

THE CHRYSOTOXINE SYRPHID-FLIES

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The material belonging to the genus *Chrysotoxum* at my disposal, mainly that in the National Collection, has permitted a fairly complete review of the American species and a partial review of the European fauna, the results of which are here given. Notes on the types of *derivatum* Walker and *villosulum* Bigot, the material recorded in the *Biologia Centralia-Americana* (all in the British Museum), and the material recorded by Giglio Tos in the "Ditteri del Messico" (in the Natural History Museum in Turin, Italy) are likewise included. I have had also the use of paratype material of *perplexum* Johnson and *plumeum* Johnson, and have obtained certain European species through an exchange with Prof. J. Hervé-Bazin.

I wish to thank Maj. E. E. Austen for permission to examine the material in the British Museum and F. W. Edwards for subsequently examining and making notes on the types; Dr. A. Borelli for permission to examine the material at the museum in Turin; Prof. J. Hervé-Bazin for the exchange of material; and C. W. Johnson for the paratypes noted above.

References to the literature of the genus have been largely limited to the original citations, to the new synonymy, and to Mr. Curran's recent review of the group.¹

The species of the genus *Chrysotoxum* are fairly large, wasplike flies of a very distinctive appearance. The genus belongs to the subfamily Syrphinae. It is easily distinguished by the elongate antenna with dorsal arista, the marginated sides of the abdomen and the wasplike body markings. The species in this genus, for the most part, are very uniform in structure and color and are separated with difficulty. All of the material at hand, American and exotic, was studied in order to work out the relative value of the characters within the genus. The genus may be divided into two subgenera on

¹ Can. Ent., vol. 56, 1924, pp. 34-40.

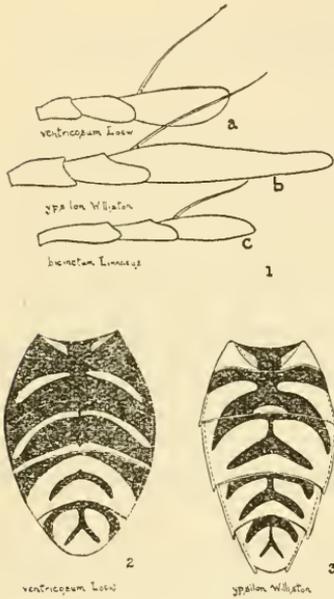
the basis of antennal characters. One, typified by *bicinctum* (Linnaeus), genotype of *Chrysotoxum*, has the first and second antennal joints greatly elongate, the two combined being much longer than the third, or the arista. This appears to be the dominant group in Europe and also occurs in Asia, but no species are known from America. The second subgenus, *Primo-chrysotoxum*, new subgenus

(type, *ypsilon* Williston), has the first and second joints but little elongate, their combined length approximating the length of the third and frequently being much shorter. The entire length of the antenna is often much shorter than the length of the fore tarsus. The specific character which appears to be of most importance in the subgenus *Primo-chrysotoxum* is found in the apical corners of the second, third, and fourth tergites. In one group of species they are projecting and in the remaining species the corners are confluent with the side margins of the abdomen. In the former group the females usually have the apical corners of the fifth tergite likewise projecting. Also in the first group the third antennal joint is usually about three times the length of the first, whereas in the second group it is about twice the length of the first.

The male genitalia are very uniform in most species of the genus. Two species, at least, are notable exceptions, namely, *cautum* Harris (Europe) and *tuberculatum*, new species (China). In the latter the styles are asymmetrical, but this asymmetry is of a different type from that which characterizes the members of the subfamily Sericomyninae.

Abnormal development of the abdominal segments appears to be unusually frequent in members of this genus. A large number of specimens examined had one or another segment more or less doubled by the presence of an additional rudimentary segment.

The species of *Chrysotoxum* are chiefly Holarctic in distribution. They are very partial to woodlands and are usually found on the forested slopes of mountains. A few species are known from tropical



FIGS. 1-3.—1, INNER VIEW OF THE ANTENNA TO SHOW RELATIVE LENGTH OF JOINTS OF: a. CHRYSOTOXUM (PRIMOCHRYSOTOXUM) VENTRICOSUM LOEW, b. CHRYSOTOXUM (PRIMOCHRYSOTOXUM) YPSILON WILLISTON, c. CHRYSOTOXUM (CHRYSOTOXUM) BICINCTUM LINNAEUS. 2, ABDOMEN OF CHRYSOTOXUM (PRIMOCHRYSOTOXUM) VENTRICOSUM LOEW, FEMALE, SHOWING THE EVEN OUTLINE. 3, ABDOMEN OF CHRYSOTOXUM (PRIMOCHRYSOTOXUM) YPSILON WILLISTON, FEMALE, SHOWING THE PROJECTION OF THE APICAL CORNERS OF THE TERGITES

countries, but these probably occur only in high altitudes. One species recorded here from India (*ladakense*, new species) was taken at an altitude of 16,000 feet. Very little is known of their immature stages. A pupa of *pubescens* has been found under a stone.

KEY TO THE SPECIES OF CHRYSOTOXUM IN THE NATIONAL COLLECTION

- A¹. Arista as long as, or longer than, combined length of first and second antennal joints (fig. 1a and 1b)-----Subgenus *Primochrysotoxum*.
 B¹. American species.
- C¹. Apical corners of tergites not projecting (fig. 2); outline of abdomen evenly rounded (best viewed from below); third sternite with yellow markings extending upon anterior margin in *coloradense* and sometimes in *derivatum*; antenna shorter than fore tarsus; fifth tergite much broader than long.
- D¹. Second sternite black except sometimes on anterior margin; pteropleura usually with black pile; frons of male black pilose; anterior bands on tergites 2 and 3 interrupted in middle and separated from side margins-----*ventricosum* Loew.
- D². Second sternite with hind margin yellow; pteropleura and frons of male yellow pilose.
- E¹. Anterior bands on tergites 2 and 3 interrupted in middle and separated from side margins--*chinook*, new species.
- E². Anterior bands on tergites 2 and 3 entire and attaining side margins-----*coloradense* Greene.
- C². Apical corners of tergites 2, 3, and 4, and usually the fifth in the female, distinctly projecting (fig. 3); antenna as long as, or longer than, fore tarsus; fifth tergite about as long as broad.
- D¹. Abdominal margins beyond middle of second tergite yellow.
- E¹. Sternites 3 and 4, and in female the fifth, with yellow only on hind margins; anterior bands on tergites 3 and 4 entire-----*aztec*, new species.
- E². Sternites 3 and 4, and in female the fifth, each with a pair of large yellow spots at the middle; anterior bands on tergites 3 and 4 interrupted.
- F¹. First tergite and anterior corners of second black pilose; apices of fore coxae with black hairs.
occidentale Curran.
- F². First and second tergites yellow pilose, sometimes with a few black hairs; apices of fore coxae with yellow hairs-----*ypsilon* Williston.
- D². Lateral margins of tergites 2 to 5 alternating black and yellow.
- E¹. Pteropleura with black pile; no yellow spot above fore coxa; arcuate abdominal bands interrupted.
- F¹. Second antennal joint shorter than the first; length of joints, 1:0.75:2.5-----*laterale* Loew.
- F². Second antennal joint longer than the first; length of joints, 1:1.25:2.5-----*fasciolatum* (DeGeer).
- E². Pteropleura yellow pilose; a more or less distinct yellow spot usually present above fore coxa.

- F¹. Second sternite with yellow only on anterior margin; third sternite with a pair of yellow spots which touch the anterior margin; arcuate bands on tergites 3 and 4 not interrupted or only slightly so.
radiusum, new species.
- F². Second sternite with hind margin yellow; yellow spots on third sternite separated from anterior margin.
- G¹. Arcuate bands on tergites 3 and 4 not interrupted.
integrum Williston.
- G². Arcuate bands on tergites 3 and 4 interrupted.
- H¹. Basal antennal joints combined as long as, or longer than the third; a large yellow spot above fore coxa; basal half of venter largely yellow pilose.....*pubescens* Loew.
- H². Basal antennal joints combined shorter than the third; venter black pilose.
- I¹. Face nearly straight in profile; antennal joints, 1:1:2.....*plumeum* Johnson.
- I². Face distinctly concave; antennal joints 1:0.5:2.....*perplexum* Johnson.
- B². Palearctic species. (All here included are Asiatic except *cautum* and *fasciolatum*, European.)
- C¹. Apical corners of tergites not projecting.
- D¹. Third antennal joint longer than first and second ones together; dorsal abdominal bands extending over sides; sternites 2, 3, and 4 with yellow markings on anterior margin.....*ladakense*, new species.
- D². Third joint as short as, or shorter than, basal ones.
- E¹. Cheeks, below eyes, entirely black.
- F¹. Lateral abdominal margins entirely yellow and with small black bristles.....*chinense*, new species.
- F². Lateral margins alternate black and yellow, and yellow pile intermixed with the black bristles.
nigrifacies, new species.
- E². Cheeks yellow.....*cautum* Harris
- C². Apical corners of tergites moderately to strongly projecting.
- D¹. Pteropleura black pilose.
- E¹. Arcuate abdominal bands extending upon sides.
- F¹. Antenna shorter than fore tarsus...*tartar*, new species.
- F². Antenna longer than fore tarsus.
fasciolatum (DeGeer).
- E². Arcuate abdominal bands separated from sides.
mongol, new species.
- D². Pteropleura yellow pilose.
- E¹. Third joint about as long as basal joints, apical corners of tergites moderately projecting; moderate sized species.
- F¹. Hind tarsi black; hind coxa with well-developed spinose tubercles.....*tuberculatum*, new species.
- F². Hind tarsi yellow; hind coxa (male and female) only with tuft of stiff black hairs...*fratellum*, new species.

E². Third antennal joint much longer than basal ones combined; apical corners of tergites strongly projecting; very robust species.

F¹. Second sternite with basal two-thirds yellow with a dark median line extending back to post margin; antennae partly yellow-----draco, new species.

F². Second sternite black with yellow hind margins; antennae wholly dark-----caeleste, new species.

A². Arista much shorter than combined length of first and second joints (fig. 1c), Palearctic species-----Subgenus *Chrysotoxum*.

B¹. Only three yellow abdominal bands developed; no distinct yellow spot above fore coxa-----bicinctum (Linnaeus).

B². At least four well-developed yellow stripes.

C¹. Abdominal side margins entirely black; mark above fore coxa present or absent; second sternite obscurely yellow basally.

D¹. Four anterior femora entirely yellow----festivum (Linnaeus).

D². Four anterior femora black basally-----vernale Loew.

C². Abdominal side margins alternate black and yellow; a distinct yellow spot above fore coxa; second sternite broadly yellow basally.

D¹. Wings without a distinct cloud near outer third on anterior margin -----elegans Loew.

intermedium Meigen.

octomaculatum Curtis.

D². Wings with a distinct cloud beyond middle near the costa.

japonicum Matsumura (?)

PRIMOCHRYSOTOXUM, new subgenus

Genotype.—*Chrysotoxum ypsilon* Williston.

This subgenus is differentiated from *Chrysotoxum*, *sensu stricto*, by the relative lengths of the antennal joints. In *Primo-chrysotoxum* the basal two antennal joints are but little elongated, and do not exceed the length of the arista. (Fig. 1a and 1b.) In *Chrysotoxum*, *sensu stricto*, the two basal joints are much longer than the arista. (Fig. 1c.)

CHRYSOTOXUM DERIVATUM Walker

Chrysotoxum derivatum WALKER, List of Diptera, Brit. Mus., vol. 3, 1849, p. 542.—CURRAN, Can. Ent., vol. 56, 1924, p. 110.—JOHNSON, Occ. Papers Boston Soc. Nat. Hist., vol. 5, 1924, p. 97.

This species has been recorded a number of times since it was first made known. It is difficult to say how many of these records may be correct; however, it is quite certain that small specimens of *ventricosum* (northwestern United States) are usually recorded as *derivatum*.

The writer has examined the type of *derivatum* and found it to be different from all other species known to him. It is unusually small, 8 mm. The antenna and the fore tarsus are equal in length; the relative length of the joints are 1:1:2.5; the apical corners of the

tergites are moderately projecting, the arcuate abdominal bands are narrow and attain the margins of the tergites only at the apical corners; the pteropleura is partly black pilose. According to these characters, it would come in the key with *laterale* and *fasciolatum*, from which it may be separated by its smaller size and the relative length of the antennal joints.

Described from one male.

Type locality.—St. Martins Falls, Albany River, Hudson Bay, Canada.

Type.—In British Museum.

CHRYSOTOXUM VILLOSULUM Bigot

Chrysotoxum villosulum BIGOT, Ann. Soc. Ent. France, ser. 6, vol. 3, 1883, p. 323.—CURRAN, Can. Ent., vol. 56, 1924, p. 34 (misidentification).

The type specimen is in poor condition. The abdomen is lost and the head is glued on the thorax. The head seems to be much more globose in shape and the eyes much more pilose than in the other American species. Perhaps the head is mismated with the thorax and it may be that it belongs to a species which does not occur in America. In view of the unsatisfactory condition of the specimen and the original description, it has been decided to leave this species unrecognized in the present paper.

Curran has identified a species from Oregon, Washington, and Idaho as *villosulum*. The male of this species has the frontal triangle and the legs yellow pilose. Bigot's type specimen, a male, has the frontal triangle and the femora black pilose and the relative lengths of the antennal joints are 1:1.5:2.

Type locality.—"Washington Territory." One male.

Type.—In British Museum.

CHRYSOTOXUM CHINOOK, new species

Chrysotoxum villosulum Bigot, CURRAN, Can Ent., vol. 56, 1924, p. 34 (misidentification).

This species is close to *ventricosum*, but may be separated by its more extensive yellow coloration; frons of male yellow pilose; pteropleura yellow pilose; second sternite margined behind with yellow; uniformly larger size, 13–14mm. The antennal joints are 1:1.25:2.

Three specimens (2 males and a female, Idaho) are distinctly smaller, 9 mm. The arcuate abdominal bands are separated from the margins of the tergites as in *ventricosum*. Twenty specimens at hand.

Type locality.—Lewis Peak, Blue Mountains, Washington.

Type.—Male, Cat. No. 28665, U.S.N.M. Allotype female; six paratypes male and female. Other paratypes in V. Argo's collection.

Distribution.—Washington: Lewis Peak, Blue Mountains, July (V. Argo); Mount Adams, 4,000–6,000 feet, July (M. C. Lane). Locality? (Williston collection). Oregon: Mount Hood (Williston collection). Idaho: Mount Moscow, July (J. M. Aldrich; R. C. Shannon); Bitter Root Mountains, July (C. V. Piper).

CHRYSOTOXUM VENTRICOSUM Loew

Chrysotoxum ventricosum LOEW, Berlin Ent. Zeit., vol. 2, 1864, p. 44.—
JOHNSON, Psyche, vol. 14, 1907, p. 77; Occ. Papers Boston Soc. Nat. Hist., vol. 5, 1924, p. 97.

The species may be recognized by the rather globose and evenly rounded abdomen, short antenna, the arista being much shorter and the third joint but little longer than the combined length of the basal ones; second sternite black except sometimes on anterior margin; the arcuate abdominal bands usually slender, narrowly interrupted at the middle and separated from the margins of the tergites; first tergite usually entirely black; frons of male usually black pilose; pteropleura usually black, pilose; sternopleura usually without yellow spot; base of femora usually black; size 7–13 mm.

Small specimens are sometimes misidentified as *derivatum* Walker. Three specimens (Idaho, Oregon, New Mexico) have the second and third arcuate bands entire.

Type locality.—Washington State.

Type.—In Cambridge Museum of Comparative Zoölogy.

Distribution.—Saskatchewan: Farewell Creek, July (V. A. Armstrong). British Columbia: South Fork, August 11, 1903 (R. P. Currie). Idaho: Moores Lake, July 10, 1907 (J. M. Aldrich); Bitter Root Mountains, July (C. V. Piper). Washington: Bonaparte Lake, 4,000 feet, July 4, 1921 (M. C. Lane); Lewis Park, Blue Mountains, July 1, 1923 (V. Argo). Locality? (Williston collection). Oregon: Mount Hood (Williston collection); Mount Hood, August 18, 1923 (G. P. Engelhardt); Crater Lake, 7,000 feet, August (G. P. Engelhardt); Marys Peak, Corvallis, July (G. P. Engelhardt); Manzanita, July 30, 1920 (L. P. Rockwood). Montana: Many Glaciers, July (G. P. Engelhardt). Colorado: Locality and collector? Tennessee Pass, 10,240 feet, July 10 (J. M. Aldrich). New Mexico: Locality? (Williston collection).

CHRYSOTOXUM COLORADENSE Greene

Chrysotoxum coloradensis GREENE, Proc. Ent. Soc. Wash., vol. 20, 1920, p. 70.—CURRAN (in part), Cal. Ent., vol. 56, 1924, p. 35.

The entire arcuate bands on tergites 3 and 4 which attain the side margins of tergites and absence of yellow spot on the sternopleura

readily separate this species from *chinook*. The fourth and fifth tergites are very extensively yellow. The even-sided abdominal margins distinguish it from *integrum* which has the apical corners of the tergites produced.

Length, 13–15 mm.

Seven specimens, all males.

The antennal joints are approximately 1:1.5:2. The fore side hind margins of the fifth tergite are about 4.5:1:2.

Type locality.—El Paso County, Colo.

Type.—In United States National Museum.

Distribution.—Colorado: El Paso County, June 7 (Champlain).

Locality and collector? Locality and collector (Coquillett collection). Montana: Locality? (Cornell University, lot 35, Williston collection). Idaho: Locality? (Cornell University, lot 35, Williston collection).

CHRYSOTOXUM YPSILON Williston

Chrysotoxum ypsilon WILLISTON, Synopsis N. A. Syrphidae, 1886, p. 14.—CURRAN, Can. Ent., vol. 56, 1924, p. 39.

Large species with the arista much shorter than antenna, in the male the third joint as long as the basal ones combined, in the female the third joint is much the longer; pteropleura with black pile; anterior corners of abdomen mostly or entirely yellow pilose; abdominal bands broad and joining margins of tergites; lateral margins beyond middle of second tergite yellow; apical corners of tergites strongly projecting; second sternite with yellow post margin; sternites 3 and 4 and in the female the fifth each with a pair of large yellow spots; Length, 15–18 mm. Two males, three females.

Type locality.—New Mexico.

Type.—In United States National Museum.

Distribution.—New Mexico: Locality? (Williston collection); Pecos, June 21 (W. P. Cockerell). Nevada: Ormsby County, July 6 (C. F. Baker). Colorado: Locality and collector?

CHRYSOTOXUM AZTEC, new species

Chrysotoxum integrum Williston, GIGLIO Tos, Mem. R. Acad. Sci. Nat. Torino, ser. 2, vol. 43, 1893, p. 10 (misidentification).

Male.—Frons black pilose; antennal joints about 1:1:2.5; arista much shorter than length of antenna; mesonotum blackish pilose; pteropleura black pilose; base of abdomen mostly yellow pilose; bases of femora black; abdominal bands rather broad, joining sides of abdomen, which are yellow beyond middle of second tergite; apical corners of tergites moderately projecting; sternites yellow only on hind margins.

Female.—Frons of usual width, black with a moderate size pair of pollinose spots. Length, 13–14 mm.; wing, 12 mm.

Close to *ypsilon*, which is larger and more robust; the abdominal bands broader, apical corners of tergites strongly projecting; and the sternites, except the first, with a pair of large yellow spots besides the yellow post margins.

The material recorded by Giglio Tos as *Chrysotoxum integrum* Williston, from Mexico, has been examined by the writer. All these specimens are the same as this new species, *aztec*.

Type locality.—Sierra Madre, Chihuahua, Mexico.

Type.—Cat. No. 28310, U.S.N.M. Male type; allotype, female; two male paratypes.

Distribution.—Mexico: Sierra Madre, Chihuahua, 7,300 feet, August 28 and September 9 (C. H. T. Townsend); Mound Valley, Chihuahua, August 23 (C. H. T. Townsend); Sanchez, Chihuahua (C. H. T. Townsend).

CHRYSOTOXUM OCCIDENTALE Curran

Chrysotoxum occidentale CURRAN, Can. Ent., vol. 56, 1924, p. 36.

A large robust species which differs from *ypsilon* in having black hairs on the apices of the fore coxae and the base of the abdomen black pilose. A male (hitherto unknown) agrees with the paratype female in these respects.

Length, 17–18 mm.

One male and one female.

Type locality.—British Columbia.

Type.—In Canadian National Collection.

Distribution.—Idaho: Moscow Mountains, July 10, 1920 (R. C. Shannon). British Columbia: Kaslo, June 5 (H. G. Dyar).

CHRYSOTOXUM LATERALE Loew

Chrysotoxum laterale LOEW, Berlin Ent. Zeit., vol. 8, 1864, p. 42.

The status of this species is uncertain. Only the female is known and its characterization is unsatisfactory. Characterized by the short second antennal joint, the relative lengths of the joints being 1:0.75:2.5; the pteropleura and base of abdomen with black pile; the arcuate bands of the abdomen reaching the sides of the abdomen which are alternate black and yellow; the apical corners of the tergites projecting. Length, 12–14 mm. Two females.

Type locality.—Nebraska.

Type.—In Cambridge Museum, Comparative Zoölogy.

Distribution.—New York: Lake George, September 4, 1920 (M. D. Leonard). New Hampshire: White Mountains, July (S. Scudder).

CHRYSOTOXUM FASCIOLATUM (DeGeer)

Musca fasciolatum DEGEER, Mem. pour serv. l'hist. d. Ins., vol. 6, 1776, p. 55.—CURRAN, Can. Ent., vol. 56, 1924, p. 40.

Differs from *laterale* chiefly by having the second antennal joint longer than broad, the relative lengths of the joints being 1:1.25:2.5-3. Lengths about 15 mm. Three males, three females. Agrees essentially with European specimens.

Type locality.—Europe.

Type.—Location unknown.

Distribution.—Maine: Echo Lake, Mount Desert, June 17, 1921 (C. W. Johnson). New Hampshire: White Mountains (H. K. Morrison); Mount Washington, June 21, 1874 (H. K. Morrison); Mount Washington (H. G. Dimmock).

CHRYSOTOXUM RADIOSUM, new species

Chrysotoxum pubescens Loew, CURRAN, Can. Ent., vol. 56, 1924, p. 39 (misidentification).

A rather small to moderate sized species. Frons black pilose, the pollinose spots in female small; antennal joints 1:1.5:2, the arista much shorter than antenna; thoracic pubescence yellow, a few black hairs on scutellum; all femora, tibiae, and tarsi yellow; abdomen mostly yellow pilose above and below; arcuate abdominal bands entire or subinterrupted in middle, joining the posterior margins of the tergites and barely coloring the apical corners of the tergites, leaving the sides of the abdomen almost entirely black; apical corners of the tergites moderately produced; hind and side margins of fifth tergite in the female about equal, the anterior margin nearly three times as long as the side margins; wings infuscated anteriorly.

Length, 10-13 mm.

Separated from *integrum* and other allies by the absence of the yellow hind margin on the second sternite and the presence of a pair of yellow spots on the third sternite bordering on the anterior margin.

Type locality.—South Wanatah, Ind.

Type.—Cat. No. 28311, U.S.N.M. Male type; allotype, female; paratypes, four females.

Distribution.—Connecticut: New Haven, June 5, 1910 (A. B. Champlain). Indiana: South Wanatah, June 1, 1916 (J. M. Aldrich); LaFayette, September 30, 1915 (J. M. Aldrich). South Dakota: Brookings, June 16, 1891 (J. M. Aldrich). Washington: Locality? (Williston collection). State and locality? (bears the number 51).

CHRYSOTOXUM INTEGRUM Williston

Chrysotoxum integrum WILLISTON, Synopsis N. A. Syrphidae, 1886, p. 16.—
CURRAN, Can. Ent., vol 56, 1924, p. 39.

Chrysotoxum coloradense GREENE, CURRAN, Can. Ent., vol. 56, 1924, p. 39
(in part).

A moderate sized species. Antennal joints about 1:1:2 in the male, and 1:1.25:3 in the female, apical corners of tergites distinctly projecting; arcuate abdominal bands entire and attaining side margins; sternites 2, 3, 4, and, in female, 5, with yellow postmargins and except the second with a pair of yellow spots. The relative lengths of the fifth tergite are 3.5:1:1 (compare with *coloradense*).

Length, 12–14 mm.

The material recorded by Williston in the Biologia Centrali-Americana as "*Chrysotoxum* sp.?" are all slight variations of *integrum* Williston, not sufficiently marked to rank as different species.

The specimen recorded by Giglo Tos as *integrum* (Ditteri Messico) is *aztec* Shannon.

Ten males, nine females.

Type locality.—Arizona.

Type.—In United States National Museum.

Distribution.—Arizona: Locality? (Cornell University, lot 35, Williston collection); East Verde River, 4,500 feet. Mexico: Sierra Madre, Chihuahua, 7,300 feet, July 21 (C. H. T. Townsend); San Jacinto, D. F., August, 1923 (E. G. Smyth); Mexico City (Juan Müller). New Mexico: Springer, August 18, 1914 (W. R. Walton); Dripping Spring, Organ Mountains, April 24 (T. D. A. Cockerell). Utah: Blue Springs, 8,000 feet, August 29, 1923 (G. P. Engelhardt). Idaho: Moscow Mountains (J. M. Aldrich). Washington: Wawawai, May 30, 1923 (V. Argo); Asotin, May 19, 1923 (V. Argo).

CHRYSOTOXUM PUBESCENS Loew

Chrysotoxum pubescens LOEW, Wien Ent. Monat., vol. 4, 1860, p. 84.—
GREENE, Proc. Ent. Soc. Wash., vol. 25, 1923, p. 84 (Puparium described).

Chrysotoxum derivatum Walker, HOWARD, Insect Book, 1901, pl. 21, fig. 31
(misidentification).

Chrysotoxum luteopilosum CURRAN, Can. Ent., vol. 56, 1924, p. 36.

Chrysotoxum currani WEHR, Univ. Studies Nebraska, vol. 22, Jan. 10, 1924,
p. 9.

Chrysotoxum cuneatum WEHR, Univ. Stud. Neb., vol. 22, Jan. 10, 1924, p. 10.

A fairly large species easily recognized by the following characters: Antenna with the relative length of the joints about 1:1.5:2; the distinct yellow spot above the fore coxa; the interrupted bands on tergites 2, 3, and 4 attaining the apical corners; apical corners of

tergites rather strongly projecting; yellow pile above and below on the abdomen. Length, about 14 mm. One male, three females.

Type locality.—Illinois.

Type.—In Cambridge Museum Comparative Zoölogy.

Distribution.—Virginia: Fairfax County, June 11, 1922 (H. S. Barber); Falls Church, May 28, 1917, reared (C. T. Greene); Glen-carlyn, May 21, 1921 (S. A. Rohwer); Falls Church, July 4, 1920 (S. A. Rohwer). Kansas: Onaga (Crevecoeur).

CHRYSOTOXUM PLUMEUM Johnson

Chrysotoxum plumeum JOHNSON, Occ. Papers Bost. Soc. Nat. Hist., vol. 5, 1924, p. 99.

Chrysotoxum ventricosum Loew, CURRAN, Can. Ent., vol. 56, 1924, p. 39 (misidentification).

A rather small species characterized by the straight or nearly straight face (in profile); antennal joints about 1:1:2; arcuate bands extending to sides of abdomen; second sternite with yellowish hind border, remaining sternites with or without anterior pair of spots.

Length, 10–12 mm.

Seventeen males, three females.

Type locality.—New Jersey.

Type.—In C. W. Johnson's collection, Boston, Mass.

Distribution.—New Jersey: Riverton, September 8 (C. W. Johnson); Caldwell, June 15 (C. W. Johnson). Maryland: Plummer Island, April 25, May 19 (R. C. Shannon); Odenton, June (R. C. Shannon); College Park (collector?). Virginia: Great Falls, May 9, 1920 (H. S. Barber).

CHRYSOTOXUM PERPLEXUM Johnson

Chrysotoxum perplexum JOHNSON, Occ. Papers Bost. Soc. Nat. Hist., vol. 5, 1924, p. 99.

Chrysotoxum laterale Loew, CURRAN, Can. Ent., vol. 56, 1924, p. 35 (misidentification).

A larger species than *plumeum* distinguished chiefly by its concave face (in profile) and relation of antennal joints, 1:5:2.

Four males, three females.

Type locality.—New Hampshire.

Type.—In C. W. Johnson's collection, Boston, Mass.

Distribution.—New Brunswick: St. John, August 15, 1898 ("W. M."). Maine: Locality and collector? Vermont: Bolton, July 15, 1923 (Owen Bryant). New Hampshire: Franconia, July 20 (C. H. T. Townsend); White Mountains, July (S. Scudder). New York: Lake George, September 4, 1920 (M. D. Leonard). Pennsylvania: Allegheny, July 9, 1891; Rockville, September 25, 1913 (A. B. Champlain). Maryland: Plummer Island, July 25 (R. C. Shannon).

CHRYSOTOXUM LADAKENSE, new species

Female.—Antennal joints 1:1:3; face prominent, moderately concave; mesonotum with short, appressed, brownish pile; scutellum yellow; pteropleura yellowish pilose; legs yellow; arcuate abdominal bands rather broad, uniform in width, strongly curved and joining side margins of the tergites; sides of abdomen rather strongly flanged, of even contour and yellow beyond middle of third tergite; second sternite yellow at apical corners; third sternite with complete (narrowed at middle) yellow basal band, and yellow apical corners; fourth with large yellow spots at anterior corners and smaller ones at apical corners; fifth almost entirely black; wing with costal cloud extending only to tip of first vein.

Length, 13 mm.; wing, 12 mm.

One specimen.

Type locality.—Rupshu Ledak, 16,000 feet, Kashmir (July 22, 1897, W. L. Abbott).

Type.—Female, Cat. No. 28312, U.S.N.M.

CHRYSOTOXUM CHINENSE, new species

Male.—Fairly large species; frons black, black pilose; antennal joints 1:1.5:5; arista a little shorter than two basal joints; face rather prominent, moderately concave; cheeks, below eyes, entirely black; mesonotum black pilose; pteropleura entirely black, with black pile; sternopleura entirely black; bases of femora darkened, remainder of legs yellow; abdomen strongly flanged, the side margins entirely yellow; arcuate bands joining lateral margins; second sternite black, narrowly yellow on post margin; sternites 3 and 4 with broad basal yellow bands; genitalia typical. Length, 15 mm.; wing, 12.5 mm. One specimen.

Type locality.—West of Chetu Pass near Tatsienlu, 13,000–15,000 feet, Szechuen, China (D. C. Graham).

Type.—Male, Cat. No. 28313, U.S.N.M.

CHRYSOTOXUM NIGRIFACIES, new species

Female.—A fairly large species; antennal joints 1:1.5:1.75; arista black, about equal to combined length of joints 1 and 2; frons entirely black, with two small pollinose spots; face prominent; cheeks entirely black; mesonotum black pilose with scattered longer black hairs; ptero- and sterno-pleurae entirely black, yellow pilose; femora darkened basally; margins of abdomen rather strongly flanged, alternate black and yellow; arcuate bands narrow, of uniform width, joining the side margins; post margins of tergites very narrowly yellow; last tergite twice as broad as long; second sternite entirely black, third with yellow band bordering on the anterior margin, fourth with two yellow spots bordering on anterior margin.

A male which is tentatively associated with this species has the cheeks partly obscurely yellowish.

Three females and the above-mentioned male, from the type locality.

Type locality.—Yellow Dragon Gorge near Songpan, 12,000–14,000 feet, Szechuen, China (D. C. Graham).

Type.—Female, and two female paratypes, Cat. No. 21314, U.S.N.M.

CHRYSOTOXUM TARTAR, new species

Female.—Distinguished from the foregoing by its much more yellowish appearance; antennal joints 1:1.25:2; arista yellow, longer than the basal joints; cheeks yellow; yellowish mesonotal and black scutellar pile; pteropleura black with black pile; sternopleura with yellow spot; femora darkened basally; abdominal pile mostly yellow, but blackish on first tergite; abdominal margins normally banded, alternately black and yellow; arcuate bands rather broad, joining side margins; yellow bands on post margins of tergites 3 and 4 very broad; yellow spots on sternites 4 and 5 not reaching anterior margin.

Length, 14 mm.; wing, 12 mm.

One specimen.

Type locality.—West of Chetu Pass near Tatsienlu, 13,000–14,500 feet, Szechuen, China (D. C. Graham).

Type.—Female, Cat. No. 21315, U.S.N.M.

CHRYSOTOXUM TUBERCULATUM, new species

Male.—A fairly large species possessing the unique character of an obtuse spinose spur on the hind coxa. Antennal joints 1:1.5:2; arista yellow and longer than the basal joints; frons black, broadly margined above with yellowish pollen; cheeks yellow; thorax entirely yellow pilose; an obscure yellow spot above fore coxa; a larger one on the sternopleura; legs yellow, the hind tarsi black and densely setose; abdominal pile rather long and yellow, with shorter and black hairs toward apices of sternites; abdominal margins alternate black and yellow; the apical corners of the tergites projecting; arcuate bands very moderately curved, the first broadened toward the ends and the yellow extending forward (inside of the black margin on the anterior half of the second tergite) nearly to the anterior margin; second sternite very narrowly yellow on hind margin; the third with a narrow anterior band which does not meet the fore margin, narrowly yellow on hind margin; the third with a narrow anterior band which does not meet the fore margin, narrowly yellow on post margin; the fourth very narrowly yellow on

fore and hind margins; genitalia unusually modified, the cerci bearing a dense tuft of pile; two dense tufts of reddish pile projecting inwardly from between the bases of the styles; the styles asymmetrical, the right-hand one rather short with two apical rounded projections, the left-hand one much longer and convoluted; wings without dark anterior border; length, 15 mm.; wing, 13 mm. One male.

Type locality.—Uen Chaun Shien, Szechuen, China, August 7, 1924 (D. C. Graham).

Type.—Male, Cat. No. 28316, U.S.N.M.

CHRYSOTOXUM FRATELLUM, new species

Male and female.—Differs from *tuberculatum* chiefly in its smaller size; legs entirely yellow; no spur on hind coxa, but with a tuft of short, stiff black hairs present instead (both sexes); apical corners of tergites very little produced; length, 12 mm.; wing, 11 mm.

Genitalia of male normal, the styles symmetrical.

Two males, one female.

Type locality.—West of Chetu Pass, near Tatsienlu, 13,000–14,500 feet, Szechuen, China (D. C. Graham).

Type.—Male, Cat. No. 28317, U.S.N.M.

Allotype.—Female; paratype, male.

CHRYSOTOXUM MONGOL, new species

Female.—Antennal joints 1:1:2.25; arista yellowish, a little longer than basal joints; face straight to the tubercular prominence, thence protruding; mesonotal pile mainly black; pteropleura black pilose; sternopleura with yellow spot; femora dark brown basally; abdominal side margins only beaded, black save at apical corners of tergites, which are moderately projecting; arcuate, strongly curved, separated from side margins, bands narrow, the second and third subinterrupted; second sternite entirely black; third with yellow band on anterior border; fourth with pair elongate yellow spots close to anterior border; margins of fifth tergite 3:1:1.25; anterior border of wing rather narrowly clouded; length, 15 mm.; wing, 13 mm. One female.

Type locality.—Yellow Dragon Gorge near Songpan, 12,000–14,000 feet, Szechuen, China, 1924 (D. C. Graham).

Type.—Female, Cat. No. 28318, U.S.N.M.

CHRYSOTOXUM DRACO, new species

Male.—A very robust and unusually marked species in which the yellow greatly predominates. Eyes bare; the black markings on the face and front have practically disappeared, only an obscure

median facial stripe present; antennae unusually short, the joints 1:1.25:4; the first two joints and basal half of the third yellowish below; the arista yellow and distinctly longer than antenna; thorax except mesonotum almost entirely yellow; legs including coxae and trochanters yellow; abdomen very broad; arcuate abdominal bands very broad, nearly bordering onto the anterior margins of second and third tergites; entire margins of abdomen yellow with densely set very short black stiff bristles; apical corners of tergites strongly projecting; second and third tergites yellow with black hind margins and dark median stripe; genitalia typical.

Length, 17.5 mm.; wing, 17 mm. One male.

Type locality.—Shin Kai Si, Mount Omei, 4,400 feet, Szechuen, China (D. C. Graham).

Type.—Male, Cat. No. 28319, U.S.N.M.

CHRYSOTOXUM CAELESTE, new species

Female.—A large robust species similar in size and dorsal abdominal coloration to *draco*. The following characters indicate the differences: Eyes pilose; frons black, basal antennal joints dark brown, third blackish; length equal to fore tarsus, relative length of joints 1:1.25:3.5; arista yellowish, much longer than basal joints combined; mesonotal pile brownish, dark posteriorly and on abdomen; pleural pile yellowish; pleura black with yellow spots on meso—and sternopleurae; dorsum of abdomen black at base, almost entirely yellowish brown beyond; side margins alternate black and yellowish brown; thickly beset with very short black hairs and longer yellowish ones; apical corners of tergites strongly projecting, less so than in *draco*; margins of fifth tergite 3:1:1; sternites 2, 3, 4, and 5 black with yellow post margins; anterior margins of wings brownish; length, 17 mm.; wing, 16 mm. One female.

Type locality.—9 miles southwest of Tatsienlu 8,500–13,000 feet, Szechuen, China (D. C. Graham).

Type.—Female, Cat. No. 28320, U.S.N.M.

CHRYSOTOXUM CAUTUM Harris

Chrysotoxum cautum HARRIS, Expos. Engl. Ins., 1892, p. 60.

Two males and one female, two of which bear Verrall's determination "*sylvarum* Mg." from Leigh, Essex, England. The third specimen bears the label "*C. 8—maculatum*," authority unstated. The male of this species is one of the few in this group which have the genitalia greatly modified, the styles being very broadly U-shaped.

Two other males and one female from France (Hervé-Bazin).

CHRYSOTOXUM FASCIOLATUM (De Geer)

Two females, Chartreuse, France (J. Hervé-Bazin). Prof. J. Hervé-Bazin informs me that he has only females of this species in his collection.

Subgenus **CHRYSOTOXUM** sensu stricto

CHRYSOTOXUM BICINCTUM (Linnaeus)

Musca bicinctum LINNAEUS, Systema Naturae, 10 ed., 1758, p. 592.

This species, together with the five species considered below, may well be considered as a separate group from the above, the chief difference being the greater combined length of the basal joints over that of the third.

Two males and two females: England, Lyndhurst (Verrall); Germany; France, Bront-Vernet (H. du Buysson) and Ste Baume Forest (W. R. Thompson); two females, Le Patys, Segre, France, June 27, 1925 (Hervé-Bazin and Shannon).

The Kertesz Catalogue of Diptera, 1910, lists this species from America. As far as the writer is aware *bicinctum* does not occur in the New World.

CHRYSOTOXUM FESTIVUM (Linnaeus)

Musca festivum LINNAEUS, Systema Naturae, 10 ed., 1758, p. 593.

This is apparently a very variable species of which the following species, *C. vernale* Loew, may be a variation. On the other hand, there is evidence in the material at hand to show that it may be a complex of several species. One male has very pronouncedly pilose eyes, whereas the other specimens have very sparsely pilose eyes. A number of specimens have a distinct yellow spot above the fore coxa and in others there is no trace of yellow at this position. One female has the fore: side: hind margins of the fifth tergite in the ratio of 5:1:4 and the width of the fifth sternite is about six times its length. This may simply be one type of many abnormalities to be found in the abdominal segments of the species of this genus. However, the arcuate bands are much narrower than in the other specimens.

Twenty-one specimens of this species were taken in about five hours' collecting at the home of Professor Hervé-Bazin, at Le Patys, Segré, France, June 27, 1925, by himself and wife and myself and wife. Four females are also at hand from Berlin, Germany (C. Schimer).

CHRYSOTOXUM VERNALE Loew

Chrysotoxum vernale LOEW, Stettin. Ent. Zeit., vol. 2, 1841, p. 138.

Three males and three females, Berlin, Germany (C. Schimer); and Toulouse, France (H. du Buysson); Chartreuse, France (Hervé-Bazin).

CHRYSOTOXUM INTERMEDIUM Meigen

Chrysotoxum intermedium MEIGEN, System Beschreib., vol. 3, 1822, p. 169.

One male and one female, Chartreuse, France (J. Hervé-Bazin).

CHRYSOTOXUM ELEGANS Loew

Chrysotoxum elegans LOEW, Stettin. Ent. Zeit., vol. 2, 1841, p. 140.

One male, one female, Chartreuse, France (J. Hervé-Bazin); one female, Bront-Vernet, France (H. du Buysson).

CHRYSOTOXUM OCTOMACULATUM Curtis

Chrysotoxum octomaculatum CURTIS, Brit. Entom., vol. 8, 1847, p. 653.

Three females from Berlin, Germany (C. Schimer).

CHRYSOTOXUM JAPONICUM Matsumura

One female from Japan (Harrington) agrees with the description in Matsumura's Synopsis of Economic Syrphidae of Japan.² The description of the antennae as given in the key and the description are at variance. Apparently No. 2 in couplet 1 of the key should be 6 and No. 5 should be 2.

² Ent. Mag., vol. 2, pp. 3 and 6, 1916.

SPECIES OF CHRYSOTOXUM NOT STUDIED BY THE WRITER

- Chrysotoxum antiquum* WALKER, Insecta Saunders, Dipt., vol. 1, 1852, p. 218.
India.
- (*Musca*) *Chrysotoxum arcuatum* (LINNAEUS), Systema Naturae, 10 ed., 1758,
p. 592. Europe.
- Chrysotoxum baphyrus* WALKER, List Diptera, Brit. Mus., vol. 3, 1849, p. 542.
Bengal.
- Chrysotoxum bigoti* GIGLIO TOS, Atti R. Accad. Sci., Torino, vol. 26, 1890, p. 154.
Italy.
- Chrysotoxum biguttatum* MATSUMURA, J. Coll. Sapporo, vol. 4, 1914, p. 72.
Japan.
- Chrysotoxum cisalpinum* RONDANI, Ann. Soc. Ent. France, ser. 2, vol. 3, 1845,
p. 197. Europe.
- Chrysotoxum continuum* BEZZI, Syrphidae, Ethiop., 1915, p. 178. E. Africa.
- Chrysotoxum convexum* BRUNETTI, Fauna Brit. India, Syrphidae, 1923, p. 298.
India.
- Chrysotoxum convexum* BRUNETTI, Rec. Ind. Mus., vol. 11, 1915, p. 249. India.
- Chrysotoxum elongatum* HARDY, Australian Zoologist, vol. 2, 1921, p. 13. Tas-
mania (=Xylotinae).
- Chrysotoxum erraticum* WALKER, List Diptera Brit. Mus., vol. 3, 1849, p. 543.
Country unknown.
- Chrysotoxum flavifrons* MACQUART, Dipt. Extot., vol. 2, 1842, p. 17. Newfound-
land. Unrecognizable.
- Chrysotoxum flavipenne* PALMA, Annal. Acad. Aspir. Natur. Napoli, ser. 3,
vol. 3, 1863, p. 40. Italy.
- Chrysotoxum fuscmarginatum* BRUNETTI, Fauna Brit. India, Syrphidae, 1923,
p. 300. India.
- Chrysotoxum grandis* MATSUMURA, J. Coll. Sapporo, vol. 4, 1914, p. 72. Japan.
- Chrysotoxum holtzi* BECKER, Ann. Mus. Zool. Ac. St. Peterb., vol. 17, 1912,
p. 605. Persia.
- Chrysotoxum kozhevnikovi* SMIRNOV, Ent. Mitteil, vol. 14, 1925, p. 291.
- Chrysotoxum lessonae* GIGLIO TOS, Atti R. Accad. Sci. Torino, vol. 26, 1890, p.
144. Italy.
- Chrysotoxum lineare* ZETTERSTEDT, Kongl. Vet. Akad. Handl., vol. 1, 1819, p. 82.
Europe.
- Chrysotoxum mundulum* HERVÉ-BAZIN, Bull. Soc. Ent. France, 1923, p. 27.
Cochin-China.
- (*Syrphus*) *Chrysotoxum? nigrita* FABRICIUS, Species Insect., vol. 2, 1781, p. 427.
Jamaica. (This may not belong to the genus *Chrysotoxum* but has been
placed in this genus by Wiedemann.)
- Chrysotoxum parmense* RONDANI, Ann. Soc. Ent. France, ser. 2, vol. 3, 1845, p.
198. Italy.
- Chrysotoxum przewalskiji* PORTSCHINSKY, Horae Sôc. Ent. Ross., vol. 21, 1887,
p. 6. Asia.
- Chrysotoxum quadrifasciatum* BRUNETTI, Fauna Brit. Ind., Syrphidae, 1923, p.
300. India.

- Chrysotoxum robustum* PORTSCHINSKY, Horae, Soc. Ent. Ross., vol. 21, 1887, p. 7. Persia.
- Chrysotoxum rotundatum* HERVÉ-BAZIN, Bull. Soc. Ent. France, 1923, p. 27. Indo-China.
- Chrysotoxum sachalinensis* MATSUMURA, J. Coll. Sapporo, vol. 4, 1914, p. 72. Japan.
- Chrysotoxum sackeni* GIGLIO TOS, Atti R. Accad. Sci. Torino, vol. 26, 1890, p. 150. Italy.
- Chrysotoxum sibiricum* LOEW, Vehr. Zool.-bot. Ver. Wien, vol. 6, 1856, p. 8. Siberia.
- Chrysotoxum stipatum* WALKER, Insecta Saunders., Dipt., vol. 1, 1852, p. 219. Country unknown.
- Chrysotoxum testaceum* SACK, Ent. Mitt., vol. 2, 1912, p. 9. Formosa.
- Chrysotoxum triarquatatum* MACQUART, in Webb and Berth.: Hist. Nat. Îles Canar., Entom., Dipt., 1838, p. 107. Canary Islands.
- Chrysotoxum violaceum* BRUNETTI, Fauna Brit. India, Syrphidae, 1923, p. 302. India.

