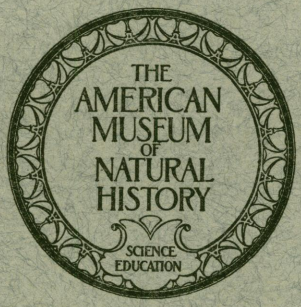
BEES OF THE GENUS *COLLETES* CHIEFLY FROM COLORADO

By P. H. Timberlake



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Article V.—BEES OF THE GENUS *COLLETES* CHIEFLY FROM COLORADO[1]

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Some time ago a small collection of *Colletes*, taken in the Rocky Mountain region chiefly by Dr. Frank E. Lutz of The American Museum of Natural History, was sent to me by Dr. T. D. A. Cockerell. To the records of this collection I have added others based on my own collecting in Colorado, New Mexico and Utah, and on the collection at Riverside now containing many specimens from the Cockerell collection.

Most species of *Colletes* are more or less widely distributed, and it is doubtful if any of the species described from Colorado are actually restricted to that state, although several of them as yet have not been found elsewhere. The *Colletes* fauna of Colorado appears to be a mixture of eastern and Pacific Coast elements, with possibly a few precinctive species not occurring much farther either east or west. Of eastern species, *C. brevicornis*, *C. nudus*, *C. latitarsis*, *C. willistoni* and *C. eulophi*, all of Robertson, and *C. compactus* Cresson extend at least as far westward as Colorado, and *C. willistoni* as far as Utah. On the other hand, Pacific Coast species such as *C. eriogoni* Cockerell and *C. wickhami* Timberlake extend eastward as far as Colorado, *C. fulgidus* Swenk extends even to Nebraska and Texas, and *C. kincaidii* Cockerell at least as far as Indiana and Michigan. There is also a small Sonoran element in the fauna of Colorado, as represented by *C. gilensis* Cockerell and *C. intermixtus* Swenk, and possibly extensive collecting in southern Colorado would reveal other species of this category. The Rocky Mountain element known only from Colorado, or neighboring states, is represented by such species as *C. paniscus* Viereck, *C. simulans simulans* Cresson, *C. lutzi* Timberlake, *C. brevihirtus* Timberlake, *C. truncatus* Timberlake, *C. rufocinctus* Cockerell and *C. trigonatus* Cockerell. Finally, there is a Great Plains element, represented by *C. andrewsi* Cockerell, *C. robertsonii* Dalla Torre, *C. petalostemonis* Swenk and *C. susannae* Swenk, which extend eastward not much farther than the Mississippi River and westward to the foot of the Rocky Mountains in Colorado.

The total number of species of *Colletes* found in Colorado is not great in comparison with such bee genera as *Halictus*, *Andrena*, *Nomada* and *Osmia*, but is nevertheless larger than that of any other state of the Union, except New Mexico, as far as existent records go. After deductions caused by synonymy, I find that there is a list of twenty-seven species now known from Colorado. New Mexico has twenty-eight recorded species, but the synonymy has not been worked out fully. Illinois has sixteen species and Nebraska about the same number. The species of California are very incompletely known, but that the number will finally exceed thirty-five or even forty is now certain.

THE SPECIES OF *COLLETES* OCCURRING IN COLORADO

Colletes andrewsi Cockerell

Figure 4

Colletes andrewsi Cockerell, 1906, Ann. Mag. Nat. Hist., (7) XVII, p. 311. Female.

The type of *andrewsi* was taken at Boulder, Colorado, at flowers of *Heuchera ribifolia* in cultivation, on June 26, 1905, and is now in the collection at Riverside. In addition I have a pair taken at Ashland, Nebraska, on *Heuchera hispida*, May 22, 1906, and determined by Swenk as *andrewsi*. The male is new.

Male.—Black, the apical half of mandible dark red. Flagellum, except first joint, brownish beneath. Small joints of tarsi

[1] Paper No. 493, University of California Citrus Experiment Station, Riverside, California.

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and tegulae ferruginous. Wings fulvohyaline, the stigma and nervures ferruginous, the subcosta blackish. Pubescence pale ochreous yellow, nearly uniform in color on head, thorax and legs; short and rather dense on face, longer on the thorax and still longer on sides of propodeum. Hind tibia and basitarsus remarkably hairy on outer side, the hair about as long as that of thorax. Tergite 1 with thin, moderately long, light hair. Following tergites with short erect fuscous or black hair, becoming longer on lateral margins and toward apex of abdomen. Tergites 2 to 5 each with a thin whitish apical hairband. Reflexed sides of tergites and lateral margins of ventrites with a rather long, dense fimbria, tinged with ochreous, and not much extending inward on apical margin of ventrites. Venter otherwise almost nude. Head large, not narrowed anteriorly, the inner orbits of eyes parallel. Mandibles stout, with a strong inner tooth. Antennae of about usual length and having joints 1 to 10 of flagellum nearly equal, longer than wide, and joint 11 still longer. Malar space, where shortest, somewhat less than half the basal width of mandible. Cheeks broad. Clypeus large, slightly convex, its disk and that of the very broad supraclypeal area even, densely and finely punctate, with striae on anterior margin of clypeus. Pronotal collar distinct, sharply margined anteriorly, the carina projecting in a minute spine on each side. Mesoscutum finely and densely punctate, the punctures becoming more separated posteriorly, especially in middle, the surface shining. Mesopleura dull, finely and shallowly punctate, the punctures dense. Base of enclosure of propodeum without a transverse keel, but with close longitudinal carinae, somewhat irregular in middle. Abdomen widest at middle, somewhat concave beneath, the tergum shining, minutely and densely punctate, the punctures becoming indistinct on apical segments. Tergites rather broadly depressed apically, the second without a basal impression. Legs, especially hind femora and tibiae, moderately incrassate. Hind basitarsus very large, broad and flat, longer than the remaining tarsal joints, and a little more than twice as long as wide. Basal nervure of fore wing received well behind the nervulus. Second submarginal cell broad, little narrowed above, and receiving recurrent nervure near its middle. Apical plates of seventh ventrite small, obliquely divergent, each a little longer than wide, rounded apically, and acutely angulate on the outer basal corner. Disk of plates with a short dense pile. Apical lobe of eighth ventrite slender as usual, but instead of being compressed as in most species it is depressed and truncate at apex. Aedeagus large. Parameres of stipites swollen, somewhat more than twice as long as basal width, tapering apically but without an articulated appendage, and provided with short pubescence at apex and along inner margin. Sagittae strongly recurved at apex, with convoluted dorsal and lateral wing-like expansions, the dorsal lamina being abbreviated apically, strongly oblique on its outer margin, which is produced much farther distad than its apical end within, where it joins body of sagitta. Lateral lamina very broad and convoluted so as to involve most of dorsal wing, and probably extending to apex of sagitta (but its apex damaged in the unique specimen). Length, 14 mm.; anterior wing, 9.5 mm.

This species is closely allied and very similar to *aestivalis* Patton. The male of *aestivalis* differs in being smaller, with the venter more concave; the lateral fimbria of abdomen denser and extending more distinctly onto the apical margin of the ventrites on each side; the hind legs not incressate, not densely hairy on tibia and basitarsus, the latter about four times as long as wide; second submarginal cell much narrowed above, so that the second abscissa of radius is shorter than the first; mesoscutum and abdomen less closely punctate. The plates of seventh ventrite in *aestivalis* are nearly circular, and the apical lobe of the eighth is normal. Aedeagus in *aestivalis* similar to *andrewsi*, but parameres of stipites less tapering apically, hardly ciliate on inner margin, and dorsal lamina of sagittae truncate at end, instead of being produced apically on the outer side.

Colletes paniscus Viereck

Colletes paniscus VIERECK, 1903, Trans. Amer. Ent. Soc., XXIX, p. 61. Male.

Colletes oromontis VIERECK, 1903, *ibid.*, XXIX, p. 62. Female. New synonymy.

Colletes grisescens COCKERELL, 1930, Amer. Mus. Novitates, No. 397, p. 4, Fig. 6. Male. New synonymy.

Having collected this species in numbers at flowers of *Mertensia lanceolata* in Colorado (at Clear Creek Camp, Berthoud Pass, June 24; Long's Peak Inn, July 2; and at Cuchara Camps, Spanish Peaks, July 4), I have been able to associate the sexes and verify the suggestion of Cockerell (1906, Bull. Amer. Mus. Nat. Hist., XXII, p. 425) that *paniscus* is the male of *oromontis*. In his description of *grisescens*, Cockerell noted some minor differences in which it departed from the description of *paniscus*, but I believe that it must be the same species.

In the American Museum collection *C. paniscus* is represented by specimens from Ward, Colorado, about 9300 feet, June 25, 1922; Elbert, Colorado, about 7400 feet, June 9–11, 1922; Tennessee Pass, Colorado, about 10,500 feet, August 6–8, 1920; Long's Peak Inn, Colorado, June 16, 1922; South Fork of the Rio Grande, Colorado, about 9250 feet, June 18–19, 1919; Florissant, Colorado, on *Mertensia* (S. A. Rohwer); Green River, Wyoming, about 6100 feet, July 2, 1920; and Jackson, Wyoming, about 7000 feet, July 13–17, 1920. (All collected by F. E. Lutz unless otherwise indicated.)

Additional material, from the Cockerell collection, includes one female, two males, summit of Las Vegas Range, New Mexico, June 28 (Cockerell); one male, Troublesome, Colorado, 7345 feet, June 8, 1908 (Rohwer); four males, Florissant, Colorado (Rohwer), one, July 4, 1908, two, July 7, 1907, one of these on *Salix*, the other swept from meadow, and one, July 11, on *Mertensia;* one female, above the trail, top of Roan Mountains, Colorado, on *Mertensia*, July (Cockerell); and one female, University of Wyoming Camp, Medicine Bow Range, Wyoming, 9160 feet, August, 1929 (Cockerell).

Colletes nigrifrons Titus

Colletes nigrifrons TITUS, 1900, Canadian Ent., XXXII, p. 304. Female.

Colletes florissantia COCKERELL, 1906, Bull. Amer. Mus. Nat. Hist., XXII, p. 425. Male. New synonymy.

Colletes polemonii COCKERELL, 1906, *loc. cit.* Male. New synonymy.

The types of *florissantius* and *polemonii* are now at Riverside, and there can be no doubt that they belong together. That they represent the male of *nigrifrons* also can hardly be doubted, as they have the characters to be expected in the male, and specimens of this kind have been taken with *nigrifrons* several times at the same flowers.

Besides the above types, the following material has been examined: one male, Stewart Ranger Station, Wyoming, about 6700 feet, July 18, 1920 (Lutz); one male, Yellowstone Park Lake, Wyoming, July 18, 1923 (Melander); two males, summit road, Ouray, Colorado, one 9000 feet, one 10,000 feet, July 13, 1919 (Lutz); one male, Beaver Reservoir, near Ward, Colorado, on *Potentilla glandulosa*, July 1, 1939, and two females on the same flower, at Ward and Long's Peak Inn, July 1 and 2 (Timberlake); one female, Ward, Colorado, on *Drymocallis*, July 18 (Cockerell collection); two males, Florissant, Colorado, June 21, 1908 (Cockerell, Rohwer) and three females, one of these on *Potentilla anserina*, July 5, 1907 (Rohwer), another on *Linum lewisii*, July 15 (Cockerell); one male, Topaz Butte, Teller County, Colorado, on *Drymocallis fissa*, June 30, 1907 (Rohwer); one female, upper Swimming Woman Canyon, Big Snowy Mountains, Fergus County, Montana, on *Potentilla fruticosa*, July 22, 1934 (S. S. Berry); and one female, Fallen Leaf, California, July, 1931 (Swezey).

Cockerell has recorded both sexes from Florissant, Colorado, at flowers, also, of *Ranunculus*. The types of both *florissantius* and *polemonii* are from Florissant, the latter at flowers of *Polemonium*. In the female the white bands of the abdomen are thin and easily worn or abraded.

Colletes consors Cresson

Colletes consors CRESSON, 1868, Proc. Boston Soc. Nat. Hist., XII, p. 168. Male.

Colletes myroni COCKERELL, 1908, Entomologist, XLI, p. 293. Female. New synonymy.

The males which I have identified as *consors* agree with Cresson's short description and are further distinguished by having a few fuscous hairs on cheeks, more or less brownish to fuscous hair on outer side of tibiae and tarsi, and much erect black hair before the thin white band on tergites 3 to 6; the malar space about twice as broad as long; and the third antennal joint equaling the fourth. The genitalia and apical plates of seventh ventrite are virtually identical with those of *C. pascoensis* Cockerell, as represented by a male from Pasco, Washington, and another from Wild Horse Canyon, Andrews, Oregon, 4270 feet, July 5, 1927 (Scullen), but the Oregon and Washington specimens have much black hair on cheeks and legs, and have the abdomen duller, more densely punctured and without white hair-bands.

Dr. Cockerell has informed me that Swenk considered *pascoensis* and *consors* to be the same species, and I believe that this is correct, but that *pascoensis* should rank as a subspecies. The female of typical *consors* has not been known, but I believe that *C. myroni* Cockerell fulfills the requirements for this sex. I have compared the type of *myroni* with females of *pascoensis* from Oregon (one, same data as male recorded above, and two from Fish Lake, Steens Mountains, 7000 feet, July 7, 1927, Scullen). All have the hair of head, pleura, sternum, legs and abdomen nearly all black but hair of mesonotum is rather bright fulvous in *myroni* and pale ochreous, almost whitish, in *pascoensis*. *C. myroni* also has the abdomen a little more sparsely punctured, but the difference is not striking. A female from Alum Rock Park, California, April 11, 1936, and a male from Wawona, California, May 21, 1938 (J. R. Warren) are *C. consors pascoensis*, but Cockerell has recorded what appeared to be a typical *myroni* female from San Francisco.

C. consors is represented in the American Museum collection by one male from Wolf-Fall Creeks, Mineral County, Colorado, June 20, 1919 (Lutz). In 1939 I took one male on *Rubus strigosus* at Beaver Reservoir, near Ward, Colorado, July 1, and three males at Cuchara Camps, Spanish Peaks, July 4, two of these on *Geranium fremontii* and the third at flowers of *Mertensia lanceolata*. Dr. Cockerell has since sent me a male labeled as taken at flowers of "*Phacelia circinata* Auctt.," without indication of locality, and a female determined as *myroni* taken between Ward and Peaceful Valley, Colorado, July 5 (Cockerell). The latter has paler pubescence than the type of *myroni*, which was collected at Boulder, May 26, 1908, by Rohwer.

The three foregoing species are closely allied and belong to a group typified by *C. californicus* Provancher. The females of this group have more or less black hair on the cheeks, or other parts of head, and on pleura, sternum, legs and abdomen, but generally none on the mesonotum. In the male, the seventh ventral plates are very short and transverse, and the sagittae of the aedeagus have a laminate wing on both dorsal and outer margins, which are generally convoluted together.

Colletes phaceliae Cockerell

Colletes phaceliae COCKERELL, 1906, Ann. Mag. Nat. Hist., (7) XVII, p. 315. Female.

Colletes salicicola geranii COCKERELL, 1906, Canadian Ent., XXXVIII, p 163. Male.

The above synonymy has been published by Gibson and Criddle (1920, Ann. Rept. Ent. Soc. Ontario, 1919, p. 132) and is undoubtedly correct. I have examined the type of *phaceliae* and two cotype males of *geranii*. This species is widely distributed in the Rocky Mountain region and Great Basin, and has been recorded from Manitoba and Alberta. Westward it extends into Washington and Oregon, but I have not seen it from California.

In the American Museum collection it is represented from Boulder, Colorado, August 7–12, 1919; Leadville, Colorado, 10,300 feet, August 3–5, 1919; Pagosa Springs, Colorado, 7200–7500 feet, June 21–24, 1919; Aspen, Colorado, July 24–27, 1919; South Table Mountain, Golden, Colorado, June 20, 1918 (L. O. Jackson); Aurora, Colorado, June 22, 1918 (L. O. Jackson); Denver, Colorado, September 5, 1920 (L. O. Jackson); Ward, Colorado, 9300 feet, June 25, 1922; Medicine Bow, Wyoming, 6600 feet, June 23, 1920; Sheri-

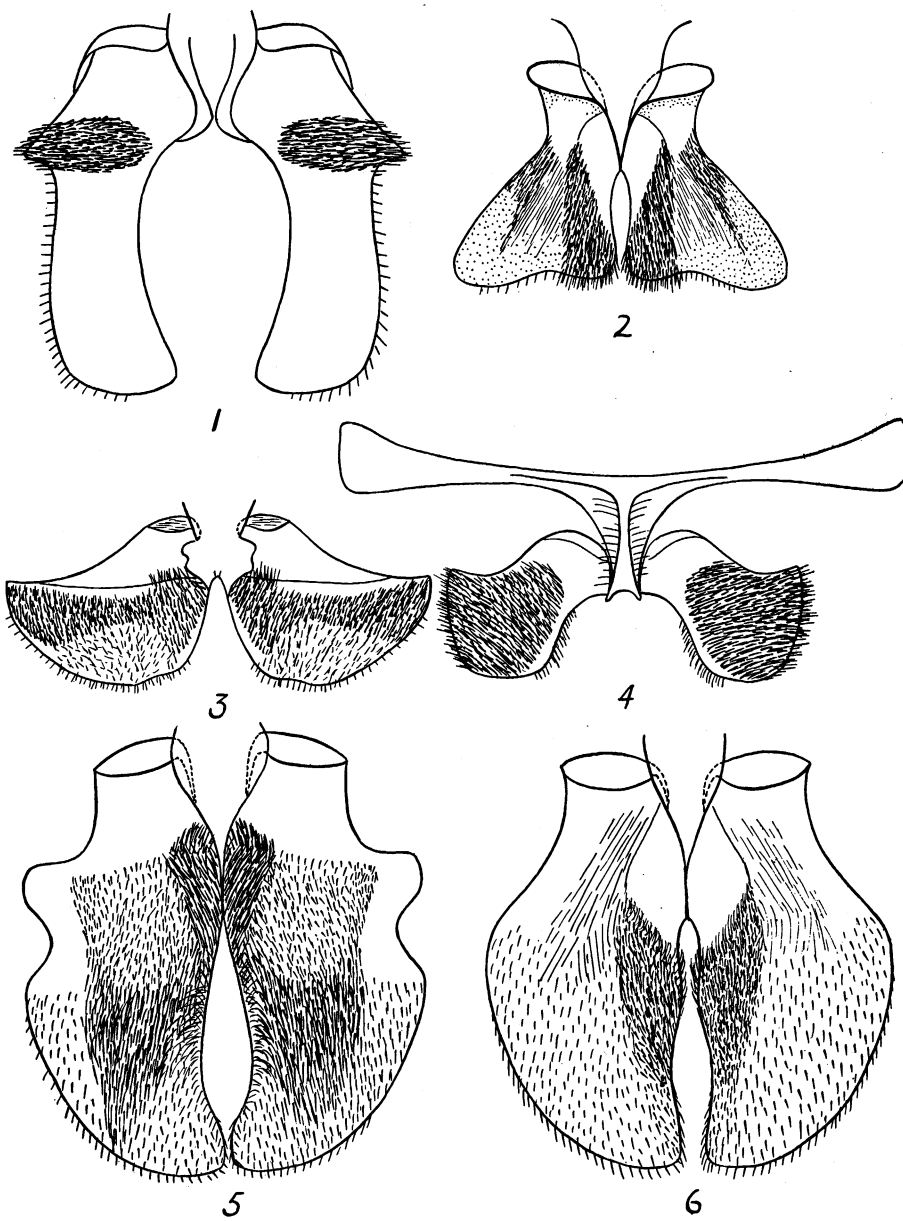

Fig. 1. *Colletes wickhami*, new species, seventh ventral plate.
Fig. 2. *Colletes lutzi*, new species, seventh ventral plate.
Fig. 3. *Colletes brevihirtus*, new species, seventh ventral plate.
Fig. 4. *Colletes andrewsi* Cockerell, seventh ventral plate.
Fig. 5. *Colletes kincaidii* Cockerell, seventh ventral plate.
Fig. 6. *Colletes eulophi* Robertson, seventh ventral plate.

dan, Wyoming (Metz); Gillette, Wyoming (Metz); Trout Creek, Ibapah Mountains, Utah, August 16, 1922 (Tom Spaulding); Eureka, Utah, June 19, 1920 (Tom Spaulding). (All collected by F. E. Lutz unless otherwise indicated.)

In the Station collection at Riverside is the following material: the female type of *phaceliae* from Ward, Colorado, on *Phacelia;* two cotype males of *geranii* from Boulder, Colorado, one female, Denver, Colorado, on *Solidago*, August 26, 1908 (Bennett); one male, Parker, Colorado, June 9 (Figgins); one female, Winecook, Montana, July 20, 1934 (S. S. Berry and W. A. Hill); one female, Jerome, Idaho, May 27, 1913 (Stahl); one pair, Salt Lake City, Utah, the female on a malvaceous flower, May 30, 1915, and male on *Gutierrezia*, September 6, 1914 (Timberlake); two males, twelve miles west of Duchesne, Utah, on *Malvastrum coccineum*, June 22, 1939 (Timberlake); one pair, Baker, Oregon, 3400 feet, July 30, 1929 (Scullen); two males, Prairie City, Oregon, 3510 feet, on *Melilotus alba*, August 12, 1929 (Scullen); and one female, Wild Horse Canyon, Andrews, Oregon, 4270 feet, July 6, 1927 (Scullen).

Additional material from the Cockerell collection, previously determined by Swenk as *phaceliae*, has been examined: five males, Olympia, Washington, June 11 and 15, 1895, and including one on *Epilobium spicatum*, July 2, 1896 (Kincaid); three males, two females, Pasco, Washington, May 25, 1896 (Kincaid); one male, Colorado, No. 5056 (Baker); one male, two females, Florissant, Colorado, the male on *Ribes*, June 15, 1908 (Cockerell), the females on *Cleome serrulata*, July 28, 1908 (Rohwer); two males, Bear Creek Canyon, Colorado, No. 5916 (Baker); one male, Denver, Colorado, June 19, 1901; one female, Platt Canyon, Colorado, No. 5917 (Baker); one female, Mountain Laboratory, Tolland, Colorado; one female, Boulder, Colorado, on *Grindelia*, August 7, 1906 (W. P. Cockerell); one male, Rifle, Colorado, July 3, 1908 (Rohwer); and six males, Pecos, New Mexico, one of these, June 9 (Grabham), four, June 21 (Cockerell) and one on *Malvastrum cockerelli*, June 28 (Cockerell).

Colletes spurcus Viereck

Colletes spurcus VIERECK, 1903, Trans. Amer. Ent. Soc., XXIX, p. 59. Female, male.

Colletes cauponarius COCKERELL, 1929, Ann. Mag. Nat. Hist., (10) IV, p. 297. Female. New synonymy.

Colletes nitidicaudus COCKERELL, 1929, *ibid.*, (10) IV, p. 299. Male. New synonymy.

The types of *cauponarius* and *nitidicaudus* are now at Riverside, and after reviewing the material listed below I am confident that they belong together and are conspecific with the New Mexican *spurcus*. This species is closely allied to *C. gaudialis* Cockerell from California but differs in having the abdomen more finely punctured, with the punctures of the first tergite much sparser. The male genitalia resemble *gaudialis* closely, but the plates of the seventh ventrite are not broadly emarginate but truncate at apex.

In the American Museum collection there are specimens from Aspen, Colorado, 8000 feet, July 24–27, 1919; Tennessee Pass, Colorado, 10,500 feet, August 6–8, 1920; Leadville, Colorado, 10,300 feet, August 3–5, 1919; Ward, Colorado, 9300 feet, August 8–10, 1919; Ouray, Colorado, 8500 feet, July 11–14, 1919 (all collected by F. E. Lutz).

The types of *cauponarius* and *nitidicaudus* were collected at Long's Peak Inn, Colorado, 9000 feet, July 9, by W. P. Cockerell. From the Cockerell collection I have examined also: one male, Dailey Canyon, New Mexico, August 10 (Cockerell); one female, Beulah, New Mexico (W. P. Cockerell); and one male, Florissant, Colorado, on *Eriogonum umbellatum*, July 22, 1907 (Rohwer). Recently, specimens of *spurcus* have been sent to me for determination from Missaukee, Mecosta, Cheboygan and Osceola counties, Michigan, by Mr. R. R. Dreisbach.

Colletes lutzi, new species

Figure 2

Closely allied to *spurcus* Viereck and *gaudialis* Cockerell. The distinguishing characters of the three species are given in a key following the description

FEMALE.—Black, the mandibles and tarsi at apex rufescent. Antennae dark, hardly at all reddened. Tegulae amber color. Apex of tergites 1 to 5 testaceous beneath the hair-band. Wings almost clear hyaline, the discal pubescence faint. Stigma and nervures dull ferruginous. Pubescence ochraceous to fulvo-ochraceous on dorsal parts, paler beneath and on abdomen, where it is whitish. On the face the hair is moderately dense, with clypeus and supraclypeal area well exposed. Tergites 1 to 5 with tomentose, mainly appressed pubescence, almost dense enough to conceal the surface and becoming denser and fasciate at apex. Tergite 6 with pale glistening non-tomentose hair. Hair of venter fine, appressed and inconspicuous. Malar space much broader than long, but hardly linear. Clypeus convex, shining, finely punctured, and non-sulcate in middle, the punctures rather close basally, sparse or almost absent on anterior third of disk and slightly lengthened longitudinally. Sides of face and frons very closely and finely punctured. Supraclypeal area more sparsely punctured. Facial foveae weak and narrow, the punctures on upper part of frons approaching closely to ridge at inner margin of eyes. Mesoscutum and mesopleura with close punctures, a little larger than those of frons, but leaving a large, almost impunctate area on posterior middle of scutum. Punctures of scutellum slightly coarser, more or less sparse. Base of propodeum enclosed by a transverse carina and divided into pits by longitudinal plicae. Bowl of the truncation triangular, not quite polished. Tergites of abdomen rather closely punctured, the punctures minute, much finer than those of head or thorax, and more distinct, as usual, on the two basal segments. Length, 7.0–7.5 mm.; anterior wing, 5.3–5.6 mm.

MALE.—Black, the flagellum usually strongly reddened, or reddish brown, but varying to nearly black. Tegulae and wings as in female. Pubescence white, very dense on face below antennae. Disk of tergite 1 with thin long white hair. Tergites 1 to 6 each with a dense white apical hair-band, the disk in front of band with thin erect hair. Ventral segments 2 to 5 each with white apical band, narrow on 5 and distinctly broadened in middle on the other segments. Tergite 2 strongly impressed across the base. Malar space about one and one-fourth times broader than long. Clypeus closely punctured. Sculpture of thorax closely approximating that of female. Abdomen much more strongly punctured than in female, the punctures a little sparser, but exhibiting a considerable range both in size and density. Normally the sculpture approaches that of *gaudialis* in size of punctures, but with less density. In comparison with *spurcus* the punctures of the first two tergites are normally a little coarser and distinctly closer, but in one specimen they are quite as fine and sparse as in that species. Genitalia and seventh ventrite similar to *spurcus* and *gaudialis*. Plates of seventh ventrite emarginate at apex, but not so strongly as is usual in *gaudialis*, and the pubescent bands on lateral margins are brighter fulvous and much less united at base. In size these plates are much smaller than in *guadialis*, as the insect itself is smaller. Length, 6–7 mm.; anterior wing, 5.2–5.3 mm.

TYPE MATERIAL.—Holotype female, and allotype male, Leadville, Colorado, 10,300 feet, August 3–5, 1919 (Lutz), in the collection of the American Museum. Paratypes: two females, six males, Leadville, Colorado, taken with the types; one female, Grand Junction, Colorado, 4580 feet, July 17, 1919; one female, Rifle, Colorado, 5400 feet, July 19–21, 1919; one male, Alamosa, Colorado, 7500 feet, June 15, 1919; one male, Ridgway, Colorado, 7000 feet, July 10, 1919; one male, Aspen, Colorado, 8000 feet, July 24–27, 1919; one female, Green River, Wyoming, 6100 feet, July 2, 1920 (all Lutz), in the American Museum; two females, Alamosa, Colorado, August 6, 1903 (Baker); one female, Florissant, Colorado, on *Cleome serrulata*, July 28, 1907 (Rohwer); one male, Salmon, Idaho, 2949 feet, July 9, 1928 (C. Wakeland); and one male, Cheyenne, Wyoming, July 12 (Cockerell), in the collection at Riverside.

In the females of *gaudialis*, *spurcus* and *lutzi* there is a small hairy tubercle at apex of front coxae on inner side. This tubercle is about as long as thick and of course much shorter than the coxal spine of the *americanus*, *aestivalis* and *simulans* groups of species. The seventh ventral plates of the male are triangular in these species, with a band of pubescence on each lateral margin. In *gaudialis* and *spurcus* these bands unite near base of plate, and the hair is more or less dark ferruginous or brownish. The three species may be distinguished by the following key:

1. Females.....2.
   Males.....4.
2. Punctures of first two tergites strong, but fine and close.....3.
   Punctures of first two tergites finer, weaker and comparatively sparse; length, about 8 mm.....*spurcus* Viereck.
3. Tergites 1 to 5 each with a broad apical hair band, the base of the segments appearing black; length, about 9 mm.....*gaudialis* Cockerell.
   Tergites 1 to 5 with depressed pale ochreous or whitish pubescence nearly all over, the hair becoming denser and fasciate at apex of each segment; length, about 7 mm. .....*lutzi*, new species.
4. Smaller species, about 6.0–7.5 mm. long; punctures of abdomen finer or sparser..5.
   Abdomen finely and closely punctured; flagellum dark; length, about 9 mm..... .....*gaudialis* Cockerell.
5. Punctures of abdomen stronger and closer (but less close than in *gaudialis*); flagellum more or less reddened; wings clear; length, about 6 to 7 mm....*lutzi*, new species.
   Punctures of abdomen sparser and weaker, notably sparse on tergite 1; flagellum dark; wings slightly dusky; length, about 7.5 mm.....*spurcus* Viereck.

Colletes eriogoni Cockerell

Colletes eriogoni COCKERELL, 1939, Pan-Pacific Ent., XV, p. 188. Male, female.

This species has been known previously only from southern California, but Lutz took two females and a male at Grand Junction, Colorado, on August 3, 1920. I have one female from Salt Lake City, Utah, on *Melilotus alba*, August 2, 1914, and another from Kyle Canyon, Charleston Mountains, Nevada, at flowers of *Senecio*, June 5, 1941 (Timberlake). In Oregon it has been collected by Scullen as follows: at Baker; thirty-six miles east of Baker, on *Eriogonum;* ten miles west of Primeville, on *Melilotus;* White Branch Meadow, Three Sisters; and at McKenzie Pass; the dates ranging from July 29 to August 17. In California it has been collected at Pasadena (E. W. Rust); Riverside; San Diego; Big Pines Camp, San Gabriel Mountains; Bear Valley, Mountain Home Creek and Mill Creek, San Bernardino Mountains; Morongo Valley; Mt. Santiago; Idyllwild, San Jacinto Mountains; Ledge Trail, Yosemite Valley (Timberlake); and in Santa Clara County (Baker).

It is frequently found on the flowers of various species of *Eriogonum* but has been taken also on *Sphaeralcea, Melilotus, Fremontia, Selinum, Senecio, Ericameria* and *Gutierrezia.*

Colletes eulophi Robertson

Figure 6

Colletes eulophi ROBERTSON, 1891, Trans. Amer. Ent. Soc., XVIII, p. 61. Female, male.

Colletes illinoiensis ROBERTSON, 1891, *ibid.*, XVIII, p. 62. Female.

Colletes eulophi is principally an eastern species and has been recorded from southern Illinois, Wisconsin and the provinces of Ontario and Quebec.[1] I have a male taken on *Cicuta maculata* at Barcroft, Virginia, July 5, 1931 (Timberlake); a male from Marion County, Arkansas, May 22, 1897 (F. M. McE.), and a female from Mount Pleasant, Iowa, September 21, 1923, from Professor Jacques, but collected, I presume, by one of his students. On June 20, 1922, Lutz took two males of *eulophi* at Boulder, Colorado.

The seventh ventral plates of male *eulophi* are shaped nearly as in *eriogoni*, but the disposition of the pubescence on inner surface is different. Moreover, the sagittae of the aedeagus are very different in the two species. In *eriogoni* the wing-like lamina on lateral margins of sagittae is extremely broad and widest subapically,

[1] In view of the wide range of the very similar species, *kincaidii* Cockerell, and its occurrence in Minnesota, Wisconsin, Michigan and Indiana, I have doubt of the correctness of the records of *eulophi* from Wisconsin and Canada and presume that they were based on specimens of *kincaidii*. The species that I recognize as *eulophi* has evidently a more southern distribution.

where it rounds off in a broad curve to the apex, and is much narrowed basally; in *eulophi* the lamina is rather narrow and tapers off apically to meet the thick, chitinized portion of apex.

Colletes kincaidii Cockerell

Figure 5

Colletes kincaidii COCKERELL, 1898, Proc. Acad. Nat. Sci. Philadelphia, p. 52. Female, male.

Colletes sieverti COCKERELL, 1906, Bull. Amer. Mus. Nat. Hist., XXII, p. 424. Male. New synonymy.

There is close relationship and similarity between *kincaidii* and *eulophi*. The females are hardly distinguishable except by differences in the sculpture of the mesopleura, sternum and ventral segments of the abdomen, as brought out in a following key to the females of the Rocky Mountain region. The males are also similar but have distinctive differences in the plates of the seventh ventrite and in the aedeagus. In *eulophi* the seventh ventral plates are large, broad, nearly semi-oval, with outer margin almost evenly rounded; in *kincaidii* the plates have the same general shape, but the outer margin is twice emarginate, once near the base and again before the middle, with a short, rather broad intervening lobe. In *kincaidii* the tips of sagittae are very broad and in *eulophi* considerably narrower. In *eulophi* the semi-segmented tips of the parameres are rather long and slender, and in *kincaidii* much shorter and broader.

C. kincaidii was described from Olympia, Washington, and has been recorded by Cockerell from Ruidoso Creek, New Mexico, 6600 feet, and from Colorado (Florissant, Ward, Long's Peak Inn, Tolland and Boulder). The type of *sieverti* is from Florissant, Colorado, where it was taken by Rohwer. The flowers visited by this species, as recorded by Cockerell, include *Potentilla*, *Lupinus*, *Rhus*, *Polemonium*, *Geranium* and *Frasera*.

In the collection at Riverside *kincaidii* is represented by specimens from Boulder, Colorado, on *Heracleum lanatum*, June 20 (L. O. Jackson), on *Rhus*, June 26 (Timberlake), and females, July 25 and August 2 (Beulah Blair); from Ward, Colorado, on *Geranium*, July 1; Beaver Reservoir, near Ward, on *Potentilla* and *Frasera*, July 1; 2.7 miles north of Cuchara Camps, Spanish Peaks, Colorado, flying over damp ground, July 3, and Cuchara Camps, about 8200 feet, on *Geranium* and *Heracleum*, July 4 (Timberlake); from Mica and Almota, Washington, June 24 and July 14 (Melander); Wallowa Lake, Oregon, 4500–5500 feet, on *Holodiscus*, July 27, and from Union, Oregon, 2716 feet, June 11 (Scullen); from Winona, Minnesota, July 11 (Melander); Iosco County, Michigan, July 15 (R. R. Dreisbach); Lafayette, Edna Mills and Delphi, Indiana, on *Melilotus alba* and *Platycodon grandiflorum*, July 4–12 (H. E. Milliron); and from Milwaukee, Wisconson, July 3 and September 27 (Graenicher), the specimens from the latter locality having been determined by Graenicher as *eulophi*. It is represented also from the following localities in California: Big Flat, Coffee Creek, Trinity County, June 20 and 22 (B. J. Hall); Bear Valley, San Bernardino Mountains, on *Horkelia* and *Epilobium*, July 7, on *Mentha*, August 9, and on *Solidago*, August 10 and 13; and Mill Creek, 6000 feet, San Bernardino Mountains, on *Eriogonum*, August 28 (Timberlake).

In the Cockerell collection of *Colletes*, now at Riverside, are specimens of *kincaidii* from Olympia, Washington, July 4 (Kincaid); Florissant, Colorado, on *Prunus melanocarpa*, *Senecio cymbalarioides*, *Cleome serrulata* and *Geranium fremonti*, June 24 to August 6 (Cockerell, Rohwer); Tolland, Colorado, August 24 (Cockerell); Ward, Colorado, on *Frasera* in July (Cockerell); Gresham, Colorado, July 8 (Cockerell); and Beulah, New Mexico, on *Frasera*, June 29 and July 8 (W. P. Cockerell).

In the American Museum collection there are specimens from Sheridan, Wyoming (Metz), and from the following localities in Colorado: Boulder, on *Heracleum*, June 18, 1922 (L. O. Jackson), June 20, 26, 27 and July 3, 1922 (Lutz); Jim Creek, near Boulder, June 21–23 and July 8–11, 1922 (Lutz); Gregory Canyon, near Boulder, June 26, 1922 (Lutz) and July 10, 1921 (L. O. Jackson); South Table Mountain, Golden, June 20, 1918 (L. O. Jackson); Aspen, July 24–27, 1919 (Lutz); Ridgway,

July 10, 1919 (Lutz); Ward, June 25, 1922 (Lutz); Long's Peak Inn, June 16, 1922 (Lutz); Ouray, July 11–14, 1919 (Lutz); Summit Road, Ouray, 10,000 feet, July 13, 1919 (Lutz); Bear Creek, Ouray, 10,000 feet, July 14, 1919 (Lutz); Stopps Lake, July 11, 1922 (Lutz); Pagoso Springs, June 22–24, 1919 (Lutz); Tennessee Pass, 10,500 feet, August 6–8, 1920 (Lutz); Glenwood Springs, August 5, 1920 (Lutz); Electra Lake, 8400 feet, June 28 to July 1, 1919 (Lutz); and Palisades, July 18, 1919 (Lutz).

Colletes trigonatus Cockerell

Colletes trigonatus COCKERELL, 1933, Ann. Ent. Soc. Amer., XXVI, p. 42. Female.

The type and only known specimen of this species is now at Riverside. It was taken at Pingree Park, Colorado, August 15, by Helen James.

The female is exceedingly like *kincaidii*, but there are certain small differences which indicate distinctness. The head is a little more distinctly trigonate; the clypeus is more channeled medially and has the sculpture more strongly and closely striate; the triangular elevated portion of the supraclypeal region is more flattened and has vague sulcations rather than punctures; and the abdomen on the whole is a little more finely and sparsely punctured. The first tergite has the punctures on the disk before the apical depression distinctly sparser and finer, but the punctures on the apical depression and those on the second tergite are perhaps a little more separated than in *kincaidii*, but only on account of their slightly smaller size.

It is possible that *trigonatus* will prove to be the female of *rufocinctus*, in which case the latter name would have priority.

Colletes rufocinctus Cockerell

Colletes rufocinctus COCKERELL, 1929, Ann. Mag. Nat. Hist., (10) IV, p. 298. Male.

As yet only the male of this species is known. The type was captured between Long's Peak Inn and Estes Park, Colorado, in August by Cockerell. Another male in the American Museum collection was taken near Sheridan, Wyoming, by Metz; and I have a male collected by E. R. Leach, September 11, 1928, in the Huachuca Mountains, Arizona.

The seventh ventral plates in this species are long and narrow, about as in *armatus* Patton, or *angelicus* Cockerell, but more abruptly widened before the apex and without the tuft of hair projecting laterally at base.

Colletes wickhami, new species

Figure 1

Only the male of this is known, which is rather small, with whitish wings, white pubescence and peculiar seventh ventrite as figured. The aedeagus shows some similarity to that of *aestivalis*, and *wickhami* is possibly closely enough allied to that species to suggest that the female may have the front coxae spined. In general appearance the male is like *gypsicolens*, but it is smaller, with abdomen more distinctly punctured and the aedeagus and seventh ventrite very different.

MALE.—Black, the mandibles reddened, the tarsi and tegulae rufo-testaceous. Wings clear, slightly whitened, the discal pubescence very fine and inconspicuous. Stigma and nervures ferruginous, the subcosta blackish. Pubescence of body grayish white, rather short and dense. Hair of face concealing most of clypeus, but vertex well exposed. Tergites 1 to 5 each with a narrow white hair-band, and a trace of a band on 6. Apical fringe of ventrites 2 to 5 dense at sides, but weakened in middle, especially on 4 and 5. Head wider than long, the eyes moderately convergent below. Malar space nearly twice as broad as long. Hind margin of pronotum closely appressed to mesoscutum, but with a short sharp spine on each side. Hind tarsi long and slender, the basitarsus about four times as long as wide. Clypeus gently convex, finely punctured, the punctures sparse anteriorly. Punctures of frons rather fine and close, those of vertex and cheeks much finer. Punctures of mesoscutum like those of frons, moderately close, and failing on posterior middle of disk. Punctures of mesopleura coarser than those of mesoscutum, rather less than a puncture width apart, and becoming sparser toward sternum. Abdomen finely punctured, rather densely on tergite 2 and more sparsely on 1. Plates of seventh ventrite as figured, each with a transverse patch of dense hair near base, and margins virtually non-ciliate. Sagittae with membranous lateral and dorsal wing-like expansions, the dorsal laminae short, broad and emarginate at distal end. Lateral laminae extending nearly whole length of exposed part of sagittae, truncate at apex, with the tips of the sagittal rods extending slightly beyond them. Distal joint of parameres

about twice as long as wide, with a moderately short hair fringe. Fringe on inner margin of proximal joint of parameres relatively weak. Length, about 7.5 mm.; anterior wing, 6 mm.

The type lacks the flagellum of both antennae beyond the basal joint. In paratypes from California the flagellum is blackish, with joints nearly twice as long as thick, and joint 3 (basal joint of flagellum) about one-half as long as 4. In the paratypes the tarsi are darker and the wings more whitish than in the type.

TYPE MATERIAL.—Holotype male, Colorado Springs, Colorado, 6000–7000 feet, June 15–30, 1896 (H. F. Wickham), in the collection of the American Museum. Six male paratypes from southern California in the collection of the Citrus Experiment Station as follows: one, Whittier, at flowers of *Brassica*, August 13, 1920 (Timberlake); four taken near Whittier, October 1, 1928, and sent to me by the late Professor L. J. Muchmore, but I believe captured by some one else, who found them flying in numbers; and one, Riverside, on *Baccharis emoryi*, October 10, 1926 (Timberlake).

Colletes brevihirtus, new species

Figure 3

This is an isolated species as far as my experience goes. The male is easily separated from all other species known to me, except *robertsonii*, in having the long erect hair of the basal tergite confined to the basal declivity and lateral margins, the disk being clothed with fine short pubescence. The short, very dense hair of face, remarkably short wings and the minutely and densely punctured abdomen are also distinctive characters.

MALE.—Black, the mandibles strongly reddened, the tarsi and flagellum beneath, except first joint, ferruginous. Tegulae pale testaceous. Wings smoky (reddish), the stigma and nervures dusky ferruginous, the subcosta blackish. Pubescence short, dense, ochreous yellow, becoming whitish on cheeks, underparts and legs. Hair of clypeus and frons very dense nearly to level of anterior ocellus. Vertex well exposed, with longer loose hair on ocellar area and occipital margin. Hair of cheeks longer anteriorly. Front femora and trochanters with a rather long dense fringe, more developed than in most species, but much less than in *brevicornis*. Disk of tergite 1 and of following segments with a fine short pile, not concealing surface. Apical band on tergites 1 to 5 pale ochreous and narrow. Apical fringe of ventrites 2 to 5 uniform. Head considerably broader than long, the eyes strongly convergent below. Malar space very short and transverse. Antennae reaching a little beyond tegulae, the middle joints of flagellum about one and one-third times longer than thick. Joint 3 about one-fourth shorter than 4. Wings unusually short, the discal pubescence distinct. Second submarginal cell about twice as long below as on radius, and receiving recurrent nervure a little beyond middle. Hind tarsi slender, the basitarsus about four times longer than wide. Clypeus and frons dull, very densely and finely punctate. Vertex and cheeks more shining, minutely punctured. Punctures of mesoscutum moderately small, being finer and denser on anterior margin and nearly contiguous elsewhere, except that the posterior middle of disk has a rather large, shining, nearly impunctate space. Mesopleura dull, densely, finely and shallowly punctate. Enclosure of propodeum with the usual narrow basal costate area, which is separated from the bowl by a transverse carina. Posterior face of propodeum, except the bowl, slightly dullish and with obscure fine punctures. Abdomen dullish, minutely and very closely punctate, the tergites not impressed basally. Apical plates of seventh ventrite transversely semicircular, densely hairy on the disk except apically and provided with short marginal cilia. Sagittae of aedeagus not much broadened basally and weakly angulate on each side above, the rods without membranous expansions except rudiments of lateral one for a short distance just beyond the middle. Apical segment of stipital parameres no longer than wide, the fringe on it and on inner margin of proximal segment, short. Length, 10 mm.; anterior wing, 6 mm.; width of abdomen, 3.1 mm.

TYPE MATERIAL.—Holotype male, Wray, Colorado, 3700 feet, August 17–19, 1919 (Lutz), in the collection of the American Museum.

Colletes robertsonii Dalla Torre

Colletes punctata ROBERTSON, 1891, Trans. Amer. Ent. Soc., XVIII, p. 62. Male. Not Mocsáry, 1877.

Colletes robertsonii DALLA TORRE, 1896, Catalogus Hymenopterorum, X, p. 44.

Colletes robustus SWENK, 1904, Ent. News, XV, p. 251. Female, male.

In the American Museum collection this species is represented by only one specimen, a male, from Boulder, Colorado (Metz). Cockerell has recorded it, under the name *robustus*, from five miles northeast of Boulder, on *Petalostemon compactus*, June 30 (L. O. Jackson). The specimen at hand has the legs mainly dark and is the form *robustus* Swenk. Robertson's type from Illinois has the legs mainly ferruginous. It is likely that *robustus* should rank as a

subspecies. Swenk records *robustus* from Nebraska, Kansas and New Mexico. Three females, including a paratype recorded by Swenk, from Las Vegas, New Mexico, on *Petalostemon*, July 21 (Cockerell), are now at Riverside.

Colletes fulgidus Swenk

Colletes fulgidus SWENK, 1904, Canadian Ent., XXXVI, p. 95. Female, male.

Colletes fulgidus is a common western species, occurring mostly on autumnal Compositae, but sometimes appearing in late spring and early summer. At Riverside, California, I have collected it on *Isocoma*, *Gutierrezia*, *Baccharis* and *Eriogonum* from September 18 to November 30; and in the spring on *Encelia*, *Coreopsis*, *Gutierrezia* and *Eriogonum* from April 28 to May 28. I have also taken it at the Gavilan, south of Riverside, on *Cryptantha*, April 27; on *Eriophyllum* in the Puente Hills, near Whittier, May 12; on *Selinum* in Bear Valley, San Bernardino Mountains, August 7; on *Isocoma* at La Jolla, August 3; and on *Ericameria* on Mt. Santiago, September 19. I have collected it also thirty-two miles south of Tijuana, Lower California, on *Rhus laurina*, July 31, and on *Isocoma*, thirty-one miles north of Ensenada, August 1; on *Melilotus alba* and *Chrysothamnus* at Salt Lake City, Utah, August 2 and September 22; on *Gutierrezia* near Morley, Colorado, August 24; and on *Senecio*, at Beaver Reservoir, near Ward, Colorado, July 1.

In the American Museum collection it is represented by specimens collected by Lutz from Giveout, Idaho, 6700 feet, July 7, 1920; Jackson, Wyoming, 6600 feet, July 13–17, 1920; Ogden, Utah, August 29–30, 1916; Glenwood Springs, Colorado, 5800 feet, August 5, 1920; Meeker, Colorado, 6200 feet, July 20–21, 1919; and from Ward, Colorado, 9300 feet, August 8–10, 1919.

Swenk has recorded it also from Nevada, Oregon, Nebraska and Texas, but there are no records, as yet, from New Mexico and Arizona.

Colletes truncatus, new species

Allied to *angelicus* Cockerell, but differing in the smaller size, much smaller and narrower frontal foveae, less densely punctured mesoscutum, with a larger impunctate area on the posterior middle, and in the less strongly and less densely punctured tergites. Both species have the collar of pronotum widened and truncate at outer ends, not spined as in other species, but having the anterior carinate edge of the collar slightly produced at each end into a small tooth.

FEMALE.—Black, the small joints of tarsi reddened, claws and tegulae ferruginous. Tibial spurs amber color. Flagellum either dark, or somewhat reddened beneath. Pubescence pale fulvo-ochreous on vertex and notum, paler and more or less whitish on face, cheeks and underparts. Scattered hairs on the partially nude posterior area of mesoscutum and a posterior fringe on scutellum black or fuscous. Abdominal hair-bands broad and white, including one at base of tergite 2. (Band on tergite 1 mainly denuded in types, but undoubtedly normally present, although not so broad as following bands.) Wings somewhat reddened, the stigma and nervures dark ferruginous. Head broader than long, with inner orbits strongly convergent below. Malar space very short and transverse. Frontal foveae rather small and narrow, widest at their middle. (In *angelicus* foveae large, much broadened above, where they reach a little more than halfway from eye margin to lateral ocellus.) Clypeus closely substriately punctured, and with two small foveae on middle of anterior margin. Supraclypeal area closely punctured. Sides of face opposite clypeus and antennae rather finely and densely punctured. Frons between the foveae closely and more coarsely punctured than rest of face. Vertex shining, finely punctured. Mesoscutum polished, the punctures somewhat larger and more distinct than those of frons and mainly less than a puncture width apart on anterior half, but less crowded than in *angelicus*, and the nearly impunctate area on posterior middle large. Mesopleura densely, almost confluently punctured and dullish. Scutellum punctured like the scutum. Costate area at base of propodeum set off by a transverse carina, the bowl on posterior face with several oblique rugae on each side. Tergite 1 with fine, distinctly unequal, moderately close punctures. Tergite 2 with punctures almost uniformly fine and close. Following tergites shining except for the minute dense punctuation. Front coxae armed at apex with a short, stout, hairy spine. Length, about 9 mm.; anterior wing, 7 mm.

TYPE MATERIAL.—Holotype female, and three female paratypes, from meadows at Estes Park, Colorado, August 12 and 17, 1919 (H. F. Schwarz). Holotype (August 12) and two paratypes (August 17) in the collection of the American Museum.

Colletes simulans simulans Cresson

Colletes simulans Cresson, 1868, Proc. Boston Soc. Nat. Hist., XII, p. 168. Male.

Colletes bigeloviae Cockerell, 1897, Ann. Mag. Nat. Hist., (6) XIX, p. 40. Female. New synonymy.

Colletes brevispinosus Viereck, 1903, Trans. Amer. Ent. Soc., XXIX, p. 62. Female. New synonymy.

Colletes tegularis Swenk, 1905, Canadian Ent., XXXVII, p. 304. Female. New synonymy.

Colletes coloradensis Cockerell, 1933, Ann. Ent. Soc. Amer., XXVI, p. 41. Male. New synonymy.

Colletes simulans was based on several males collected in Colorado by James Ridings, but its identity has remained, up to the present time, uncertain. Recently, through the kindness of V. S. L. Pate, I have had the opportunity of examining one of the original specimens, now labeled a paratype, which was compared with the type by Doctor Pate and found to be essentially similar, as far as he could see. This specimen has proved to be a form of the familiar eastern *armatus*, which consequently should be cited in the future as *C. simulans armatus* Patton.

The description of *simulans* does not mention any darker hairs intermixed on the mesonotum, but there are a few such hairs (more brownish than black) present in part of the type material, including the specimen examined by me. Cockerell has discussed this point (1906, Trans. Amer. Ent. Soc., XXXII, p. 291) with the assumption that two species were involved, but it is now apparent that this may not be the case, since a species that has much black hair on the mesonotum in a part of its range could be expected to show a little variability in this respect.

Swenk (1908, Univ. Studies, Univ. Nebraska, VIII, p. 95 [No. 1, Art. 2, p. 53]) synonymized *bigeloviae* and *brevispinosus* with *armatus* and described *nevadensis* from a male found at Reno, Nevada, because he had found that the plates of the seventh ventrite were somewhat different. Cockerell later described *coloradensis* from Pingree Park, Colorado, the type of which is now at Riverside. I now believe that all these names represent forms of *simulans* Cresson, which is thus distributed from the Atlantic to the Pacific Coast. Other synonyms of the race *armatus*, first recorded by Robertson, are *scitulus* Patton and *spinosus* Robertson. The status of *tegularis* Swenk is a little uncertain, as it agrees better with *nevadensis* than with *simulans*, but as its distribution (Gering and Agate, Nebraska, and Albuquerque, New Mexico) comes within the expected range of *simulans* it would be better to consider it as representing individual variants of that race, rather than use it as a prior name of the more western *nevadensis*.

The form *nevadensis*, as I recognize it, is a common fall *Colletes* at Riverside. A small percentage of the males have the plates of the seventh ventrite nearly as in Swenk's figure, the trapezoidal shape of which is possibly exaggerated. At any rate the oblique apical margin of each plate in the figure is greater than the length of the lateral margin, as measured from the angle to the basal hair-tuft, whereas in all specimens examined the apical margin is distinctly less than the lateral margin as in Swenk's figure of *armatus*. In most local specimens the plate flares out more or less abruptly near apex both on the inner and outer margins, thus producing a lobate effect, but the apical margin is little or not at all emarginate as in *armatus*, so that the lobate condition is less accentuated than in eastern material. The striate area of the disk is large, extends farther toward apex and is less narrowed toward base than in *armatus*. The transverse and more or less arcuate band of hair marking distal end of the striate area, which is seen in *armatus* and the type of *coloradensis*, is little apparent in *nevadensis*. In *armatus* nearly the whole of the disk beyond the striate area is covered with long hair, while in *nevadensis* the long discal hair is better developed on the inner half.

In Colorado material the plates of the seventh ventrite seem to be partially intermediate between *armatus* and *nevadensis*, but favoring more the former. The apical lobate condition of *armatus* is less pronounced, and the hair on the outer portion of the hair-band and on its continuation based along the outer margin is shorter, although a male from Wray has the plates more as in *armatus*.

In other characters there is less difference between the forms. The aedaegus is virtually the same in eastern and western material. The prothoracic spine, especially in females, averages much shorter in western material. In *armatus* the female has much black hair on the mesonotum and vertex, and the male has black hair intermixed at least on the scutellum and hind part of the mesoscutum. In western material the male generally has the pubescence entirely light, and the female has the black hair restricted mainly to the scutellum and margins of the nude area of the mesoscutum.

There seems to be no doubt that Swenk was correct in considering New Mexico and Colorado material as representing a form of *armatus*. There is little doubt also that *nevadensis* will be found to intergrade completely when large series of specimens are available for study from many parts of the West. We may recognize, therefore, a far western race to be called *C. simulans nevadensis* Swenk, inhabiting the Pacific Coast and Great Basin area, a Rocky Mountain race to be called *C. simulans simulans* Cresson, and the eastern race *C. simulans armatus* Patton. The females of *nevadensis* and *simulans* are hardly distinguishable, except that *simulans* usually has black hairs intermixed on the anterior part of mesoscutum.

In the American Museum collection, *simulans* is represented by specimens from Glenwood Springs, Colorado, 5800 feet, July 22–29, 1919, and August 5, 1920 (Lutz); Wray, Colorado, 3700 feet, August 17–19, 1919 (Lutz); Lookout Mountain, near Golden, Colorado, on *Grindelia*, August 16, 1916 (L. O. Jackson); and mountains near Sheridan, Wyoming (Metz).

Other material examined includes the type of *coloradensis* Cockerell from Pingree Peak, Colorado; one male from Las Cruces, New Mexico, on *Solidago*, August 30 (Townsend), determined years ago by Cockerell as *americanus* Cresson; three males from Pecos, New Mexico, August 31 (Cockerell); two males and two females from Beulah, New Mexico, in August (Cockerell and W. Porter); and a female from Sapello Canyon, New Mexico, August 31 (W. Porter).

Colletes gilensis Cockerell

Colletes gilensis COCKERELL, 1897, Ann. Mag. Nat. Hist., (6) XIX, p. 41. Male.

The female has been described by Swenk (1908, Univ. Studies, Univ. Nebraska, VIII, p. 65 [No. 1, Art. 2, p. 23]), and the species was recorded by him from various localities in New Mexico and from Oak Creek Canyon, Arizona, and southern Arizona. The flowers visited in New Mexico by this bee, according to Cockerell, are *Petalostemon oligophyllus*, *Melilotus alba* and *Solidago canadensis*. Cockerell has more recently recorded it from Boulder, Colorado, where it was found at flowers of *Petalostemon compactus*, July 20, by L. O. Jackson.

In the American Museum collection there is a small series of both sexes taken at Grand Junction, Colorado, August 3, 1920 (Lutz), and at Pueblo, Colorado, August 9, 1920 (Lutz). I also have three females from Las Vegas, New Mexico (W. Porter), and a male from Pecos, New Mexico (Cockerell).

Colletes brevicornis Robertson

Colletes brevicornis ROBERTSON, 1897, Trans. Acad. Sci. St. Louis, VII, p. 315. Male. 1900, *ibid.*, X, p. 51. Female.

Colletes opuntiae COCKERELL, 1906, Ann. Mag. Nat. Hist., (7) XVII, p. 312. Male, female.

The types of *opuntiae* were taken at Boulder, Colorado, on *Campanula* and *Opuntia*, June 27 to July 3, by Mrs. W. P. Cockerell.

At Boulder in 1939 I collected both sexes on *Campanula rotundifolia* on June 26 and a male on a garden *Campanula* on June 27. From Virginia I have a pair taken at Barcroft, the male, May 30, on *Specularia perfoliata*, the female, June 1, on *Anthemis cotula;* and a male from Dawson's Beach, on *Rubus argutus*, June 6, 1931 (Timberlake). I also have a pair from Bryson City, North Carolina, on *Specularia*, May 27, 1923 (Crawford); a male from Boulder, Colorado, on *Calochortus*, June 29 (Cockerell); another from Boulder, on *Anemone intermedia*, June 26 (Cockerell); and one

from Springview Bridge, Brown County, Nebraska, on *Campanula*, June, 1902 (Crawford).

In the American Museum collection there are two females from Boulder, Colorado (Metz), and one male from Jim Creek, near Boulder, June 21–23, 1922 (Lutz).

Colletes willistoni Robertson

Colletes willistoni ROBERTSON, 1891, Trans. Amer. Ent. Soc., XVIII, p. 60. Female.

The male was briefly described by Robertson in 1895 (Trans. Amer. Ent. Soc., XXII, p. 166) and more fully by Swenk in 1908 (Univ. Studies, Univ. Nebraska, VIII, p. 56 [No. 1, Art. 2, p. 14]). The following records extend the known range of the species far westward: one pair, Boulder, Colorado, June 20, 1922 (Lutz); one female, Jim Creek, near Boulder, July 8–11, 1922 (Lutz); and one male, Provo, Utah, July 29 to August 1, 1920 (Lutz). I also have a male from Lincoln, Nebraska, on *Symphoricarpos*, July 10, 1903 (Swenk). The species is said to be chiefly a visitor of *Physalis*.

Colletes latitarsis Robertson

Colletes latitarsis ROBERTSON, 1891, Trans. Amer. Ent. Soc., XVIII, p. 60. Female, male.

Swenk has recorded this species from Colorado Springs, Colorado. In the American Museum collection there is one male from Wray, Colorado, August 17–19, 1919 (Lutz).

I have a female from Bryson City, North Carolina, on *Physalis*, August 12, 1923 (Crawford); a male from Sioux City, Iowa, July 26, 1924 (C. N. Ainslie); three pairs from Lafayette, Indiana, on *Physalis* sp. and *P. pubescens*, August 8, 1942 (H. E. Milliron); and a female from southern Illinois (Robertson). The preferred flower visited by this bee is *Physalis*, but it is also common on *Solidago*, according to Swenk, and occasionally visits other flowers.

Colletes nudus Robertson

Colletes nudus ROBERTSON, 1898, Trans. Acad. Sci. St. Louis, VIII, p. 43. Female, male.

Colletes vierecki SWENK, 1905, Canadian Ent., XXXVII, p. 301. Female.

Colletes hydrophilus COCKERELL, 1906, Ann. Mag. Nat. Hist., (7) XVII, p. 313. Male. New synonymy.

The type of *hydrophilus* was taken in Boulder Canyon, a few miles above Boulder Colorado, flying over damp sand, June 26 (Cockerell).

At Boulder in 1939 I collected one female of *nudus* on *Rhus glabra* in cultivation on June 27, and five males on *Rhus cismontana* on June 26. In addition, a male was taken on the same flower, on Flagstaff Mountain, near Boulder, on June 30. I have also a female from Boulder Canyon, July, 1930 (B. Blair), and two males from the same locality, June 23, 1925 (C. H. Hicks); a male from Fedor, Texas, May 26, 1902 (Birkmann); and a female from Marion County, Arkansas, in June (Bridwell).

In the American Museum collection there is a small series from Boulder, taken June 20, June 26 and July 3, 1922, besides one male collected at Boulder by Metz. Cockerell also has recorded *nudus* from Boulder, where it was taken by Mrs. W. P. Cockerell.

In the eastern states *nudus* chiefly visits *Ceanothus americanus*, but as far as I know there is no *Ceanothus* flowering around Boulder in late June and July.

There is no doubt that *hydrophilus* is conspecific with *nudus*, but it might be recognized as a subspecies, as the punctures of the abdomen in Colorado males are distinctly coarser and closer than in eastern specimens.

Colletes intermixtus Swenk

Colletes intermixtus SWENK, 1905, Canadian Ent., XXXVII, p. 302. Female.

Colletes lippiarum COCKERELL, 1909, *ibid.*, XLI, p. 394. Female. New synonymy.

The type of *intermixtus* came from Fedor, Lee County, Texas, and Swenk later (1908, Univ. Studies, Univ. Nebraska VIII, p. 84 [No. 1, Art. 2, p. 42]) described the male and recorded the species from Cotulla, Texas, and Oak Creek Canyon, Arizona. Cockerell has recorded *intermixtus* from San Benito, Texas, and the type of *lippiarum* was collected at La Cueva, Organ Mountains, New Mexico. Swenk records only one flower visit, *Acacia farnesiana;*

Cockerell records *Koeberlinia spinosa* and *Lippia wrightii* as visited by this bee.

In southern California *intermixtus* is not uncommon and I have taken it at Riverside at flowers of *Erigonum fasciculatum, Solanum douglasii, Gnaphalium beneolens, Gutierrezia californica, Ericameria palmeri, Cotoneaster* and *Schinus molle*. The captures range from May 8 to October 14. I also have it from Claremont (Baker) and Corona (C. M. Dammers).

In the American Museum collection there is one male from Grand Junction, Colorado, taken August 3, 1920. The species has not been recorded previously from either California or Colorado.

Colletes petalostemonis Swenk

Colletes petalostemonis SWENK, 1906, Canadian Ent., XXXVIII, p. 40. Female, male.

Swenk described this species from Nebraska and Wyoming, and Cockerell has recorded it as taken by L. O. Jackson, at flowers of *Petalostemon compactus*, five miles northeast of Boulder, Colorado, on June 30. I have seen no Colorado material but have a paratype female from Glen, Sioux County, Nebraska.

Colletes susannae Swenk

Colletes susannae SWENK, 1925, Amer. Mus. Novitates, No. 186, p. 1. Female, male.

Swenk recorded one specimen as taken in Colorado, without a more definite locality. The species ranges eastward through Kansas, Nebraska and South Dakota to southern Illinois. It is an oligotropic visitor of *Petalostemon*, particularly favoring *P. purpureum*, but Swenk records certain other flowers which are visited mostly for nectar.

Colletes compactus Cresson

Colletes compacta CRESSON, 1868, Proc. Boston Soc. Nat. Hist., XII, p. 166. Female, male.

Swenk has recorded *compactus* from Colorado and from southern Arizona, without more definite localities, and states that males from these two states lack the usual black thoracic pubescence. This is a common eastern species and visits autumnal Compositae, especially *Solidago*.

WESTERN *COLLETES* NOT KNOWN FROM COLORADO

Colletes species

In the American Museum collection there is one male found on a train between Provo, Utah, and Grand Junction, Colorado, August 1, 1920 (Lutz). This specimen represents a species of the *americanus* group, and is apparently new, but because of the meager material and lack of a definite locality record, it had better be left undescribed for the present.

Colletes gypsicolens Cockerell

Colletes gypsicolens COCKERELL, 1897, Ann. Mag. Nat. Hist., (6) XIX, p. 47. Male.

There is one female, from Grand Gulch, Utah, 5000 feet (B. T. B. Hyde) in the American Museum collection.

This species was described from the White Sands, near Whitewater, New Mexico, where males were found visiting the flowers of *Bigelovia* (*Chrysothamnus*), October 6 (C. H. T. Townsend). I have one of the original specimens and have collected the species in southern California as follows: one female, Riverside, on *Isocoma veneta* variety *vernonioides*, October 29; and three males, twenty-nine females, Mohave Desert, on *Chrysothamnus nauseosus*, all, with the exception of one male from Oro Grande, October 7, being taken October 28 and 29 in different years, the collection sites ranging from three miles north of Victorville to twelve miles southwest, and from eight to twelve miles south of Adelanto. I have also one male from Palmdale, October 6 (E. G. Linsley).

FEMALE.—Closely allied to *americanus* Cresson, being similar although considerably larger. Front coxae with a long hairy spine at apex. Prothoracic spine short, acute, largely concealed by pubescence. Malar space transverse, but not so extremely abbreviated as in *americanus*. Tarsal claws toothed near middle. Inner spur of hind tibia minutely pectinate. Pubescence ochreous yellow, becoming

whitish on cheeks, underparts of thorax and on legs and abdomen. Hair-bands at apex of tergites 1 to 5 broad and dense, with a similar one at base of tergite 2. Base of tergite 3 often with a thin, narrow band. Differs from *americanus* in having punctures of mesoscutum considerably coarser and closer, sparse or absent only in a small area on the posterior middle; mesopleura duller, very densely punctate, the rounded protuberance just below base of fore wing less prominent and becoming sculptureless and shining on lower margin; protuberance on upper part of metapleura slightly margined below, but without the overhanging arcuate and testaceous margin of *americanus;* punctures of tergites finer and fainter; wings relatively larger and longer, with a long narrow stigma. Length, 10–12 mm.; anterior wing, 7–8 mm.

The New Mexico male (Townsend's No. C 36) differs from the new material in having the wings clearer and whitened, the nervures and stigma amber color; tarsi more ferruginous (tarsi entirely dark in California males, except in one specimen from Palmdale); and pubescence whiter (it is whitish to strongly ochreous yellow in California males).

Colletes wootoni Cockerell

Colletes wootoni COCKERELL, 1897, Ann. Mag. Nat. Hist., (6) XIX, p. 42. Male.

In the American Museum collection there are male specimens from Sycamore Canyon, about 3800 feet, Santa Catalina Mountains, Arizona, August 20, 1916 (Lutz); and from Mud Springs, about 6500 feet, Santa Catalina Mountains, Arizona, July 17–20, 1916 (Lutz). These have been compared with a male determined by Cockerell (Wooton's No. 92), probably one of the original specimens. I have also examined three males from the Cockerell collection, and determined by Swenk, one of these from Riley's Ranch, Organ Mountains, New Mexico, on *Lippia wrightii*, August 29; and two from La Cueva, Organ Mountains, April 23 (Cockerell).

Colletes apacheorum, new species

Similar to *kincaidii* Cockerell, but abdominal punctures on the whole less close; the second tergite more deeply impressed at base; the first two tergites shining, but third and fourth tergites minutely tessellate, dullish, less distinctly and much more sparsely punctate; basal portion of enclosure of propodeum in front of the transverse keel, broader, the pits consequently longer than wide; clypeus less closely punctured; malar space slightly longer; wings clearer hyaline and more sparsely pubescent.

FEMALE.—Black, the extreme apex of tarsi and claws ferruginous. Flagellum slightly brownish beneath. Apical margin of tergites more or less testaceous beneath bands. Tegulae dark translucent brown. Wings clear hyaline, the stigma ferruginous, nervures generally darker. Pubescence strongly plumose on head and thorax, partially concealing the surface of notum, but clypeus well exposed, the hair ochreous to fulvo-ochreous on vertex and notum, elsewhere more or less white. Tergites 1 to 5 with a dense white apical hair-band, broad on 2 to 5 and narrower on 1. Tergite 1 with long, loose white hair on disk, becoming rather dense on lateral margins. Base of tergite 2 with a narrow white band, which is thinner than apical bands. Disk of tergites 2 to 5 with short, nearly erect, light pubescence, some of the hairs on 4 and 5 being much longer, and a few of these on 5 a little dusky but not conspicuously black. Tergite 6 with blackish hair. Malar space slightly longer than half the basal width of mandible. Front coxae unarmed (with a very short, blunt tubercle in *kincaidii*). Inner spur of hind tibia neither ciliate nor pectinate. Basal nervure of fore wing received rather far beyond nervulus. Second submarginal cell very broad, receiving first recurrent nervure at middle. Disk of wing sparsely pubescent. Spine on each side of pronotum small, acute and directed obliquely upward. Clypeus with strong, moderately close striate punctures and somewhat sulcate in middle. Supraclypeal area a little depressed, less elevated than base of clypeus, and strongly punctured. Frons densely punctured, the punctures slightly smaller than in *kincaidii*, and the surface more shining. Vertex shining, minutely punctured, with a few somewhat larger punctures interspersed. Mesoscutum and scutellum punctured as in *kincaidii*, the punctures deep, mainly less than a puncture width apart, becoming sparser on posterior part of scutum, leaving a large impunctate space on each side of the middle and those of scutellum slightly coarser and absent at the base. Punctures of mesopleura as coarse as those of scutellum and fully a puncture width apart. Costate area at base of propodeum broader than in *kincaidii*, the pits longer than wide. Bowl of enclosure with oblique cross carinae on each side. First two tergites shining, finely, but strongly, and closely punctured, the punctures of 1 a little finer and closer than in

kincaidii, and those of 2 a little less dense. Base of tergite 2 with a rather deep, abrupt, transverse impression. Following tergites a little dullish, minutely tessellate, with minute punctures, which are much sparser and weaker than in *kincaidii*. Length, 8.5–11.0 mm.; anterior wing, 7.1–8.0 mm.

TYPE MATERIAL.—Holotype female from Coyote Mountains, Arizona, about 3500 feet, August 4–7, 1916 (Lutz), in the American Museum. Five paratype females in collection of Citrus Experiment Station as follows: two, six miles northwest of Prescott, Arizona, on *Mentzelia multiflora*, July 4, 1932 (Timberlake); one, Laguna, New Mexico, on *Isocoma wrightii*, September 4, 1930 (Timberlake); one, Riley's Ranch, Organ Mountains, New Mexico, on a "plant like *Rhus*, with white flowers," April 23 (Cockerell); and one from Marfa, Texas, April 18, 1942 (Melander).

Colletes tucsonensis Cockerell

Colletes tucsonensis COCKERELL, 1906, Canadian Ent., XXXVIII, p. 163. Male.

Two males, one female, Tucson, Arizona, October 2–25, 1916, in the American Museum collection.

There has recently come to hand a female specimen from Las Cruces, New Mexico, on *Salix*, May 2 (Cockerell), which was determined by Cockerell years ago as *texanus* and so recorded in the literature but differing distinctly from the true *texanus* Cresson, as redescribed by Swenk in 1908 (Univ. Studies, Univ. Nebraska, VIII, p. 85 [No. 1, Art. 2, p. 43]).

This is a common species on the Mohave and Colorado deserts of California and occurs sparingly at Riverside. It is mainly an autumnal species, visiting Compositae exclusively, but it is also subject to a small but apparently regular emergence in the spring. The spring brood visits Compositae as well as other flowers, and females have been taken on *Agave*, *Cercidium*, *Prosopis* and *Prunus*, and presumably collect pollen from these flowers. A female taken on *Cercidium*, at any rate, has the scopa of the hind legs full of pollen from the flowers of that tree.

FEMALE.—Black, the apex of mandibles and small joints of tarsi reddened, the tegulae translucent brown. Wings glassy hyaline, with relatively short sparse discal pubescence, in comparison with *fulgidus*. Stigma and nervures dark reddish, the subcosta piceous, or sometimes nervures entirely piceous. Pubescence white, that of the notum slightly more grayish, with black hairs on the scutellum and on the relatively nude area on posterior half of mesoscutum. Tergites 1 to 5 each with apical white hairband and base of tergite 2 with similar slightly thinner band, the bands moderately wide. Venter with rather thin shortish hair. Malar space transverse. Clypeus closely, striately punctured. Frons closely punctured, the punctures shallow and smaller than those of mesoscutum. Vertex polished and minutely punctured. Facial foveae narrow, moderately widened just above the middle. Mesoscutum and scutellum polished, closely punctured, but posterior half of scutum with a large, nearly impunctate area, the punctures round, deep and nearly contiguous on anterior half of scutum. Mesopleura densely, more coarsely punctured, the surface dull. Abdomen polished, very shining, weakly, minutely punctate. Punctures of tergite 1 remote, those of 2 moderately close and those of following segments still closer. Pronotal spines large and strong but extending no farther outward than sides of head or mesothorax, and often slightly curved forward. Spine-like process at apex of front coxae about twice as long as thick. Length, about 9–12 mm.; anterior wing, 7.5–8.0 mm.

On October 7, 1928, I found the males of this species swarming in large numbers at the flowers of *Ericameria paniculata*, at Black Canyon, on the Mohave Desert near Barstow, California.

Colletes simulans nevadensis Swenk

Colletes nevadensis SWENK, 1908, Univ. Studies, Univ. Nebraska, VIII, p. 94 (No. 1, Art. 2, p. 52). Male.

Colletes angelicus SWENK, 1908, *ibid.*, VIII, pp. 52 and 101 (No. 1, Art. 2, pp. 10 and 59). Female. Not Cockerell. New synonymy.

Although this is the commonest fall *Colletes* at Riverside, I have only a few from other localities in California. From Riverside, many, September 9 to October 29, mostly on *Isocoma veneta* variety *verno-*

nioides, a few on *Gutierrezia californica* and *Baccharis emoryi;* a pair from Plaza del Rey, Los Angeles County, on *Ericameria ericoides*, November 1, 1924; one male, Cajon Canyon, 4000 feet, on *Lepidospartum*, September 13, 1936; one male, two females, Whitewater, on *Isocoma acradenia*, October 27, 1934; four males, Morongo Valley, on *Gutierrezia lucida*, October 5, 1934, and a female on *Isocoma acradenia*, September 27, 1941 (Timberlake).

In the American Museum collection there is one male from Ogden, Utah, August 29–30, 1916 (Lutz).

The status of *nevadensis* has been considered previously in this paper, where reasons are given for believing that it should rank as a race of *simulans* Cresson.

SYNOPTIC TABLES

In case of the males certain species are so similar that in the following tables it has been advisable to make use of the hidden apical ventral segments and the genitalia.

Males

1. Head more or less narrowed anteriorly, the inner orbits converging below; sides of abdomen not fimbriate.....2.
   Head not trigonate, the inner orbits parallel; clypeus large, densely, finely punctate; abdomen somewhat concave beneath, the lateral margins fimbriate, with long dense hair; tergites with much fuscous, or black, hair, the white apical bands on tergites 1 to 5 narrow and weak; antennal joints 3 and 4 equal; length, 14 mm. .....*andrewsi* Cockerell.
2. Mesonotum with the hair entirely light.....3.
   Mesonotum with dark hair intermixed, at least on scutellum; clypeus usually not densely covered with hair.....23.
3. Antennae short, the joints of flagellum not much longer than thick; joint 3 subequal to 4.....4.
   Antennae longer, the joints of flagellum distinctly longer than thick; joint 3 usually much shorter than 4.....6.
4. Antennae with joints beyond the fourth barely longer than thick; legs without black hair, and abdomen usually with but little.....5.
   Antennae slightly longer, the joints beyond the fourth about one and one-fourth times longer than thick, joint 3 equal to 4; legs often with more or less black hair on tibiae and tarsi; disk of tergites (at least 3 to 6) with long, erect black hair contrasting with the whitish apical bands; hair of face thin, the clypeus well exposed; length, 9–10 mm.....*consors* Cresson.
5. Hair of face thin, with black or dusky hairs intermixed on the orbital margins, vertex and scapes; tergites minutely and rather sparsely punctate; antennal joint 3 a little longer than 4; length, 8–9 mm.....*paniscus* Viereck.
   Hair of face rather short and dense up to a line slightly above level of antennae, and entirely whitish; tergites finely, sharply and almost densely punctate; antennal joint 3 a little shorter than 4; length, about 7 mm.....*nigrifrons* Titus.
6. Tergite 1 with very short hair on the disk.....7.
   Tergite 1, and often basal middle of 2, with long loose hair on disk.....8.
7. Abdomen minutely and densely punctured; tergite 1 with short erect hair on basal declivity and lateral margins, its disk and that of following segments with very short, pale ochreous hair, the hair-bands narrow and whitish; hair of face short, very dense, the vertex abruptly exposed; wings very short; length, 10 mm..... .....*brevihirtus*, new species.
   Abdomen broad, densely and rather coarsely punctured, with an apical white hair-band on tergites 1 to 6 and thin basal band on 2 and 3; hair of head and thorax

moderately dense and of usual length; wings normal; length, about 10 mm..... ..... *robertsonii* Dalla Torre.

8. Wings clear hyaline, or even a little whitish, the discal pubescence short, fine and faint..... 9.
   Wings more or less dusky and distinctly pubescent on the disk..... 14.
9. Malar space about three-fourths as long as wide to slightly longer than wide..... 10.
   Malar space about one-half as long as wide..... 13.
10. Malar space about as long as wide, or somewhat shorter; hair-bands of venter well developed..... 11.
    Malar space a little longer than wide; antennal joint 3 one-half as long as 4; tergites 1 and 2 strongly, but finely, rather densely punctured; punctures of mesopleura only slightly coarser than those of abdomen and separated by about a puncture width; hair-bands of abdomen rather narrow, those of venter represented by a narrow white apical fringe on segments 2 to 4; length, 8–10 mm..... ..... *wootoni* Cockerell.
11. Antennal joint 3 a little longer than half of 4; punctures of mesopleura mostly about one-half to one puncture width apart; tergite 1 rather closely and finely punctured ..... 12.
    Antennal joint 3 one-half as long as 4; punctures of mesopleura rather small and crowded; tergite 1 with fine, rather sparse punctures, those of 2 much closer; pubescence whitish, faintly tinged with ochreous above; hair-bands of abdomen broad and dense; length, 8–9 mm..... *tucsonensis* Cockerell.
12. Malar space about or nearly as long as wide; pubescence white, long and rather dense; hair-bands of abdomen broad, those of ventral segments 2 and 3 much broadened in middle; punctures of mesoscutum small, well separated, those of tergites very fine and moderately close, those of 2 closer; tergite 2 broadly and strongly impressed at base; plates of seventh ventrite quadrate; length, 8–9 mm..... *phaceliae* Cockerell.
    Similar but smaller; malar space somewhat shorter; tergite 2 less strongly impressed at base; punctures of mesoscutum coarser and consequently appearing closer together, those of tergites 1 and 2 more nearly uniform; plates of seventh ventrite triangular, emarginate at apex, length, 6–7 mm..... *lutzi*, new species.
13. Tergites 1 and 2 finely punctured, closely on 2, more sparsely on 1; mesopleura with rather coarse, subcontiguous punctures; metapleura rugoso-punctate all over, slightly protuberant above; pubescence white; abdominal bands moderately wide, those of ventral segments 2 to 5 rather weak and weaker in the middle; length, about 7.5 mm..... *wickhami*, new species.
    Tergites 1 and 2 with very minute and well-separated punctures, becoming less distinct on 1; mesopleura densely and rather coarsely punctured; metapleura with a large, shining, smooth space, above which is a rugoso-punctate protuberance; pubescence white; hair-bands of abdomen broad and dense, those of ventral segments 2 to 5 dense and broadened in middle on 2 and 3; length, about 9–10 mm. ..... *gypsicolens* Cockerell.
14. Metapleura merely protuberant above..... 15.
    Metapleura strongly protuberant above, with lower edge of protuberance abrupt, narrowly testaceous, arcuate and strongly overhanging a smooth recess, which has about two coarse wrinkles; punctures of mesopleura dense, those of tergite 2 fine and very close, those of tergite 1 much sparser; pubescence ochreous, paler on face, cheeks and underparts; length, about 8 mm..... species near *americanus* Cresson.
    (*C. americanus* Cresson, as well as *aberrans* Cockerell and *wilmattae* Cockerell, has the same peculiar structure of the metapleura.)
15. Malar space about, or nearly as long as broad; hair-band or fringe at apex of ventrite 5 longer and denser on each side or interrupted at middle..... 16.

(Cf. *compactus*, couplet 27, western specimens of which with black hairs of mesonotum lacking, would run out here, as malar space is long, but fringe on ventrite 5 is uniform.)

Malar space more transverse, nearly twice as broad as long; fringe or band on ventrite 5 uniform ..... 19.

16. Malar space about as long as broad ..... 17.

Malar space shorter than broad by about one-fourth; punctures of mesopleura mainly nearly a puncture width apart; tergites 1 and 2 finely and rather closely punctured, more sparsely on 1; pubescence dull ochreous, whitish beneath and on abdomen; length, about 7.0–7.5 mm. ..... *spurcus* Viereck.

17. Tergite 2 more weakly impressed at base and more densely punctured; lateral expansions of sagittae narrow ..... 18.

Tergite 2 strongly and broadly impressed at base, moderately densely punctured; mesopleura with punctures mostly about half a puncture width apart; apical fringe of ventrite 5 long at sides, broadly weak or interrupted in middle, a small tuft of still longer hair on each side of ventrite 6; pubescence bright fulvous to ochreous or whitish, not much paler beneath; lateral expansion of sagittae broad; length, 8–10 mm. ..... *eriogoni* Cockerell.

18. Punctures of tergite 1 moderately dense, mainly about one to two puncture widths apart; tergite 2 more closely punctured; pubescence fulvous to pale ochreous; apices of sagittae rather narrow; apical plates of ventrite 7 large and broad, longer than wide, with outer margin evenly rounded and marginal cilia of apical half short; length, about 7–9 mm. ..... *eulophi* Robertson.

Punctures of tergites 1 and 2 dense, little if any sparser on 1; pubescence fulvous to pale ochreous; sagittae broader and blunter at apex, the lateral expansions rather narrow; apical plates of ventrite 7 shaped as in *eulophi* except outer margin strongly emarginate near base and before the middle, with a short quadrate lobe between; length, about 8–10 mm. ..... *kincaidii* Cockerell.

19. Posterior face of propodeum, except enclosure, rugosely reticulate; mesoscutum more or less closely punctured; apical plates of ventrite 7 with a conspicuous tuft of hair on outer margin near base ..... 20.

Posterior of face of propodeum shining, with scattered setiferous pustules which become closer at sides; punctures of mesoscutum moderately coarse and rather well separated; those of tergite 1 mainly about one to two puncture widths apart, of 2 closer; basal impression of tergite 2 rather weak; pubescence fulvo-ochreous to whitish, hair-bands of abdomen dense; apical plates of ventrite 7 long, narrow, widened at apex, without tuft of hair on outer margin near base; length, 8–9 mm. ..... *rufocinctus* Cockerell.

20. Sagittae with broad lateral membranous expansion, which is broadly truncate at tip, coterminous with the broad sclerotized apex ..... 21.

Lateral expansion of sagittae narrow and narrowed toward apex, the sclerotized tips of sagittae being comparatively narrow and rounded; apical plates of seventh ventrite columnar, expanded at apex, with short, dense, discal pubescence and short apical fringe; length, 8–10 mm. ..... *fulgidus* Swenk.

21. Collar of pronotum with its anterior carinate margin produced on each side into a distinct spine; basal half of disk of apical plates of seventh ventrite nude ..... 22.

Collar of pronotum obliquely truncate at each end, with the posterior margin extended farther laterad than the anterior margin; apical plates of seventh ventrite columnar, expanded at apex (similar to *fulgidus*, but longer), the middle of disk with rather long erect hair, the apical fringe short; length, 8–11 mm. ..... *angelicus* Cockerell.

22. Apical plates of seventh ventrite more or less abruptly and conspicuously widened beyond the middle, with discal pubescence long and loose, fringing the margin;

pubescence ochreous, the abdominal hair-bands white or whitish, the discal hair of tergites in front of bands black or very dark; stigma and nervures more or less ferruginous; length, about 9 mm. ..... *simulans simulans* Cresson.

Apical plates of seventh ventrite more or less gradually and evenly widened toward apex and obliquely truncate or rounded on apical margin (California material verges a little more toward typical *armatus* than Swenk's figure of the type); pubescence bright fulvous to ochreous; stigma and nervures usually dusky; length, 8–10 mm. ..... *simulans nevadensis* Swenk.

23. Hind tibiae distinctly swollen and widest at, or a little beyond, the middle; hind basitarsi two to three times as long as wide ..... 24.

Hind tibiae more or less slender, or tapering from apex toward base; hind basitarsi more than thrice as long as wide ..... 25.

24. Front femora with a dense, very long white fringe behind; antennae rather short, joint 3 longer than 4; hind basitarsi short and broad, barely more than twice as long as wide; apical tergites with much black hair; length, about 10 mm. ..... *latitarsis* Robertson.

Front femora with a comparatively short thin fringe behind; antennae rather long, joint 3 little more than half as long as 4; hind basitarsi nearly thrice as long as wide; longer hair at apex of abdomen mainly light; length, about 8 mm. ..... *intermixtus* Swenk.

25. Tergites more or less depressed apically, the extreme margin not reflexed ..... 26.

Tergites 1 to 3 with a deep preapical groove, the apical margin narrowly and sharply reflexed and more or less erose; clypeus convex, densely punctured and hairy; malar space very short and transverse; antennae short, joint 3 longer than 4; length, about 9 mm. ..... *brevicornis* Robertson.

26. Antennae long, joint 3 much shorter than 4 ..... 27.

Antennae rather short, joint 3 as long as 4 on under side, but shorter than 4 above; clypeus depressed, dull, rather obscurely and closely punctured and nearly nude; malar space about twice as broad as long; abdomen finely and densely punctured, the hair-bands broad; length, about 9 mm. ..... *willistoni* Robertson.

27. Malar space very short ..... 28.

Malar space as long as wide; clypeus subdepressed, shining, sparsely punctate and thinly hairy; abdomen finely, moderately densely punctured; length, 8–11 mm. ..... *compactus* Cresson.

(Western specimens of *compactus* are said by Swenk to lack the dark hairs of the mesoscutum, and hence would run out at couplet 15.)

28. Pleura of thorax shining, with separate but close punctures, as coarse as, or coarser than, punctures of mesoscutum; abdomen less closely, more coarsely punctured. 29.

Pleura of thorax dullish, closely, almost confluently punctured, at least above and anteriorly; abdomen finely and very closely punctured ..... *simulans simulans* Cresson.

29. Clypeus densely punctured, hairy; abdomen with moderately close small punctures, the base of tergite 2 weakly impressed, minutely and sparsely punctured; base of tergites 3 and 4 strongly impressed and deeply recessed beneath a strongly projecting ledge of the basal articulating portion; length, 9–10 mm. .. *nudus* Robertson.

Clypeus shining, sparsely punctured and partially nude; abdomen closely, rather coarsely punctured; base of tergite 2 strongly impressed, where the punctures become finer and denser, and with a still more impressed narrow basal groove; base of following tergites but little impressed; length, about 12 mm. ..... *gilensis* Cockerell.

FEMALES

1. Head more or less wider than long, the inner orbits of eyes converging below.....2.
   Head nearly as long as broad, the inner orbits hardly converging below; abdomen dull, finely and closely punctured; front coxae with a long hairy spine; claws cleft, the teeth subequal; dorsal pubescence ochreous to fulvous; hair-bands on tergites 1 to 5 rather narrow, white, the disk of tergites 2 to 5 with black hair, becoming light on base of 2; length, about 12 mm.....*andrewsi* Cockerell.
2. Hair of head partially or entirely black; hair, also, of legs, tergum and sometimes of pleura more or less black.....3.
   Hair entirely light, or with black hairs intermixed only on vertex, mesoscutum and scutellum; hair of legs usually light, but tergites often with black or dusky hair on the disk in front of hair-band.....5.
3. Hair of head, pleura, legs and abdomen, including venter, all or nearly all black, the light hair-bands of abdomen weak or absent.....4.
   Hair of head light, with black hairs intermixed on sides of face, vertex, cheeks and scapes; hair of pleura entirely light, of legs, especially the hind pair, more or less black; tergites 1 to 5 each with a white apical band; tergite 1 very finely and sparsely punctured; pleura shining with fine, well separated punctures; length, 8–9 mm.....*paniscus* Viereck.
4. Hair of thoracic notum whitish, sometimes with blackish hairs, intermixed, that of head, pleura, legs and abdomen black; tergites 1 to 5 each with a thin whitish, easily worn band; mesoscutum and mesopleura similarly punctured, the punctures small and rather close; tergite 1 with fine, unequal, moderately close punctures; truncation of propodeum dullish, the bowl of enclosure mainly finely rugose; length, about 7 mm.....*nigrifrons* Titus.
   Hair of thoracic notum ochreous to fulvous, that of head, pleura, legs and abdomen black, but tergite 1 with hair mainly long, loose and light, and some light hair on basal middle of tergite 2; tergites 1 and 2 each with a thin whitish apical band, broadly interrupted in middle; mesoscutum and mesopleura more closely punctured than in *nigrifrons;* bowl of enclosure little rugose; abdomen shining, minutely punctured, the punctures sparse on tergite 1, closer on base of 2; length, about 9 mm.....*consors* Cresson.
5. Clypeus closely or densely punctured, the punctures more or less striate; supraclypeal area closely punctured.....6.
   Clypeus and supraclypeal area polished, the middle of clypeus with a few sparse punctures, the supraclypeal area nearly impunctate; pubescence whitish, the abdomen nearly uniformly covered, the hair becoming longer and thinner on tergite 1 and a little denser on apex of tergites and on base of tergite 2; apical depression of tergites testaceous; length, 7–8 mm.....*petalostemonis* Swenk.
6. Hair of vertex, mesoscutum and scutellum entirely light.....7.
   These parts with more or less black or fuscous hair intermixed.....16.
7. Front coxae unarmed, or at most with a short blunt tubercle, no longer than thick..8.
   Front coxae with a hairy spine-like process at apex; inner spur of hind tibia minutely and closely pectinate; claws with a subbasal inner tooth; mesopleura dull, densely punctured; abdomen shining, very minutely punctate, the disk of tergite 1 nearly impunctate; apex of tergites 1 to 5 and base of 2 with a broad, dense hair-band; base of tergite 3 with a thin band; length, about 11 mm.....*gypsicolens* Cockerell.
8. Hair of face and thorax rather dense and strongly plumose; tergite 1 with more or less abundant long loose hair on disk and basal declivity; mesopleura and abdomen shining; inner spur of hind tibia not pectinate.....9.
   Hair of face and thorax thin and little plumose; tergite 1 nearly nude, the disk with short, fine, sparse hair; mesopleura and tergites dullish, strongly and closely punctured; inner spur of hind tibia minutely pectinate; enclosure of propodeum, in-

cluding the bowl, rather coarsely rugose; length, 11–13 mm.....
.....*robertsonii* Dalla Torre.

9. Disk of tergites 2 to 4 in front of apical band with appressed light pubescence more or less concealing the surface; wings clear hyaline, with fine, weak, comparatively sparse and inconspicuous discal pubescence; hair of tergite 6 light.....10.
Disk of tergites in front of apical band with fine, more or less erect hair, not concealing surface; hair of tergite 6 often black.....11.

10. Tergite 2 with a broad basal and apical band, the intervening space about equaling either band and more or less exposed; disk of following segments more or less covered with pubescence; punctures of tergites fine and rather close, becoming coarser and a little sparser on tergite 1; length, about 9 mm.....*phaceliae* Cockerell.
Similar but smaller, with pubescence of abdomen more nearly concealing the surface, the comparatively nude area of tergite 2 narrow; clypeus more sparsely punctured; punctures of abdomen finer, becoming slightly sparser, but not coarser, on tergite 1; length, about 7 mm.....*lutzi*, new species.

11. Tergites 1 and 2 more weakly or rather sparsely punctured.....12.
Tergites 1 and 2 more or less closely and strongly punctured, the punctures, however, not coarse.....13.

12. Punctures of tergites 1 and 2 very fine, rather close on 2 and sparse on 1; hair-bands of abdomen rather narrow, the base of tergite 2 with a rather thin band; apex of tergite 1 hardly depressed; longer, coarser, erect hairs of tergite 5 and those of 6 light; hair of notum tinged with brown; length, about 7–8 mm...*spurcus* Viereck.
Punctures of tergites 1 and 2 fine, moderately close on 2, and becoming a little sparser on 1; tergite 1 well depressed apically, the depression preceded by a slight ridge or swelling on each side; hair-bands, including one at base of tergite 2, broad and dense; longer hairs of tergite 5 and hair of 6 usually black; hair of notum more or less bright reddish fulvous; length, 8–10 mm.....*eriogoni* Cockerell.

13. Supraclypeal area, just above clypeus, closely punctured.....14.
Supraclypeal area with part just above clypeus depressed, hardly punctured, but with vague striae; the upper portion strongly tectiform, with the declivous sides densely punctured; clypeus closely striately punctured; punctures on disk of tergite 1 rather well separated, becoming finer and very close on apical depression; hair of tergite 6 reddish; length, about 10 mm.....*trigonatus* Cockerell.

14. Tergite 2 hardly impressed at base; malar space shorter than half the basal width of mandible; wings a little dusky, with distinct, close, discal pubescence.....15.
Tergite 2 strongly impressed at base, except at sides; malar space about as long as half the basal width of mandible; wings clear hyaline, with rather weak and sparse discal pubescence; tergites 1 and 2 shining, with fine, strong, nearly uniformly close punctures, those on disk of 1 slightly coarser; tergite 3 minutely tessellate and very finely punctured; length, 9–11 mm.....*apacheorum*, new species.

15. Punctures of mesopleura round, subequal to, and sparser than, those of mesoscutum, mainly at least a puncture width apart and gradually becoming shallower toward middle of sternum, which is tessellate, and foveate at middle of hind margin; impunctate area on posterior middle of mesoscutum large; ventral segments of abdomen slightly dullish and minutely punctured; length, 9–11 mm.....
.....*kincaidii* Cockerell.
Punctures of mesopleura a little coarser than, and nearly as close as, those of mesoscutum, mainly less than a puncture width apart, many of them more or less oval, and becoming subobliterated on the rugulose middle of sternum, which is hardly foveate behind; ventrites more shining, more strongly punctured; impunctate area of mesoscutum smaller; length, about 10 mm.....*eulophi* Robertson.

16. Front coxae with a distinct spine-like hairy process at apex.....17.
Front coxae unarmed.....21.

17. Scutellum non-striately punctured; mesoscutum shining, more or less closely punctured.....18.
Scutellum striately punctured; mesoscutum more or less subconfluently punctured anteriorly, where the surface is dull; posterior middle of scutum at most with a small impunctate space on each side of median line, the usual impunctate region of other species being more or less punctured, although more sparsely than anterior part of scutum; length, about 10–11 mm.....*simulans* Cresson.[1]
18. Prothoracic spines sharp, extending outward about level with sides of head; tergite 1 more or less sparsely punctured.....19.
Collar of pronotum truncate at each end, not produced into a spine.....20.
19. Wings glassy hyaline, with the discal pubescence comparatively sparse and weak; tergites 1 and 2 polished, very finely punctate, the punctures on disk of tergite 1 remote, those on 2 closer and weaker; hair-bands of abdomen broad, dense, pure white; mesopleura dull, very densely punctured; length, 10–11 mm.....
.....*tucsonensis* Cockerell.
Wings dusky hyaline, the discal pubescence close and distinct, tergites 1 and 2 with the punctures stronger than in *tucsonensis*, but fine, moderately sparse on 1 and close on 2; hair-bands of abdomen less heavy, more easily worn or damaged; length, about 11 mm.....*fulgidus* Swenk.
20. Collar of pronotum rather broad throughout, obliquely truncate and emarginate at each end, the carinate margin at anterior corners slightly produced, the posterior corners rounded; frontal foveae finely, sparsely punctate, broad above and reaching halfway to lateral ocelli; abdominal bands broad and dense; length, about 11 mm.....*angelicus* Cockerell.
Collar of pronotum narrow, widened at each end where it is almost squarely truncate, the anterior corner sharp but hardly produced; frontal foveae comparatively small, narrowed at both ends and more or less invaded by the large punctures of frons; punctures of mesoscutum less crowded than in *angelicus*, the impunctate area on posterior middle larger; puncturation of abdomen sparser than in *angelicus*, and nearly as in *fulgidus;* length, about 9 mm.....*truncatus*, new species.
21. Tergites 1 to 3 without a narrow, groove-like, preapical impression.....22.
Tergites 1 to 3 with a narrow, groove-like impression near apex, followed by an elevated erose margin or flange, the groove containing the usual hair-band, the posterior side of the flange, at least on tergites 1 and 2, with a short white fringe; tergite 1 with strong, close punctures, nearly as coarse as those of mesoscutum; following segments closely punctured, the punctures becoming gradually finer toward apex of abdomen; clypeus dull, closely and non-striately punctured; length, about 8–9 mm.....*brevicornis* Robertson.
22. Apical ventrite not carinated.....23.
Apical ventrite with a coarse ridge or carina on each side; enclosure of propodeum convex, without a transverse carina, the bowl with transverse rugae; mesopleura shining, the punctures more separated than those of anterior half of mesoscutum; abdomen closely and rather finely punctured; length, about 12 mm.....
.....*compactus* Cresson.
23. Clypeus depressed or subdepressed, more or less dull and striately sculptured, with the puncturation little developed; tergites finely and densely punctured.....24.
Clypeus more convex, shining, strongly punctured; tergites more sparsely punctured, the punctures either comparatively coarse or minute.....25.

[1] The races of *simulans* may be separated thus:
a. Prothoracic spines very long, extending outward, usually, beyond the sides of head; vertex, mesoscutum and scutellum with much black hair.....*simulans armatus* Patton.
Prothoracic spines shorter; vertex, mesoscutum and scutellum with less black hair.....b.
b. Vertex and anterior half of mesoscutum with at least some black hairs intermixed; punctures of mesoscutum more confluent.....*simulans simulans* Cresson.
Black hairs mainly confined to the comparatively nude area of mesoscutum and scutellum and its margins; punctures of mesoscutum less confluent.....*simulans nevadensis* Swenk.

24. Mesoscutum and mesopleura shining, similarly and closely punctured, the scutum without an impunctate area; scutellum large, depressed, closely punctured all over; scopal hairs of hind femora and tibiae brownish fuscous; hind basitarsi very broad, hardly more than twice as long as wide; length, about 9 mm..... ..... *latitarsis* Robertson.

Mesopleura dull, densely punctured, the punctures a little larger and more crowded than those of the shining mesoscutum; scutellum convex, sparsely punctured at the base; hind basitarsi about thrice as long as wide; scopal hairs of hind femora and tibiae light; clypeus strongly depressed, minutely sculptured; length, about 9 mm..... *willistoni* Robertson.

25. Punctures of tergite 1 rather coarse, subequal to, or but little finer than, those of mesoscutum..... 26.

Punctures of abdomen very minute, sparse on middle of tergite 1 and rather close on tergite 2; mesoscutum shining, very closely punctured, with a small impunctate space behind; scopal hair on outer side of hind femora and tibiae rather compact and tinged with brown; length, about 9–10 mm..... *intermixtus* Swenk.

26. Punctures of clypeus close, becoming substriate on anterior part; mesoscutum shining with strong, close punctures, which become a little coarser and well separated on posterior half; scutellum with coarse, well-separated punctures; bowl of enclosure without transverse rugae; joint 3 of antennae equal to 4; length, about 10–11 mm..... *nudus* Robertson.

Punctures of clypeus strongly striate, moderately close; punctures of mesoscutum nearly uniformly equal and close, with a small impunctate space behind; bowl of enclosure with transverse rugae; antennal joint 3 considerably longer than 4, length, about 12–13 mm..... *gilensis* Cockerell.