STYLOPIZED VESPIDÆ¹BY GEORGE SALT² AND JOSEPH BEQUAERT³

It is becoming increasingly difficult to prepare a complete account of the various insects infested with Strepsiptera. Many of the early writers on these parasites gave lists of hosts without stating definitely whether they had themselves seen stylopized specimens or whether their records were copied from earlier workers. Taxonomists have mentioned infested specimens in monographs of various host groups, so that many records have become scattered in articles not at all concerned with the parasites, where they are likely to be found only by a student of the hosts. Mistakes in the identification of host species have caused much confusion; and the change of names, which seems inevitable in taxonomic revision, has greatly complicated the existing lists.

As one of us (J.B.) has been for a number of years interested in the Vespidae, while the other (G.S.), in the course of studies on stylopization, has found it necessary to keep lists of stylopized wasps, we have thought that it would be useful to publish jointly an annotated list of the Vespidae known to be infested with Strepsiptera. From the data contained in our list we have been able to draw several conclusions which are of some interest and importance to the general subject of the inter-relation of parasite and host.

We have examined stylopized material mainly from the Academy of Natural Sciences of Philadelphia, the American Museum of Natural History, the Boston Society of Natural

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History, the Canadian National Collection, Cornell University, the Museum of Comparative Zoölogy, and the United States National Museum; and from the personal collections of Mr. Charles Robertson of Carlinville, Illinois, Dr. C. H. Kennedy of Ohio State University, and Dr. W. M. Wheeler of the Bussey Institution, Harvard University; as well as that which we had in our own possession. We have been particularly fortunate in being able to study the stylopized specimens accumulated at the United States National Museum by Dr. W. D. Pierce and thus to connect our own identifications and records with his extensive lists. To the authorities of these institutions and to the workers who have so kindly lent or given us material, we are very grateful.

In the following list valid records are given in heavy face type, synonyms or records based on misidentifications in italics. References cited only once are given in full in the text, those used in several instances are placed in the bibliography. The words "male" or "female" invariably refer to the host, the signs ♂ or ♀ to the parasite. ♂ e represents the exuvium of a male Strepsipteron, ♂ p the puparium of the same. We record the position of the parasite by giving the number of the abdominal tergite under which it is found and the letter "R" or "L" for the right or left side respectively. In the few cases in which the parasite was situated under a sternite rather than a tergite, the letters "st" follow the number of the segment. The other abbreviations are self-explanatory. Needless to say, our re-assignment of host records, in particular those of Pierce, is based upon an examination of the specimens in question.

LIST OF THE KNOWN VESPID HOSTS OF STREPSIPTERA

Masaridinæ

Paragia decipiens Shuckard. Smith, 1867, Proc. Ent. Soc. Lond. (3) 5, lxxxviii: Gawler River, Adelaide, South Australia; ♂ e. Kriechbaumer, 1874, Stettin Ent. Zeit. 35, 254: South Australia; six males and three females. Oglobin, 1923, Sbornik Ent. Odd. Narod. Mus. Prague

1, 46: Gawler, South Australia; Odewahn; ♂ and ♀ of *Paragiozenos brachypterus* described. Hofeneder, 1928, *Societas Entom.* 43, 46: Gawlertown, Australia; male, ♀ -4R. ♀ *Paragiozenos brachypterus* Ogl. Hofeneder, *ibid.* p. 48: Flasun, Australia; 1872; male, ♂ e.

New record: New South Wales; female, ♂ e-3L, ♂ e-3L, ♂ e-3R, ♂ e-4R (A.M.N.H.).

Paragia tricolor Smith. Saunders, 1872, 42: Australia; ♀. This may have been either the true *P. tricolor* Smith or *P. smithii* Sauss.

Raphiglossinae

Psiliglossa odyneroides Saunders. Saunders, 1872, 42: Epirus; ♂ p.

Zethinae

Zethus pubescens Smith. Salt, 1927, 183: Mfongosi, Zululand; Dec. 1911; W. E. Jones; female, ♂ p-4L.

Zethus romandinus Sauss. New record: Iquitos, Peru; 27 July to 7 Aug. 1920; Cornell Univ. Exped.; female, ♀ -3L, ♂ e-4R.

Zethus spinipes Say var. **variegatus** Sauss. Salt, 1927, 183: Dallas, Texas; Jacob Boll; female, ♀ -4R; and female, ♀ -4R (both M.C.Z.).

New record: Gainesville, Alachua Co., Florida; 23 April 1923; Alexander and Walker; male, ♂ e-4R (U.S. N.M.).

Eumeninae

Eumenes arcuatus (Fabr.) var. **praslinius** (Guérin). Pierce, 1918, 489 (as *E. flavopicta* Blanchard): Larat; F. Muir; ♀, ♂ p, ♂ e, and triangulinids.

New record (probably one of above specimens): Larat; male, ♂ e-4R (U.S.N.M.).

Eumenes campaniformis (Fabr.) var. **higletti** Meade-Waldo. Salt, 1927, 183 (as *E. campaniformis* var. *marshalli* Bequaert): Salisbury, S. Rhodesia; Dr. Melle Arcturus; male.

Eumenes campaniformis (Fabr.) var. *marshalli* Bequaert.
Salt, 1927, 183:=*E. campaniformis* var. *higletti* Meade-Waldo.

Eumenes campaniformis (Fabr.) var. **rendalli** Bingham.
New record: Boma, Congo; 16 June 1915; Lang and Chapin; female, ♂ p-4R (A.M.N.H.).

Eumenes fenestralis Sauss. See *E. maxillosus* var. *fenestralis* Sauss.

Eumenes flavopicta Blanchard. Pierce, 1918, 489: in error for *E. arcuatus* var. *praslinius* Guérin.

Eumenes fraternus Say. Salt, 1927, 183: Forest Hills, Mass.; 19 Aug. 1926; George Salt; male, ♀ -3R.

Eumenes harmandi Pérez. New record: Chas Yang, Chili, China; 11 July 1921; A. P. Jacot; male, ♀ -3R (U.S.N.M.).

Eumenes maxillosus (Degeer). Heyden, 1867, 398 (as *E. tinctor* Christ): Abyssinia; ♀.

New records: Matadi, Congo; 9 June 1915; Lang and Chapin; female, ♀ -3L (A.M.N.H.). Boma, Congo; 17 June 1915; Lang and Chapin; male ♂ p-4R (A.M.N.H.).

Eumenes maxillosus (Degeer) var. *circinalis* (Fabr.). Salt, 1927, 183=*E. pyriformis* var. *circinalis* (Fabr.).

Eumenes maxillosus (Degeer) var. **conicus** (Fabr.). New record: Bangkok, Siam; 18 April 1926; H. M. Smith; female, ♀ -3R, ♀ -3L (U.S.N.M.).

Eumenes maxillosus (Degeer) var. **fenestralis** (Sauss.). Heyden, 1867, 398: Abyssinia; ♀.

New record: Boma, Congo; 29 June 1915; Lang and Chapin; male, ♂ e-3L (A.M.N.H.).

Eumenes maxillosus (Degeer) var. **reginus** (Sauss.). Salt, 1927, 183: Diego Suarez, Madagascar; female.

Eumenes melanosoma Sauss. var. **æthiopicus** (Sauss.). New record: Kakatown, Liberia; Aug. 1926; J. Bequaert; male, ♀ -3L.

Eumenes petiolata (Fabr.). Smith, 1859, 130: = *E. pyriformis* Fabr.

Eumenes pomiformis (Rossi). Saunders, 1872, 42: Nicæa; ♂ p.

Eumenes pyriformis Fabr. Smith 1859, 130 (as *E. petiolata* Fabr.): India; female, ♀ -3, ♂ e-4.

Eumenes pyriformis Fabr. var. **circinalis** Fabr. Salt, 1927, 183 (as *E. maxillosus* var. *circinalis* Fabr.): Amboina, Moluccas; Rouyer; female.

New record: Trong, Lower Siam; W. L. Abbott; female, ♀ -3R, ♀ -3L; and female, ♀ -3L (both U.S.N.M.).

Eumenes tinctor Christ. Heyden, 1867, 398: = *E. maxillosus* (Degeer).

Odynerus (See also *Pachodynerus* and *Ancistrocerus*).

Odynerus sp. Smith, 1859, 130: Brazil; female, ♂ p-3. Pierce, 1918, 489: Tucson, Arizona; 24 Aug. 1913; W. D. Pierce; ♀ -3, ♀ -4.

Odynerus annulatus Say. Pierce, 1909, 180: Dallas, Texas; 31 July; W. A. Hooker; ♀. Salt, 1927, 183: Austin, Texas. New Braunfels, Texas. Custer County, Dakota; S. W. Garman.

New records: Montana; female, ♂ p-5R (A.N.S.P.). New Mexico; female, ♀ -4L (A.M.N.H.).

Odynerus anormis (Say). Robertson, 1910, 325: Carlinville, Illinois; 31 May, 29 Oct., Chas. Robertson. Salt, 1927, 183: Carlinville, Illinois; Chas. Robertson.

New record: Colorado; C. F. Baker; male, ♀ -3R (U.S.N.M.).

Odynerus arvensis Sauss. Robertson, 1910, 325: Carlinville, Illinois; 2 Aug.; Chas. Robertson. Pierce, 1911, 499: from above specimen describes ♀ of *Pseudoxenos arvensidis*. Pierce, 1918, 489 (as *O. firmus* Cresson): Cedar Point, Ohio; 19 June 1913; J. B. Parker; ♀. Salt, 1927, 183: Carlinville, Illinois; Chas. Robertson; male, ♂ p-4R (M.C.Z.).

New records: Put-in-Bay, Bass Island, Ohio; 1-10 July; C. H. Kennedy; female, ♀ -4L. Texas; female, ♀ -3L, ♀ -4R (A.N.S.P.).

Odynerus ater (Sauss.). Schultze, 1925, Phil. Journ. Sci. 27, 235: Manila, Philippine Islands; Oct. 1924; W. Schultze; male, ♀ -3R, ♀ -3L, ♂ p-4R, ♂ p-4L; male, ♂ p-4L; wasp, ♂ p-4; and wasp, ♀ -3. ♂ and ♀ of *Macroxenos piercei* described (as *Rynchium atrum* Sauss.).

Odynerus bellulus Cresson. Salt, 1927, 183: Lee County, Texas; G. Birkman; male.

Odynerus bermudensis Beq. New record: Bermuda; Sept. 1925; L. Ogilvie; female (holotype), ♀ -4R (Brit. Mus.).

Odynerus bifurcus Rob. Robertson, 1910, 325: Inverness, Florida; 3 March; Chas. Robertson.

New record (may be same specimen as above): Inverness, Florida; 3 March; Chas. Robertson: Male, ♂ p-4L (U.S.N.M.).

Odynerus blandus Sauss. Salt, 1927, 183: Stanford University, California.

Odynerus chloroticus Spinola. Heyden, 1867, 398: Abyssinia; ♀.

Odynerus colon Cresson. Pierce, 1909, 180: in error for *Ancistrocerus fulvipes* (Sauss.).

Odynerus crenatus Lepel. Monod, 1925, Bull. Soc. Zool. France 50, 230: Sierra Morena, Spain; A. Seyrig; female, ♂ p-3-L, ♂ p-4L, ♂ p-5R; and female, ♀ -3R, ♂ e-5R. ♂ and ♀ of *Pseudoxenos seyrigi* described.

Odynerus dantici (Rossi). New record: Dalmatia; male, ♀ -3R (A.N.S.P.).

Odynerus deflendus (Saunders). Saunders, 1853, 141: Epirus and Corcyra; male; June to Aug.; ♂ and ♀ of *Pseudoxenos heydenii* described.

Odynerus figulus Sauss. New record: Sanchez, Rep. Dominicana; 11-16 May 1915; male, ♀ -3R (A.M.N.H.).

Odynerus firmus Cresson. Pierce, 1918, 489: in error for *O. arvensis* Sauss.

Odynerus flavomarginatus (Smith). Smith, 1852, Trans. Ent. Soc. London (2) 2, pt. 1, 35 (as *Rhynchium flavomarginatum* Sm.): Northern China; male; 2 ♀-3. S. Saunders, 1872, 42. Pierce, 1909, 180.

Odynerus flavopictus Sauss. New record: Put-in-Bay, Bass Island, Ohio; 1-10 July; C. H. Kennedy; male, ♂ e-3L, ♂ e-4R; female, ♂ e-4R; and male, ♀ -4R. Falls Church, Virginia; 2 June; N. Banks; male ♂ e-5R (M.C.Z.).

Odynerus foraminatus Sauss. Pierce, 1909, 180: Cincinnati, Ohio; 10 Aug.; ♀. Robertson, 1910, 325: Carlinville, Illinois; 13 Aug.; Chas. Robertson. Pierce, 1911, 506: Trenton, New Jersey; 5 July 1907; ♀ of *Pseudoxenos foraminati* described p. 499. Salt, 1927, 183: Woods Hole, Massachusetts; male, ♀ -4L; female, ♀ -4L, ♀ -4L, ♀ -4R; and male, ♂ p-4L. Carlinville, Illinois; Chas. Robertson; female, ♀ -4L (M.C.Z.). Chicago, Illinois; female, ♀ p-5R; male, ♂ e-4L; and male, ♀ -4L. Philadelphia, Pennsylvania; 23 Aug. 1900; female, ♀ -4L. Dallas, Texas; J. Boll; female, ♀ -3R, ♀ -3L, ♀ -4R (M.C.Z.). Fedor, Texas; 11 May; G. Birkman; male, ♀ -3R (M.C.Z.). West Jefferson, Ohio; 26 Aug. 1923; J. Bequaert; female, ♂ p-5R. Vienna, Virginia; 18 Aug.; male, ♀ -4R. Dyke, Virginia; 14 May; N. Banks; male, ♂ p-4L (M.C.Z.). Falls Church, Virginia; N. Banks.

New records: Nyack, New York; 2 July 1884; female, ♀ -4L (A.M.N.H.). Pennsylvania; male, ♂ p-4R (U.S.N.M.). Put-in-Bay, Bass Island, Ohio; July; C. H. Kennedy; female, ♂ -3R, ♀ -3L; female, ♀ -3L, ♀ -4R; female, ♀ -4L; female, ♀ -4L; and female, ♀ -4L. Lawrence County, Ohio; 23 Aug. 1926; C. H. Kennedy; male, ♀ -4R. Texas; male, ♀ 4R (A.N.S.P.). Texas; 5 May 1900; male, ♀ -4R.

Odynerus fundatiformis Robt. Robertson, 1910, 325: Orlando, Florida; 17 Febr.; Chas. Robertson.

Odynerus fundatus Cresson. Robertson, 1910, 325: Carlinville, Illinois; 25 June, 19 July; Chas. Robertson.

Pierce, 1911, 506: Carlinville, Illinois; 25 June; Chas. Robertson; ♀ of *Pseudoxenos fundati* described p. 500. Salt, 1927, 183: Austin, Texas. Carlinville, Illinois; Chas. Robertson.

Odynerus fusus Cresson. New record: Texas; female, ♀ 13R, ♀ -3L; female, ♀ -3R; and male, ♀ -3R (all A.N.S.P.).

Odynerus hæmorrhoidalis (Fabr.). New record: Buitenzorg, Java; March 1909; Bryant and Palmer; female, ♀ -3L (U.S.N.M.).

Odynerus hidalgi Sauss. Pierce, 1909, 181 (as *O. verus* Cresson): Dallas, Texas; 21 July; W. A. Hooker; male, ♀ of *Pseudoxenos hookeri* described p. 139 (U.S.N.M.).

Odynerus japonicus (Dalla Torre). New record: Kyoto, Japan; female, ♀ -3L (A.N.S.P.).

Odynerus lævipes Shuckard. Saunders, 1853, 142 (as *O. rubicola* Dufour): Epirus; ♂ of *Pseudoxenos klugii* described.

Odynerus leprieurii Spinola. Spinola, 1841, 128:== *Montezumia leprieurii* (Spinola).

Odynerus leucomelas Sauss. New record: Queen's Park, Aylmer, Quebec; 15 Aug. 1924; C. B. Hutchings; female, ♀ -4L (Can. Nat. Coll.).

Odynerus manifestus Cresson. Salt, 1927, 184:== *O. primus* Dalla Torre.

Odynerus megæra Lepel. New record: Florida; female, ♂ e-4R, ♂ e-4L (Can. Nat. Coll.).

Odynerus molestus Sauss. Dury, 1902, 180: Cincinnati, Ohio.

Odynerus pedestris Sauss. Robertson, 1910, 325: Carlinville, Illinois; 6 July; Chas. Robertson. Pierce, 1911, 500: from above specimen describes ♀ of *Pseudoxenos pedestridis*.

Odynerus perennis Sauss. Salt, 1927, 184: Great Falls, Virginia; 9 Sept.; N. Banks; male, ♀ -3L (M.C.Z.). Dyke, Virginia; 14 May; N. Banks; male, ♂ p-4L (M.C.Z.).

Falls Church, Virginia; 27 June; N. Banks; female, ♀ -3L (M.C.Z.).

Odynerus pratensis Sauss. Salt, 1927, 184: El Paso, Texas; female.

Odynerus primus Dalla Torre. Salt, 1927, 184 (as *O. manifestus* Cress.): Fedor, Texas; female.

Odynerus rubicola Dufour. Saunders, 1853, 142: = *O. lævipēs* Shuckard.

Odynerus spinipes (Linn.). Saunders, 1872, 46: Corcyra; 22 May; ♂ of *Pseudoxenos corcyricus* described.

Odynerus sulphureus Sauss. New record: Baron, California; female, ♀ -3R, ♀ -3R, ♀ -4L (U.S.N.M.).

Odynerus synagroides (Sauss.). New records: Stanleyville, Belgian Congo; 15 March; female, ♀ -2L, ♂ e-4L; and male, ♂ p-3L (both A.M.N.H.). Coquilhatville, Belgian Congo; 15 October 1922; J. Bequaert; male, ♂ e-5L.

Odynerus toas Cresson. Pierce, 1918, 489: Albuquerque, New Mexico; ♂ of *Pseudoxenos neomexicanus* described p. 463. Salt, 1927, 184: Valentine, Texas; male. El Paso, Texas, male. Steins, New Mexico; male.

Odynerus turpis Sauss. Robertson, 1910, 325: Inverness, Florida; 19 March; Chas. Robertson.

Odynerus vagans Sauss. Pierce, 1909, 181: Mound, Louisiana; 12 May; C. R. Jones; ♀ of *Pseudoxenos louisianæ* described p. 138.

Odynerus verus Cresson. Pierce, 1909, 181: in error for *O. hidalgi* Sauss.

Odynerus ziziæ Robt., mss. Robertson, 1918, Bull. Brooklyn Ent. Soc. 13, 85.

Rhynchium (See *Odynerus*).

Pachodynerus cubensis (Sauss.). Salt, 1927, 184: Soledad, Cuba; April; J. Bequaert; male, ♀ 3R, ♀ -4L, ♀ -4stL, ♂ e-5R (♂ emerged in captivity).

Pachodynerus erynnis (Lepel.). Robertson, 1910, 325: Inverness, Florida; 10 Febr., 10 and 25 March; Chas. Robertson. Pierce, 1911, 506: Inverness, Florida; Chas. Robertson; ♀ of *Pseudoxenos erynnidis* described p. 499. Salt, 1927, 184: Lakeland, Florida; Wm. T. Davis. Inverness, Florida; Chas. Robertson. Miami, Florida; J. Bequaert.

New records: Inverness, Florida; Chas. Robertson; female, ♀ -3L; male, ♀ -3R, ♀ -3L; male, ♀ -2R, ♀ -2L, ♂ e-4R, ♂ e-4L; and male, ♀ 3R, ♀ -3L (all M.C. Z.). Punta Gorda, Fla.; 11 Nov. 1911; female, ♂ p-3R, ♀ -3L, ♀ -3stL, ♂ p-4L, ♀ p-4R (A. M. N. H.). Royal Palm Park, Florida; 12-18 April 1923; male, ♀ -4R (A.M.N.H.). Miami, Florida; 18 Dec. 1912; F. Knab; female, ♀ -3L, ♂ p-4R (U.S.N.M.).

Pachodynerus guadulpensis (Sauss.). Salt, 1927, 184: Santeurs, Grenada; Sept. 1910; Allen and Brues; female, ♀ -3R.

Pachodynerus nasidens (Latr.). Salt, 1927, 184: Puerto Castilla, Rep. Honduras; J. Bequaert.

New record: Ypiranga, R. Iga-Putumayo, Brazil; 29 Aug. 1920; Cornell Univ. Exped.; female, ♀ -2L, ♀ -3R.

Pachodynerus præcox (Sauss.). New record: St. Benedict Mt., Tunapuna, Trinidad; 3 Sept. 1927; M. G. Netting; male, ♀ -3R, ♂ p-4L.

Pachodynerus punctulatus Brèthes. New records: Iguazu Falls, Argentina; 20-22 Jan. 1920; Cornell Univ. Exped.; female, ♀ -3L, ♂ e-4L, ♂ e-4R. Paso de 1. Libres, Corrientes, Argentina; 12-14 Jan. 1920; Cornell Univ. Exped.; female, ♂ p-4L, ♀ -4R.

Ancistrocerus sp. (*auctus* (Fabr.)?) [*A. auctus* (Fabr.) = *A. parietum* (Linn.)]. Heyden, 1836, lxxiv: ♂.

Ancistrocerus albophaleratus (Sauss.). Pierce, 1911, 506 [as *A. capra* (Sauss.)]: Washington State; male, ♂ e-4L (U.S.N.M.). Salt, 1927, 184: Canaan, Connecticut; J. Bequaert. Halfway House, Mt. Washington, New

Hampshire; C. W. Johnson. Maine. Bilby, Alberta; George Salt.

New record: Edmonton, Alberta; 23 June 1924; George Salt; male, ♀ -3L.

Ancistrocerus bacu (Sauss.). New records: Soledad, Cuba; 3 April 1926; J. Bequaert; female, ♂ -e3L, ♂ 4R. Hoyo Colorado, Cuba; Oct. 1923; C. Enamorado; female, ♂ p-4L.

Ancistrocerus birenimaculatus (Sauss.). Salt, 1927, 184: Flushing, New York; J. Bequaert, Newfoundland, New Jersey.

New records: vicinity of New York, New York; ex nest; 1924; female, ♂ p-4L; male, ♂ p-3R; male, ♂ p-4R; male, ♂ p-4L male, ♂ p-4R (all A.M.N.H.).

Ancistrocerus bradleyi (Robt.). Robertson, 1910, 324 (as *A. clypeatus* (Robt.)); Carlinville, Illinois; 24 May, 31 May; Chas. Robertson. Salt, 1927, 183: no data.

Ancistrocerus campestris (Sauss.). Pierce, 1909, 180: Missouri; C. V. Riley; ♂ e (U.S.N.M.).

Ancistrocerus capra (Sauss.). Pierce, 1911, 506: in error for *A. albophaleratus* (Sauss.).

Ancistrocerus catskillensis (Sauss.). Salt, 1927, 184: Forest Hills, Massachusetts; L. H. Taylor. Auburndale, Massachusetts; C. W. Johnson. Keene Valley, New York; H. Notman. Colebrook, Connecticut; W. M. Wheeler. Salt, 1927, 184 (as *A. waldenii* (Vier.)): Forest Hills, Massachusetts; O. E. Plath.

New record: Put-in-Bay, Bass Island, Ohio; 1-10 July; C. H. Kennedy; male, ♀ -4R.

Ancistrocerus clypeatus (Robt.). Robertson, 1910, 324: = *A. bradleyi* (Robt.).

Ancistrocerus fulvipes (Sauss.). Pierce, 1909, 180 (As *O. colon* Cresson): Mound, Louisiana; 12 May; C. R. Jones; ♀ of *Pseudoxenos jonesi* described p. 138. Salt, 1927, 184: Lee County, Texas; G. Birkman. New Braunfels, Texas; 27 June 1917; J. Bequaert; male, ♂ e-4L.

Ancistrocerus hæmatodes (Brullé). New record: Canary Islands; ♀ -3L (Cornell Univ.).

Ancistrocerus histrio (Lepel.). Robertson, 1910, 325: Inverness, Florida; 20 and 24 March; Chas. Robertson. Pierce, 1911, 506: Inverness, Florida; 20 March; Chas. Robertson; ♀ of *Pseudoxenos histrionis* described p. 500. Salt, 1927, 184: Inverness, Florida; Chas. Robertson.

Ancistrocerus histrionalis (Robt.). Robertson, 1910, 324: Carlinville, Illinois; 5 and 27 Aug.; Chas. Robertson. Pierce, 1911, 506: Carlinville, Illinois; 27 Aug.; Chas. Robertson; ♀ of *Pseudoxenos robertsoni* described p. 501. Salt, 1927, 184: no data.

Ancistrocerus parietum (Linn.). Saunders, 1872, 44: Corcyra; Oct.; ♂ of *Pseudoxenos schaumii* described. Ogloblin, 1925, Bull. Ent. Pologne 3, 120: Mielnica, Poland; 20 Aug. 1922; V. Noskiewicz; male 4 ♂ p, ♀, and triungulinids of *Pseudoxenos schaumii* Saunders. Salt, 1927, 184: Ithaca, New York.

Ancistrocerus pertinax (Sauss.). Pierce, 1909, 180: National Park, Wyoming; 31 July; male.

Ancistrocerus sexcingulatus Ashmead. Pierce, 1911, 507: Florissant, Colorado; 26 June 1907; S. A. Rohwer.

Ancistrocerus tigris (Sauss.). Robertson, 1910, 324: Carlinville, Illinois; 23 Sept.; Chas. Robertson. Pierce, 1911, 501: from above specimen describes ♀ of *Pseudoxenos tigridis*. Salt, 1927, 184: Ramsey, New Jersey; 6 and 16 June 1916; J. Bequaert; male, ♀ -3R; male, ♂ p-4L. Fort Lee, New Jersey; 3 Sept. 1916; female, ♂ p-4L. Falls Church, Virginia; 18 Sept.; N. Banks; female, ♀ -3L, ♂ p-4R (M.C.Z.). Glencarlyn, Virginia; 26 Sept.; N. Banks; female, ♀ -3L (M.C.Z.). Melsh, Pennsylvania; female, ♀ -3L (M.C.Z.). Colebrook, Connecticut; 6 Sept. 1921; W. M. Wheeler; female, ♀ -3L, ♀ -4R. Colebrook, Connecticut; 23 Aug. 1919; W. M. Wheeler; female, ♀ -4R.

New record: Put-in-Bay, Bass Island, Ohio; 1-10, July; C. H. Kennedy; male, ♀ -3L.

Ancistrocerus waldenii (Vier.). Salt, 1927, 185: in error for *A. catskillensis* (Sauss.).

New record: Montreal, Quebec; W. Couper; female, ♂ p-4L (U.S.N.M.).

Monobia quadridens (Linn.). Pierce, 1909, 180: Wolfe City, Texas; 31 May; ♀. Orange, Louisiana; 23 Aug.; F. C. Bishopp; ♀ of *Monobiaphila bishoppi* described p. 139.

New records: Pensacola, Florida; 11-14 Oct. 1914; female, ♀ -4L, ♀ -4R (A.M.N.H.). New York, New York; male, ♀ -3R, ♀ -3L, ♂ e-5R, ♂ e-5L (A.M.N.H.). Yaphank, Long Island, New York; 12 July; male, ♀ -3R, ♂ p-5L (A.M.N.H.). Paterson, New Jersey; 21 July; male, ♀ -4L (A.M.N.H.).

Montezumia sp. near *brunnea* Smith. Salt, 1927, 183: Rio Salado, Chaco de Santiago del Estero, Argentina; female.

Montezumia infernalis (Spinola). Salt, 1927, 183: Villarica, Paraguay; 1923; female.

New records: Chapada, Brazil; March; female, ♂ p-4R, ♂ p-5L (A. N. S. P.). Paraguay; female, ♀ -4L (A.M.N.H.).

Montezumia leprieurii (Spinola). Spinola, 1841, Ann. Soc. Ent. France 10, 128 (as *Odynerus leprieurii* Spinola): Cayenne, French Guiana; female, ♂ e-5.

Montezumia vigillii Brèthes. Brèthes, 1923, 45: Cordoba, Rep. Argentina; ♀ of *Montezumiaphila vigili* described.

Polybiinae

Nectarina lecheguana (Latr.). New record: Tacna, Rio Putumayo, Peru; 28 Aug. 1920; Cornell Univ. Exped.; female, ♀ -5R.

Polybia sericea (Olivier). Smith, 1859, 131: Brazil; female, ♀ -4.

Mischocyttarus flavitarsis (Sauss.). Pierce, 1918, 490 (as *Megacanthopus flavitarsis* [Sauss.]): Stone Cabin Ca-

nyon, Santa Rita Mts., Arizona; 25 Aug. 1913; W. D. Pierce.

Clypeopolybia duckei Brèthes. Brèthes, 1923, 46: Bolivia; female, ♀ of *Clypo xenos americanus* described.

Belonogaster brunneus Ritsema. New record: Lenga Town, Liberia; 16 Aug. 1926; J. Bequaert; male, ♀ -4L.

Belonogaster dubius Kohl. du Buysson, 1909, 236: female, 4L.

Belonogaster elegans Gerst. See *B. lateritius* var. *elegans* (Gerst.).

Belonogaster filiventris (Sauss.). Salt, 1927, 185: La Panda, Katanga, Belgian Congo; 2 Oct. 1920; Mich. Bequaert; female.

Belonogaster griseus (Fabr.). Saunders, 1872, 36: Africa; ♀. Saunders, 1872, 36 (as *B. rufipennis* Degeer): Africa; ♂ e and ♀. du Buysson, 1909, 249; female, ♂ p-4R.

New record: Boma, Congo; 16 June 1915; Lang and Chapin; female, ♂ p-5L (A.M.N.H.).

Belonogaster guerini (Sauss.). du Buysson, 1909, 226: male, 5R.

Belonogaster junceus (Fabr.). Smith, 1859, 130: Tripoli; ♀. Salt, 1927, 185: Masinga Archipelago, Victoria Nyanza; J. Carl.

New records: Medje, Belgian Congo; Jan.; Lang and Chapin; female, ♂ e-3R (A.M.N.H.). Stanleyville, Belgian Congo; 8 Aug. 1909; Lang and Chapin; male, ♀ -4R (A.M.N.H.). Faradje, Belgian Congo; Sept. 1912; Lang and Chapin; female, ♀ -3L (A.M.N.H.). Moala, Liberia; 3 Nov. 1926; J. Bequaert; male, ♂ p-6L. Gbanga, Liberia; 12 Sept. 1926; J. Bequaert; female, ♂ p-4L; female, ♀ -4L; and female, ♂ e-3L, ♂ e-4L, ♀ -4R.

Belonogaster lateritius Gerst. var. *elegans* (Gerst.). Zavattari, 1909, Ruwenzori Rel. Sci. 1, 212 and 271-273: Butiti, Uganda, July; ♀. Pierce, 1911, 498: from above

specimen describes ♀ and triungulinids of *Belonogaster techthrus zavattarii*.

Belonogaster pusillus Kohl. du Buysson, 1909, 239: worker, e-4L.

New record: Garamba, Belgian Congo; July 1912; Lang and Chapin; female, ♂ e-4L (A.M.N.H.).

Belonogaster rufipennis (Degeer). Saunders, 1872, 36:== *B. griseus* (Fabr.).

Belonogaster turbulentus Kohl. du Buysson, 1909, 240: female, ♀ -4R.

Ropalidiinae

Ropalidia cineta (Lepel.). Salt, 1927, 185: Gali, Belgian Congo; J. Bequaert; male.

Ropalidia ferruginea (Fabr.). Horne, 1870, 170: North-west Provinces of India.

Ropalidia nobilis (Gerst.). Salt, 1927, 185: Lisala, Congo; Oct. 1924; female, ♂ e-5R.

Polistinae

Polistes spp. Saunders, 1872, 36: Caffra; ♂. Fenyess, 1901, Ent. News 12, 90: Mount Arlington, New Jersey (probably *P. fuscatus* var. *pallipes* [Lepel.]). Muir, 1906, Bull. Haw. S. P. Assoc. 2, 9: Honolulu, Hawaii. Pierce, 1909, 184: Virginia; ♂ (A.N.S.P.). Victoria, Texas; 27 June; C. R. Jones; 25 Sept.; J. C. Crawford; ♀ and ♂ p of *Xenos hunteri* described p. 130. Hat Creek, Sioux County, Nebraska; Aug.; ♀ and ♂ e of *Xenos bruneri* Pierce (described?). Schrader, 1924, 162: Connecticut; New York; Pennsylvania; District of Columbia; Maryland. Leonard, 1928, Cornell Univ. Agric. Exp. Station Memoir 101, 521: Staten Island, New York.

Polistes americanus Fabr. See *P. crinitus* var. *americanus* (Fabr.).

Polistes anaheimensis Provancher. Pierce, 1918, 489:==*P. fuscatus* var. *bellicosus* (Cresson).

Polistes annularis (Linn.). See *P. canadensis* var. *annularis* (Linn.).

Polistes aurifer Sauss. See *P. fuscatus* var. *aurifer* (Sauss.).

Polistes bellicosus Cresson. See *P. fuscatus* var. *bellicosus* (Cresson).

Polistes canadensis (Linn.). Pierce, 1909, 182: Texas; ♂ e. See also *P. canadensis* var. *metricus* Say. Hoffman, 1914, Zool. Anz. 45, 99: Uruguay; Bohls; ♂, ♀, and triungulinids of *Xenos bohlsi* described.

Polistes canadensis (Linn.) var. **annularis** (Linn.). Brues, 1903, 242 and 246: Austin, Texas; May 1901; C. T. Brues; ♂ of *Xenos pallidus* described. Brues, 1905, 291: Texas; ♂ and ♀ of *Xenos pallidus* Brues, and ♂ and ♀ of *Xenos nigrescens* Brues. Pierce, 1909, 181 and 182: Paxton, Texas; 9 Aug.; W. D. Pierce; ♀. Rosser, Texas; Sept. and Oct.; F. C. Bishopp and C. R. Jones; ♂ and ♀ of *Xenos pallidus* Brues. Agricultural College, Mississippi; ♀. Bennington, Indian Territory; 28 Aug.; J. C. Crawford. Victoria, Texas; 16 July; W. E. Hinds; female, ♀ -4R, ♀ -5L (U.S.N.M.). Texas; G. W. Belfrage; male, ♂ p-2R, ♂ p-6L (U.S.N.M.). Plummer's Island, Maryland; Nov. 1907; W. P. Hay and W. L. McAtee; ♂ p and ♀ of *Xenos pallidus* Brues. Pierce, 1918, 489: Louisville, Nebraska; 2 Aug. 1914; H. A. Jones and E. G. Anderson; 7 females, ♂ of *Xenos pallidus* Brues. Omaha, Nebraska; 20 Aug. 1913; L. T. Williams; female, ♀ of *Xenos pallidus* Brues. New Orleans, Louisiana; E. Foster. Salt, 1927, 185: Mongolia County, West Virginia; L. H. Taylor; male and 2 workers. Rau, 1929, Bull. Brooklyn Ent. Soc. 33, 231: Kirkwood, Missouri; P. Rau; 2 females.

New records: Orlando, Florida; 7 Dec. 1906; female, ♀ -5L; female, ♀ -5L; female, ♂ e-2R, ♂ e-3R, ♀ -5R, ♀ -5L; female, ♀ -4L, ♂ e-3R (all U.S.N.M.). Orlando, Florida; 17 June 1907; Chittenden; female, ♀ -5R (U.S.N.M.).

Polistes canadensis (Linn.) var. **lanio** (Fabr.). New record: Las Loras, near Puntarenas, Costa Rica; 18 Sept. 1905; F. Knab; female, ♀ -5R (U.S.N.M.).

- Polistes canadensis** (Linn.) var. **metricus** (Say). Note: Northern records of *P. metricus* Say refer to *P. fuscatus* var. *pallipes* (Lepel.). Pierce, 1909, 182 (as *P. canadensis* (Linn.)); Mound, Louisiana; 20 Aug. 1906; F. C. Bishopp; female, ♂ e-3L (U.S.N.M.). Pierce, 1909, 183 (as *P. navajoe* Cresson): Metacomba Key, Florida; March 1898; G. N. Collins; female, ♂ e-3L (U.S.N.M.). Pierce, 1909, 184 (as *P. rubiginosus* Lepel.): Onaga, Kansas; Crevecoeur; female, ♂ e-3R (U.S.N.M.).
- Polistes canadensis** (Linn.) var. **unicolor** (Lepel.). Lepeletier, 1836, Hist. Nat. Ins. Hym. 1, 520: Cayenne, French Guiana; Doumerc; worker, ♂ e-5.
- Polistes carnifex** (Fabr.) Pierce, 1909, 182: Mexico; ♂ p and ♂ e. New record: "Colom"; C. F. Baker; female, ♂ p-4R, ♀ -5L (U.S.N.M.).
- Polistes cavapyta** Sauss. Brèthes, 1923, 43; San Luis, Rep. Argentina; ♀ of *Xenos argentinus* described.
- Polistes crinitus** (Felton). Pierce, 1909, 182: See *P. crinitus* var. *americanus* (Fabr.). Pierce, 1918, 490: New Orleans, Louisiana; E. Foster (this record is very doubtful as *P. crinitus* probably does not occur on the American mainland). Salt, 1927, 185: Sanchez, Rep. Dominicana; 17-21 May 1915; female, ♂ p-4R; female, ♂ p-3L; female, ♂ p-3R; female, ♂ e-4L; female, ♂ p-3R, ♂ p-4L.
- Polistes crinitus** (Felton) var. **americanus** (Fabr.). Smith, 1859, 131: North America; female, ♂ e. Hubbard, 1892, Can. Entom. 24, 258: Florida. Pierce, 1909, 122 and 182 (based on Hubbard's specimens): Crescent City, Florida; 6 April; H. G. Hubbard; 14 ♂, ♀, and triungulinids of *Xenos hubbardi* (Pierce, 108, Proc. Ent. Soc. Wash. 9, 84). These three records are certainly erroneous as *P. crinitus* var. *americanus* (Fabr.) does not occur on the American mainland. Salt, 1927, 185: Mayaguez, Porto Rico; 16-16 Febr. 1914; female, ♂ p-4R; female, ♀ -5L. Coamo Springs, Porto Rico; 17-19 July 1914; female, ♂ e-3L, ♀ -5L. Manati, Porto Rico; 27-29 June

1915; female, ♀ -5L. Cayey, Porto Rico; 30-31 May
1915; female, ♀ -5R. Jayuya, Porto Rico; 6 Jan. 1915;
female, ♂ p-3R. Aibonito, Porto Rico; 14-17 July 1914;
female, ♂ p-3R.

New record: Porto Rico; female, ♀ -3L (Hamburg
Mus.).

Polistes cubensis Lepel. Pierce, 1909, 183 (as *P. lineatus*
(Fabr.)) : Cuba; Palmer and Riley; ♂ p and ♂ e (one
specimen seen: female, ♂ e-4R (U.S.N.M.)).

Polistes diadema Latr. See *P. gallicus* var. *diadema* (Latr.).

Polistes erythrocerus Cameron. Cameron, 1900, Ann. Mag.
Nat. Hist. (7) 6, 419: Kamakura, Japan; George Lewis;
female.

Polistes flavus Cresson. Pierce, 1909, 182=*P. fuscatus* var.
aurifer (Sauss.).

Polistes fuscatus (Fabr.). See *P. fuscatus* var. *pallipes*
(Lepel.).

Polistes fuscatus (Fabr.) var. **apachus** (Sauss.). Brues, 1903,
242 (as *P. texanus* Cresson) : Austin, Texas; ♂ e. Ano-
nymous, 1903, Ent. News 14, 274 (as *P. texanus* Cres-
son) : Pecos, Texas. Pierce, 1909, 184 (as *P. texanus*
Cresson) : New Mexico; C. F. Baker; female, ♂ e-3R,
♂ e-3L (U.S.N.M.). Victoria, Texas; 7 July; C.M.
Walker; ♂ p. Victoria, Texas; 25 July; C.R. Jones; ♀
and ♂ e of *Xenos texani* described p. 132. Pecos, Texas;
27 Febr., 25 and 30 Sept.; A. E. Brown; ♂, ♂ p, and
♀ of *Xenos pecosensis* described p. 128.

Polistes fuscatus (Fabr.) var. **aurifer** (Sauss.). Perkins,
1899, Fauna Hawaiiensis 1, 29: Lanai and Hawaii.
Pierce, 1909, 182: Washington State; ♂. California;
♂ p. Folsom, California; 10 and 12 July; female, ♂ e-3R,
♂ e-4L; and female, ♂ e-4L (both U.S.N.M.). Pierce,
109, 182 (as *P. flavus* Cresson) : Colorado; ♂ p (U.S.
N.M.). Pierce, 1911, 507: Palo Alto, California; Febr.
1892; W. G. Johnston; ♂ e and ♀ of *Xenos auriferi*
described p. 498. Terry, 1912, Proc. Haw. Ent. Soc. 2,
181: Hawaii. Ehrhorn, 1915, Proc. Haw. Ent. Soc. 3,

86: Honolulu, Oahu, Hawaii. Pierce, 1918, 489: Auburn, California; 14 Aug. 1915; L. Bruner; female, ♀. Williams, 1927, Proc. Haw. Ent. Soc. 6, 463: Hawaii.

New records: "W. T."; male, ♂ p-4L (A.N.S.P.). No data; female, ♂ e-3R (A.N.S.P.).

Polistes fuscatus (Fabr.) var. **bellicosus** (Cresson). Pierce, 1909, 182 (with doubt): Natchitoches, Louisiana; 15 Sept.; ♂. Pierce, 1918, 489: Stone Cabin Canyon, Santa Rita Mts., Arizona; 24 Aug. 1913; W. D. Pierce; ♂ p. Pierce, 1918, 489 (as *P. anaheimensis* Provancher): Auburn, California; 23 July 1915; L. Bruner; male, ♀ of *Xenos californicus* Pierce (described?).

Polistes fuscatus (Fabr.) var. **pallipes** (Lepel.). Kirby, 1813, 116 (as *P. fuscatus* (Fabr.) .: Newbury, Massachusetts; ♂ and ♀ of *Xenos peckii* described. Austin, 1882, Journ. Bost. Zoöl. Soc. 1, 12 (as *P. metricus* Say): Reading, Massachusetts. Dury, 1902, 180 (as *P. fuscatus* [Fabr.]): Cincinnati, Ohio; ♂. Brues, 1903, 241 (as *P. metricus* Say). Pierce, 1909, 183: Marion, Massachusetts; 2-12 Sept.; F. C. Bowditch; ♂ and ♀ of *Xenos bowditchi* described p. 130. Cincinnati, Ohio; June-Sept.; ♂, ♀ ♂ p, and ♀ e of *Xenos bowditchi*. Pierce, 1909, 183 (as *P. metricus* Say): Colebrook, Connecticut; Aug.; W. M. Wheeler; ♂ and ♀ of *Xenos wheeleri* described p. 129. Washington, D.C.; 6 Sept.; ♂ of *Xenos wheeleri* (Pierce). Ithaca, New York; Aug. and Sept. Detroit, Michigan; ♂ and ♀ of *Xenos bruesi* described p. 124. Chicopee, Massachusetts; F. Knab; female, ♂ e-3stR, ♂ e-4R, ♂ e-4L; and female, ♂ e-4R (both U.S.N.M.). Pierce, 1909, 183 (as *P. instabilis* Sauss.): New Orleans, Louisiana; July; female, ♂ e-4L (U.S.N.M.). Pierce, 1909, 184 (as *P. variatus* Cresson): Washington, D.C.; female, ♂ p-3L, ♂ e-4R (U.S.N.M.). Wheeler, 1910, 277 (as *P. metricus* Say): Colebrook, Connecticut; Aug. 1900; W. M. Wheeler. Pierce, 1911, 507 (as *P. metricus* Say): Cornell Univ., Ithaca, New York. Salt, 1927, 185: Colebrook, Robertsville, and Chapenville, Connecticut; W. M. Wheeler.

New records: Cincinnati, Ohio; 16 Sept. 1905; male, ♂ e-3L (U.S.N.M.). Pennsylvania; C.F. Baker; male, ♂ p-4R (U.S.N.M.). Washington, D.C.; Oct. 1884; male, ♂ e-4R, ♀ -5L (U.S.N.M.).

Polistes fuscatus (Fabr.) var. **perplexus** (Cresson). Pierce, 1909, 183: Texas; ♂ e.

Polistes fuscatus (Fabr.) var. **rubiginosus** (Lepel.). Brues, 1903, 242: Austin, Texas; Oct. 1901; C. T. Brues; ♂ and ♀ of *Xenos nigrescens* described p. 247. Brues, 1905, 290: Paris, Texas; 22 May; C. T. Brues: ♀ and triungulinids of *Xenos nigrescens* Brues. Pierce, 1909, 184: Round Mountain, Texas; ♂ e and ♀. Logansport, Louisiana; 6 June; W. D. Pierce; ♂ p and ♀ of *Xenos rubiginosi* described p. 132. New Boston, Texas; 26 Sept. 1906; F. C. Bishopp; male, ♂ e-3L, ♂ e-4R, ♂ e-4stR; and male, ♂ p-3L, ♂ e-4stL, ♂ e-5R (both U.S.N.M.). Henrietta, Texas; 50ct. 1906; F. C. Bishopp; male, ♂ e-4L (U.S.N.M.). Mineola, Texas; 19 July 1906; Bishopp and Jones; female, ♂ e-2R, ♂ e2-L, ♂ e-3stR, ♂ e-4stL, ♀ -4L, ♂ e-4R, ♀ e-5L (U.S.N.M.). Waco, Texas; 29 Aug. 1906; F. C. Bishopp; female, ♂ e-3L, ♀ e-4R, (♀ removed?) of *Xenos pecosensis* described p. 128 (U.S.N.M.). Texas; ♀ of *Xenos maximus* described p. 132. See also *P. canadensis* var. *metricus* (Say). Pierce, 1911, 507: Arlington, Texas; 30 Sept.; ♂ e. Tallulah, Louisiana; 29 Jan. and 16 Febr.; V. I. Safro; ♂ e and ♀.

Pierce, 1918, 490: New Orleans, Louisiana; E. Foster.

New record: Victoria, Texas; 15 June 1904; female, ♂ e-2L (U.S.N.M.).

Polistes fuscatus (Fabr.) var. **variatus** (Cresson.) Brues, 190, 241: parasitized by *Xenos peckii* Kirby. Pierce, 1909, 184: in error for *P. fuscatus* var. *pallipes* (Lepel.). Robertson, 1910, 324: Carlinville, Illinois; 30 Sept.; Chas. Robertson. Wheeler, 1910, 377: Chicago, Illinois; W. M. Wheeler. Pierce, 1911, 507: Church's Island, Maryland; 3 Nov.; W. L. McAtee; ♂ and ♀. Pierce, 1918, 490: Clarksville, Tennessee; 10 Nov. 1915;

E. E. Crumb; 4 ♂ e. Lanham, Maryland; 24 Nov. 1915; H. F. Loomis; ♂ p and ♀. Salt, 1927, 185: Carlinville, Illinois; Chas. Robertson; male, ♀ -5L.

Polistes gallicus (Linn.). Rossi, 1793, Bull. Sci. Soc. Philomath. Paris 1, 49: Italy; ♂ of *Xenos vesparum* described. Rossi, 1807, Fauna Etrusca 2, 136. Kirby, 1813, 116: Europe; ♂ and ♀ of *Xenos rossii* described. Jurine, 1818, Mem. R. Accad. Sci. Torino 23, 63; Italy. Heyden, 1836, lxxix: ♀. Rosenhauer, 1842, Stettin. Ent. Zeit. 2, 53: Germany. Saunders, 1853, 125: Albania. Saunders, 1866, Proc. Ent. Soc. Lond. (3) 2, 116. Saunders, 1872, 36: Europe; *Xenos jurinei* described p. 39. Rouget, 1873, 268: France. Nassanow, in Hofeneder, 1910, 3: Cairo, Egypt. Léveillé, 1895, Bull. Soc. Ent. France (1895), vi: Gryon, Canton de Vaud, Switzerland; Aug. 1894. Pierce, 1909, 183: Innsbruck, Austria; 28 Oct.; Karl Hofeneder; worker, ♂ e-3R, ♂ e-5L U.S.N.M.). Rabaud and Millot, 1927, C.R. Soc. Biol. 96, 944. Salt, 1927, 185: no data; worker, ♂ e-4R.

Polistes gallicus (Linn.) var. **diadema** (Latr.). Rouget, 1873, 268: France. Hofeneder, 1910, 5 footnote: female, 6 ♂ p.

Polistes hebraeus (Fabr.). Horne, 1870, 171; Maxwell-Lefroy and Howlett, 1909, 395; and Pierce, 1918, 490: =*P. olivaceus* (Degeer).

Polistes instabilis Sauss. Smith, 1859, 131: Brazil; female, 4 ♂ e and 5 ♀; incorrectly determined. Pierce, 1909, 183: in error for *P. fuscatus* var. *pallipes* (Lepel.).

Polistes lineatus (Fabr.). Pierce, 1909, 183: =*P. cubensis* Lepel.

Polistes major Beauvois. Pierce, 1918, 490: District Federal, Mexico; J. R. Inda; 4 ♂ e and 4 ♂ p.

Polistes marginalis (Fabr.). Schulz, 1905, Hymen. Studien. 15: Boma, Belgian Congo; worker, 5 parasites.

New records: Luvungi, Belgian Congo; 30 Jan. 1927; J. Bequaert; female, ♂ e-3L, ♂ e-4L, ♂ e-4R. Kwamouth, Belgian Congo; 13 Dec. 1926; J. Bequaert; male

♂ e-3L, ♂ e-3stL, ♀ -3R, ♀ -3R, ♂ e-5R; and male, ♀ -3stR, ♂ p-4R, ♀ -6L.

Polistes metricus Say. See *P. canadensis* var. *metricus* (Say) and *P. fuscatus* var. *pallipes* (Lepel.).

Polistes minor Beauvois. Pierce, 1918, 490: in error for? (*P. minor* does not occur in Louisiana, the locality given by Pierce).

Polistes navajoe Cresson. Pierce, 1909, 183: in error for *P. canadensis* var. *metricus* (Say).

Polistes olivaceus (Degeer). Horne, 1870, 171: North-west Provinces of India. Maxwell-Lefroy and Howlett, 1909, Indian Insect Life, 395; India; ♂. Pierce, 1918, 490: Pusa, Bihar, India; 12 April 1911; G. R. Dutt; ♂ and ♀.

Polistes opinabilis Kohl. Fahringer, 1919, Zeitschr. wiss. Ins. biol. 15, 48: Pola, Istria, Italy.

Polistes pallipes Lepel. See *P. fuscatus* var. *pallipes* (Lepel.).

Polistes perplexus Cresson. See *P. fuscatus* var. *perplexus* (Cresson).

Polistes rubiginosus Lepel. See *P. fuscatus* var. *rubiginosus* (Lepel.).

Polistes stigma (Fabr.). Horne, 1870, 172: North-west Provinces of India.

Polistes texanus Cresson=*P. fuscatus* var. *apachus* (Sauss.).

Polistes unicolor Lepel. See *P. canadensis* var. *unicolor* (Lepel.).

Polistes variatus Cresson. See *P. fuscatus* var. *variatus* (Cresson).

Polistes versicolor (Olivier). Brèthes, 1923, 44; Buenos Aires, Rep. Argentina; ♂ and ♀ of *Xenos bonariensis* described.

Vespiinæ

Vespa acuta Lefebvre in Ann. Soc. Ent. France 4: xlv; 1835. (a nomen nudum).

- Vespa carolina** Linn. Pierce, 1918, 489: Clarksville, Tennessee; 19 Oct. 1915; S. E. Crumb; male, ♂ p.
- Vespa concolor** Kirby. Kirby, 1813, 118: ♂ e.
- Vespa crabro** Linn. Pierce, 1909, 181 Japan; female, ♀ of *Vespaexenos crabronis* described p. 134.
- Vespa ducalis** Smith, du Buysson, 1906, Revue d'Entom. 25, 11: Hué, Annam; E. Fleutiaux; worker, ♂ p-4R. Parasite extracted and described as the ♂ of *Vespaexenos moutoni* du Buysson. Pierce, 1903, 134: proposes *Vespaexenos buyssoni* new name.
- Vespa lama** du Buysson. du Buysson, 1906, 175 (additional data in du Buysson, 1905, 580); Sikkim, India; ♀ -5R.
- Vespa magnifica** Smith. du Buysson, 1903, 175 (additional data in du Buysson, 1905, 526): Yun-nam, China; male, ♂ p-4st. Tsé-kou, China; worker, ♀ -5. ♀ of *Vespaexenos moutoni* du Buysson.
- Vespa mandarinia** Smith. du Buysson, 1903, 175 (additional data in du Buysson, 1905, 522): Ngan-hoei, China; R. P. Mouton. Yng-chan, China. ♀ of *Vespaexenos moutoni* described p. 175 .
New records: Kyoto, Japan; female, ♀ -5R; and female, ♀ -5R (both A.N.S.P.).
- Vespa mongolica** André. New record: Kyoto, Japan; female, ♂ p-4R (A.N.S.P.).
- Vespa nigrans** du Buysson. du Buysson, 1903, 175: Yun-nam, China. Tsé-kou, China. ♀ of *Vespaexenos moutoni* (du Buysson).
- Vespa vulgaris** Linn. Heyden, 1836, lxxiv: Stuttgart, Germany; Van Roser; ♀.

GROUPS STYLOPIDIZED

Our list includes members of eight of the eleven sub-families of Vespidae. The Euparagiinae, Gayellinae, and Stenogastrinae are unrepresented. Of the Gayellinae we have examined only about half a dozen specimens for

Strepsiptera, and of the Stenogastrinæ and Euparagiinæ fewer than fifty, so we are not surprised that parasitized examples have not yet turned up.

There are, however, some rather puzzling lacunæ. Among the Eumeninæ, *Synagris* forms one; we have deliberately examined over four hundred specimens without finding any evidence of stylopization. That more infested individuals of Polybiinæ, and especially of *Polybia*, *Metapolybia*, and *Mischocyttarus*, are not known is surprising when one considers their abundance in the tropics; we ourselves have examined some hundreds of specimens especially from the West Indies and Colombia without finding a single parasitized example. The genus *Vespa* contributes several species to the list but the common forms, of which one might expect numerous records if they are subject to strepsipterous attack, are conspicuously absent.

The data, however, are lacking rather than actually negative; and in spite of these contrary indications in certain groups it has frequently occurred to us, as we gathered the records, that sooner or later stylopized specimens will be found in most, if not all, of the genera of Vespidæ. The majority of the common genera are already known to be attacked, at any rate occasionally, and our lack of records for the rarer groups is not surprising when one considers the very low frequency of stylopization in the Vespidæ as a whole. Until 1927 no representative of the Zethinæ had appeared in the host lists; now five stylopized specimens belonging to three species are known. The Ropalidiinæ were long included solely on the basis of Horne's record from India; three specimens are listed above. It was not until 1909 that Pierce recorded the first case of stylopization in *Monobia*, and until 1923 that *Montezumia* was first found infested by Brèthes. In his monograph of *Nectarina*, du Buysson (1905a) mentioned expressly that he had not seen a stylopized specimen of that genus; Crawford (Pierce, 1909, p. 23) studied 2500 individuals of *Nectarina lecheguana* from one nest, without finding a single example parasitized; and we ourselves examined several hundreds of specimens before finding the infested one recorded above. It would seem, therefore, that infested

individuals are eventually found in most groups. We hope that the publication of this list will stimulate those interested in the taxonomy of the Vespidae to mention the stylopized examples contained in the collections they study.

THE FREQUENCY OF STYLOPIZATION

The frequency of stylopization, then, varies from zero in certain groups to as much as 25% in particular collections of *Polistes* (Wheeler, 1910; Schrader, 1924). In our search for stylopized specimens we have kept some count of the frequency of their occurrence in several collections and in different taxonomic groups, and are able to give the following figures. Unfortunately we did not always make notes upon the frequency, and while the following numbers are proportionate, they do not represent our entire search.

Vespidae	of 16,932 specimens	157 stylopized,	or 0.93 %
Masaridinae	256	0	0 %
Raphiglossinae	8	0	0 %
Zethinae	158	4	2.53 %
Eumeninae	14,926	138	0.92 %
Eumenes	1,651	11	0.67 %
Odynerus s. l.	4,316	35	0.81 %
Monobia	271	4	1.48 %
Montezumia	152	0	0 %
Synagris	443	0	0 %
Pterochilus	74	0	0 %
Alastor	65	0	0 %
Polybiinae	623	8	1.28 %
Ropalidiinae	160	2	1.25 %

No records were kept of the frequency of stylopized *Polistes* in collections because much more accurate data based on field counts are available for this genus (see Pierce, 1909, 1911, 1918; Schrader, 1924).

In the American Museum of Natural History is preserved a mud nest of *Ancistrocerus birenimaculatus*, and the twenty-two wasps which emerged from it. Five of these twenty-two wasps, or 22.7%, are stylopized; showing that the rate of parasitism in particular nests can be almost as

high in *Ancistrocerus* as it has been reported for particular colonies of *Polistes*.

THE SEX OF THE HOST

As far as can be judged from our data both sexes of the host are attacked with equal readiness. The following is a summary of the cases in our list in which the sex of the host is known. In giving these and following figures we have not thought it necessary to incorporate the data so admirably summarized by Pierce (1909, 17-23; 1911, 487-489; 1918, 392-393, 396-397), and have confined ourselves to those in the above list.

	<i>Males Females</i>			<i>Males Females</i>	
Masaridinæ	8	4	Montezumia	0	5
Zethinæ	1	4	Polybiinæ	4	15
Eumenes	7	8	Ropalidia	1	1
Odynerus s.l.	50	49	Polistes	13	56
Monobia	3	1	Vespa	2	6

Where, as in *Polistes* and the Polybiinæ, decidedly more female than male hosts are known, this must undoubtedly be attributed to the fact that females of these groups are much more commonly collected.

POSITION OF THE PARASITE IN THE HOST

As would be expected, the parasites extrude in about equal numbers on the two sides of the host. A summary of the cases in our list for which the side is recorded gives 132 on the right and 141 on the left.

A very strong preference is shown for a dorsal position. In our list only ten cases of extrusion between the sternites appear. One of these occurs in *Vespa* and was recorded by du Buysson. Of the nine cases which we have observed, seven occur in *Polistes* and two in *Pachodynerus*. In each of these nine cases the unusual, ventral position is obviously due to crowding, for in four cases the parasite appearing ventrally is one of three in the same host; in two cases one of four; in one case one of five; and in one case, where two

parasites appear between the sternites, there are seven parasites present in the one wasp.

In an earlier paper (Salt, 1927) it has been shown that in *Odynerus* (*s. l.*) the female parasites usually occur under the third abdominal segment of the host and the males behind, under the fourth segment; while in *Polistes* the male parasites usually lie before, under the third and fourth segments, the females behind under the fifth. The same curious difference, together with additional facts, appear from a consideration of the cases recorded in our list; where the parasites are situated as follows:

Under abdominal segment number		2	3	4	5	6
In <i>Eumenes</i> . . .	♂ parasites	—	1	4	—	—
	♀ parasites	—	10	—	—	—
In <i>Odynerus</i> . . .	♂ parasites	—	5	17	7	—
	♀ parasites	1	25	24	—	—
In <i>Pachodynerus</i> .	♂ parasites	—	1	9	1	—
	♀ parasites	3	13	4	—	—
In <i>Ancistrocerus</i> .	♂ parasites	—	2	12	—	—
	♀ parasites	—	8	3	—	—
In <i>Monobia</i> . . .	♂ parasites	—	—	—	3	—
	♀ parasites	—	3	3	—	—
In <i>Montezumia</i> . .	♂ parasites	—	—	1	2	—
	♀ parasites	—	—	1	—	—
In <i>Belonogaster</i> . .	♂ parasites	—	2	5	1	1
	♀ parasites	—	1	5	—	—
In <i>Polistes</i>	♂ parasites	5	26	27	5	1
	♀ parasites	—	3	3	14	1
In <i>Vespa</i>	♂ parasites	—	—	3	—	—
	♀ parasites	—	—	—	4	—

For the *Masaridinae*, *Raphiglossinae*, and *Zethinae* the numbers are too low to be significant, and are not given. The parasites of *Eumenes* clearly take the same position as those of *Odynerus* (*s. l.*), the females preferring a position under the third, the males under the fourth abdominal segment. Our separate notes for *Odynerus* (*s. st.*), *Pachodynerus*, and *Ancistrocerus* serve to show that in these genera the parasites act similarly, and that our former treatment

of them (1927) as a single group, *Odynerus s. l.*, was quite permissible. The numbers for *Monobia* and *Montezumia* are again very low but seem to indicate agreement with the condition found in *Odynerus*. The figures for *Belonogaster* suggest preference of both sexes for the fourth segment. The parasites of *Vespa* apparently agree with those of *Polistes*, the males lying anteriorly to the females. We have, then, the Eumeninæ forming one group, *Polistes* and *Vespa* another; the difference being clearly shown in the totals, as follows:

Under abdominal segment number		2	3	4	5	6
Eumeninæ . . .	♂ parasites	—	9	43	13	—
	♀ parasites	4	59	35	—	—
Polistes and Vespa	♂ parasites	5	26	30	5	1
	♀ parasites	—	3	3	18	1

Since, in the Vespidae, the males have seven, the females only six visible abdominal segments, we have examined our records to see whether the sex of the host has any effect on the position of the parasite. Summarizing our records for the two groups shown above, we have the following:

Under abdominal segment number		2	3	4	5	6
Eumeninæ						
males	♂ parasites	—	4	22	6	—
	♀ parasites	2	23	12	—	—
females	♂ parasites	—	5	20	7	—
	♀ parasites	2	33	22	—	—
Polistes and Vespa						
males	♂ parasites	1	5	9	2	1
	♀ parasites	—	2	—	2	1
females	♂ parasites	4	21	21	3	—
	♀ parasites	—	1	3	15	—

The ♂ and ♀ *Xenos* found under the sixth abdominal segment of a male *Polistes* could not have extruded under this segment, of course, in a female host. With this excep-

tion no tendency for the parasites to move back in male hosts is apparent.

THE SEX OF THE PARASITE

The parasites listed above include 245 males and 206 females, divided as follows:

<i>Parasites of</i>	♂	♀	<i>Parasites of</i>	♂	♀
Masaridinæ . . .	7	3	Monobia	3	8
Zethinæ	3	3	Montezumia . . .	3	2
Eumenes	6	12	Polybiinæ	10	13
Odynerus	32	59	Polistes	144	61
Pachodynerus . .	11	21	Vespa	5	8
Ancistrocerus . .	21	16			

It will be seen that male parasites are known, and indeed are common, in all groups; so that no such condition exists in the Vespidae as in the bee genus *Halictus* where hundreds or even thousands of female parasites are found for each male. The preponderance of male *Xenos* in *Polistes* is striking, but except in *Odynerus*, where an excess of female parasites is indicated, the other numbers are too low to be worthy of discussion.

We have compared the sex of the parasites found in male and female hosts, but as there is no very significant result we do not give the summary in detail. As far as our data go, male and female parasites infest male and female hosts indiscriminately.

NUMBER OF PARASITES PER HOST

There is some difficulty in counting the number of parasites per host from published records, as it is not always stated definitely whether the host contained one or several parasites, or whether the several parasites mentioned came from one or more hosts. Our summary, therefore, includes only those cases of which we are quite sure, either from a personal examination of the specimen, or from a definite statement in the record. In the following list we give the

average number of parasites per host, per male host, and per female host.

	<i>host male female</i>				<i>host male female</i>		
Masaridinæ	2.	1.	4.	Monobia	2.25	2.33	2.
Zethinæ	1.2	1.	1.25	Montezumia	1.33		1.33
Eumenes	1.25	1.	1.5	Belonogas-			
Odynerus	1.34	1.15	1.52	ter	1.15	1.	1.20
Pachody-				Polistes	1.75	2.	1.68
nerus	2.38	2.5	2.29	Vespa	1	1.	1.
Ancistro-							
cerus	1.14	1.	1.3				

In most groups, female hosts support a slightly higher average number of parasites than males.

In Pierce's table of maximum parasitism per individual (1909, p. 26; 1918, p. 397) and in our own notes (1927, p. 189), it is very noticeable that heavily infested *Polistes* contain largely or exclusively male parasites. Eleven *Polistes* bearing four or more parasites are mentioned in those tables and four others in the present list; the entire fifteen containing parasites as follows: 1-2 ♂ 2 ♀, 1-3 ♂ 1 ♀, 1-4 ♂, 2-5 ♂, 1-3 ♂ 3 ♀, 1-6 ♂, 1-6 ♂ 1 ♀, 2-7 ♂, 1-8 ♂, 1-9 ♂, 1-10 ♂, 1-11 ♂, 1-15 ♂. There are here included 100 ♂ and 7 ♀. One is led to recall the interesting discovery of Cobb, Steiner, and Christie (1927) who have shown the striking preponderance of male nematodes in heavily infested hosts. In stylopized Eumeninæ as well as in infested bees the opposite seems to hold, and in cases of heavy stylopization, female parasites are in the majority.

THE GEOGRAPHICAL DISTRIBUTION OF STYLOPIZED VESPIDÆ

Our list includes vespids hosts from all the continental areas and many islands, and where records are lacking we must, at the present state of our knowledge, attribute their absence to insufficient collecting or study.

Some interesting problems in distribution are furnished by the Strepsiptera. The chance of their establishment in

isolated insular regions must be very remote, much more so than that of their host. Yet the first record of an *Odynerus* from Bermuda, the holotype and only known specimen of *Odynerus bermudensis* Bequaert, bears a female Strepsipteron. *Polistes fuscatus* var. *aurifer*, which was introduced into the Hawaiian Islands fairly recently, through the agency of man, carried its parasite with it. We list above several stylopized specimens from various islands, more or less remote, of the West Indies, the East Indies, and the Canary Islands.

Since the powers of flight of the host are impaired by stylopization, and female hosts are frequently rendered sterile, it is probable that the introduction of Strepsiptera into distant regions is brought about in the triungulinid stage. Several of these minute larvæ could cling to the body of a perfectly healthy host without seriously burdening it. Brues, indeed, has already reported (1924) the occurrence of triungulins, presumably of the meloid *Horia maculata*, on a bee (*Xylocopa transitoria*) from the Galapagos Islands.

THE PROBLEM OF HOST SPECIFICITY

It seems to have been generally assumed that Strepsiptera obtained from different species of hosts are themselves specifically distinct. Pierce (1909, p. 70) stated that as a rule species of Strepsiptera are confined to single species of hosts; and in his classification used tribes as divisions of convenience to unite genera of parasites infesting different families of hosts. Following a decision to unite the vespid groups *Leionotus*, *Ancistrocerus*, etc., with *Odynerus*, the same author (1911, p. 498) combined the genera *Leionotoxenos* and *Pseudoxenos* parasitic on those groups. Many species and several genera in the Strepsiptera are based solely on the unsatisfactory characters of the female together with the name of the host, which latter one sometimes feels is the more valuable part of the description.

It is not our intention to discuss here the validity of this tacit assumption of host specificity in the Strepsiptera, but some points arising from our redetermination of several

hosts deserve mention. Our records for *Polistes fuscatus* var. *pallipes*, for instance, include hosts reported under the names *P. fuscatus*, *P. metricus*, *P. instabilis*, and *P. variatus*; and parasites described as *Xenos peckii*, *X. bowditchi*, *X. wheeleri*, and *X. bruesi*. *Polistes fuscatus* var. *rubiginosus* likewise becomes the host of *Xenos nigrescens*, *X. rubiginosus*, *X. pecosensis*, and *X. maximus*. The parasites become similarly scattered among the host species. Until this interesting problem has been seriously investigated it should not be assumed that the hosts and their parasites are related, species to species, and genus to genus; and new species described in the Strepsiptera should stand on their own morphological characters, not on the identity of their hosts.

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ANATRICHIS MINUTA DEJ. A single specimen was taken in Framingham, Mass., on May 10, 1908, and no more have been seen until September 15, 1929, when I found 5 specimens by treading about in the soft soil in a dried-up pond in Acton, Mass. On September 22, I again visited the place and took four more. They were hiding among the small grass-like plants and prostrate vegetation. There is but one record in the New York list of insects.

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