



12-31-1959

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Johnson, D. Elmer and Johnson, Lucile M. (1959) "Taxonomic notes on North American beeflies, with descriptions of new species (Diptera: Bombyliidae)," *Great Basin Naturalist*: Vol. 19 : No. 4 , Article 1. Available at: <https://scholarsarchive.byu.edu/gbn/vol19/iss4/1>

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The Great Basin Naturalist

PUBLISHED BY THE
BRIGHAM YOUNG UNIVERSITY, PROVO, UTAH

VOLUME XIX

December 31, 1959

No. 4

TAXONOMIC NOTES ON NORTH AMERICAN BEEFLIES, WITH DESCRIPTIONS OF NEW SPECIES

(Diptera: Bombyliidae)

D. Elmer¹ and Lucile M. Johnson

A number of genera and species of North American beeflies are evidently little known in collections and have received too little attention from taxonomists to be adequately described in the literature. Availability of material in some of these groups, together with a study of type material, permits elucidation of several of the described species and descriptions of two new ones. Opportunity is also utilized to rename a homonym created in an earlier paper. Location of material studied is listed under each species discussed below.

Amphicosmus arizonensis, n. sp.

(Figs. 4, 6, 7)

Similar to *A. elegans* Coq., but lacks the pollinose stripes on mesonotum. Length 7-9 mm.

Male.—Head black, cheeks and posterior oral margin nearly white; front, sides of face, and occiput silvery white pubescent, middle of face and extreme vertex shining black; front and occiput sparsely short white pilose; ocelli yellow. Antennae wholly black, lightly pollinose; first two segments sparsely short white pilose; first segment slightly cup-shaped, about two-thirds as long as wide; second segment about two-thirds as long as wide; third segment long-tapering, oval, widest at basal third, about one and one-third times as long as first two combined.

Thorax shining dark brown to black, two silvery white pubescent patches on each side: anterior patch occupies upper part of pro- and mesopleura and antero-lateral portion of mesonotum to a little caudad of transverse suture (mesad margin of this patch is angulate); posterior patch occupies the ptero-, meta-, and hypopleura; mesonotum and scutellum sparsely white pilose, a few fairly long white hairs on metapleura.

Legs brown, yellowish at the joints; lightly pubescent, sparse pile and weak, hairlike spines white.

1. Associate Entomologist, Ecological Research, University of Utah, Dugway, Utah.

Wings hyaline; veins yellowish, darkening distally; basal costal setulae nearly white. Halteres nearly white.

Abdomen laterally compressed; first tergite brown, postero-lateral margins broadly yellowish; second tergite brown basally, lateral and posterior margins broadly yellowish brown; third, fourth, and fifth terga yellowish brown, with dark brown forming patches on the sides of the third and fourth and a saddle on fifth; remaining terga and genitalia dark brown; visible part of venter mostly yellow; first and most of second, third, and fourth terga shining; dorsal patches on second, third, and fourth, and all of remaining terga silvery white pollinose when viewed from in front; short, sparse pile nearly white.

Female.—Much larger and more robust than male. Front only very narrowly pubescent along orbits; lower lateral corners of front, sides of face, cheeks, and lower occiput pale yellow. Anterior and posterior callosities and upper part of mesopleura yellow; anterior pubescent patch on thorax much less extensive than in male. Legs with much more yellow. Abdomen almost wholly yellowish red, only the first basally and the sixth and seventh terga wholly except their hind margins brown. Pile of first and on hind margins of rest of terga and on venter pale yellow, rest of pile of abdomen dark brown to black; venter sparsely white pubescent. On sides of third and fourth terga are circular patches of closely spaced, tiny circular dark brown pits.

Types.—*Holotype* male and *allotype* female, Tucson Mountains, Arizona, August 16, 1955 (G. D. Butler). *Paratypes*.—2 ♀ Continental, Arizona, July 15, 1940 (D. E. Hardy). A badly broken female and a headless male bear the same collection data as the paratypes. Another broken female bears the data Courtland, Arizona, August 12, 1940 (C. D. Michener). The *holo-* and *allotype*s and one paratype are in our collection, the other specimens are in the Snow Entomological Museum at the University of Kansas.

Under magnification of 216 powers the pubescence found on these flies appears to be composed of fine, narrow, hairlike scales rather than the granular pollinose vestiture frequently found in like situations. The tiny pits on the third and fourth terga of the female have not previously come to our attention.

Desmatoneura argentifrons Williston

Williston² described this species from a single male specimen from Albuquerque, New Mexico. Melander³ described the female from a single Utah specimen. We have not often encountered the species in collections, but it cannot be considered rare—simply another case wherein collectors have not been present during the flight period of the species, or have overlooked this small, inconspicuous fly. In the dunes of the Western Utah deserts we have at times found them to be very common.

In studying a long series of specimens in our collection from

2. Williston, S. W., Kans. Univ. Quart. III, 267, 1895.

3. Melander, A. L., Pan-Pac. Ent. XXVI, #4, 153, 1950.

a single population (approximately 100 specimens from the dunes on the eastern edge of Dugway Valley, Tooele County, Utah) we have found this species to exhibit considerable variation, particularly in size and ground color of the body. Our largest specimen is nine millimeters in length, our smallest, four and one-half. There has been no apparent correlation between size and season, all sizes being present at any given time. More of the very small specimens are female than male, but so also are more of the very large ones.

Ground color of the head and thorax remains quite constant. But the ground color of the abdomen and legs varies quite remarkably, particularly among the larger females. We have seen females that are all dark brown except the seventh segment and the knees. In contrast to this we have seen specimens which have only the middles of the fore femora dark, the abdomen and the rest of the legs being yellowish brown to yellow. Many of the specimens have varying degrees of intergradation between these two extremes. Degree of paleness in the abdomen appears to progress from caudad forward, and from the venter dorsad, there apparently being no cases of reversal of this order. In the legs the dark color disappears first from the tibiae, and progressively from the two ends of the femora, from the middle, to the hind, to the fore-legs. Most of the very small specimens of both sexes are dark; most of the very pale specimens are large.

Color of the wings varies from the condition as described by Williston, in which a fairly definite band is present, to a condition in which there is little or no color in the wing save in the costal cell, which appears to be always at least partially yellow. The males usually have darker wings than the females. The larger specimens usually have more color in the wing than the small.

The color of the tomentum varies less than the ground color of the body, but is not always constant. Always the tomentum of the dorsum is darker than that of the pleura and venter. Usually that of the hind margins of the scutellum and first abdominal segment is white or nearly so. Often the hind margins of the other terga are bordered with paler scales, particularly on the sides, but there are specimens in which this tomentum is completely concolorous.

Dicranoclista Bezzi

In 1894 Coquillett⁴ announced the discovery in North America of the genus *Spogostylum* Macquart, and described *Spogostylum vandykei* from California. However, the third submarginal cell of *Spogostylum* (*Spogostylum* of authors) is formed by a cross-vein uniting veins R_{2-3} and R_4 rather than veins R_1 and R_3 as is the case with Coquillett's species. Therefore Williston⁵ removed this species from the genus *Spongostylum* and erected the genus *Coquillettia* to receive it. This name is preoccupied (Uhler, 1891)⁶ and is, there-

4. Coquillett, D. W., Trans. Am. Ent. Soc. XXI, 94, 1894.

5. Williston, S. W., Manual of North American Diptera, 65, 1896.

6. Uhler, Tr. Maryland Ac. Sc., 79, 1890.

fore, not available. In 1924 Bezzi⁷ erected the genus *Dicranoclista* to receive the Ethiopian species *Dicranoclista simpsoni*, speculating at the time that Coquillett's species might be congeneric. According to Bezzi's description and figure, *Dicranoclista simpsoni*, the genotype, which we do not know in nature, bears no tomentum on the abdomen, and cell R_5 , or the first posterior cell, is closed and petiolate. Coquillett's *Spogostylum vandykei* bears sparse hair-like tomentum on the abdominal dorsum and cell R_5 is narrowly open. Other characters mentioned by Bezzi in his description of the genus *Dicranoclista* fit our present North American species well enough. We do not believe these two character differences to be of sufficient importance to bar the American species from inclusion in the genus *Dicranoclista* Bezzi. and the junior writer, following the suggestion of R. H. Painter, so indicated in her study of the beflies of Utah⁸.

In his Families and Genera of North American Diptera, Curran⁹ ignored this genus. In his work this genus keys to *Anthrax* Scopoli, which it resembles in many respects, particularly in the nature of the antennae. But the peculiar wing venation of *Dicranoclista* readily separates the two genera.

Dicranoclista vandykei Coquillett

(Fig. 1)

Coquillett's types are in good condition in the U. S. National Museum. In addition to being mixed up on the sexes, he failed to mention the fact that the abdomen of the male is broadly reddish brown at the sides, and bears, under the black hairs of the caudal several segments, some black hair-like tomentum which, being the same color as the shining surface, is difficult to see.

In the case of the males, especially, this is a very handsome species. The broadly red sides of the abdomen are covered with long, dense, brightly orange pile, while the central black area is covered with shorter, finer, less dense, mostly black pile which forms a triangle with its broad base on the third tergite and its apex on the seventh. There are a few long, very slender scales on the hind margin of the first tergite, and a few short, hardly visible black scales on the second. In general appearance this species is reminiscent of the more highly colored individuals of *Villa fulviana* (Say).

Although evidently quite rare, this species is wide spread. In addition to the California types we have examined specimens from Utah and Texas. The latter material, lent by the University of Kansas, was compared directly with Coquillett's types and was found to be identical in all characters studied.

Dicranoclista fasciata, n. sp.

(Figs. 2, 3)

Mostly dark brown, pile mostly pale yellow, narrow fasciae of tomentum on hind margins of tergites. Length 10-12 mm.

7. Bezzi, Mario, Bombyliidae of the Ethiopian Region, British Museum (N. H.), 178, 1924.

8. Maughan, Lucile, Jour. Kans. Ent. Soc., VIII, 34, 1935.

9. Curran, C. H., Families and Genera of North American Diptera. Ballou Press, 1934.

Male.—Head black, a narrow area of yellow around each antenna. Pile of vertex and front moderately dense, black, that of occiput and face yellow, a few black hairs on the epistoma; tomentum of head yellow, sparse and short on occiput, somewhat more dense on lower front and lower face, the latter quite long. Antennae short, the slender styliform part of the third segment about one and one-fourth times as long as the globular base; pile of first two segments short, black, a few yellow hairs on lower outside one-fourth. Proboscis does not project beyond the epistoma; palpi brown, very short; sparse hair yellow.

Mesonotum shining, pleura faintly gray pollinose. Pile of thorax pale yellow, of collar and pleura long and dense, of mesonotum and scutellum short, sparse; macrochaetae pale yellow, the scutellar bristles rather weak.

Coxae and femora brown; tibiae and tarsi brownish yellow, the latter darkening distally. Pile and tomentum of coxae grayish yellow; tomentum of rest of legs grayish yellow to brown, pile and bristles black.

Wings hyaline; base, costa, and subcosta yellow, small brown clouds at base of R_{2+3} , on the r-m, cross-vein, on bases of M_3 and Cu_1 , and in the middle of cell R. Veins yellowish brown basally, darkening distally; basal costal setulae black, tomentum pale yellow to brown. Halteres light brown, the knobs pale yellow. There is a long spur on the angles of R_{2+3} and R_4 . Vein R_4 is sharply angulate near its middle and a cross-vein joins this vein at the angle to R_5 near the margin of the wing to form a second cell R_4 . Median cross-vein angulate with very short spur extending into cell $1M_2$.

Abdomen dark shining brown, the sides narrowly and the venter brownish yellow. Pile pale yellow, very slightly darker on sides; moderately long and dense on sides, shorter and sparser in middle of dorsum, very sparse on venter. A few very long, slender scales on hind margins of rest of terga except seventh, white on second, fifth and sixth, and sides of third and fourth, black in middle of third and fourth and a few on fifth; black, decumbent narrow scales on dark areas of second to sixth terga are almost invisible against shining nearly black background. Genitalia fairly prominent, red, the cerci edged with dark brown.

Female.—Very much like the male. Lacks the areas of yellow ground color around the antennae. Face and front quite densely pale yellow tomentose and pilose; occiput with much more tomentum than male, that on the posterior orbits being quite dense. Pile of fore and middle femora pale yellow. Wings almost wholly hyaline; vein R_{2+3} obtusely angulate at about its distal sixth, with a very short spur extending into cell R_3 . Sides of abdomen more narrowly yellow than male. Abdominal venter with considerable pale yellow tomentum.

Types.—*Holotype* male: Cedar Creek, Arizona, 15 miles west of Ft. Apache. June 21, 1957 (G. Butler and F. Werner). *Allotype* female: Provo, Utah County, Utah, July, 1933 (D. E. Johnson). The specimens are in our collection.

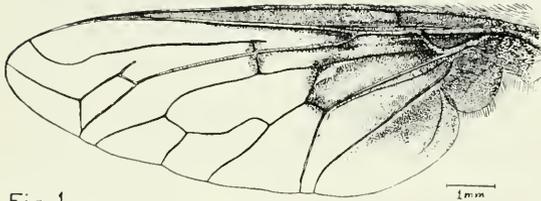


Fig. 1

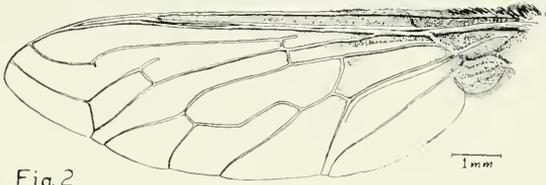


Fig. 2

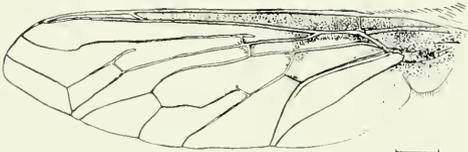


Fig. 3

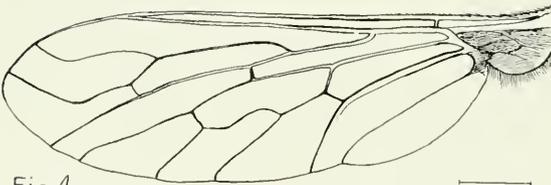


Fig. 4

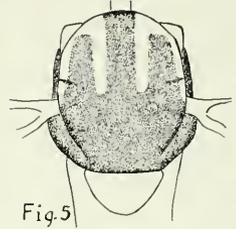


Fig. 5

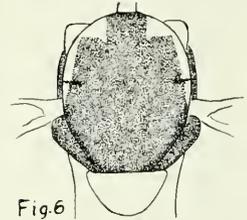


Fig. 6

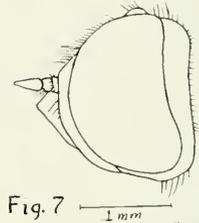


Fig. 7

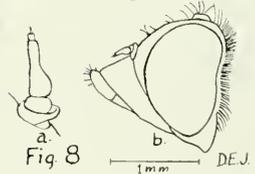


Fig. 8

Explanation of Plate

Figure 1. *Dicranoclista vandykei* Coquillett, wing of male homotype.

Figure 2. *Dicranoclista fasciata*, new species, wing of allotype.

Figure 3. *Dicranoclista fasciata*, new species, wing of holotype.

Figure 4. *Amphicosmus arizonensis*, new species, wing of holotype.

Figure 5. *Amphicosmus elegans* Coquillett, dorsum of thorax.

Figure 6. *Amphicosmus arizonensis*, new species, dorsum of thorax.

Figure 7. *Amphicosmus arizonensis*, new species, profile of head of holotype.

Figure 8. *Exepacmus johnsoni* Coquillett: a) dorsal aspect of antenna, b) profile of head of allotype.

The fasciae of scales on the hind margins of the abdominal segments of this species will readily distinguish it from *D. vandykei* Coq. It might be of interest to note that the allotype was picked up as it rested on a twig one morning before sunrise, near the tent where we were camped in the woodland along the Provo River. The site is now in the 800 block west on 1020 North Street, now a residential section of Provo, Utah.

In the junior writer's 1934 study this specimen was misidentified and reported as *D. vandykei* Coq.

Exepacmus johnsoni Coquillett

(Fig. 8)

Records of only two specimens of the genus *Exepacmus* have so far made their way into the literature. The first, a female from California, is in rather poor condition in the U. S. National Museum. It is the type specimen for Coquillett's (Op. cit. p. 101) *Exepacmus johnsoni*, which species is the genotype of his genus. The other specimen, also a female from California, is in the collection of Dr. A. L. Melander, and is the type of his species *Exepacmus nasalis*.

Melander (Op. cit. p. 152) separates his species from that of Coquillett on the basis of the differences in ground color of face, base of antennae, and femora, and states that the face of his species is apparently more protuberant than that of *E. johnsoni*, and notes that Coquillett does not mention an antennal depression such as *E. nasalis* has. We have not seen *E. nasalis* Melander, but aside from the differences in ground color, we found his description to fit very well, even including the "nasal groove," the parts of Coquillett's type which remain intact.

At Inyokern, California, the senior writer collected six specimens belonging to this genus, three males and three females. One of the females was about seven millimeters in length, and fit very well Coquillett's description of *E. johnsoni*. The other five specimens are about five millimeters in length. One small female is mostly dark in ground color, and except that the face and lower front are yellow and the pile of the front yellow on the area of yellow ground color, is like the larger specimen. The other small female has much yellow on head and thorax. We find no morphological differences between the large and the small specimens. Two of the males are almost wholly dark in ground color, the other has some yellow. There are no morphological differences apparent.

In view of the large differences in size and ground color exhibited by the specimens studied from the single population of *Desmatoneura argentifrons* Williston reported above, and inasmuch as all six of these specimens were collected in the same small area on the same day we are inclined to believe that *Exepacmus johnsoni* Coquillett and *Exepacmus nasalis* Melander are one and the same species.

The male may be described as follows:

Male.—Head densely white pollinose, front and face shining silver when viewed from above; ground color of front and face pale yellow, oral margin nearly white. Pile of head pale yellow, short, fairly dense on occiput, sparse on front and face, the latter very fine. Face strongly and sharply projecting, face and front divided by a marked impression. Proboscis dark brown, hardly projecting from beyond the pointed epistoma. First antennal segment cup-shaped, about one-third as long as wide; second segment about one-half as long as wide, contained for nearly one-half its length within the cupped first segment; third segment nearly twice as long as first two combined, the basal half broadly tapering, the apical half blunt, its sides nearly parallel, bearing a short blunt style with short stigma; a few short pale hairs on first and second segments.

Thorax brown, densely cinereous pollinose; tomentum and short sparse pile of mesonotum and scutellum pale yellow, of pleura white or nearly so; macrochaetae pale yellow; halteres yellow; wings hyaline, veins yellowish brown, darker distally.

Tibiae and apices of coxae and femora yellow, rest of legs brown; fairly dense tomentum of legs pale yellow to nearly white, spines black.

Abdomen subcylindrical, brown, narrow hind margins of segments paler; tomentum dense, that on dorsum pale yellow, on venter nearly white; pile dense on sides of first, sparse on rest of segments, nearly white. Genitalia yellowish; basi-styli pollinose, without hairs, largely hidden from view by rounded corners of ninth sternum, which bear five or six heavy spines on each side which interlock behind.

Allotype.—Male, Inyokern, Kern County, California, April 28, 1945 (D. E. Johnson). *Paratypes*: 2♂ same data.

The allotype and one paratype are in our collection. The other paratype is in the collection of R. H. Painter.

Exoprosopa painterorum, new name

On page 76, volume XVIII, numbers 3-4, of this periodical, dated December 31, 1958, we described *Exoprosopa cingulata* as a new species. Dr. R. H. Painter drew our attention to the fact that in 1885 van der Wulp¹⁰ had named an *Exoprosopa cingulata* from Australia, which name we had overlooked. It gives us pleasure, therefore, to rename this species *Exoprosopa painterorum*, new name, for our good friends, Dr. and Mrs. R. H. Painter.

10. Van der Wulp, Frederick M., Notes Leyden Mus., VII, 82, 1885.