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NOTES ON SOME WESTERN BEES

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The bees upon which the following notes are based were collected by the American Museum expeditions to Arizona and the Rocky Mountains. Except where otherwise stated, they were collected by Frank E. Lutz and the field notes are by him.

DIANDRENA Cockerell

This genus (or subgenus of *Andrena*) was founded on those bluish or greenish species which possess only two submarginal cells, the *Panurgus chalybæus* of Cresson being the type. Viereck has (1917) described species in *Parandrena*, but this group appears to have been derived quite independently from the *Andrena* stem. As we now know it, *Diandrena* consists of a considerable number of rather closely related species, having its center in California, with a general distribution very like that of the mariposa lilies (*Calochortus*). The following species are Californian: *chalybæa* (Cresson), *puthua* Cockerell, *beatula* Cockerell, *cyanosoma* Cockerell, *clariventris* Cockerell, *scintilla* Cockerell, *foxii* (Cockerell), *austrocalifornica* (Viereck), *olivacea* (Viereck), *subchalybea* (Viereck), *submæsta* (Viereck), and *parachalybea* (Viereck). The only known species which are not Californian are *nothocalaidis* Cockerell from Colorado, *chalybioides* (Viereck) from Oregon, *perchalybea*¹ (Viereck) from Washington State, and the following new one from Wyoming.

Diandrena ablegata new species

♀.—Length about 9.5 mm. Blue-green, varying to olive-green, with a dull and granular surface. The type has the abdomen olive-green, with the hind margins of the third and fourth segments very broadly steel-blue and the first two segments suffused with the same color apically. Process of labrum strongly emarginate. Mandibles dusky reddish apically. Clypeus closely and finely punctured. Third antennal joint a little shorter than the next three together; apical half of flagellum marked with clear yellowish-ferruginous beneath. Facial foveæ black, very short and narrow, not going below antennal line; face with thin, pale hair in middle and black at sides; cheeks with white hair. Mesothorax and scutellum dull; thorax with pale fulvous-tinted hair, very thin above; a little dark hair sometimes present about the middle of the mesopleura. Tegulae shining black. Wings as in *D. nothocalaidis*, slightly

¹The name "*perchalybia*" in 1916, Proc. Acad. Nat. Sci. Phila., LXVIII, p. 591, is a misprint, as is shown by the references on p. 590 with the correct spelling.

dusky; stigma clear ferruginous. Legs with pale hair; scopa of hind legs abundantly pale fulvous, the tibiae posteriorly toward base with dark fuscous hair. Second abdominal segment depressed about one-third. Hair at apex of abdomen very pale fulvous, becoming fuscous at tip.

Wyoming: 7 ♀, Stewart Ranger Station (type locality) in Jackson Hole, about 6700 ft. alt., among lodgepole pine, Engelmann spruce, etc., July 18, 1920; 4 ♀ (one with deep orange pollen), Jackson, about 6300 ft. alt., moderately moist pasture-land, July 13-17, 1920.

This is so near to *D. nothocalaidis*, which flies in May, that I wondered whether it could be a pale-haired second brood of that species. Against this is the fact that *D. nothocalaidis* is very common at Boulder, Colorado, and we have never found any sign of a second generation or any other form of *Diandrena* there. *D. nothocalaidis* has the hair of face abundant and black, of pleura black, etc.

HALICTOIDES Nylander

The genus *Halictoides* was founded by Nylander in 1848 on two black European bees, of which *H. dentiventris* Nylander has been designated the type. No additions have been made to this immediate group; but Morawitz has described six species forming a series of *Halictoides* in which the body or head is more or less blue-green or blue-black and the legs of the males of the three species in which that sex is known are modified. Of these later species, *H. paradoxus* lives at high altitudes in the European Alps, *H. atocæruleus* and *H. pamirensis* occur in Turkestan; *H. calcaratus* and *H. montanus* are from China; and *H. clavicrus* is Mongolian. By the structure of the mouth-parts, *H. paradoxus* is nearer to some of the American species than to *H. dentiventris* (See *Annals and Mag. Nat. Hist.*, (7) IV, 1899, p. 420).

In America the genus is more numerously represented with over a dozen species. A table was given in 1916, *Ent. News*, XXVII, p. 62. In the same year Crawford described *H. viridescens* from California. California, with five species, and New Mexico, with six, indicate that the genus is best represented in the Southwest. One species, *H. novæangliæ* Robertson, occurs in the Northeastern States and one, *H. marginatus* Cresson, is found in the Central States from Illinois, whence Robertson described it as *autumnalis*, westward to the Rocky Mountains.

Five species were taken by the American Museum expeditions as follows.

Halictoides oryx Viereck

COLORADO: 1 ♀, Aspen, about 7900 ft. alt., at edge of town, July 24, 1919, collected by Herbert F. Schwarz.

Halictoides mülleri Cockerell

WYOMING: 1 ♂, Stewart Ranger Station in Jackson Hole, about 6700 ft. alt., among lodgepole pine, Engelmann spruce, etc., July 18, 1920.

This is a most astonishing record, *H. mülleri* being a species of southern California (Pasadena and Claremont). There is no question about the identification.

Halictoides harveyi Cockerell

COLORADO: 5 ♂, 1 ♀, about 10,000 ft. alt. on Summit Road near Ouray, July 13, 1919, collected by Messrs. Lutz, Schwarz, and Bailey; 1 ♂, Ouray, about 8000 ft. alt., at *Achillea millefolium*, July 11, 1919; 2 ♂, 4 ♀, Tennessee Pass, about 10,300 ft. alt., August 1, 1919, and 1 ♀ collected by Mrs. F. E. Lutz at about 10,500 ft. alt., August 8, 1920; 1 ♀, Leadville, about 10,200 ft. alt., August 3, 1919; 1 ♂, Pagosa Springs, about 7400 ft. alt., in the U. S. Forest Reservation, June 22, 1919.

Halictoides (Parahalictoides) maurus (Cresson)

IDAHO: 1 ♀, Victor, about 6300 ft. alt., July 11, 1920. WYOMING: 1 ♂, Thumb of Yellowstone Lake, about 7800 ft. alt., July 9, 1920; 1 ♂, Stewart Ranger Station in Jackson Hole, about 6700 ft. alt., July 18, 1920; 1 ♂, along Cache Creek near Jackson, about 6600 ft. alt., July 14, 1920. COLORADO: at about 10,000 ft. alt., along Summit Road near Ouray, July 13, 1919, collected by Herbert F. Schwarz.

From Jackson, Wyoming, also comes a specimen of *Colletes nigrifrons* Titus, superficially exactly like *H. maurus*. Whether this resemblance has any biological significance I do not know. The *Colletes* was not found with the *H. maurus* but higher up at about 7000 ft. alt.

Halictoides (Epihalictoides) marginatus (Cresson)

COLORADO: 49 ♂, 5 ♀, Wray, about 3700 ft. alt., August 17-19, 1919, both sexes but especially males at *Helianthus*, collected by Messrs. Lutz and Bailey; 1 ♂, La Junta, about 4100 ft. alt., August 12, 1920; 5 ♂, Boulder, about 5300 ft. alt., on plains, August 7-12, 1919; 1 ♀, about 8200 ft. alt., along Castle Creek near Aspen, July 24, 1919, at *Erigeron macranthus*.

Halictoides marginatus halictulus (Cresson)

UTAH: 66 ♂, Ogden, August 30, 1916, asleep in early morning on *Helianthus* flowers. WYOMING: 1 ♂, Sheridan, collected by Dr. Metz. COLORADO: 4 ♂, Boulder, about 5300 ft. alt., on plains, August 7-12, 1919.

Typical *marginatus*, described from Kansas, has clear wings and amber stigma. I have it from Baldwin, Kansas, (Bridwell); the Wray and other specimens listed above conform with it. Cresson described *Panurgus halictulus* from Colorado and Utah, noting the dusky nervures. With the fine series now before me, I can clearly separate *halictulus* as a distinct race or subspecies having the wings dusky and the stigma dusky-ferruginous, margined with fuscous. This form is not accounted for in

the table in Entomological News, 1916. The two races meet at Boulder, a series taken on the plains west of the town consisting of three *marginatus*, four *halictulus*, and two more or less intermediate. It is, however, astonishing to find that the specimen from Aspen, high up in the mountains, is true *marginatus* with pale amber stigma. I have *halictulus* from Santa Fé, New Mexico; the specimen was compared by Mr. Fox with Cresson's type and found to agree. Contrary to expectation, a specimen from Las Cruces, New Mexico, is also *halictulus*.

CALLIOPSIS Smith

Calliopsis rhodophilus (Cockerell)

COLORADO: 1 ♀, north of Animas, near Durango, about 6600 ft. alt., June 26, 1919; 1 ♀, Ridgeway, about 7000 ft. alt., July 10, 1919.

The above were overlooked when reporting on these bees in Amer. Mus. Novitates No. 24. The Ridgeway female resembles *C. andreniformis* in possessing dog-ear marks but it has the black hair on the head and thorax above that are characteristic of *rhodophilus*. The same form was taken at Las Vegas, New Mexico, July 11, at flowers of *Melilotus officinalis* by Mrs. W. P. Cockerell.

SPINOLIELLA Ashmead

The species of this genus are rather numerous in the West but no locality seems to possess any large number. The greatest concentration or diversification of specific forms seems to be in California, whence nine have been recorded. The American Museum expeditions obtained only three in Colorado. Possibly no others occur in the regions covered, though *S. helianthi* Swenk and Cockerell, collected by Cary in Sioux County, Nebraska, might be expected in eastern Colorado and Wyoming. It has deep yellow bands on the abdomen. *S. meliloti* Cockerell is a very distinct species from southern New Mexico.

Spinoliella zebrata (Cresson)

COLORADO: 48 ♂, 4 ♀, Ridgeway, about 7000 ft. alt., among *Artemisia*, cactus, etc., July 10, 1919, collected by Messrs. Lutz and Bailey.

The large size readily distinguishes this species from the other two. The male has the face below the antennæ entirely yellow and the scape yellow in front. The female varies somewhat. In one specimen the light spots below the antennæ are lacking and the clypeus is black except the sides broadly and a median band not reaching the upper and lower margins. The male may either have or lack yellow marks on the upper margin of the prothorax.

Spinoliella australior (Cockerell)

COLORADO: 10 ♀, La Junta, about 4100 ft. alt., August 12, 1920; 1 ♀, Pueblo, vacant lots in town, August 9, 1920; 1 ♂, Boulder, about 5300 ft. alt., on plains, August 8, 1919.

The male is distinguished from the light-faced form of *scitula* by the presence of the dog-ear marks. In Sioux County, Nebraska, Swenk found *S. australior* common, but no *scitula* were obtained. *S. scitula* is the characteristic form of the mountain region of Colorado. At Fort Collins, however, Baker found both *scitula* and *australior*.

Spinoliella scitula (Cresson)

WYOMING: 11 ♂, 34 ♀, Green River, about 6100 ft. alt., June 29 and July 2, 1920; 1 ♀, Rock Springs, about 6250 ft. alt., June 29, 1920; 1 ♂, 1 ♀, Jackson, about 6300 ft. alt., July 13-17, 1920. COLORADO: 1 ♂, 2 ♀, Leadville, about 10,300 ft. alt., August 3-5, 1919; 7 ♂, 25 ♀, Glenwood Springs, about 5800 ft. alt., July 22-29, 1919, and August 5, 1920, various collectors; 3 ♀, Alamosa, about 7500 ft. alt., at *Radicula sinuata* along the Rio Grande, June 15, 1919; 1 ♀, Monte Vista, about 7650 ft. alt., June 16, 1919; 13 ♂, 15 ♀, Rifle, about 5400 ft. alt., on a bare sandy place used as a play-ground, July 19-21, 1919; 1 ♀, north of Animas near Durango, about 6600 ft. alt., at alfalfa, June 26, 1919; 1 ♀, Aspen, about 7900 ft. alt., July 25, 1919.

There is a variation of the female in which the fifth abdominal segment has only very minute, hardly noticeable spots. This must not be confused with *australior*, as the clypeus entirely lacks the light median band of that species and the face-marks in general agree with *scitula*. Five of the six Glenwood Springs females, two from Rifle, and the one from Jackson belong to this variant form.

The males also vary. Those from Glenwood Springs and Leadville have the clypeus largely black; Rifle males vary from much black on the clypeus to hardly any; Green River and Jackson males have the clypeus white, slightly marked with black or with only two dots or small spots. The form with white clypeus is typical *scitula*, the male described by Cresson as *pictipes*.

For the nesting habits, see Bull. Amer. Mus. Nat. Hist., XXII, p. 440.

HOPLITINA Cockerell

This genus was first called *Hoplitella* (1910) but, that name being preoccupied, was altered to *Hoplitina* (1913). The type is *H. pentamera* Cockerell from Claremont, California. In 1916 Crawford added a second species, *H. hesperia*, also from California. When I described *H. pentamera* I also published *Osmia remotula*, based on a female from Claremont, California. The mouth-parts were retracted and were not

examined, but the venation and other characters were so exactly like those of the Old World group *Erythrosmia*¹ that I had no hesitation in referring it there. Now comes a female from the Grand Canyon, Arizona; it is very close to *O. remotula*, certainly congeneric with it, but clearly distinct. The mouth-parts are exposed and the maxillary palpi have five subequal joints, the last two long and very slender. *Osmia* (*Erythrosmia*) *andrenoides* Spinola, which is to be considered the type of *Erythrosmia*, differs from true *Osmia* in having four-jointed maxillary palpi,² which are stout and very bristly, the two middle joints long, cylindrical, and about equal, the last pyriform and about half as long as the penultimate. *Erythrosmia* Schmiedeknecht may be considered a distinct genus, with the species *E. andrenoides* (Spinola) and *E. melanura* (Morawitz). *Osmia fallax*, which I have from Malaga, April, (Morice), appears to be closely related but is placed in a different group on account of the long axillar spines. *Osmia semirubra* Friese, which I have from Jericho, (Morice), probably falls in *Erythrosmia*.

If we thus exclude the American forms from *Erythrosmia* and transfer them to *Hoplitina*, the separation of the latter from *Osmia* becomes difficult. They are, however, remote from typical *Osmia* and it is merely a question of recognizing either a genus or a subgenus. The species assigned to *Hoplitina* in the broader sense may be separated as follows.

1. First three segments of abdomen wholly without hair-bands, even at the sides; tegulae black, faintly reddish posteriorly; first recurrent nervure joining second submarginal cell about twice as far from base as second from apex.
remotula (Cockerell).
First three segments of abdomen with conspicuous white hair-bands, at least at sides.....2.
2. Tegulae black; first recurrent nervure joining second submarginal cell far from base, the second about half as far from apex.....*incanescens*, new species.
Tegulae red or reddish.....3.
3. First recurrent nervure joining second submarginal cell very near base, the second more remote from apex; basal nervure exactly meeting nervulus (falling some distance short of it in *E. andrenoides*)...*pentamera* (Cockerell).
Recurrent nervures equally distant from base and apex of second submarginal cell; proportions of palpal joints also differing.....*hesperia* Crawford.

In the U. S. National Museum Crawford has rearranged the bees of this group and has separated *hesperia* as the type of a new genus, as yet

¹Ashmead regarded *Erythrosmia* as a synonym of *Pseudosmia* Radoszkowsky. *Pseudosmia* was based on a mixture of species, including only one *Erythrosmia*, *andrenoides*. I will designate as the type the first species, *P. cristata* (Fonscolombe). I have this from Marseilles, (Morice), and it is very different from *Erythrosmia*. *Pseudosmia*, on this basis, is apparently not separable from *Anthocopa* Lepeletier, the type of which is *papaveris* (Latreille). *Furcosmia* Schmiedeknecht, 1886 (*papaveris* here designated the type), is the same group.

²Concerning the palpi of *Osmia*, see Titus, 1901, Canadian Entomologist, p. 257.

unpublished. Possibly this genus should include all of the above species except *pentamera*.

Hoplitina incanescens, new species

♀.—Length about 8 mm.; robust. Black, with the first three abdominal segments clear red, the extreme base of the fourth also red; eyes pea-green. Pubescence abundant, white; first three abdominal segments with white marginal hair-bands at sides; apical segments appearing gray from a covering of appressed hairs. Flagellum very obscurely reddish beneath. Tegulae shining black. Wings hyaline, very faintly dusky; nervures and stigma black; basal nervure falling just short of nervulus, which is arched outward. Mandibles very broad at apex, acutely tridentate; tongue long; second and fifth joints of maxillary palpi each about $95\ \mu$ long, the third and fourth each about 88. Ventral scopa white, very short, carrying very pale yellow pollen.

In general like *H. remotula* but considerably larger, with a polished spot in the median line behind the ocelli, disc of mesothorax rather sparsely and weakly punctured (densely and minutely in *remotula*), abdomen with lateral bands, spurs fuscous. The metathorax is as in *remotula*.

ARIZONA: 1 ♀, Grand Canyon, about 7000 ft. alt., May 24, 1918, collected by Frank M. Jones.

CHELYNIA Provancher

When reporting on this genus in Amer. Mus. Novitates No. 21, the following species was overlooked, being mixed with *Osmia*, which it so much resembles.

Chelynia pavonina Cockerell

WYOMING: 1 ♂, Jackson, about 6600 ft. alt., July 14, 1920. COLORADO: 1 ♀, Pagosa Springs, about 7700 ft. alt., June 22, 1919.

The male has pale hair on the mesothorax, but in the female it is all black. The female is brilliant peacock-green, with the pleura bluer and the mesothorax yellowish green. The male has the abdomen much more purple than in the type, the colors being exceedingly rich.

