninth shorter than first; fifth less than two-thirds, and sixth one-half, as long as first; rest gradually shorter.

Length 17–18 mm.; width 5 mm.

Holotype: Female; Honolulu, OAHU, January 1907 [author's collection].

Paratypes: Two; Kona, Hawaii, November 15, 1937 (C. J. Davis) [Utah State Agricultural College].

Remarks: The author takes great pleasure in naming this species for Elwood C. Zimmermann, of the Honolulu Experiment Station, through whose generosity the holotype was received.

From all other known species similarly marked and likewise with biannulate antennal segments, this form is readily distinguished by the separate, long, pale brown, flying hairs which are scattered over the elytral surface and which are best seen in profile.

Occurrence of a Japanese Centiped in Alaska

Three species of chilopods were collected by Dr. J. S. Stanford in McKinley Park, Alaska, in July of 1948. These are *Alaskobius josephus* Chamberlin, previously known from points along the Matanuska River, *Arctogeophilus glacialis* Attems, previously recorded from Fairbanks, Nome and Port Clarence, and *Escaryus japonicus* Attems, recorded heretofore only from Japan (Todohokke, Hohando). The extension of the range of the last named form into Alaska, where several endemic forms of the same genus occur, is of interest. The point of origin of the species is, of course, an open question for migration may have occurred in either direction.

R. V. CHAMBERLIN

Records of the Palearctic Megachile rotundata in the United States (Hymenoptera: Apoidea)

By Howell V. Daly, Dallas, Texas

Megachile (*Eutricharaea*) *rotundata* (Fabricius), one of the two species in its subgenus reported from North America, has previously been known from the District of Columbia and Virginia (Krombein, 1948). The following inland localities are reported, based on specimens at the University of Kansas (K), and in the private collections of Dr. Lloyd H. Shinners (S), Mr. Robert Van Vleet (V), and the author (D).

Kansas. Riley Co.: Manhattan, 1950, no further data (K; acc. to Dr. C. D. Michener, in letter).

Missouri. St. Louis: Missouri Botanical Garden. 2 ♂♂ 16 July, 1948 on *Veronica longifolia* L.; 3 ♀♀ 16–19 July, 1948 on *Lythrum Salicaria* L.; 2 ♂♂ 21 July, 1948 on *Mentha crispa* L.; 1 ♂ 7 August, 1948 on *Euphorbia marginata* Pursh; 2 ♂♂ 8 August, 1948 on *Mentha crispa;* 1 ♂ 10 August, 1948 on *Statice* sp.; 1 ♂ & 1 ♀ 13 August, 1948 on *Lythrum Salicaria* (S).

Texas. Dallas Co.: Southern Methodist University campus, Dallas. 4 ♂♂ & 1 ♀ 11 July, 1948 on *Leucophyllum fructescens* (Berl.) Johnston (S). 1 ♀ 12 July, 1948 on *Salvia Greggii* Gray (V). 2 ♂♂ & 3 ♀♀ 31 July, 1951 on *Lythrum Salicaria* (D).

Mitchell (1937) reports the related *M. apicalis* Spinola with the comment that the males are practically indistinguishable from those of *M. rotundata*. The fact that females of only *M. rotundata* appeared at the same localities with the males, would suggest that all the males are correctly assigned to the same species. Recorded host plants include representatives of four different families (Labiatae, Lythraceae, Plumbaginaceae, Scrophulariaceae), and of the seven species, four are cultivated plants of European origin (*Lythrum Salicaria, Mentha crispa, Statice* sp., *Veronica longifolia*), and three are cultivated plants native to western Texas and northern Mexico (*Salvia Greggii, Leucophyllum frutescens, Euphorbia marginata*). In Europe this bee is said to visit *Thymus serpyllum, Sedum acre, Sedum*

reflexum and *Centaurea jacea* (Stoeckhert, 1932). All of these except *Sedum reflexum* are naturalized in north-eastern America.

I am indebted to Dr. C. D. Michener for the Kansas record cited, and for verifying the identification of two pairs of *M. rotundata* deposited with him; to Dr. Shinners for the use of specimens in his private collection, and for information on host plants; and to Mr. Van Vleet for the use of specimens in his private collection.

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Apterona crenulella in Utah (Lep.: Psychidae)

Large numbers of larvae of *Apterona crenulella* (Bruand), family Psychidae, were found skeletonizing leaves of apple trees in an area of North Logan, Utah, June 5, 1951. These small larvae were identified by Mr. H. W. Capps of the Bureau of Entomology and Plant Quarantine, Division of Insect Identification.

Upon a careful examination of the affected area, larvae of this bagworm also were found to be skeletonizing foliage of sage brush (*Artemisia tridentata*), matchweed (*Gutierrezia sarothrae*), boxelder (*Acer negundo*), willow (*Salix* sp.), narrow-leaf plantain (*Plantago minor*), pigweed (*Amaranthus retroflexus*), rabbit brush (*Chrysothamnus* sp.), narrow leaf cottonwood (*Populus angustifolia*), and also a yellow composite (*Senecio* sp.). These larvae were so extremely numerous that they also became a house pest. Thousands of them were observed on the walls and windows of homes in the vicinity, a condition definitely objectionable to the home owners. This is the first time that either of the writers have seen *Apterona crenulella* doing damage to cultivated plants in this area.—Ted Tibbetts and G. F. Knowlton, Logan, Utah.

A Possible Case of Blowfly Myiasis in a Rat, with Notes on the Bionomics of Bufolucilia silvarum (Mg.)

By Harold R. Dodge, Scientist (R), Communicable Disease Center, Public Health Service, Federal Security Agency, Atlanta, Georgia

Various species of normally saprophytic blowflies may cause myiasis of animals by depositing eggs upon the body of the host, particularly in wounds, or in the soiled wool of sheep. A few species are obligatory parasites, laying their eggs only in wounds, sores, or natural orifices of the body of various animals, or even of man. The following incident seems worthy of record.

One afternoon in June 1951, the writer was with H. L. Gilbertson when he shot a Norway rat at Stoughton, Wisconsin. Upon immediate examination the rat was found to have clusters of fly eggs matted in its fur on both sides of the body. Other than the bullet hole in its head, no sores or wounds were visible. The carcass was placed upon several inches of soil in a glass jar with two thicknesses of cloth securely fastened over the top of the jar. After the maggots had completed feeding, the carcass was removed. When the majority of the flies had emerged and died, these flies and the soil in which they were reared were sent to the author for examination. The flies were identified as follows: 35 *Bufolucilia silvarum* (Meigen), 15 *Lucilia illustris* (Meigen), 3 *Muscina stabulans* (Fall.) and 1 *Sarcophaga nearctica* Parker. An examination of the soil disclosed 87 puparіae of *Lucilia* and *Bufolucilia* and 27 of *Muscina*.

As the premises where the rat was shot had been treated with rat poison four weeks earlier, the possibility that the rat was poisoned must be considered. Judging by the position of the eggs upon its body, it apparently could have removed most or all of the eggs from its fur. If the rat remained alive and in good health the question arises: could the larvae upon hatching successfully penetrate and eventually kill it? Could weakening by poison or disease have predisposed this particular rat to "blowing" by flies?

The rearing of *M. stabulans* and *S. nearctica* indicates contamination of the rearing jar through the cloth cover. These species emerged after the blowflies; most of the *Muscina* escaped when the jar was emptied. The larvae of *stabulans* have been reported to be very destructive to house fly larvae.[1] It is possible that, in the present case, *M. stabulans* destroyed a good many blowfly larvae, for it is estimated that there were at least several hundred eggs on the carcass.

Both *B. silvarum* and *L. illustris* are Holarctic in distribution. Their known biologies and habits are summarized in Hall's monograph.[2] *B. silvarum* is considered to be parasitic upon toads and frogs. *L. illustris* is considered a saprophytic species, breeding in carrion; one record of this species killing young foxes by subdermal myiasis is discounted. However, James[3] reports two cases of human subdermal myiasis involving this species.

TABLE 1. Fly Trap Data on *Bufolucilia silvarum* at Muskegon, Michigan

Year	Trap collections		Max. *silvarum* per trap			Period of trap operation[1]
	No. positive	No. yielding *silvarum*	No.	% of total	Date	
1948	95	80	60	11.9	Sept. 28	Aug. 12 to Oct. 21
1949	196	162	163	13.4	July 7	June 10 to Oct. 21
1950	235	192	2,098[2]	27.8	July 12	Apr. 25 to Sept. 13

[1] *Bufolucilia silvarum* was taken during the entire trapping period except in 1950, when it first appeared May 16.

[2] This figure is based on 265 *silvarum* of a total 953 flies in a 120 cc. sample of a collection totalling 950 cc.

The rearing of *B. silvarum* is of especial interest, in view of the fact that all previously known biological references to species of the genus *Bufolucilia* indicate that they are parasitic, or possibly saprophytic (Hein de Balzac, referred to in Hall) on frogs

[1] PORTCHINSKY, I. A. 1913. [Abstracted in Review App. Entomology Ser. B, 1: 108–110.]

[2] HALL, D. G. 1947 (1948). The Blowflies of North America. The Thomas Say Foundation, Baltimore, Maryland.

[3] JAMES, M. T. 1947 (1948). The flies that cause myiasis in man. USDA Misc. Pub. 631.

and toads. It is also stated (Hall, *idem*) that adults are rarely collected upon decaying substances, and are not often attracted to decaying meat in traps. However, Communicable Disease Center fly traps operated over a three-year period at Muskegon, Michigan, yielded many specimens of this species. The data in Table 1 indicate a sustained high population, evidently greater than could be supported by parasitism of frogs and toads alone.

SUMMARY

Bufolucilia silvarum (Meigen) and *Lucilia illustris* (Meigen) were reared from a rat which was found to have fly eggs matted in its fur when shot. The rat appeared to be healthy; no sores or wounds were found upon its body which might have predisposed it to attack by the flies. The rearing of *B. silvarum* from a vertebrate host is contrary to previous knowledge of its biology. Some fly trap data for this species are presented. *Muscina stabulans* (Fall.) and *Sarcophaga nearctica* Parker were also reared, evidently as a contamination of the rearing jar.

Report of Brown Dog Tick, Rhipicephalus sanguineus (Latr.) Attacking Humans

By ROBERT W. HELM [1]

A female specimen of the brown dog tick, *Rhipicephalus sanguineus* (Latr.) was recently submitted to the author for identification. The specimen was collected by a physician, Dr. M. P. Brolsma, of Lincoln, Nebraska. During August, 1951, Brolsma received a patient seeking information about a tick which had been found firmly attached to the leg, near the ankle. Brolsma inspected the tick, found it to be partially engorged and then sent it to the Department of Entomology at the University of Nebraska for identification.

Although this tick has been recorded in the Mediterranean region as attacking man and as also active in the transmission of boutonneuse fever, a search of available literature does not reveal any previous record of *R. sanguineus* (Latr.) attacking man within the United States.

[1] Extension Specialist in Entomology, University of Nebraska.

Current Entomological Literature

COMPILED BY R. G. SCHMIEDER AND J. W. H. REHN

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia and the University of Pennsylvania, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the year 1952 unless otherwise noted. Continued papers, with few exceptions, are recorded only at their first installment.

For other records of general literature and for economic literature, see the Bibliography of Agriculture, Washington, and the Review of Applied Entomology, Series A, London. For records of papers on medical entomology see Review of Applied Entomology, Series B.

NOTE: The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the List of periodicals and serials published in our January and June issues. The number of the volume, and in some cases, the part, heft, &c. is followed by a colon (:). References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to Neotropical species, and not so indicated in the title, have the symbol (S).

Papers published in ENTOMOLOGICAL NEWS are not listed.

GENERAL—Bier, O.—In memoriam—André Dreyfus (1897–1952). [111] 12: 1–6 (portrait and bibliography). **Chagnon, G. et O. Fournier**—Les ordres d'insectes. [Contr. Inst. Biol. Univ. Montreal] No. 28: 1–36 (k), ill. **Drechsler, C.**—Widespread distribution of Delacroixia coronata and other saprophytic Entomophthoraceae in plant detritus. [80] 115: 575–76. **Hassall, A. M., A. Doss and J. M. Humphrey**—Index catalogue of medical and veterinary zoology. Part 17, authors U to Wyville, pp. 5211–5608. U. S. Dept. Agric., U. S. Gov't Printing Office, 1952. $1.25. **Knöpp, H.**—Studien zur Statik und zur Dynamik der Biozönose eines Teichausflusses. [Arch. Hydrobiol.] 46: 15–102. **Ohle, W.**—Die hypolimnische Kohlendioxyd-Akkumulation als produktionsbiologischer Indikator. [Arch. Hydrobiol.] 46: 153–285. **Robinson, H. S.**—The use of anaesthetics in funnel mercury vapour insect traps. [30] 85: 97–101. **Russell, E. S.**—Analysis of instinctive behaviour. [53] 169: 940–41 (Review of N. Tinbergen: The study of instinct. Pp. 228, Clarendon Press, London, Oxf. Univ. Pr., 1951. 25s). **Schwartz, B.**—Livestock parasitology in the United States. [46] 38: 93–104. **Tischler, W.**—Biozönotische Untersuchungen an Ruderalstellen. [Zool. Jahrb. (Syst.)] 81: 122–74. **Vaurie, P.**—Insect collecting in the Bimini Island group, Bahama Islands. [2] No. 1565: 1–24. **Wigglesworth, V. B.**—The role of iron in histological staining. [74] 93: 105–18.

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36: 211–46. On the morphology of Hyperaspis vinciguerrae Çapra. *Ibid.* 247–91. On the histology of the alimentary canal of Hyperaspis vinciguerrae Capra. *Ibid.* 293–310. **Haget, A.**—Expériences de section longitudinale de la blastule de Leptinotarsa (Coleop.). [C. R. Soc. Biol.] 146: 87–89. **Hall, I. M.**—Observations on Perezia pyraustae Paillot, a microsporidian parasite of the European corn borer. [46] 38: 48–52. **Happey, F. and A. J. Hyde**—Composition of silk. [53] 169: 921. **Henke, K.**—Die Hauptformen der Gliederungsvorgänge in der Entwicklung des Insektenflügels. [Zool. Anz.] Suppl. 16: 42–62, ill. **Jones, J. C. and O. E. Tauber**—Effects of hemorrhage, cauterization, ligation, dessication and starvation on hemocytes of mealworm larvae (Tenebrio molitor). [34] 26: 371–36. **Khalifa, A.**—A contribution to the study of the reproduction in the bed-bug (Cimex lectularius L.). [Bull. Soc. Fuad I d'Ent.] 36: 311–36. **Knülle, W.**—Die Bedeutung natürlicher Faktorengefälle für tierökologische Untersuchungen demonstriert an der Verbreitung der Spinnen. [Zool. Anz.] Suppl. 16: 418–33. **Leston, D.**—Antennal oligometry in Heteroptera. [53] 169: 890. **Levine, R. P.**—Adaptive responses of some third chromosome types of Drosophila pseudoobscura. [100] 6: 216–33. **Lin, S. and A. G. Richards**—Studies on the nutritional value of soybean flour to Tribolium confusum Duv. [45] 60: 107–18. **Lüdtke, H.**—Retinomotorik im Insektenauge. [Zool. Anz.] Suppl. 16: 186–91. **Luzzietti, A. M.**—Sulla biologia degli Anofeli. [Atti Accad. Ligure, Genova] 7: 4–11, 53–56, 1951. **Malogolowkin, C.**—Sobre a genitália dos Drosophilidae (Diptera). III. Grupo willistoni do gênero Drosophila. [111] 12: 79–96. **Manna, G. K.**—Study of the chromosomes during meiosis in forty-three species of Indian Heteroptera. [Proc. Zool. Soc. Bengal] 4: 1–116, 1951. **Nolte, H. W.**—Beiträge zur Morphologie und Biologie des Lärchenblasenfusses (Taeniothrips laricivorus Krat.) (Thysanoptera). [Beiträge zur Ent.] 1: 110–39. **Piepho, H.**—Ueber die Lenkung der Insektenmetamorphose durch Hormone. [Zool. Anz.] Suppl. 16: 62–76. **Poisson, R. et P. Razet**—Recherches sur les uréides glyoxyliques et leurs enzymes chez phasme Carausius morosus Br. [C. R. Acad. Sci.] 23: 1804–06. **Qadri, M. A. H.**—On the anatomy of the mouth parts and the mode of feeding in the aquatic bugs (Cryptocerata). [Proc. Zool. Soc. Bengal] 4: 117–136, 1951. **Rhein, W. von**—Ueber die Entstehung des weiblichen Dimorphismus im Bienenstaate und ihre Beziehung

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ENTOMOLOGICAL NEWS

NOVEMBER 1952

Vol. LXIII No. 9

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PUBLISHED MONTHLY, EXCEPT AUGUST AND SEPTEMBER, BY
THE AMERICAN ENTOMOLOGICAL SOCIETY
PRINCE AND LEMON STS., LANCASTER, PA.
AND
1900 RACE STREET, PHILADELPHIA 3, PA.

Subscription, per yearly volume of ten numbers: $5.00 domestic; $5.30 foreign; $5.15 Canada. Entered as second-class matter April 19, 1943, at the post office at Lancaster, Pa., under the Act of March 3, 1879. Acceptance for mailing at the special rate of postage provided for in paragraphs (d-2), Section 34.40, P. L. & R. of 1948, authorized April 19, 1943.

ENTOMOLOGICAL NEWS

ENTOMOLOGICAL NEWS is published monthly, excepting August and September, by The American Entomological Society at Prince and Lemon Sts., Lancaster, Pa., and the Academy of Natural Sciences, 1900 Race Street, Philadelphia 3, Pa., U. S. A.

PHILIP P. CALVERT, Editor Emeritus. R. G. SCHMIEDER, Editor. Editorial Staff: E. J. F. MARX, M. E. PHILLIPS, J. A. G. REHN, and A. G. RICHARDS.

Subscription price, per yearly volume of 10 numbers: Domestic, $5.00; Foreign, $5.30; Canada, $5.15—U. S. Currency.

SUBSCRIPTIONS, ADVERTISEMENTS: All communications and remittances to be addressed to **ENTOMOLOGICAL NEWS, 1900 Race Street, Philadelphia 3, Pa.**

MANUSCRIPTS and all communications concerning same should be addressed to **R. G. Schmieder, Zoological Laboratory, University of Pennsylvania, Philadelphia 4, Pa.**

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ENTOMOLOGICAL NEWS

VOL. LXIII NOVEMBER, 1952 No. 9

A New Subspecies of Erebia epipsodea Butler (Lepidoptera: Satyridae)

By PAUL R. EHRLICH, Maplewood, New Jersey

In the fall of 1951, Mr. P. S. Remington of St. Louis, Mo., sent the author a short series of *Erebia epipsodea* collected by him during the preceding summer along the Alaska Highway in northern British Columbia and southern Yukon Territory. The single pair of specimens from the Yukon were obviously atypical and were labeled by Mr. Remington *"Erebia epipsodea?."* Further investigation has shown that this pair was representative of a population deserving a subspecific name. Therefore I propose:

Erebia epipsodea ssp. **remingtoni** nov.

Erebia epipsodea, Gibson, 1920, Report of the Canadian Arctic Expedition 1913–18, vol. 3, pt. I, p. 18i.

Erebia epipsodea, Holland, 1931, The butterfly book, revised ed., p. 204, pl. 61, figs. 24, 27.

Erebia epipsodea, McDunnough, 1937, Can. Ent. 69: 18.

FACIES

Both sexes may be distinguished from *epipsodea epipsodea* by the general reduction in number and size of the ocelli on both surfaces. This is most easily observed and analyzed on the underside of the male secondaries, which in *epipsodea epipsodea* usually has three well defined ocelli. In the 99 males from Alaska, the Yukon, and extreme northwestern British Columbia which are included in the type series of *remingtoni*, 48% had the underside of the secondaries immaculate, 45%

had the ocelli greatly reduced in size or number, and only 3% had even one ocellus which was pupilled with white. On the other hand, 435 male *epipsodea* from below 55° N. latitude showed only 4% immaculate, 34% reduced, and 52% with at least one pupilled ocellus. It has been impossible with the material on hand at present to determine whether these characters fall into a north-south cline. In the author's collection there are two male *epipsodea* from Upper Peace River District, and ten males from Mile 146–150, Alaska Highway, both localities being in northeastern British Columbia. These specimens do not differ appreciably from material from more southern localities. It should be stressed that in no southern population was any indication seen of the degree of immaculateness found in *remingtoni*.

No attempt has been made to work with the ground color of the specimens, as this varies greatly with the age of the specimen and with the time elapsed between its emergence and its capture.

The underside of the male holotype of *remingtoni* is illustrated in color on plate 61, fig. 27, of Holland (1931). The figure shows very clearly the characters discussed. The male type of *epipsodea,* of which the author has photographs, is larger than any *remingtoni* examined, and is as well marked on the upperside as the average *remingtoni* female, having three distinct ocelli on each of the secondaries. On the underside of the secondaries there are three small but definite ocelli, the first one on the right secondary being pupilled with white. In the figure of *epipsodea* accompanying the original description a specimen is shown with two of three ocelli on the underside of the left secondary pupilled. This could be a mistake on the part of the artist, or a representation of the one other specimen on which the original description was based. Plate 61, fig. 25, of Holland shows the underside of a male *epipsodea* from Montana which is remarkably close to that of the type, differing mainly in that the type has both ocelli on the forewing clearly pupilled and is larger. On plate 24, fig. 262, of Wright (1905) is illustrated the upper surface of a male *epip-*

sodea which is also close to the type. The ocelli on the secondaries are not as heavily pupilled in the type as in the figure, and the type has a third ocellus on the primary which is unpupilled. Since the male type of *epipsodea* does not resemble any of the 99 male *remingtoni* examined it seems safe to assume that it did not come from a population of *remingtoni*.

Plate 61, fig. 24, of Holland shows the upper surface of the female allotype of *remingtoni,* and a quick comparison with fig. 26 on the same plate, which is a fairly typical female of *epipsodea*, will suffice to show the subspecific differences.

Other good photographs of *epipsodea* are figs. 1163, 1164, 1165, 1169 and 1170 on plate 83 of Warren (1936).

Genitalia

Male. 13 male paratypes of *remingtoni* and 47 males of *epipsodea* have been dissected. The first few dissections seemed to show constant differences between the two subspecies; however, these faded away into mere tendencies with dissection in series. The genitalia throughout the species proved to be very variable, particularly in the shape of the clasp, but also in the length and shape of the saccus and the shape of the anterior end of the aedeagus. Plate 38, figs. 357 and 358, and plate 104, fig. 1640 in Warren are photographs of the male genitalia. In the clasp of *remingtoni* there appears to be a tendency towards a sharp shoulder with an extension of the spines of the head basally over the shoulder. In *epipsodea* the slope of the shoulder is often somewhat gentler, with the spines more or less restricted to the ridge between the head and shoulder. These differences are not constant enough to be anything but a secondary aid in identification.

Female. 3 female paratypes of *remingtoni* and 6 females of *epipsodea* have been dissected. The female genitalia seem to vary little, and no hint of subspecific differences could be seen. A brief description of the female genitalia follows:

Bursa copulatrix membranous, approx. 2.3 mm. in length, 1 mm. wide at its widest, somewhat oval in outline, tapering into the ductus bursae. Bursa with two simple signa, approx.

.8 mm. by .1 mm., covered with numerous small spines and lying more or less parallel to the axis of the ductus bursae. Ductus bursae well sclerotized, approx. .9 mm. by .4 mm., slightly wider at the anterior end. Genital plate roughly wrinkled, especially around the roughly triangular ostium. Ovipositor lobes lunate, lightly sclerotized; apophyses of ovipositor approx. .5 mm. long, tapering to a point anteriorly.

Distribution

So far *remingtoni* has been seen from the extreme northwestern corner of British Columbia (Atlin), southeastern Yukon Territory, and along the Yukon River Valley from Dawson, Y. T., to Fort Yukon, Alaska, on the Arctic Circle. It probably occurs in suitable localities throughout the Yukon and Western Alaska south of the tree line.

Type Material

Holotype male, Dawson, Yukon Territory, June 11, 1916, J. A. Kusche; *allotype* female, Circle, Alaska, June 25, 1916, J. A. Kusche; both in the collection of the Carnegie Museum. There are 98 male and 21 female *paratypes* as follows: 3 males, Atlin, B. C., June 20, July 11, 12, 1930; 1 male, Mile 1120, Alaska Highway, Y. T., July 12, 1951, P. S. Remington (genitalic slide no. 34, P.R.E.); 1 female, Kluane Lake nr. Burwash Landing, Y. T., July 12, 1951, P. S. Remington (genitalic slide no. 89, P.R.E.); 1 male, Lower Klondike, Y. T., July 1, 1919, alt. 2,000′; 1 male, 1 female, Yukon Territory, Lat. 62°31′ to 63°06′ Long. 137°30′ to 139°30′, summer of 1916; 6 males, Dawson, Y. T., Treadgold; 6 males, 3 females, Dawson, Y. T., June 11–13, 1916, J. A. Kusche (male genitalic slide no. 37, P.R.E.); 2 males, 5 miles up Klondike River, Dawson, Y. T., June 15, 1916, J. A. Kusche (genitalic slide no. 67, P.R.E.); 9 males, 1 female, Dawson, Y. T., July, various dates, 1949, W. W. Judd; 19 males, 2 females, Dawson, Y. T., various altitudes between 1,100′ and 2,000′, June and July, various dates, 1949, P. F. Bruggemann; 10 males, 2 females, Head of Bonanza Cr., alt. 2,000′, Dawson, Y. T., June 16, 1916, J. A. Kusche (male genitalic slides nos. 43 and 46, P.R.E., female genitalic slide no. 90, P.R.E.); 12 males, 2 females, Moose Hide Canyon, alt. 1,500′, Dawson, Y. T., June 17, 1916, J. A. Kusche (male genitalic slides nos. 63

and 65, P.R.E.); 4 males, 4 females, 12-mile Camp, Dawson, Y. T., June 16, 1916, J. A. Kusche (male genitalic slides nos. 42 and 64, P.R.E.); 1 male, Mile 25 W. of Dawson, Y. T., alt. 3,500′, August 16, 1949, P. F. Bruggemann; 1 male, Mile 16 W. of Dawson, Y. T., alt. 3,600′, August 22, 1949, P. F. Bruggemann; 1 male, Mile 61 W. of Dawson, Y. T., alt. 4,000′, July 15, 1949, P. F. Bruggemann; 13 males, 4 females, Eagle, Alaska, June 27, 29, 1903, July 5, 1901, Reed Heilig, F. Perkins, and S. Hall Young (male genitalic slides nos. 38 and 44, P.R.E., female genitalic slide no. 88, P.R.E.); 7 males, 1 female, Circle, Alaska, June 25, 1916, J. A. Kusche (male genitalic slides nos. 36 and 62, P.R.E.); 1 male, 3 miles up Porcupine River, Fort Yukon, Alaska, July 29, 1916, J. A. Kusche.

Distribution of paratypes: 3 males are in the American Museum of Natural History; 38 males and 9 females are in the Carnegie Museum; 39 males and 4 females are in the Canadian National Collection; 1 male is in the United States National Museum, ex collection Carnegie Museum, ex collection P. R. Ehrlich; 1 pair is in the collection of P. S. Remington, ex collection Carnegie Museum, ex collection P. R. Ehrlich; 16 males and 7 females (15 males and 6 females, ex collection Carnegie Museum) are in the author's collection, some of which will be distributed.

Remarks

Erebia epipsodea Butler (1868, p. 80) was described from two specimens from the "Rocky Mountains." The type is in the British Museum. Unfortunately it has not yet been possible to fix a definite type locality; however, there is good reason to believe that the type was not taken within the range of the new subspecies; first because of the differences between the type of *epipsodea* and *remingtoni* as previously analyzed, and secondly because it seems unlikely that anyone would have been collecting in the area occupied by *remingtoni* around the middle of the last century. The type is similar to specimens of *epipsodea* which the author has seen from Montana, Idaho, Washington, Southern Alberta, and Southern British Columbia. There is also some historical evidence to indicate that

the type was taken in this area, possibly near what is now Banff, Alberta.

Erebia rhodia Edwards (1871, p. 273) was described from Colorado, and is at present considered a synonym of *epipsodea*. Should the type locality of *epipsodea* be definitely fixed somewhere within the area previously delineated, *rhodia* will be the name available for the Colorado race, should this prove worthy of distinction.

Erebia epipsodea? var. *brucei* Elwes (1889, p. 326), based on a specimen from high altitude in Colorado, appears to be only an individual variant, in spite of its treatment as a species by Holland (1931, p. 204, pl. 61, fig. 20).

Erebia sine-ocellata Skinner (1889, p. 239) was described as a variety of *epipsodea,* the type being taken at Fort Qu' Appelle, Saskatchewan. Plate 83, fig. 1171 in Warren shows a near typical specimen of this fairly common aberration.

Erebia epipsodea is an extremely variable species, flying throughout a tremendous geographic area, and having a vertical range of over 10,000'. It has a tendency to break up into local strains or micro-subspecies, and these minor variations have apparently formed the basis for the prevalent idea that the species is devoid of racial variation. In the author's opinion nothing could be further from the truth; he would not be surprised eventually to see several distinct subspecies recognized. The author hopes ultimately to publish a complete report on the distribution and subspeciation of this species, based on several thousand specimens; however, it was considered desirable to publish this preliminary work in order to validate manuscript paratypes which had been designated.

Acknowledgments

The author wishes to thank Mr. Harry K. Clench of the Carnegie Museum, who lent him long series of *remingtoni* from their collection and generously allowed him to retain a portion of the paratypes which he designated. The author is also indebted to Dr. T. N. Freeman and Dr. E. G. Munroe of the Division of Systematic Entomology of the Canadian Department of Agriculture, who during his recent visit to Ot-

tawa, took time from their many duties to assist him in his work and to answer his many questions. The author is most grateful to Dr. F. H. Rindge and Dr. A. B. Klots of the American Museum for their help on several taxonomic problems and for reading this manuscript.

The author wishes especially to thank his friend Mr. P. S. Remington for his many favors. It is in his honor that the new subspecies is named.

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A New Limotettix from South Dakota (Homoptera: Cicadellidae)

By Dorothy J. Knull, The Ohio State University, Department of Zoology and Entomology

Limotettix bisoni n. sp.

Allied to *L. striolus* (Fallén) but larger, more robust, vertex less produced, last ventral segment of ♀ more feebly excavated, and style in ♂ with apex produced.

♂.—Head slightly longer at middle than against eyes; with eyes wider than pronotum; pronotum more than twice median length of head, transversely striate on posterior half; elytra

smoky semihyaline, veins pale, black dorsum showing through them gives darkened aspect.

General color of body yellow, brighter on scutellum and head, and often orange-tinged on venter, marked with black as follows: two almost parallel narrow transverse bands on apex of head, joined by tenuous black streak at outer edge of each orange ocellus, enclose pale area twice width of either band; three spots above each antenna against eye, evenly spaced, six irregular black arcs on each side of front, and sides of clypeus and front narrowly margined. Dorsum dark, venter of abdomen with dark central area diminishing in size toward last ventral segment which has only median spot on both margins.

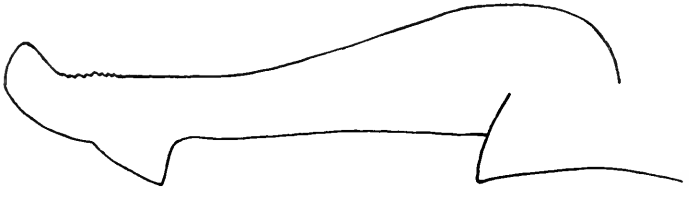

Fig. 1. Apex of style, greatly enlarged.

Valve short, broad, evenly produced from lateral angles; half as long at middle as preceding segment. Plates together as long as broad, three times as long as valve, with blunt tips, meeting in straight line from base; outer margins with abundant stout pale hairs. Styles distinct as illustrated.

♀.—Last ventral segment twice as long as preceding, evenly, arcuately excavated one-third its length, a patch of black the width of black ovipositor on segment above it, tip of ovipositor pale, about three rows of stout hairs on pygofer either side.

All specimens were collected by Dr. H. C. Severin in South Dakota. *Types* are deposited in the Collections of the Ohio State University and South Dakota State College. ♂ *holotype, allotype,* 1 ♂ and 13 ♀ *paratypes,* Buffalo, Sept. 10, 1948; 9 ♂, 10 ♀ *paratypes,* Florence, Sept. 7, 1948; 2 ♂, 1 ♀, Brookings, July 25, 1950, and 1 ♀, July 11, 1950.

Undescribed Species of Crane-Flies from the Western United States and Canada (Dipt.: Tipulidae) Part XIII

By Charles P. Alexander, University of Massachusetts, Amherst, Massachusetts

The preceding part under this general title was published in Entomological News 61: 29–35, 1950. In the present report I am describing a few Eriopterine species from Colorado, California, Oregon, British Columbia, and Alberta, collected by myself and by my good friend, Kenneth M. Fender, to whom I express my deep appreciation for invaluable cooperation in the past. The types of the novelties are preserved in my collection of these flies.

Neolimnophila brevissima new species

General coloration gray, the praescutum with two narrow intermediate brown stripes, the lateral pair not or scarcely indicated; wings subhyaline, the large oval stigma pale brown, conspicuous; cells *C* and *Sc* a trifle darkened; vein R_{3+4} unusually long, about twice as long as vein R_3 and nearly equal to vein R_4; *m–cu* from two-fifths to about one-half its length beyond the fork of *M*.

♀. Length about 8 mm.; wing 9 mm.

Rostrum gray; palpi black. Antennae black throughout, the basal three segments very sparsely pruinose. Head light gray, the posterior vertex very faintly tinged with brown.

Pronotum pruinose. Mesonotum grayish pruinose, the praescutum with two narrow intermediate brown stripes, the lateral pair not or barely indicated; tuberculate pits black, occupying the darkened stripes. Pleura gray, the dorsopleural region more buffy yellow. Halteres with stem whitened, the knob a trifle darkened. Legs with the coxae gray pruinose; trochanters obscure yellow; remainder of legs brownish black. Wings subhyaline, the large oval stigma pale brown, conspicuous,

much more so than in related species; a longitudinal dusky seam behind vein *Cu*, cells *C* and *Sc* a trifle more brownish yellow than the ground; veins brown, more yellowed in the prearcular field. Venation: Sc_2 at extreme tip of Sc_1; R_{2+3+4} strongly arcuated at origin; R_{3+4} unusually long, about twice R_3 alone and nearly as long as vein R_4; *m–cu* about two-fifths to one-half its length beyond the fork of *M*.

Abdomen uniformly dark brown. Ovipositor with cerci slender, only gently upcurved.

Habitat. Colorado. *Holotype:* ♀, Rabbits Ears Pass, at Columbine Lodge, altitude 9,620 feet, August 23, 1946 (C. P. Alexander).

Although a single specimen is available I must regard this fly as being distinct from the other Nearctic species and subspecies of the genus. The unusually small cell R_3 is not approached by any of the numerous specimens of *Neolimnophila ultima* (Osten Sacken) that I have seen. In the eastern Palaearctic region, other species, as *N. perreducta* Alexander show this extreme reduction in the size of this cell but are otherwise quite distinct.

Erioptera (Gonomyodes) yohoensis new species

General coloration of thorax light to darker brown, head dark gray; wings subhyaline, unpatterned; Sc_1 long, nearly two-thirds *Rs;* cell R_3 very deep, R_2 subequal to or longer than R_{3+4}; *m–cu* at or near midlength of cell *1st* M_2; male hypopygium with the outer dististyle a straight black rod that terminates in two subequal acute spines; phallosome narrow, without distinct lateral shoulders.

♂. Length about 4.3–4.5 mm.; wing 5.2–5.5 mm.
♀. Length about 4.5–5 mm.; wing 5.3–5.5 mm.

Rostrum brown; palpi brownish black. Antennae black throughout; flagellar segments oval, the verticils exceeding the segments. Head dark gray.

Thorax varying from uniform light brown or yellowish brown to darker grayish brown, the praescutum still darker medially.

Halteres pale. Legs with the coxae ochreous; trochanters yellow; remainder of legs light brown, the outer tarsal segments blackened. Wings subhyaline, unpatterned; veins a little darker than the ground. Venation: Sc_1 ending beyond fork of *Rs*, Sc_2 about opposite midlength of that vein, Sc_1 thus very long, nearly two-thirds *Rs;* cell R_2 very deep, vein R_4 being only a little shorter than the outer section of M_{1+2}; vein R_2 subequal to or longer than R_{3+4}; *m–cu* at or near midlength of cell *1st* M_2.

Abdomen dark brown, the basal sternites obscure yellow; hypopygium yellow. Male hypopygium with the two outer dististyles subequal in length, the outermost distinctive in conformation, appearing as a stout black rod that terminates in two subequal acute spines; intermediate style a little dilated on outer half, the apex produced into a flange and extended into a beak, forming a more or less evident saucer-shaped depression at end. Phallosome narrow, without conspicuous lateral shoulders, setiferous.

Habitat. ALBERTA, BRITISH COLUMBIA. *Holotype:* ♂, Kicking Horse Pass, along the Kicking Horse River exactly at the border between Alberta and British Columbia, altitude 5,350 feet, July 18, 1949 (C. P. Alexander). *Allotopotype:* ♀, pinned with type. *Paratopotypes:* Numerous specimens of both sexes, some unmounted, July 14–August 2, 1949; *paratypes:* Several of both sexes, Mount Edith Cavell, Jasper National Park, Alberta, altitude 6,000 feet, July 22 and 25, August 5, 1949 (C. P. Alexander).

This unusually interesting fly is quite distinct from the other regional species, including *Erioptera* (*Gonomyodes*) *knowltonia* Alexander and *E.* (*G.*) *tacoma* Alexander, differing especially in the male hypopygium. The flies were very common at the Great Divide in Kicking Horse Pass, especially along the upper branch of the Kicking Horse River where it forms the Provincial boundary. Here they were swept from spruce, fir, birch and willow close to the stream. Later it was found at Mount Edith Cavell where it was associated with *E.* (*G.*) *tacoma.* The weather was constantly cold and rainy and the various crane-flies were swept from underneath the lower branches of evergreens

growing close to the glacial stream emanating from the Angel Glacier.

Erioptera (Hesperoconopa) pugilis new species

General coloration gray, the praescutum with a broad median darker brownish gray stripe; antennae relatively long, more than one-fourth the length of body; wings with a rather strong brownish tinge, stigma faintly indicated; no macrotrichia in cells, Sc_2 atrophied; male hypopygium with the lateral branch of the outer dististyle small; inner dististyle unusually stout, on its lower margin at near three-fourths the length with a conspicuous knob; inner gonapophysis dilated at tip into a weakly spatulate blade, the margin of which is microscopically serrulate; aedeagus short.

♂. Length about 4.5 mm.; wing 5 mm.; antenna about 1.4 mm.

♀. Length about 4.5–5 mm.; wing 5–5.5 mm.

Rostrum gray; palpi black. Antennae with scape and pedicel black, basal segments of flagellum brown, the outer ones more blackened; antennae relatively long, as shown by the measurements; flagellar segments subcylindrical to long-oval, with a dense white pubescence; verticils relatively inconspicuous, more evident on the proximal segments. Head gray.

Mesonotum gray, with darker markings, including a broad median brownish gray praescutal stripe; scutal lobes less evidently darkened. Pleura clear light gray. Halteres uniformly pale yellow. Legs with the coxae heavily gray pruinose; trochanters dark brown; remainder of legs chiefly dark brown, femoral bases restrictedly paler; tibiae, except for tips, somewhat paler. Wings with a rather strong brown tinge, prearcular field more yellowed, stigmal region faintly and restrictedly more darkened; veins brown, paler in the prearcular field. No macrotrichia in wing cells. Venation: Sc_2 atrophied; R_{2+3+4} a little less than twice R_{2+3}; *m–cu* at fork of *M*.

Abdomen, including hypopygium, brownish black. Male hy-

popygium with the mesal face of basistyle with unusually long and abundant setae. Outer dististyle with lateral branch small. Inner dististyle unusually stout, its outer surface with the usual erect to subretrorse setae; lower margin at near three-fourths the length with a conspicuous knob giving a sinuous appearance to the lower margin of the style. Inner gonapophysis dark colored, dilated at apex into a weak spatulate blade, the margin microscopically serrulate. Aedeagus short, the lateral flange extending to the tip or virtually so.

Habitat. Colorado. *Holotype:* ♂, Gothic, Gunnison County, altitude 9,500 feet, July 6, 1934 (C. P. Alexander). *Allotopotype:* ♀. *Paratopotype:* 1 ♂, July 2, 1934.

Erioptera (*Hesperoconopa*) *pugilis* is most readily separated from the only similar regional species, *E.* (*H.*) *aperta* (Coquillett), by the structure of the male hypopygium, particularly the inner dististyle and gonapophyses.

(*To be continued*)

The Occurrence of Archilestes Grandis Rambur in Western North Carolina (Odonata)

By D. L. Wray, Raleigh, N. C.

Last October among several collections of insects sent in to me for the State Insect Collection by my friend, a naturalist, Mr. James Hutchins, were a number of dragonflies. There were about a dozen large *Aeschna umbrosa,* among which I found one specimen of *Archilestes grandis* Rambur. These were collected on October 17, 1951, about a mile from Windom, a small hamlet in Yancey County which is situated on the western slope of the mountain range that includes Mt. Mitchell. The water drainage here is eventually into the Mississippi. The specimens were collected around a small marshy place. Mr. Hutchins collected again in that area several days later, but found only the *Aeschna* and no more specimens of *Archilestes.* This is the first record for our state and is an interesting extension of range southeastward.

House Centipede (Scutigera forceps (Raf.)) Biting a Human

By W. W. Judd, Department of Zoology, University of Western Ontario, London, Ontario

On May 9, 1951, a man in London, Ontario, reported being bitten by a house centipede which had been crawling over his clothing and which he brushed off with his right hand. The bite caused a sharp stinging sensation. It was on the tip of the little finger of the right hand and was about the size of a pinhead. It bled slightly for a few minutes. The tip of the finger remained red for a few days but no swelling occurred. The centipede, when examined, proved to be full grown, the body being about an inch long.

Metcalfe and Flint (1951), referring to this centipede as *Scutigera cleoptrata* (L.), report that there are "a few cases on record where the centipede has inflicted a painful bite when handled" and Herms (1939) says that these animals are "able to pierce the skin with their poison claws and cause severe pain with some swelling at the site of the bite."

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Two Species of Great Basin Orthoptera New to Colorado

By Gordon Alexander and Hugo G. Rodeck, University of Colorado

For several years the University of Colorado Museum has been making a faunal survey of Dinosaur National Monument. Collections of Orthoptera were made in several parts of the Monument during the seasons of 1948, 1949, and 1951. Although the collections are not complete it seems desirable at this time to report the occurrence of *Pediosciretes nevadensis* Thomas (Acrididae) and *Capnobotes fuliginosus* (Thomas)

(Tettigoniidae) in Colorado. These species have not been previously recorded from the state, nor even within hundreds of miles of the collecting locality.

Dinosaur National Monument is in Colorado and Utah, surrounding the canyons of the Yampa and Green Rivers above and below the confluence of the former with the latter. Most of the Monument area is within Colorado. Collections have been made at various points in the area from the floor of the canyon, at an elevation of approximately 5,000 feet above sea level, to Round Top, the highest point on the south rim of the Yampa Canyon, at an altitude of 8,258 feet.

Sage brush desert invades the general area from the west, climbing up the gradual ascent of the Yampa Plateau from the south even to the edge of the high rim. Where conditions are favorable scattered stands of aspen interrupt the sage brush on the Plateau but sage brush is the dominant form of vegetation. At the edge of the canyon rim this comes into abrupt contact with Douglas fir and other members of a mesic plant community, this vegetation growing on the north-facing slope immediately below the canyon rim. Here we find Great Basin species of Orthoptera in contact with those typical of the montane zone of the Southern Rocky Mountains. Thus it is quite understandable that one of our new records is from Round Top, one of the highest points in the Monument. In spite of the elevation, Round Top is within the edge of the Great Basin Desert, which, according to Tinkham (1944), extends into northwestern and west central Colorado. The distribution of sage brush up to the canyon rim is therefore quite significant.

Three specimens of *Pediosciretes nevadensis* were collected, all at the edge of the sage brush area on Round Top. All are now in the University of Colorado Museum. Two of these are juvenile—a fifth instar female, July 18, 1951, and a fourth instar female, July 19, 1951, both collected by Gordon Alexander. An adult male was collected September 13, 1951 by Richard and Anne Bingham. Previous published records of this species, which appears to be nowhere common, are from northern Arizona, Nevada, and Idaho (Ball et al., 1942). Mr. James A. G. Rehn has kindly informed us by letter that he has

collected the species on the Paunsaugunt Plateau near Bryce Canyon, Utah. Its occurrence in northwestern Colorado, therefore, represents a considerable extension of its known range.

The occurrence of *Capnobotes fuliginosus* in northwestern Colorado is even more remarkable since it has previously been thought to occur no further north than in the southern portions of the Great Basin Desert. The nearest recorded locality is in southwestern Utah (Tinkham, 1948). While we may with more reason expect to find *Capnobotes occidentalis* (Thomas) in Colorado the latter has not yet been reported. The specimens we are recording are typical *fuliginosus,* both in size and color. When *occidentalis* is taken in Colorado it will probably be found in the piñon-juniper region of the southeastern or southwestern part of the state.

The specimens of *Capnobotes fuliginosus* collected in Dinosaur National Monument are three adults, two females collected by H. A. Fehlmann and a male collected by H. W. Dick, all now in the University of Colorado Museum. Two were collected in Castle Park, in the floor of the Yampa Canyon, a female on July 12, 1949 and the male, July 15, 1949. It is interesting to note that the former was collected on the first ascent of the Crow's Nest, a precipice rising from the Yampa Canyon floor at Castle Park. The second female was collected July 19, 1949 at Pat's Hole (at the confluence of the Yampa and Green Rivers).

The discovery of these Great Basin Desert forms in northwestern Colorado suggests that this desert fauna is as likely to appear in the northwestern as in the southwestern part of the state. Further collections will probably indicate significant range extensions of other members of this fauna into the region being investigated.

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Current Entomological Literature

COMPILED BY R. G. SCHMIEDER

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia and the University of Pennsylvania, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the year 1952 unless otherwise noted. Continued papers, with few exceptions, are recorded only at their first installment.

For other records of general literature and for economic literature, see the Bibliography of Agriculture, Washington, and the Review of Applied Entomology, Series A, London. For records of papers on medical entomology see Review of Applied Entomology, Series B.

NOTE: The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the List of periodicals and serials published in our January and June issues. The number of the volume, and in some cases, the part, heft, &c. is followed by a colon (:). References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to Neotropical species, and not so indicated in the title, have the symbol (S).

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ENTOMOLOGICAL NEWS

DECEMBER 1952

Vol. LXIII **No. 10**

CONTENTS

PUBLISHED MONTHLY, EXCEPT AUGUST AND SEPTEMBER, BY
THE AMERICAN ENTOMOLOGICAL SOCIETY
PRINCE AND LEMON STS., LANCASTER, PA.
AND
1900 RACE STREET, PHILADELPHIA 3, PA.

Subscription, per yearly volume of ten numbers: $5.00 domestic; $5.30 foreign; $5.15 Canada. Entered as second-class matter April 19, 1943, at the post office at Lancaster, Pa., under the Act of March 3, 1879. Acceptance for mailing at the special rate of postage provided for in paragraphs (d-2), Section 34.40, P. L. & R. of 1948, authorized April 19, 1943.

ENTOMOLOGICAL NEWS

ENTOMOLOGICAL NEWS is published monthly, excepting August and September, by The American Entomological Society at Prince and Lemon Sts., Lancaster, Pa., and the Academy of Natural Sciences, 1900 Race Street, Philadelphia 3, Pa., U. S. A.

PHILIP P. CALVERT, Editor Emeritus. R. G. SCHMIEDER, Editor. Editorial Staff: E. J. F. MARX, M. E. PHILLIPS, J. A. G. REHN, and A. G. RICHARDS.

Subscription price, per yearly volume of 10 numbers: Domestic, $5.00; Foreign, $5.30; Canada, $5.15—U. S. Currency.

SUBSCRIPTIONS, ADVERTISEMENTS: All communications and remittances to be addressed to **ENTOMOLOGICAL NEWS, 1900 Race Street, Philadelphia 3, Pa.**

MANUSCRIPTS and all communications concerning same should be addressed to **R. G. Schmieder, Zoological Laboratory, University of Pennsylvania, Philadelphia 4, Pa.**

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ENTOMOLOGICAL NEWS

VOL. LXIII DECEMBER, 1952 No. 10

New Taxonomic Entities in Neotropical Aeshnas (Odonata: Aeshnidae).

By PHILIP P. CALVERT, University of Pennsylvania and Academy of Natural Sciences of Philadelphia

Work on the neotropical species of the genera *Aeshna* and *Coryphaeschna,* announced in the NEWS for October, 1936 (Vol. xlvii–8–: 213–214), has progressed so far that blocks for 45 half-tone plates have been made and the explanation thereof has been typed. The mechanical work of preparing the remainder of the text for the printer is sufficiently extensive as to make it desirable to give nomenclatural status to the names of new species, subgenera and genera adopted by publishing them at this time.

Cockerell established the subgenus Hesperaeschna (Proc. U. S. N. M. 45–2000–: 581, 1913) for *Aeschna californica* Calv., giving as its characters (1)* "M3 and M4 separated by one cell only at margin of wing, but a short distance before by two rows of cells, owing to the deflection of M4 from the straight course; (2) cell formula of triangles 2,1,1; (3) upper branch of radial sector in a line with the stem; (4) Rs separated from supplementary vein below it by only three rows of cells; (5) fork of Rs a short distance before the beginning of stigma."

The venation of *Aeshna californica* is figured by Needham, Proc. U.S.N.M. 26 (1331), pl. 40, fig. 1, 1903.

The characters given for *Hesperaeschna* by Cockerell will, in many cases, serve to differentiate it from *Aeshna* Fabr., whose

* The numbers in parentheses () are solely to facilitate reference to the characters.

generotype was fixed by Westwood (1840) as *Ae. grandis* (Linn.). The venation of *grandis* is shown in an excellent photographic reproduction by Fröhlich (Odon. u. Orthop. Deutschlands, Fischer, Jena, taf. 3, fig. 10, 1903) and in figures by Lucas (Brit. Dragfls., pl. xviii, 1899) and Longfield (Dragfls. Brit. Isles, edit. 1, 1937, pl. 21, edit. 2, 1949, pl. 30). Cockerell's characters serve to differentiate *Hesperaeschna* from the figures of some other European Aeshnas (*juncea, caerulea, cyanea,* but *not isosceles* (*rufescens*) or *mixta*) in Lucas and Longfield and from the figure of the North American *Ae. eremita* in Walker's *Aeshna,* p. 15, 1912.

When, however, series of individuals of various species of "*Aeshna*" are examined, it will be found that most of Cockerell's characters shade from the condition given for *Hesperaeschna* into those existing in *Ae. grandis* and its nearest allies. The tables of Bartenef (Zool, Anz. 89 (1–2) : 39–44, 1930) for 12 palaearctic species of *Aeschna* are illuminating in this respect.

Other characters existing in Cockerell's generotype of *Hesperaeschna* (*californica*) are more constant; among these are (**6**) the presence of a ventral tubercle on the first abdominal segment; (**7**) supratriangular cross-veins present; (**8**) thorax dark with two lateral pale stripes; (**9**) males with superior appendages in lateral edge view not bifid nor with an anteapical ventral point, (**10**) a median dorsal carina on abdominal segment 10 and (**11**) anal triangle of hind wings 3-celled.

Of the characters 6–11, only 6 and 11 separate *Hesperaeschna* from typical *Aeshna* and from the first ten of the sixteen North American species of *Aeshna* treated by Walker (1912) ; char. 6 separates it also from *palmata, umbrosa* and *constricta* of North America; others, 7–10, in various combinations, separate *Hesperaeschna* from other groups, as indicated below.

Cockerell referred no other species than *californica* to *Hesperaeschna.* In its modified definition, as here presented, *Hesperaeschna* includes *californica, biliosa* Kennedy (in which the two lateral pale thoracic stripes are broken into spots), *confusa* Rambur, *cornigera* Brauer, *haarupi* Ris, *joannisi* Martin, *manni* Williamson, *marchali* Rambur, *peralta* Ris, *psilus* Calvert,

punctata Martin, *variegata* (Fabricius) Ris and *williamsoniana* Calvert.

Aeshna (Hesperaeschna) cornigera planaltica new subspecies

Proposed for the more southern members of *Ae. cornigera* Brauer which have the pale lateral thoracic (mes- and metepimeral) stripes constricted on the anterior margins by a deep sinus or indentation, in contrast with the more northern typical examples in which these stripes are not constricted. These differences are referred to by Calvert, Biol. Centr.-Amer. Neur. Supplement, p. 400, 1907, and by Ris, Arch. f. Naturges. 82 A (9) : 157–8, 1918, but without the application of distinctive names.

Holotype ♂ of *planaltica,* Nova Teutonia, Santa Catarina, Brazil, Dec. 1, 1935, by Fritz Plaumann, coll. Calvert (No. 226). *Paratypes:* Huigra, Feb. 12–13, 1911, by Samuel N. Rhoads, 1♂ 1♀, Acad. Nat. Sci. Philadelphia, Abitagua, 5.xi.39, by MacIntyre, 1♂, coll. C. H. Kennedy, and Naranjapata, by F. Campos R., No. 34, 1♂, Acad. Nat. Sci. Phila. all three Ecuador; vicinity of Guayabamba, Dept. Amazonas, Aug. 14, 1936, 2♂, 1♀, and vicinity of Llangua River, Lallanga, Dept. Cajamarca, June 13, 1936, 1♂, both localities Peru and by Felix Woytkowski, Mus, Zool. Univ. Mich.; Rio Perené, 1♂, San Ramon, Oct., 1930, 1♀, La Merced, Chancamayo, 1♀, from Dr. P. Martin, and Oxapampa, "Staudinger vd.", 2♂, all Peru, coll. J. Cowley; Sapucay, Paraguay, Nov. & Dec., 1899, by W. T. Foster, 3♂, U. S. Nation. Mus.; Nova Teutonia, Brazil, as above for holotype, Nov. to March, 8♂, 1♀, coll. C. H. Kennedy, 6♂, 3♀, coll. Calvert; Buschental, Dept. San José, Nov. & Dec., 1934, 2♂, and Aigua, 1♂, by H. Schneider, both Uruguay, coll. J. Cowley.

The proposed name *planaltica* refers to the area Plano Alto, as shown on maps, pls. xi and xii, of Haseman's "Some Factors of Geographical Distribution in South America" (Annals New York Acad. Sci. xxii, 1912).

Cornigera planaltica and *c. cornigera* meet at Abitagua, Ecuador. As indicated in the list of types above, *planaltica* extends

from Ecuador to Uruguay, and is the only form of *cornigera* known to me to occur south of 15 degrees South Latitude. *C. cornigera* reaches from Mexico to Bolivia.

For the three neotropical species, *brevifrons* Hagen, *intricata* Martin and *vigintipunctata* Ris, the new subgenus *Marmaraeschna* is proposed, with *intricata* as generotype. Its characters are (12) abdominal segment 1 with a ventral tubercle; (13) supratriangular cross veins present; (14) thorax pale with scattered black marks; (15) vein M1a beginning proximal to the level of the stigma or under the proximal end or proximal half of the stigma; males with (16) a mid-dorsal longitudinal carina on abdominal segment 10, (17) superior appendages, in lateral edge view, with the apex not bifid nor with an anteapical ventral point, (18) anal triangle 3-celled.

The name *Marmaraeschna,* from the Greek μάρμαρος, marble, and *Aeschna,* has been suggested by the use of the word "marbré" by Martin in his description of the thorax of *intricata* (1908, p. 59) and of "marmoriert" applied by Ris (1918, p. 164) to the thorax of *vigintipunctata.*

Character 14 separates *Marmaraeschna* from all its allied subgenera and genera, also 12 from typical subgenus *Aeshna* and from *Coryphaeschna,* 13 and 15 from the subgenus *Neureclipa* (see below), 16 from *Coryphaeschna* and 17 from *Schizuraeschna* (also below).

For the nearctic-neotropical group, *multicolor* Hagen, *mutata* Hagen, *jalapensis* Williamson and *dugesi* Calvert, the new subgenus *Schizuraeschna* is proposed, with *multicolor* as the generotype; the name is from the Greek σχιζω, to split, ουρα, tail, and *Aeschna,* in allusion to the bifid apex of each male superior appendage. The characters are (19) abdominal segment 1 with a ventral tubercle; (20) supratriangular cross-veins present; (21) thorax dark with two pale oblique lateral stripes; (22) veil M1a beginning distal to the level of the stigma, or under the distal end thereof; (23) cell formula of discoidal triangles 2,1,1(,1); (24) internal triangles 2-celled; males with (25) a mid-dorsal longitudinal carina on abdominal segment

10, (26) superior appendages, in lateral edge view, bifid in the apical fourth or less, the lower division much shorter than the upper and in one species (*dugesi*) reduced to an inferior anteapical point, (27) anal triangle of the hind wings 3-celled. Character 26 distinguishes *Schizuraeschna* from all its allied genera and subgenera, and in addition 19 separates it from the typical subgenus *Aeshna,* 20, 23 and 24 from the subgenus *Neureclipa* (see below), 21 and 22 from the subgenus *Marmaraeschna,* 19, 25 and 27 from *Coryphaeschna,* 24, 27 and the absence in the male of the posterior ventral teeth of abdominal segment 1, described below under *Castoraeschna,* from that genus.

The genus *Neureclipa,* here relegated to subgeneric rank, was proposed by Navás (Revista Museu Paulista 8: 478, 1911) for *bonariensis* Rambur and *litigatrix* Navás, with the following characters; (28) hypertrigonal (supratriangular) space in each wing with no cross-veins, male (29) having the 10th (abdominal) segment with a dorsal tooth and (30) the superior cerci with an inferior tooth, "otherwise as in *Aeschna.*" As Navás did not specify a generotype, as he mentions *bonariensis* first and as *litigatrix* may not be specifically different, *bonariensis* is here fixed as the generotype.

The following are here added as subgeneric characters of *Neureclipa:* (31) abdominal segment 1 with a ventral tubercle; (32) vein M1a beginning at the level of the distal half, or distal end, of the stigma, or distal to the level of the stigma; (33) thorax with two oblique pale lateral stripes; (34) cell formula of discoidal triangles usually 1,1,1; (35) internal triangles usually 1-celled; males with (36) anal triangle of the hind wings 3-celled, (37) superior appendages, in lateral edge view, not bifid at the apex nor with an inferior anteapical point.

Neureclipa is differentiated from typical *Aeshna* by characters 28, 31, 34, 35 and 36, from *Hesperaeschna* by 28 (and from some of its species by 34 and 35), from *Marmaraeschna* by 28, 32 and 33, from *Schizuraeschna* by 28, 34, 35 and 37, from *Coryphaeschna* and *Castoraeschna* (see below) by Rs forking proximal to the level of the stigma, with three rows of cells be-

tween the fork at the level of the distal end thereof, and by the proximal side of the discoidal triangle of the hind wings half, or more than half, as long as the hind side, and, in addition, from *Coryphaeschna* by characters 28, 29, 31 and 36. Characters of *Neureclipa* separating it from *Castoraeschna* are the absence of the two ventral posterior teeth of abdominal segment 1 of the male and 28 and 36.

In addition to *bonariensis* (including *litigatrix?*), *Neureclipa* embraces *diffinis* Rambur, *galapagoensis* Currie and two forms here presented as undescribed: *N. diffinis absoluta* and *N. elsia.* The pale mesepimeral stripe seems to be the chief differential for the species of *Neureclipa.* It appears to be absent in all studied material of *galapagoensis;* it reaches upward to the upper margins of the mesepimeron and metepisternum in *bonariensis, elsia,* and *diffinis absoluta,* but only part way (¾ or less) to those upper margins in *diffinis diffinis.*

Aeshna (Neureclipa) diffinis absoluta new subspecies

♂. Frons above and face pale cadmium yellow (Smith's Glossary), labium pale clay yellow, stem of black T-spot of frons narrowing forward from base (.9–1.23 mm.) to .33–.57 mm. at almost its junction with the top of the T, bordered on each side by a parallel pale yellow stripe not as wide as the black stem, this in turn followed laterad by an isolated subquadrangular purple brown spot reaching laterad to beyond the level of the end of the top of the T. A pale brown, occasionally black, line on the fronto-nasal suture. Most of the vertex and of the occiput pale yellowish.

Pterothorax a rather pale greenish brown; pale bluish antehumeral stripe occupying a little less than the lower half of the mesepisternum, .74–1.23 mm. long, .25–.33 mm. wide, diverging downward (forward) from its fellow of the opposite side; pale yellow mesepimeral stripe as stated above under the genus, .41–.82 mm. wide at mid-height, nearly straight; a pale yellow metepimeral stripe likewise reaching to the upper margin of its sclerite, .50–.65 mm. wide at mid-height, almost straight, continued on to the sides of abdominal segments 1 and 2.

Pale brown markings on dorsum of abdominal segments 3–10 consist of anterior dorsal, mid-dorsal and posterior dorsal spots (AD, MD and PD of Walker, 1912); taken collectively they exceed in area the black which bounds them on 3–7, but AD rapidly decreases on 7 and 8 to zero on 9 and 10.

Wings with 12–14 antenodals on front pair, 8–10 on hind, 6–9 postnodals on front, 8–11 on hind; hind wings with 2 vertical rows of cells in the anal loop (3 rows in one wing out of 14). Pterostigma pale brown ochre to pale Van Dyke brown above, in some paler at distal end, below gamboge; membranule brown, basal 4th to 5th white.

♀. Differs from the male as follows: Face a little darker; lateral genital plates one-half as long as ovipositor.

Dimensions: Abdomen (excluding appendages) ♂ 34–35, ♀ 32.5–36; hind wing ♂ 34–35, ♀ 35.5–37; superior appendages ♂ 4.34–4.75, ♀ 3.8–4.5; pterostigma ♂ 2.45–3.45, ♀ 2.9–3.27 mm.

Holotype ♂ vicinity of Concepcion, Peru, April 7–8, 1935, by Felix Woytkowski, Mus. Zool. Univ. Mich. *Allotype* ♀ and paratypes 3 ♂, 3 ♀, same data as for holotype; also *paratypes* 7 ♂, 1 ♀, same locality, collector and museum, but dated April 26–27, 1935, and 1 ♀ Cotahuasi, Peru, 9000 feet, October, 1911, Yale Peruv. Exp. in U. S. National Museum.

Distribution: Concepcion and Cotahuasi, Peru.

The proposed subspecific name, *absoluta,* refers to the completeness of the pale epimeral stripes in that they reach upward to the upper margin of their respective sclerites.

In *diffinis diffinis* Rambur the epimeral stripes reach upward only to three-fourths or less of the height of the sclerites and the geographical distribution is from Valparaiso to Filuca, Chile, on the Pacific slope, and Montevideo and Buenos Aires on the Atlantic slope, of the material which I have examined. Navás (1933, Revista Acad. Cien, Madrid 29: 54) has cited *diffinis* from Arequipa, Peru, and Porter (1897, Revista Chil. Hist. Nat. 1: 13, 1899, 3: 181) from Copiapo and the province of Atacama, Chile; whether these more northern examples of *diffinis* are *d. diffinis* or *d. absoluta* is still to be determined.

Bonariensis is like *diffinis absoluta* in having the long pale epimeral stripes and a pale antehumeral stripe on the lower half of the mesepisternum. The geographical distribution of *bonariensis* is very different, ranging from the States of Minas Geraes and Paraná in Brazil and San Juan Province in Argentina to Montevideo and Buenos Aires; there is also a single Chilean record, viz. Las Mercedes by Gonzulla & Ruiz (1928). I have designated *absoluta* as a subspecies of *diffinis* rather than of *bonariensis* because of the predominantly Pacific distribution of the first two.

Aeshna (Neureclipa) elsia new species

♂. Frons pale clay yellow (Smith's Glossary, pl. iv, 22), superiorly with a black T-spot whose stem narrows from base (.65–1.23 mm. wide) anteriorly to .41–.65 mm. almost at its junction with the top of the T; stem bordered each side with yellow which is not as wide as the base of the stem but is wider than the stem where the latter joins the top of the T.* This bordering yellow followed laterad by greenish blue which extends laterad on to the side of the frons beyond the level of the acute end of the top of the T. Anterior surface of frons pale brownish in its upper half, very pale bluish in its lower half. Fronto-nasal suture with a brown line.* Clypeus (nasus + rhinarium) very pale bluish. Labrum near gamboge or pale bluish. Labium pale bluish to pale clay yellow. Most of the vertex and of the occiput pale clay yellow or bluish.

Pterothorax pale greenish brown, no pale antehumeral stripe. Mesepimeral stripe often faded in dried specimens, bluish white, reaching upward to the upper margins of mesepimeron and metepisternum, .9–1.6 mm. wide at mid-height, ending below in a crescentic yellow spot, convexity ventrad; this yellow spot is often all that is visible of the mesepimeral stripe in many specimens. Metepimeral stripe bluish white, reaching to the

* The male from Patagonia, No. 134, has the T-spot and the blue spot following the bordering yellow as described above for *diffinis absoluta* and has a well-marked black line on the fronto-nasal suture.

upper margin of its sclerite, 1.2–1.6 mm. wide at mid-height, lower end narrowing to .5 mm., yellowish.

Abdominal segment 1 largely brown ochre on the sides, dorsally, as well as the anterior dorsal half of 2, Van Dyke brown. Most of the posterior half of 2 and the mid-dorsal (MD of Walker, 1912), posterior dorsal (PD), antero-lateral (AL), mid-lateral (ML) and posterior lateral (PL) spots on 3–8 and much of the posterior half of 9 and 10 bright blue. Remainder of the abdominal tergites black, or on 3–5 dark brown. Mr. Woytkowski, the collector, noted on the envelope of the Chosica male: "has fine very vivid blue marks, which have become dull after drying."

Wings with 11–14 antenodals on front pair, 8–9 on hind; 7–9 postnodals on front, 7–10 on hind; hind wings with 2 vertical rows of cells in the anal loop, occasionally (7 wings out of 26) 3 cells at the lower end. Pterostigma near Van Dyke brown above, paler at the extreme ends, pale brown to pale clay yellow below. Membranule brown, whitish at extreme base.

♀ differs from the male: (In the two females from Miñi-Miñi the anterior surface of the frons and clypeus lavender, labium pale rosaceous.) Fronto-nasal suture with a very pale brown line. Blue of the abdomen replaced by lilaceous or a paler blue, the black replaced by dark brown (Roman sepia or Cologne earth of Smith), which is less extensive than the black of the male. Pterostigma pale brown ochre (or burnt siena, Azapa) above, pale brown pink (Smith) or pale clay yellow below; basal sixth to third of membranule whitish. Lateral genital plates one half as long as the ovipositor.

Dimensions: Abdomen (excluding appendages) ♂ 37–40, ♀ 35–39; hind wing ♂ 35–40, ♀ 36.5–40; superior appendages ♂ 4.42–4.82, ♀ 3.93–4.25; pterostigma, costal edge, front wing, ♂ 2.6–3.35, ♀ 2.95–3.52 mm.

Holotype male and *allotype* female vicinity of Pacasmayo, Peru, May 20, 1936, a mating pair taken over a pond between sand dunes, Felix Woytkowski collector, No. 2222, Mus. Zool. Univ. Mich. *Paratypes:* same locality, date and collector 1 ♂ (P.P.C. no. xix); vicinity of Villa, 120 m. a(bove) s(ea)

lev(el), Dept. Lima, Peru, Mar. 15, 1936, same collector, 6 ♂ 1 ♀; Repartición, 140 m. a. s. level, Dept. Lima, Peru, 1 ♂ Feb. 28, 1 ♂ Feb. 29, 1936, same collector; vicinity of Chosica, 990 m. a. s. level, Dept. Lima, Peru, Mar. 1, 1936, 1 ♂, same collector, Mus. Zool. Univ. Mich. Miñi-Miñi, 18.ii.48, 2 ♀ and Azapa, 1.iii.48, 1 ♀, CHILE, Cornell Univ. Coroicó, Chile, May, Steind[achner?], 1 ♂, 1 ♀, Mus. Comp. Zool. Patagonia 1 ♂, Amer. Mus. Nat. Hist. (P.P.C. no. 134).

Named for Elsie Lincoln Rosner who made the great majority of the drawings referred to in the opening paragraph of this paper and helped in tabulating characters.

As stated above under the subgenus *Neurreclipa, N. elsia* differs from *N. diffinis diffinis* and agrees with *N. d. absoluta* and *bonariensis* in having the pale epimeral stripes reaching upward to the upper margins of their respective sclerites. It differs from *bonariensis* in geographical distribution which has been given above under *d. absoluta.* The distribution areas of *elsia* and of *d. absoluta,* both in Peru, are not as widely separated and additional material may show that they overlap. *Elsia* has the epimeral stripes bluish white, terminating inferiorily in a yellow spot, and wider at mid-height (.9–1.6 mm.) while in *bonariensis* and in *d. absoluta* they are yellow throughout and narrower (.41–.74 mm.) at mid-height. When, as so often happens, the epimeral stripes are faded in specimens of *elsia,* very close examination of them under a lens is necessary for identification.

Coryphaeschna secreta new species

♂. Frons superiorly and face, including lips, pale brown ochre (Smith's Glossary, pl. iv, 36), no T-spot on dorsum of frons, vertex pale Van Dyke brown.

Pterothorax darker Van Dyke brown; antehumeral, mes- and metepimeral stripes green, all narrower than the intervening brown, the green antehumeral narrowing inferiorly.

Abdomen a pale reddish brown (faded?), paired pale green anterior dorsal, median dorsal and posterior dorsal spots on segments 4–6, posterior dorsal also on 7(?) and 8; 10 with a low continuous mid-dorsal carina.

Superior appendages in bad condition, the left 5.15 mm. long, the right broken off at .29 length, the left with a piece .57 mm. long broken out of the lateral margin just beyond half length; left appendage with lateral margin slightly sinuate in the middle third of its length, inner (mesal) margin narrowed to .2 of appendage length, thence gradually widening to mid-length, thence narrowing to .83 length, whence the appendage is of nearly uniform width to the rounded apex; distal half of inner margin with hairs longer than appendage width; a distinct, inferior, subbasal tooth at .14 of appendage length. Inferior appendage broken off (at somewhat more than half length?).

Wings: area between Cu1 and Cu2 on hind pair with one row of cells throughout; this character variable in *C. luteipennis* Burm.

Dimensions: Abdomen (excluding appendages) 51, hind wing 47, sup. apps. 5.15, pterostigma, costal edge, front wing, 3.93 mm.

♀ unknown.

Holotype male: S. Diego d 1 Baños, CUBA, Apr. 14 00 Palmer & Riley U. S. National Museum.

The proposed specific name refers to the long concealment of this large insect in spite of much biological exploration of Cuba.

Secreta falls under rubrics F, G of the key to the species of *Aeschna,* Biol. Centr.-Amer. Neur., p. 180, and under rubrics A, 1, 2 (in part) of the key to the species of *Coryphaeschna* by Geijskes, Ent. News liv (3): 63, March, 1943. Its nearest allies by these two keys are *luteipennis* Burm. and *ingens* Rambur. From the males of *luteipennis* and *rufipennis* Kennedy it differs in lacking a quadrangular excision on the inner margin of the superior appendages. From *ingens* male it differs in its smaller size; abdomen 51 mm. vs. 58–61 mm. (*ingens*), hind wing 47 vs. 55–59, sup, apps. 5.15 vs. 7–7.75, pter. 3.93 vs. 4.83–6. mm., and from both species by the lack of a dark T-spot on the dorsum of the frons.

Coryphaeschna viriditas new name for *C. virens* Rambur preoccupied

Aeschna virens Rambur, 1842, Hist. Nat. Ins. Névroptères, p. 193, is a homonym of *Ae. virens* Charpentier, 1840, Libel. Europ., p. 101, tab. x, xii.

CASTORAESCHNA new genus

(38) Subnodal sector (Rs) forking at the level of from one-half the last postnodal costal cell to three postnodal costal cells proximal to the stigma, or, more rarely, at the level of the proximal end of the stigma, with (39) 3 or 4, rarely 2, rows of cells between the fork at the level of the distal end of the stigma; (40) proximal side of the discoidal triangle of the hind wings always shorter than one-half the length of the hind side; (41) sternite of abdominal segment 1 with a median tubercle bearing spinules, hairs, or both; (42) internal triangles 1-celled; males with (43) ventral posterior angles of tergite of abdominal segment 1 each prolonged into an acute mesad-projecting tooth;* (44) anal triangle of the hind wings 2-celled; (45) glans penis with a thread-like dorsal cornu. Generotype: *Aeschna castor* Brauer.

The generic name proposed is a combination of the specific name of the generotype and *Aeschna*.

This genus differs from all other genera of American Aeshninae by character 43 and in addition from *Coryphaeschna* by 41, and usually from the subgenera of *Aeshna* by 40. It includes also *colorata* Martin, *coronata* Ris, *januaria* Hagen and *longfieldae* Kimmins.

The claim of this group of species to generic rank was recognized by Ris (1918, Arch. Naturges., 82 A (9): 169) and by Geijskes (1943, Ent. News liv (3): 61), but no one seems to have given the group a generic name.

* Figures of these teeth in two species of *Castoraeschna* are given by Kimmins, 1929, Ann. & Mag. Nat. Hist. (10) iii: 490, figs. 1A and B.

The Status of Some Australian Amblyopone Species (Hym.: Formicidae)

By W. L. Brown, Jr., Museum of Comparative Zoology, Harvard University

A recent tour of Australia and a visit to the British Museum (Natural History) permit me to correct the synonymy of some of the smaller, yellowish species of *Amblyopone* Erichson with longitudinally striate heads, related to *A. ferruginea* Fred. Smith.

Amblyopone ferruginea Fred. Smith

A. ferruginea Fred. Smith, 1858, Cat. Hym. Brit. Mus. 6: 110, worker, *nec A. ferruginea* Wheeler, 1927, Proc. Amer. Acad. Arts Sci. 62: 20–22, fig. 5, worker.
A. ferruginea Clark (*in litt.*) in Wheeler, 1927, *op. cit.*, p. 22, Victorian records.
A. mandibularis Clark, 1928, Jour. R. Soc. W. Aust. 14: 33–34, Pl. 1, figs. 12–15, worker. New Synonymy

The worker of this species has the inner mandibular borders crowded with small, mostly subequal teeth, usually double-ranked in unworn specimens; no very large tooth in an isolated position basad of the midlength. So far as I am aware, the distribution as known is confined to Melbourne and suburbs plus the adjacent lower basin of the Yarra River and the stretch of country immediately south of the Dandenong Ranges and west to Port Phillip Bay. Melbourne is the type locality given by Smith.

Workers from the type nest of Clark's *A. mandibularis,* from Belgrave, Victoria, kindly given me by the original collector, Mr. F. E. Wilson, have been compared by me with the *A. ferruginea* holotype and prove to be the same species.

I have seen *A. ferruginea* from additional Victorian localities as follows: Ferntree Gully (F. P. Spry). Greensborough (J. McAreavey). Burnley; East Burwood; Mooroolbark; Lower Ferntree Gully; Warrandyte; Research; Eltham (W. L. Brown). This ant is strongly hypogaeic, and therefore,

while common in its range, it is not very commonly seen except after the winter and spring rains, when the workers come up beneath logs and stones or are washed out onto the ground surface. I have seen numerous enfeebled and dead workers on the surface after particularly heavy rains during the winter of 1951 in the park at Burnley, where *Iridomyrmex* workers carried them off by the dozen.

The preferred habitat is in the soil of medium-rainfall sclerophyll forest such as the eucalypt-wattle bush to the east of Melbourne, or in the *Eucalyptus elaeophora-E. macrorrhyncha* association of the Eltham district. This species appears to be replaced in the wetter sclerophyll forest and fern gullies by *Amblyopone* of the *australis* group and of the very small "Fulakora" complex.

Amblyopone longidens Forel, reinstated as a good species

A. ferruginea var. *longidens* Forel, 1910, Rev. Suisse Zool. 18: 1, worker.

A. ferruginea Wheeler, 1927, Proc. Amer. Acad. Arts Sci. 62: 20–22, fig. 5, worker (*nec* Clark records *in litt.*, p. 22), *nec* Fred. Smith.

Wheeler (*loc. cit*) wrongly synonymized *longidens* with *A. ferruginea,* as is evident from Forel's short description and his citation of the type locality (Bombala, New South Wales). As Forel stated, *A. longidens* has a large, sharp isolated tooth on the inner mandibular border just basad of the midlength, while the few remaining teeth are grouped along the apical half of the border. This species has a far wider range and is commoner than is *A. ferruginea;* it occurs very close to the Melbourne area (I have seen specimens from Gembrook, Victoria), but has not yet been found actually within the range of *A. ferruginea. A. longidens* is a common ant in open forest and savannah woodland areas of eastern New South Wales; I have examined most of the specimens upon which Wheeler based his New South Wales records, and have, in the company of Mr. Tom Greaves, also found this ant at many places in the hills around Canberra during the early winter after heavy rains, usually under logs and stones. Mr. Bruce Given and I found

it also under slabs of rock in dense scrub of Grampians snow gum (*Eucalyptus alpina*) at Mirranatwa Gap, Grampians Ranges, western Victoria. I have also found numerous workers after rains under logs and grass tree stumps in mallee heath and *Casuarina stricta* scrub near the Ravine des Casoars, western Kangaroo Island, South Australia; the latter is apparently the most westerly known record.

A. longidens varies considerably in size, and many specimens have the head and alitrunk deeply infuscated, but the dentition remains constant; no intergrades to *A. ferruginea* have been seen. The distributional pattern shown by these two species is a curious one, and unaccountable when the seeming lack of barriers or major ecological differences is taken into account. There does seem to be a difference in moisture preferences, with *A. longidens* tolerating drier sites; but why *A. ferruginea* remains known from such a restricted area is a mystery. The distribution of *ferruginea* in and around Melbourne is almost that of an introduced species, and this latter possibility must not be ruled out entirely until the relationship of *ferruginea* to the very similar *A. clarki* Wheeler of southwestern Australia has been thoroughly studied.

Undescribed Species of Crane-Flies from the Western United States and Canada (Dipt.: Tipulidae) Part XIII

By Charles P. Alexander, University of Massachusetts, Amherst, Massachusetts

(*Continued from page 237*)

Erioptera (Symplecta) sunwapta new species

General coloration gray, the praescutum with three narrow darker brown stripes; wings with the ground rather strongly infuscated; abdomen dark brownish gray, the lateral borders

conspicuously yellow; male hypopygium with the outer dististyle expanded outwardly, bearing a powerful erect spine on outer margin before tip, together with a smaller subapical spine; gonapophysis a simple blackened horn.

♂. Length about 4.8–5.2 mm.; wing 5.5–6 mm.
♀. Length about 5.5 mm.; wing 6 mm.

Rostrum brown, yellowed beneath; palpi brownish black. Antennae black throughout; flagellar segments oval, subequal in length to the verticils, the outer segments more elongate. Head dark gray; eyes (male) large, narrowing the vertex.

Pronotum brown; pretergites yellow. Mesonotal praescutum light brown, with three narrow darker brown stripes, these subequal in width to the interspaces, humeral region more yellowed; posterior sclerites more pruinose, the scutal lobes patterned with darker brown, the posterior callosities yellow; a dark central spot at base of scutellum. Pleura gray, the dorsopleural membrane yellowed behind. Halteres with stem light yellow, its outer third, with the knob, dark brown. Legs with the coxae pruinose; trochanters brownish yellow; remainder of legs brownish black to black. Wings rather strongly infuscated, patterned with darker brown, including spots at origin of *Rs*, Sc_2, cord and outer end of cell *1st* M_2, tip of R_{1+2} and the supernumerary crossvein, and as paler and more diffuse clouds in cell *1st A* adjoining vein *2nd A*, at near midlength and again before the tip; veins brown. Venation: Sc_1 ending just beyond level of R_2, Sc_2 about opposite one-third the length of *Rs;* supernumerary crossvein in cell R_3 opposite tip of vein R_{1+2}; *m–cu* approximately one-half its length before fork of *M;* vein *2nd A* strongly sinuous.

Abdomen dark brown, gray pruinose, the lateral borders of the segments conspicuously yellow; hypopygium fulvous to brownish fulvous. Male hypopygium with the outer dististyle expanded outwardly, bearing a powerful erect spine on outer margin before tip, with a smaller subapical spine; lower edge of style back from apex elevated into a low flange. Inner dististyle subequal in length, appearing as a slender sclerotized rod, its apex obtuse. Gonapophysis a simple blackened horn, the outer

surface with short setae. Phallosome forking into two blades, each of which is produced into two slightly unequal parts.

Habitat. ALBERTA. *Holotype:* ♂, Sunwapta Pass, on the exact border between the Banff and Jasper National Parks along the highway, altitude 6,670 feet, July 21, 1949 (C. P. Alexander). *Allotopotype:* ♀, pinned with type. *Paratopotypes:* Numerous specimens, several unmounted, July 21, 26, August 5, 1949 (C. P. Alexander).

This very distinct fly is readily told from the related regional species, *Erioptera* (*Symplecta*) *cana* (Walker) and *E.* (*S.*) *hybrida* (Meigen), by the very different male hypopygium. The fly was not uncommon in the wet boggy meadows at the Pass, in both the Banff National Park and Jasper National Park. This is in the drainage of the North Saskatchewan River, through Hilda and Nigel Creeks. The specimens were swept from the tundra-like vegetation, including dwarf birch and willow, with grasses and sedges. Conditions were cold and bitter, even on sunny days, since the glaciers of Mount Athabasca and the Columbia Icefield are close at hand.

Molophilus (Molophilus) fenderi new species

Belongs to the *plagiatus* group; general coloration brownish black, sparsely pruinose; antennae (male) approximately one-half as long as the wing; male hypopygium with the basal dististyle a massive blackened structure, its main axis a powerful spine, at near midlength on outer face with a subappressed spine.

♂. Length about 3.5 mm.; wing 4 mm.; antenna about 2 mm.

Rostrum, palpi and head brownish black. Antennae (male) elongate, as shown by the measurements, black throughout; individual segments fusiform, their apices somewhat more narrowed than the bases; verticils exceeding the segments; in addition to the verticils, the segments with several long yellow setae, the longest subequal to the segments.

Thorax brownish black, the surface sparsely pruinose, the scutellum and postnotum more conspicuously so; pretergites narrowly testaceous yellow. Halteres yellow. Legs with the

coxae testaceous yellow, trochanters clearer yellow; remainder of legs dark brown to brownish black, the femoral bases obscure yellow. Wings with a strong blackish tinge, the veins and trichia darker. Venation: R_2 lying some distance beyond the level of *r–m; m–cu* about one-half the petiole of cell M_3; vein *2nd A* moderately sinuous, ending shortly beyond the level of *m–cu*.

Abdomen, including hypopygium, black. Male hypopygium with the beak of the ventral dististyle slender, straight, blackened. Outer dististyle with the arms slightly unequal, the inner one slightly longer and more slender. Basal dististyle a massive blackened structure, the main axis a powerful gently curved spine, at near midlength on outer face with a subappressed black spine that is about half as long as the axial one. In the type, the axial arm bears a very small point or tooth on lower margin a short distance back from the tip.

Habitat. CALIFORNIA, OREGON. *Holotype:* ♂, Castle Creek Forest Camp, Shasta National Forest, Shasta County, California, July 30, 1950 (C. P. Alexander). *Paratype:* 1♂, Beaver Sulphur Creek, Rouge River National Forest, Siskiyou Mountains, Oregon, altitude 1,750 feet, August 10, 1950 (K. M. Fender).

I take great pleasure in naming this distinct fly for Kenneth M. Fender, in remembrance of an outstanding excursion through the Oregon Siskiyous in August 1950. This, the most northerly member of the group in western North America, is readily told from related species, including *Molophilus* (*Molophilus*) *palomaricus* Alexander, *M.* (*M.*) *sequoiae* new species, and *M.* (*M.*) *stolidus* Alexander, by the structure of the male hypopygium.

Molophilus (Molophilus) sequoiae new species

Very similar in its general appearance to *M.* (*M.*) *palomaricus* Alexander and *M.* (*M.*) *stolidus* Alexander, differing in the structure of the male hypopygium. Beak of the ventral dististyle long and slender, straight or virtually so. Outer dististyle with the outer arm a little shorter and stouter than the inner. Basal dististyle a strong curved arm that narrows into a long straight spine, on outer margin at near three-fourth the length

with a strong appressed spine that is approximately one-third as long as the apex; surface of style with more than a dozen punctures, mostly on the proximal two-thirds but with at least one beyond the lateral spine.

In *palomaricus* (Southern California: Palomar Mountain), the beak of the ventral dististyle is slender and straight. Basal dististyle an unusually long and very slender gently curved simple rod that narrows to an acute point. I had originally considered *sequoiae* as representing a paratype of *palomaricus* but now consider them as being sufficiently distinct (Bull. Southern California Acad. Sci. 46: 48, 1947).

In *stolidus* (Arizona: White Mountains), the beak of the ventral dististyle is stout and cleaver-like. Basal dististyle with an outer spine, somewhat as in the present fly, the apical spine much shorter; outer surface of style microscopically scabrous.

Habitat. CALIFORNIA. *Holotype:* ♂, Sequoia National Park, near entrance on Route 198, altitude 4,000 feet, July 18, 1946 (C. P. Alexander).

Periodical Cicada in New Jersey in 1952

In an area, of numerous gravelly knolls, along the eastern side of route 34 about one-half way between Allenwood Circle and where route 34 crosses route 35 (Monmouth County) the periodical cicada appeared in large numbers during the last of May, 1952. By June 12 they were still numerous and noisy. During the two comparatively cooler days of June 23 and 24 they disappeared. By July 3 much terminal twig injury, due to oviposition, was apparent on the oaks. According to the injury to the oaks the infested area was about one mile square principally on the eastern side of route 34, with much less injury on the western side. Other observers who visited the area at the peak of the infestation and before twig injury appeared thought the infested area was at least two miles square.

According to C. L. Marlatt (The Periodical Cicada, Bull. 71, U. S. D. A., 1907) Brood IX, due in 1952, covers a compact

area from the southern part of West Virginia across Virginia into North Carolina and is the southern extension of Brood VIII, one year retarded. The 1952 infestation in New Jersey is believed to be an advance emergence of some members of Brood X due in 1953 and at one time generally distributed over New Jersey, but gradually being eliminated in many areas due to land clearance for farms and building operations.—H. B. Weiss.

Hypera postica (Gyll.) Reaches New Jersey (Col.)

This curculionid, known commonly as the alfalfa weevil was discovered for the first time in New Jersey during the summer of 1952. After the first eastern infestations had been reported from Maryland and Delaware, a joint scouting program was carried on in New Jersey by the State Department of Agriculture and the Entomology Department of the New Jersey Agricultural Experiment Station. As a result larval infestations were found on alfalfa from June 17 to June 26 at Bridgeton, Millville, Quinton, Salem, Atlantic City, Pennsville, Hancocks Bridge, Woodstown, Swedesboro, Mullica Hill and Mickleton. Adults were collected in July at Rio Grande, Cape May, Leesburg and Cedarville. At present the infested area extends roughly along the western border of New Jersey from Gloucester County to Cape May County. In succeeding years adjoining areas will be invaded.—H. B. Weiss.

Current Entomological Literature

COMPILED BY R. G. SCHMIEDER

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia and the University of Pennsylvania, pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the year 1952 unless otherwise noted. Continued papers, with few exceptions, are recorded only at their first installment.

For other records of general literature and for economic literature, see the Bibliography of Agriculture, Washington, and the Review of Applied Entomology, Series A, London. For records of papers on medical entomology see Review of Applied Entomology, Series B.

Note: The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the List of periodicals and serials published in our January and June issues. The number of the volume, and in some cases, the part, heft, &c. is followed by a colon (:). References to papers containing new forms or names not so stated in titles are followed by (*); if containing keys are followed by (k); papers pertaining exclusively to Neotropical species, and not so indicated in the title, have the symbol (S).

Papers published in Entomological News are not listed.

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Errata

In article by P. H. Arnaud on "Swarming of Blacus sp. in California," in No. 6: 149–150 (June 1952).

On page 150, line 5, "Those" should read "These," and line 7 should be deleted and the following inserted "barbecue pit, usually at a height of 5 to 7 feet. The swarms"

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