

COLORADO BOMBIDÆ.

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During 1900-01 I made some studies on the Bombidæ occurring in Colorado. This paper is an abstract of those studies, the main body of which is in an unpublished thesis deposited with the Secretary of the State Board of Agriculture at Ft. Collins, Colorado. The material used is in the collection at the State Agricultural College of Colorado, and in my own collection; also a few specimens at the U. S. Nat. Mus. Most of the collection passed through the hands of Mr. Wm. H. Ashmead, who corrected determinations and who very kindly looked over the table given below, not only making corrections in it, but adding some species I had not recognized.

It will, of course, be understood that *colour characters* referred to in the table *always* mean *colour of pubescence*.

TABLE OF SPECIES.

I.—Abdomen without orange-red band.

Dorsum of thorax generally entirely yellow.

A. Apex of abdomen black.

First segment yellow, rest black *Virginicus*.

First segment yellow, next three fulvous *dorsalis*.

First two segments yellow, rest black *vagens*.

First two and basal middle of third segment yellow,
rest black *Morrisonii*, ♀.

First three segments bright lemon-yellow, rest glossy
black *perplexus*, ♂.

First three and middle of fourth segment yellow, rest
black *Morrisonii*, ♂.

AA. Apex of abdomen fulvous.

First three segments yellow, rest, except apex,
black var. *Hudsonicus*, ♂.

Dorsum of thorax more or less black on the disk.

A. Apex of abdomen black.

First segment yellow, basal middle of second yellow or tawny, rest
black *separatus*.

First three segments yellow, rest black *Nevadensis*, ♀.

AA. Apex of abdomen black and fulvous.

First three segments yellow *Nevadensis*, ♂.

Dorsum of thorax banded with black.

A. Thorax before the band white *appositus*.

AA. Thorax before the band yellow, scutellum yellow.

B. Apex of abdomen black.

First segment and second (except basal middle)

yellow *affinis*.

First, second partly, and fourth segments yellow, rest black *Edwardsii*.

First and second segments yellow *scutellaris*, ♀.

First four segments yellow *fervidus*, ♀.

First four segments lemon-yellow *sonorus*, ♀.

First, second, fourth and fifth (partly) yellow.

Venter nearly bare *Putnamii*, ♀.

Venter and legs with long yellowish hairs.. *Putnamii*, ♂.

BB. Apex white.

First two segments black, third fulvous, fourth to sixth segments white *Coloradensis*, ♀, var. nov.

First two and fourth segments black *proximus*.

First, second partly, and fourth segments black.. *Howardii*.

BBB. Abdomen, except apex, ochreous or yellow.

Apex tufted with black, wings uniformly

fuscous..... *fervidus*, ♂.

Apex fulvous or fulvous-yellow, wings subhyaline basally, broadly fuscous at apical third..... *Pennsylvanicus*, ♂.

AAA. Thorax before the band yellow, scutellum more or less black.

First segment black, vertex with two yellow patches. *terricola*, ♀.

First segment partly yellow, vertex all black.. *Pennsylvanicus*, ♀.

"All the dorsal segments clothed with a fulvous pubescence"..... *Titusi*, n. sp., Ashmead.

II.—Abdomen with a more or less distinct orange-red band.

Dorsum of thorax more or less distinctly banded with black.

A. Apex of abdomen black or nearly so.

B. First and fourth segments, second at least partly, and third segment entirely, orange-red.

C. Scutellum all yellow.

Second segment all orange-red, face yellow..... *ternarius*.

- Second segment orange-red, face pale, black hairs above antennæ.....*sylvicola*.
 Second segment with basal middle yellow.....*rufocinctus*.
 CC. Scutellum and second segment partly black, remainder of second segment orange-red.....*bifarius*.
 BB. First two segments yellow, third and fourth orange-red.
 Scutellum all yellow.....*juxtus*.
 Scutellum partly black, thorax anteriorly mixed with black.....*flavifrons*.
 AA. Apex of abdomen not entirely black.
 Apex of abdomen orange-red, first two segments yellow, third black.....*Oregonensis*, ♀.
 Apex of abdomen not so bright, some yellow mixed with fulvous colour.....*Couperii*.

Dorsum of thorax with mixed pubescence.

First two segments pale, third black, apex orange-red.....*mixtus*.

All localities in the following list are in Colorado, except where otherwise stated.

B. dorsalis, Cress., 1878.

Mr. Ashmead, in looking over my table, has written in "First segment yellow, 2, 3 and 4 fulvous.....*dorsalis*, ♀." I have not seen the specimens the note was upon.

B. separatus, Cress., 1863.

♀ June, ♀ July 20, August 8 (C. Stannard) at Ft. Collins: ♂ Henderson, August 30 (Gillette).

B. Morrisonii, Cress., 1878.

♀ May 10, June 8, 9, September 15; ♀ July 20, 24; ♂ September 22, at Ft. Collins. 2 ♀ July 13, Trinidad; August 5, Antonito (Gillette). ♀ ♂ August 21, Cerro Summit; August 19, Horsetooth Gulch. ♂ August 22, Cimmaron. Taken on *Cleome serrulata*, *Mentzelia multiflora*, *Helianthus annuus*, *Thermopsis montanum*, *Alnus viridis* and "wild rose."

This very distinct species is one of the largest and finest Colorado Bombidæ; and is found not uncommonly in Colorado and New Mexico.

B. perplexus, Cress., 1863.

One ♂ September 22, Ft. Collins, which I doubtfully refer to this species. The pubescence is beautifully bright, and the black hairs are

very glossy. The second joint of the maxillary palpi is very long, the relation of first to second being as 2 to 19.

B. perplexus, var. *Hudsonicus*, Cress., 1863.

Prof. Cockerell records this variety from Cusack Rch, Custer Co., Colo., August 3. The type locality is "Hudson Bay Terr.," not "Hudson" as given by Dalla Torr .

B. Nevadensis, Cress., 1874.

B. improbus, Cress., 1878, ♂.

♀ ♀ June, July 12, 24, August 6, 18, at Ft. Collins; ♀ ♂ July 31, August 1, Beaver Creek; July 3, Little Beaver Creek; May 23, Boulder; May 26, Bellvue; August 5, Antonito (Ball); ♀ July 24, Virginia Dale; ♂ July 8, Livermore.

There is now little question that *B. improbus* is the male of this species. The type of the male was taken in "Colorado" by Morrison; of the female the types were from Nevada, Arizona and New Mexico.

B. fervidus, Fabr., 1798.

"*Apathus elatus*" ♂, in part.

♀ May 12, 30, June 7, 8, 11, 16, 19; ♀ May 14, 20, 25, June 15, July 20, 31, August 8, 19, 20; ♂ September 3, 16, all at Ft. Collins. ♀ ♀ August 14, July 8; ♀ July 15, at Livermore; ♀ August 5, Antonito; July 13, Trinidad; August 17, Montrose (Gillette); July, Ft. Lupton (R. Haynes). 2 ♂ September 4, Boulder. A very common species.

B. borealis, Kby., 1837.

This species was recorded by Prof. Cockerell from Old Beddoe's Rch, Custer Co., August 9, on *Rudbeckia laciniata*. I have not been able to satisfactorily separate this species from any material I have seen.

B. appositus, Cress., 1878.

♀ August, Ft. Collins (C. Stannard); August 5, Cameron Pass; August 9, Gunnison; August 23, Leadville; September 23, Vir. Dale; June 15, Bellvue; July 15, Livermore. ♀ ♀ August 30, Store Prairie (7,000 ft.). ♂ Palmer Lake, August 12, 1896 (Gillette). This species can readily be recognized by the white pubescence of the anterior part of the thorax; visible even in specimens on the wing. It has been taken on *Thermopsis montanum* and *Rudbeckia*, sp.

B. dubius, Cress., 1863.

This is recorded by Prof. Cockerell from Custer Co.; a female in the collection at Ft. Collins, doubtfully labelled *B. Edwardsii*, may belong here. I took the specimen at Westlake (8,000 ft.), July 7, 1900.

B. scutellaris, Cress., 1863.

♂ July 22, August 25, Ft. Collins; August 4, Julesburg (Ball). The pubescence is bright and showy, while on *B. Edwardsii*, its nearest relation, it is more irregular and paler.

B. Edwardsii, Cress., 1878.

♀ (2) June 12, Ft. Collins; June 15, Bellvue; Rist Canon, July 1; Westlake, July 7; August 3, Barnes' Camp (8,000 ft.).

B. Putnami, Cress., 1878.

♀ June 12, Ft. Collins; August 1, Lizard Head (Ball); ♂ August 30, Ward (7); August 17, Home (Ball). All these localities are high Alpine, 7,000 to 10,000 ft., Ft. Collins excepted. This species was described from one male collected by J. Duncan Putnam, probably at Empire City, a high Alpine species. Closely related to *Couperii* and *Edwardsii*. More abundant material is needed to base satisfactory determinations.

B. proximus, Cress., 1863.

♀ April 23, Horsetooth Gulch; July 21, Rist Canon; September 3, Vir. Dale. ♀ ♀ May 15, Ft. Collins; July 7, Westlake; August 18, Home (Ball); August 24, Vir. Dale; ♂ ♀ ♀ August 22, Cimmaron; August 23, Marshall Pass (Gillette).

B. proximus, var. *Coloradensis*, var. nov.

♀.—Black; face with yellow and black hairs; thorax banded with black; anteriorly yellow; scutellum with some black hairs mixed with yellow, especially along the sides; thorax beneath brownish-black; first two abdominal segments with black pubescence, third with fulvous yellow,—a few black hairs intermixed on basal margin; fourth to sixth with white hair, a high-power lens shows a few black hairs on the middle of fourth segment basally; a few pale hairs at extreme apical margin of second; posterior tibiæ and femora fringed with pale brown hairs, basal joint of posterior tarsi within very bright rufous, last four joints of all tarsi brownish; some pale hairs on fourth and fifth ventral segments; clypeus shiny, punctured; wings fuscous, tip of marginal cell very dark. Length, 20 mm.

Described from one specimen collected by me in Rist Canon (6,500 ft.), May 8, 1897. Easily separated from *proximus* or *Howardii* by the position and colour of abdominal pubescence.

B. Howardii, Cress., 1863.

♀ August 1, Beaver Ck. (10-12,000 ft.); August 23, Marshall

Pass, both by Prof. Gillette; and July 31, Ridgeway (Ball). ♂, Cimmaron, August 22 (Gillette).

The type specimen was taken at "Pike's Peak, Col. Terr.," by Mr. Winslow J. Howard. Prof. Cockerell records it from high altitudes in New Mexico. Mr. Ashmead writes me that he has never seen a queen of this species. It often is mixed with *B. proximus* in collections.

B. terricola, Kby., 1837.

This was determined for me by Mr. Ashmead; I had not recognized the species. ♀, Ft. Collins (C. Stannard).

B. Pennsylvanicus, De Geer, 1775.

B. americanorum, Fabr.

"*Apathus elatus*" in part.

I had the synonymy of this and the previous species mixed, but Mr. Ashmead kindly straightened out the matter for me, and gives me the above synonymy as correct, as far as *Pennsylvanicus* and *Americanorum* are concerned.

♀ June 9, 23, 29; ♀ July 23, August 8, 13; ♂ September 8, 17, 22; all at Ft. Collins.

♀ August 1, near Ft. Collins; June 30, near Foothills; July 8, Livermore; July 24, Vir. Dale; ♀ August 4, Julesburg (3 by Ball); August 7, 10, Rocky Ford.

B. Titusi, n. sp., Ashmead (in litt.).

♂.—Length, 16 mm. The abdomen dorsally covered with fulvous pubescence. One specimen September 10, 1898, Lamar (Gillette).

I had this specimen under *B. Pennsylvanicus*; Mr. Ashmead separated it out, and very kindly named it. The type is in the U. S. Nat. Mus.

B. ternarius, Say, 1838.

♀ May 3, 4, 12, 14, 19, 27, 28, April 16, 23; ♀ July 4, 20, August 6; ♂ August 5; all at Ft. Collins; ♀ May 16, Bellvue; ♀ July 8, 15, Livermore; July 31, Ridgeway; July 10, Lamar; July 27, September 3, Vir. Dale; July 20, Westlake; August 3, Durango; August 5, Antonito; ♂ Clear Ck. Can., July 18; July 7, Westlake; July 24, Vir. Dale; August 30, Ward; August 24, Glenwood Sprgs.; October 8, Salida.

This is the most common Colorado Bombus; it has been recorded heretofore from the State by Carpenter, "high Alpine," 1873; Dr. Uhler, Beaver Bk. Gulch, August 6; McCauley, "San Juan," 1877; J. D.

Putnam, from Empire, 1876; Prof. Cockerell, from Willow Ck., Custer Co., August 22; and by Dr. Rothrock, in 1872, from "Colorado"; and others.

B. rufocinctus, Cress., 1863.

♀ June 16, Ft. Collins; ♂ August 16, Horsetooth Gulch; both determined by Ashmead. Prof. Cockerell records this species from Custer Co., May 28, and August 19.

B. bifarius, Cress., 1878.

♀ May 28; ♂ August 26 (Bruner), at Ft. Collins; ♀ May 23, Boulder; ♀ ♀ July 7, Westlake; July 1, Rist Canon; ♀ August 23, Marshall Pass (Gillette); August 25, Alder; July 10, Lamar; ♀ ♂ August 22, Cimmaron; August 30, Ward; August 2, Muldoon (Ball); ♂ July 23, Palmer Lake; July 31, Ridgeway; August 14, Steamboat Springs.

B. sylvicola, Kirby, 1837.

♀ August 1, Lizard Head (Ball); ♀ August 25, Alder (Gillette); August 2, Muldoon; ♂ ♀ August 27, Marshall Pass; ♀ ♀ ♂ August 30, Ward (Ball). All determined by Ashmead. Prof. Cockerell records it from Ula, Custer Co., July 30. It is certainly a distinct high Alpine species, and I had not recognized it.

B. juxtus, Cress., 1878.

♀ July 8, Livermore; ♀ July 20, Ft. Collins; July 23, Vir. Dale; August 2, Estes Park (Gillette); August 20, North Park (Ball); ♂ August 22, Palmer Lake.

I have seen a male from Woods Holl, Mass. (Gillette), that belongs to this species.

B. flavifrons, Cress., 1863.

♀ ♀ August 27, Marshall Pass; ♀ ♀ ♂, August 1, Lizard Head (Ball); August 30, Ward.

This species in general appearance sometimes resembles *B. juxtus*, but can be readily separated. Some specimens from Lizard Head are very bright, and the thorax has much more black anteriorly than in ordinary specimens.

B. Couperi, Cress., 1878.

♀ ♂ August 30, Ward; August 1, Lizard Head, all determined by Ashmead. Prof. Cockerell has stated that he did not feel warranted in separating *Couperi* and *Putnami* from *frigidus* after examining the types

of the two former. *Putnami*, as recognized in this paper and as determined for me by Mr. Fox and Mr. Ashmead, can be readily separated from *Couperi*.

B. Oregonensis, Cress., 1878.

♂ August 30, Ward; August 1, Lizard Head, several specimens collected by E. D. Ball and determined for me by Mr. Ashmead.

B. mixtus, Cress., 1878.

♀ Ft. Collins, May 22; ♀ August 5, 19, Cameron Pass; August 17, Home; August 30, Ward. I have seen no males, and what I take to be queens are rather small and some of them may prove to be workers.

B. sonorus, Say.

This has been taken in New Mexico by Prof. Cockerell, and is added to the Colorado list on authority of Mr. Ashmead. It is very closely allied to *B. fervidus*. Specimens I have seen can be readily separated. There is black pubescence on the sides of the thorax.

Mr. Ashmead, in his List of Colorado, Hymenoptera, recorded twenty-eight species of *Bombus*. I have included in the table the following, of which I have seen no specimen from this State: *Bombus affinis*, *B. hudsonicus*, *B. vagans* and *B. virginicus*. In this paper twenty of these species are given Colorado records.

The records from Prof. Cockerell referred to several times, are from his Custer County list.

I wish here to express my thanks for favours received from Prof. T. D. A. Cockerell, Mr. W. J. Fox and Prof. L. Bruner, and especially for the kind assistance of Mr. W. H. Ashmead. Prof. C. P. Gillette, under whom these studies were carried on, has ever been ready and willing to aid me in any possible way.

ANÆA ANDRIA IN INDIANA.

On April 27th, while collecting with my young son, Robert, the boy distinguished himself by capturing several ♂♂ of *Anæa andria*, at a point east of Richmond, Ind., not far from the Indiana-Ohio State line. The authorities give the habitat of *andria* as "Western States, from Illinois to Texas; Nebraska." No ♀♀ were seen, nor were any specimens seen in the fall. I presume that south-western Ohio can be considered its most eastern habitat. No apparent difference exists between the specimens referred to and material from Texas and other western points.

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