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Descriptions and Records of Bees.— IX.

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My knowledge of the habits of our marine Medusæ leads me to believe that *Limnocnida* has a hydroid stage in its life-history. So far as I am able to foresee, there should be no great difficulties to be overcome in rearing the fertilized ova of *Limnocnida* in small bell-jars. It would be a much quicker method than that of trying to find the hydroid in the lakes. The hydroid may have a special habitat which might take many years to find. If, on the other hand, the Medusa reproduces by direct development only, one would be able by rearing the ova to observe and preserve all the stages.

Limnocnida still remains outside any system of classification. It looks at first sight a Narcomedusa, on account of the shape of the stomach and the position of the gonads; but I do not think that it has any connexion whatever with the Narcomedusæ. Whether it is an Anthomedusa or is closely related to the Anthomedusæ should be decided when its development and life-history are definitely and clearly known. At present I am inclined to look upon *Limnocnida* as a specialized Anthomedusa. I have promised to give a description, with figures, of the specimens from the Niger in the "Budget Memorial Volume."

References.

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5th February, 1906.

XL.—*Descriptions and Records of Bees.*—IX.
By T. D. A. COCKERELL, University of Colorado.

Andrena (Trachandrena) perforatella, sp. n.

♀.—Length about 8 mm.

Black, with the middle and hind tarsi, and the hind tibiae, clear red; pubescence greyish white, the hair at apex of abdomen golden; wings strongly yellowish, the stigma and nervures clear ferruginous; flagellum dusky reddish beneath. Process of labrum very broad, truncate; clypeus exceedingly densely punctured, with no smooth line; facial foveæ, seen

from above, white, occupying about two thirds distance between eye and antenna, separated from each other by a narrow shining band or line, and ending at about level of the antennæ; mesothorax with very large and widely separated punctures; area of metathorax with coarse rugæ; abdomen shining, with small but distinct punctures, the bands represented only by patches of hair at sides of segments 2 to 4; second segment depressed more than one half, but not as much as the third.

The sculpture of the head and thorax practically with those of *A. Maria*, Rob., but, apart from the shape of the abdomen, legs, and caudal fimbria, perforated by smaller insect. The sculpture of the area is much more than in *A. sphaerodina*.

Hab. Boulder, Colorado, June 11, 1905 (W. P. Cresson).

The following table separates this species from its allies:—

Mesothorax between the punctures shiny; tarsi dark; abdominal segments 2 and 3 with conspicuous lateral patches of white hair	<i>multipligera</i>
Mesothorax between the punctures dullish	1.
1. Tarsi of middle and hind legs, and tibiae of hind legs, clear red; size smaller	<i>perforatella</i>
Tarsi dark reddish or blackish; size larger	2.
2. Abdomen nearly always red; stigma red	<i>Maria</i> , Rob.
Abdomen always black; stigma dark	<i>grandis</i> , Rob.

Andrena (Pterandrena) Gardineri, sp. n.

♀.—Length 10-11 mm.

Black, the thorax dull and granular, the abdomen and punctured; pubescence greyish white, rather dense on thorax above; abdominal segments with the margins hyaline, but covered by very conspicuous con white hair-bands, that on the first a little weakened in the middle; apical fimbria pale yellowish. Head on process of labrum strongly bidentate; clypeus shining with strong punctures, distinctly separated in the middle; hairs about head; apical six joints of flagellum red beneath; seen from above, greyish white, rather narrow occupying more than half of distance between eye and antenna, not separated from eye, and quite short, reaching level of antennæ; mesothorax quite dullish with small but distinct punctures; area granular; tegulae with a reddish spot. Wings a little dusky; stigma and narrow, light ferruginous, margined with clear

knowledge of the habits of our marine Medusæ leads me to believe that *Limnocoidea* has a hydroid stage in its life-history. So far as I am able to foresee, there should be no difficulties to be overcome in rearing the fertilized *Limnocoidea* in small bell-jars. It would be a much easier method than that of trying to find the hydroid in the field. The hydroid may have a special habitat which might be difficult to find. If, on the other hand, the Medusa develops by direct development only, one would be able by observing the eggs to observe and preserve all the stages.

Limnocoidea still remains outside any system of classification. At first sight a Narcomedusa, on account of the position of the stomach and the position of the gonads; but I do not think that it has any connexion whatever with the Narcomedusæ. Whether it is an Anthomedusa or is related to the Anthomedusæ should be decided when the life-history and life-history are definitely and clearly known. At present I am inclined to look upon *Limnocoidea* as a related Anthomedusa. I have promised to give a description, with figures, of the specimens from the Niger in my next Memorial Volume."

References.

1. J. S. P. 1894. "On a Medusa observed by Dr. J. S. P. on the River Niger at Bamakou (French Soudan)." *Nat. Hist. ser. 6*, vol. xiv. pp. 29-34.
2. J. S. P. 1892. "Preliminary Account of the Fresh-water Medusæ of Lake Tanganyika (*Limnocoidea tanganica*)."
3. J. S. P. 1893. "Sur la Méduse du Victoria Nyanza." *Acad. Sci. Paris*, tom. cxvii. pp. 867-869.

Descriptions and Records of Bees.—IX.

Andrena (Pterandrena) perforatella, sp. n.

Length 8 mm.
Head and hind tarsi, and the hind tibiae, greyish white, the hair at apex of wings strongly yellowish, the stigma and flagellum dusky reddish beneath. Clypeus very broad, truncate; clypeus exceedingly broad, with no smooth line; facial foveæ, seen

from above, white, occupying about two thirds of the distance between eye and antenna, separated from eye only by a narrow shining band or line, and ending at about the level of the antennæ; mesothorax with very large and deep, widely separated punctures; area of metathorax with large coarse rugæ; abdomen shining, with small but distinct punctures, the bands represented only by patches of white hair at sides of segments 2 to 4; second segment in middle depressed more than one half, but not as much as two thirds.

The sculpture of the head and thorax practically agree with those of *A. Marie*, Rob., but, apart from the colour of the abdomen, legs, and caudal fimbria, *perforatella* is a smaller insect. The sculpture of the area is much coarser than in *A. sphærodina*.

Hab. Boulder, Colorado, June 11, 1905 (*W. P. Cockerell*).

The following table separates this species from its nearest allies:—

Mesothorax between the punctures shiny; tarsi dark; abdominal segments 2 and 3 with conspicuous lateral patches of white hair	<i>multiplicata</i> , Ckll.
Mesothorax between the punctures dullish	1.
1. Tarsi of middle and hind legs, and tibiae of hind legs, clear red; size smaller	<i>perforatella</i> , Ckll.
Tarsi dark reddish or blackish; size larger	2.
2. Abdomen nearly always red; stigma red	<i>Marie</i> , Rob.
Abdomen always black; stigma dark	<i>grandior</i> , Ckll.

Andrena (Pterandrena) Gardineri, sp. n.

♀.—Length 10-11 mm.

Black, the thorax dull and granular, the abdomen shining and punctured; pubescence greyish white, rather long and dense on thorax above; abdominal segments with the hind margins hyaline, but covered by very conspicuous continuous white hair-bands, that on the first a little weakened in the middle; apical fimbria pale yellowish. Head ordinary; process of labrum strongly bidentate; clypeus shining, with strong punctures, distinctly separated in the middle; no dark hairs about head; apical six joints of flagellum red beneath; foveæ, seen from above, greyish white, rather narrow, not occupying more than half of distance between eye and antennæ, not separated from eye, and quite short, scarcely reaching level of antennæ; mesothorax quite dullish, with small but distinct punctures; area granular; tegulæ hyaline, with a reddish spot. Wings a little dusky; stigma small and narrow, light ferruginous, margined with darker,

nervures ferruginous; third s.m. narrowed more than half to marginal. Legs dark, the small joints of the tarsi reddish; basal joint of middle tarsus broad and flat, with light golden hair beneath; hind legs with a copious, beautifully plumose scopa, which is filled with bright orange pollen, presumably of one of the Compositae; abdomen rather broad.

Allied to *A. Krigiana*, Rob., and *A. lauracea*, Rob., but considerably larger. In Viereck's table of north-western species it runs nearest to *A. nudimedioornis*, Vier., but it is not that. In Bruner's table it runs nearest to *macilentata*, Prov., and *trizonata* (Ashm.), but it is neither of these.

Hab. Boulder, Colorado, June 4, 1905, two (W. P. Cockerell).

Dedicated to the memory of Professor John Gardiner, who was Professor of Biology at the University of Colorado.

Andrena lupinorum, sp. n.

♀.—Length a little over 13 mm.

Black, robust, of the group of *A. Carlini*; hair of thorax above, tubercles, and sides of metathorax fox-red, especially bright on tubercles and scutellum; hair of pleura rusty black; of head pale reddish, blackish at sides of occiput; no black hair on face, but the scape has dark fuscous hair; abdomen very shiny, with piliferous punctures, the very scanty pubescence black, the caudal fimbria heavy and purple-black; second segment depressed hardly over a third, with slight purple tints in the middle, and a faint longitudinal keel; legs black, with black hair, that on anterior femora behind pale ferruginous; hair on inner sides of basal joints of tarsi black; spurs black, tipped with reddish; scopa coarse, that on hind femora and metathorax especially filled with creamy-white pollen; tegulae with a red band posteriorly. Wings strongly smoky; stigma very small and narrow, ferruginous, the nervures fuscous; first r. n. joining second s.m. well beyond the middle. Process of labrum very broad, broadly truncate; clypeus shiny, nude, very densely punctured, and with a median raised line; flagellum faintly reddish beneath; third antennal joint longer than 4+5; facial foveae, seen from above, light reddish, very broad, occupying practically all the space between eye and antenna, not separated from eye-margin, ending a little above level of top of clypeus; face on each side of clypeus with well-separated punctures, conspicuously of two sizes, on a shining ground; mesothorax dull, but well-punctured; area of metathorax broadly triangular, very coarsely granular.

This has nearly the colours of *A. p.* smaller, and the hair of the head and thorax is more yellowish; it is something like *A. l.* of legs is quite a different colour, from *vicina* in the colour of the tarsi. *Carlini* it is easily separated by the surface being coarsely granular, and broader above than below of metathorax, &c. The colour of tarsi is like *A. Helvi*, but it is not that species.

Hab. Boulder, Colorado, at flower time, June 1905 (Cockerell).

Andrena pyrrura, sp. n.

♀.—Length about 11 mm.

Black; hair of head and thorax black, with a slight creamy tinge on scutellum, &c. Head yellowish, on inner side of basal joint of tarsi fulvous; abdomen without hair-bands, with white hair, which in certain lights gives the sides of the segments (very much) a caudal fimbria very bright golden red, with a reddish spot. Wings yellowish, broadly smoky; stigma and nervures fairly large; first r. n. joining second s.m. oblique. Process of labrum truncate; clypeus strongly and densely punctured, ill-defined median line; antennae conspicuously longer than 4+5; mesothorax obscurely punctate; area of metathorax bounded by a rim, dull and granular; abdomen rather shining, with small punctures; basal joints of tarsi large, light brownish. Facial foveae, seen from above, greyish, or greyish white, very broad, occupying nearly all the space between quarters of the distance between eyes, from eye only by a narrow line, ending in the clypeus.

Very much like *A. salicifloris*, but the abdominal segment is depressed more than that feebly, whereas in *salicifloris* it is depressed a third; the area of metathorax which is a ridge posteriorly, seen in *salicifloris* is yellowish, and the sculpture of the surface is different. In Robertson's tables it is (= *commoda*) as anything. It is evidently a new species, but differs by the clypeus lacking

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Andrena lupinorum, sp. n.

over 13 mm.

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scutellum; hair of pleura rusty black;
blackish at sides of occiput; no black
cape has dark fuscous hair; abdomen
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shad fimbria heavy and purple-black;
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st r. n. joining second s.m. well
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le, very densely punctured, and
scutellum faintly reddish beneath;
than 4+5; facial foveae, seen
very broad, occupying practically
and antenna, not separated from
the above level of top of clypeus;
clypeus with well-separated punctures,
on a shining ground; mesothorax
d; area of metathorax broadly tri-
angular.

This has nearly the colours of *A. perimelas*, Ckll., but it is smaller, and the hair of the head is quite differently coloured; it is something like *A. perplexa*, but the hair of legs is quite a different colour, &c.; it differs at once from *vicina* in the colour of the thoracic hair, and from *Carlini* it is easily separated by the area of metathorax more coarsely granular, and broader above, colour of hair at sides of metathorax, &c. The colour of the thoracic hair recalls *A. Halbi*, but it is not that species.

Hab. Boulder, Colorado, at flowers of *Lupinus*, June 27, 1905 (*Cockerell*).

Andrena pyrrura, sp. n.

♀.—Length about 11 mm.

Black; hair of head and thorax long, greyish white, with a slight creamy tinge on scutellum, &c.; that on legs mostly yellow, on inner side of basal joints of tarsi light golden fulvous; abdomen without hair-bands, but with some fine white hair, which in certain lights shows up as patches at the sides of the segments (very much as in *A. Wilmattæ*); caudal fimbria very bright golden red; tegulae piceous with a reddish spot. Wings yellowish, with the apical margin broadly smoky; stigma and nervures ferruginous, the stigma fairly large; first r. n. joining second s.m. about the middle; second s.m. oblique. Process of labrum very broad, subtruncate; clypeus strongly and densely punctured, with an ill-defined median line; antennae dark, third joint conspicuously longer than 4+5; mesothorax dull, rather obscurely punctate; area of metathorax triangular, not bounded by a rim, dull and granular, with weak plications; abdomen rather shining, with small but very distinct punctures; basal joints of tarsi large and flattened; spurs light brownish. Facial foveae, seen from above, very pale greyish, or greyish white, very broad, occupying about three quarters of the distance between eye and antenna, separated from eye only by a narrow line, ending at the level of the top of the clypeus.

Very much like *A. salicifloris*, Ckll., but the second abdominal segment is depressed much less than half, and that feebly, whereas in *salicifloris* it is depressed two thirds; the area of metathorax wholly lacks the transverse ridge posteriorly, seen in *salicifloris*; the wings are much yellower, and the sculpture of the mesothorax is entirely different. In Robertson's tables it runs as near to *corni* (= *commoda*) as anything. It is evidently near to *commoda*, but differs by the clypeus lacking a distinct median ridge,

the paler tibial scopa, darker tarsi, &c. In Bruner's table it runs to *Dunningi* and *errans*, but it is not closely related to these.

Hab. Boulder, Colorado, June 4, 1905 (*W. P. Cockerell*).

Andrena Birtwelli, Ckll., 1901.

This species was found at Ward, Colorado, July 18, 1905, visiting flowers of *Drymocallis*. As it is somewhat variable, and my original description did not allude to certain important characters, I give a new description, from the Ward material.

♀.—Length about or not quite 10 mm.

Black, with greyish-white hair, that on dorsum of thorax very pale ochreous; head broad; process of labrum rather narrow, truncate, the end thickened; clypeus with strong, rather irregularly placed punctures, and a strong smooth median ridge; antennae dark, third joint longer than 4+5, flagellum a little reddened apically; facial foveae broad, dark chocolate-colour, seen from above not diverging from eye-margin, ending near level of top of clypeus; mesothorax dull, with feeble punctures, in the middle it is more shining, with the punctures evanescent; scutellum shining, sparsely punctured; area of metathorax very ill-defined, dull, and granular; tegulae very dark brownish, shining. Wings a little dusky, especially apically, stigma dull reddish, nervures fuscous; first r. n. joining second s.m. *about the beginning of its last fourth*. Legs dark, hair on inner side of basal joints of anterior and middle tarsi dark shining reddish, that on hind tarsi more fuscous; scopa on hind tibiae short and dark chocolate-colour (the hind femora and sides of metathorax carry a large amount of very pale greenish-yellow pollen, but the tibiae little); tuft over hind knees brown-black; the very large metathoracic scopa is shining white. Abdomen nearly nude, shining black, with no bands, and only very sparse piliferous punctures; second segment in middle depressed more than half, but feebly; caudal fimbria purplish black.

Andrena edwiniae, sp. n.

♀.—Length about 13 mm.

Black, with the general appearance of the species of the *vicina* group. Hair of face, top of head, thorax above, first abdominal segment and middle of second, long, coarse, and yellowish white, of sides of occiput, hind legs, cheeks, and pleura black, of lower anterior part of legs pallid; head

broad; clypeus shining, distinctly beyond the punctures of two sizes, a broad one near the apex a broad but shallow one; labrum broad, truncate; antennae dark, faintly reddish, third joint only just beyond its middle; facial foveae, seen from above, broad, part pallid, hardly departing from level of just below level of antennae; supra-ocular area roughened; mesothorax dull and granular, punctured; area of metathorax ordinally shining, dull, not plicate; tegulae shining blackish; stigma reddish, long and narrow; second s.m. broad, nearly square, not beyond its middle. Legs black, tarsi reddish; hair of legs mainly black, on anterior femora behind is yellowish; side of basal joint of anterior tarsi reddish; femora brownish, of hind tibia black, with abundant, carrying a large amount of pollen; spurs reddish brown. Abdomen without distinct punctures, the sides of the following segments with coarse, black hair; fimbria black.

In Bruner's table this runs at *Andrena Kirbyi*, but differs in the colour of the legs, is not rufescent. It is also allied to *A. Birtwelli*, Ckll., but is larger, and differs in the hair of head, shape of process of labrum, size with *A. advarians*, Viereck, a species which has been indicated in a table (Canad. Ent. Soc. Trans. 1905, p. 100). The few characters given indicate a difference, also be compared with *A. hemileuca*, V. which have the scopa pale, and is only 10 mm. long.

Hab. Ward, Colorado, prox. 9000 ft. *Edwinia americana*, July 1905, two (2) specimens. One specimen is old, with tattered pubescence.

Colletes Andrewsii, sp. n.

♀.—Fully 12 mm. long.

The hair of head and thorax fully abundant on scutellum, not at all mixed with short, black; malar space about twice as broad, orbits not strongly converging, with large hairy spines. Wings yellow, and the nervures dark reddish. Abdomen

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put, hind part of cheeks, and
part of cheeks pallid; head

broad; clypeus shining, distinctly but sparsely punctured, the punctures of two sizes, a broad median smooth band, and near the apex a broad but shallow depression; process of labrum broad, truncate; antennæ dark, only the last joint faintly reddish, third joint only just longer than 4+5; facial foveæ, seen from above, broad, blackish, the lower part pallid, hardly departing from orbital margin, ending just below level of antennæ; supraclypeal area dull and roughened; mesothorax dull and rough, inconspicuously punctured; area of metathorax ordinary, finely rougher, dull, not plicate; tegulae shining black. Wings quite fun- ginous; stigma reddish, long and narrow, nervures fuscous; second s.m. broad, nearly square, not oblique, receiving the first r. n. beyond its middle. Legs black, the small joints of tarsi reddish; hair of legs mainly black, but the long hair on anterior femora behind is yellowish white; hair on inner side of basal joint of anterior tarsi reddish; scopa of hind femora brownish, of hind tibia black, both coarse and very abundant, carrying a large amount of very pale yellowish pollen; spurs reddish brown. Abdomen rather shining, without distinct punctures, the sides of the second and all of the following segments with coarse, but not dense, black hair; fimbria black.

In Bruner's table this runs at once to *A. impuncta*, Kirby, but differs in the colour of the thoracic hair, which is not rufescent. It is also allied to *A. Washingtoni*, Ckll., but is larger, and differs in the abundant pale hair of head, shape of process of labrum, &c. It agrees in size with *A. advarians*, Viereck, a species which has only been indicated in a table (Canad. Ent. 1904, p. 192), but the few characters given indicate a different species. It might also be compared with *A. hemiteuca*, Vier., but that is said to have the scopa pale, and is only 10 mm. long.

Hab. Ward, Colorado, prox. 9000 ft., at flowers of *Edwinia americana*, July 1905, two (*T. D. A. & W. P. Ckll.*). One specimen is old, with tattered wings and abraded pubescence.

Colletes Andrewsii, sp. n.

♀.—Fully 12 mm. long.

The hair of head and thorax fulvous, very bright and abundant on scutellum, not at all mixed with black; antennæ short, black; malar space about twice as broad as long; head broad, orbits not strongly converging below; anterior coxæ with large hairy spines. Wings yellowish; stigma small, it and the nervures dark reddish. Abdomen with narrow apical

hair-bands; the disks of the segments with short hair, white in the middle of 2, giving place to black laterally, coarse and entirely black on 3 to 5; hair on segment 6 long and light fulvous; hair on inner side of tarsi light orange; claws bifid.

In all respects very closely related to *C. astivalis*, Patton, but larger, with the pubescence more brightly coloured, the ridges on base of metathorax wider apart, the second s.m. broader, and the flagellum darker. It agrees nearly with the description of *C. Kincaidii*, Ckll., but the second s.m. is not as large as the third, the orbits converge less below, the punctures of the first abdominal segment are not so large and strong, the apical segment has pale fulvous hair; so that, with more the appearance of *Kincaidii*, the insect is actually nearer to *astivalis*. The colour of the hair of the scutellum is suggestive of the European *C. nasutus*, Smith.

Hab. Boulder, Colorado, at flowers of *Heuchera ribifolia* in cultivation (the hind legs carry much bright red pollen), June 26, 1905 (Cockerell).

It was taken in the garden of Mr. D. M. Andrews, and is named after him, in recognition of his numerous botanical discoveries in the vicinity of Boulder.

Colletes opuntiae, sp. n.

♂.—Length about 8½ mm.

Black, the pubescence white, and quite abundant on head and thorax, on scutellum largely blackish, and slightly stained with blackish on hind part of mesothorax, but not at all blackened on top of head; eyes very strongly converging below; face very densely covered with white hair; malar space very short, more than twice as broad as long; mandibles dark reddish apically; labrum with a very strong apical pit; antennæ short, like those of a female, the middle joints not longer than broad, third joint considerably longer than fifth; vertex shining, punctured; mesothorax very shiny, with large, well-separated punctures, very sparse on the disk posteriorly; scutellum shining, with large punctures; postscutellum closely punctured; area of metathorax with the usual basal quadrate spaces, these mostly longer than broad, the whole bounded posteriorly by a sharp rim; lateral faces tuberculate; legs black, with white hair, only the end of the claw-joint reddish; anterior coxæ without spines; abdomen with large, very strong punctures, well-separated on the first segment, closer on the second and third; apical hair-bands weak on the first two segments, strong on the next three; tegulæ shining black. Wings hyaline, a little dusky, nervures

and stigma dark fuscous short of t.-m.; second first r. n. before its mid of *C. brevicornis*, Rob., closely punctured; mand dark, not testaceous; joints of tarsi dark.

♀.—Similar, but broader covered by hair as to hide densely punctured, only

Hab. Boulder, Colorado, *Opuntia*, July 3 (W. P. female at flowers of *Cam*

The female carries pollen having a delicate lilac male also has a fair amount of pollen, and may very well

This species is the weakest of Rob.; the differential characters are but sufficient to indicate

Colletes

♂.—Length about 10

Black, with white and posterior disk of mandible dark reddish; labrum very short, more than twice as long as broad; converging below; face antennæ dark, long, the much longer than wide black, contrasting with of the flagellum; joint 5 much longer than 4 (than 4); mesothorax separated, large and strong very large punctures; smaller punctures, and anterior margin; area of verse ridge bounding very large quadrate spaces posterior faces shining, reticulate; prothoracic Wings hyaline, clearer in *C. gilensis*; stigma fuscous; b. n. nearly

with short hair, white laterally, coarse and about 6 long and light orange; claws bifid. *C. festalis*, Patton, brightly coloured, the part, the second s.m. agrees nearly with the second s.m. is not large less below, the vent are not so large pubescent hair; so that, the insect is actually fair of the scutellum, Smith.

of *Heuchera ribifolia* (a bright red pollen),

M. Andrews, and is numerous botanical

and stigma dark fuscous; stigma small; b. n. falling far short of t.-m.; second s.m. higher than broad, receiving first r. n. before its middle. Agrees with the description of *C. brevicornis*, Rob., ♂, except as follows: vertex rather closely punctured; mandibles less red; nervures and stigma dark, not testaceous; tegulae very dark, shining; apical joints of tarsi dark.

♀.—Similar, but broader; the face broader, and not so covered by hairs as to hide the surface; clypeus strongly, very densely punctured, only moderately convex.

Hab. Boulder, Colorado, 1905; type ♂ at flowers of *Opuntia*, July 3 (W. P. Cockerell); another male, July 5; female at flowers of *Campanula*, June 27 (W. P. Cockerell).

The female carries pollen, presumably of the *Campanula*, having a delicate lilac tint, the grains very small. The male also has a fair amount of pollen attached to the pubescence, and may very well be a means of cross-fertilization.

This species is the western representative of *C. brevicornis*, Rob.; the differential characters are not of great importance, but sufficient to indicate a distinct species.

Colletes hydrophilus, sp. n.

♂.—Length about 10½ mm.

Black, with white pubescence, blackish on scutellum and posterior disk of mesothorax; apical half of mandibles dark reddish; labrum with a row of pits; malar spaces very short, more than twice as broad as long; eyes strongly converging below; face densely covered with white hair; antennae dark, long, the flagellum stout, crenulate, its joints much longer than wide; third antennal joint dull velvety black, contrasting with the pruinose appearance of the rest of the flagellum; joint 4 about or nearly as long as 2+3; 5 much longer than 4 (in *C. gilensis* it is only a little longer than 4); mesothorax shining, with uniformly-placed, well-separated, large and strong punctures; scutellum with close very large punctures; postscutellum with exceedingly dense, smaller punctures, and a row of roundish pits along its anterior margin; area of metathorax with a very strong transverse ridge bounding the basal area, which is divided into very large quadrate spaces by about six carinae; lateral posterior faces shining, not much roughened, and not at all reticulate; prothoracic spines evident; tegulae shining black. Wings hyaline, clearer (and greyish, not at all reddish) than in *C. gilensis*; stigma ferruginous, nervures rather light fuscous; b. n. nearly reaching t.-m.; second s.m. broader

than high, receiving the first r. n. at or a little beyond the middle. Legs black, with white hair, spurs and claws ferruginous; abdomen shining, with very strong, well-separated punctures, and narrow white hair-bands on the apices of the segments; last ventral segment with the longitudinal carina barely indicated.

In my table in 'Psyche,' 1905, this runs straight to *C. gilensis*, Ckll., but that is a considerably larger insect, and the sculpture of the metathorax is quite different. In Robertson's table it appears to run closest to *C. nudus*, Rob., but it is easily known from that by the very strong punctures of the abdomen. It has a very close resemblance to *C. ajuntiae*, described above, but differs entirely in the antennae, and otherwise in various small details.

Hab. Boulder Cañon, a few miles above Boulder, Colorado, June 26, flying over damp sand (Cockerell).

Colletes Kincaidii, Ckll., 1898.

Both sexes were taken at Ward, Colorado, 9000 ft., in July (*T. D. A. & W. P. Ckll.*). The female was at flowers of *Fraseria*, while two males were taken at flowers of *Geranium Fremontii*. The male has never been described in full, so a description is here offered:—

♂.—Length about 9 mm.

Black, with pale yellowish pubescence, bright ochraceous, with no intermixture of black, on dorsum of thorax, light ochreous on face; labrum shining, with a distinct central pit and feeble lateral ones; malar space about as broad as long; mandibles only slightly red apically; antennae entirely dark, long, the flagellar joints much longer than wide; flagellum stout, not crenulated; fifth antennal joint longer than fourth, fourth longer than third; prothoracic spines distinct; mesothorax shining, with large strong punctures, dense anteriorly and laterally, absent in the middle of the disk posteriorly; scutellum smooth anteriorly, otherwise with punctures like those of mesothorax; postscutellum roughened; base of metathorax with the usual transverse area, of which the cross-plications are rather numerous but irregular; apical middle (lower part of triangle) concave and very shiny; lateral faces roughened, not very shiny; tegulae brown. Wings hyaline, a little milky, stigma very dark ferruginous, nervures piceous; b. n. a moderate distance short of t.-m.; second s.m. very broad, receiving the first r. n. beyond the middle; second r. n. with a very strong double curve. Legs black, only the claws ferruginous. Abdomen strongly punctured, and with very conspicuous pale

ochraceous hair-bands; first sulcate; last ventral segment not strongly bearded laterally.

In Robertson's table runs distinguished from that by the abdominal segment, dark post

This is smaller than the type

Colletes ph

♀.—Length slightly over 9

Similar to *C. salicicola*, Ckll. minimal pubescence, with broad base of second segment; the metathorax, and very light tint—on mesothorax and top of clypeus with much smaller and they are very large and space malar space shorter, being a first abdominal segment, except dull, with small well-separated (*salicicola*); black (bare) band distinctly narrower than the apical numerous minute but distinct segment black (covered with s.m. broader, receiving the first conspicuously beyond the middle *cana*, Cresson, it is readily thoracic pubescence, dull surface much darker stigma, somewhat labrum with the lateral pits have a small apical hairy process to be called a spine; the wings all yellowish); the inner clouter, and arises from the middle is very obliquely microscopic lens the appearance of a very be seen, and that with difficulty with strong punctures running depression.

In Robertson's table this the colour of the thoracic the posterior tarsi are black, are very broad. The sculptural minimal segments is quite different *geranii*, Ckll.

r. n. at or a little beyond the white hair, spurs and claws shining, with very strong, well-narrow white hair-bands on the last ventral segment with the indicated.

1905, this runs straight to s a considerably larger insect, tathorax is quite different. In o run closest to *C. nudus*, Rob., that by the very strong punctures as a very close resemblance to c, but differs entirely in the various small details. y miles above Boulder, Colorado, and (Cockerell).

idii, Ckll., 1898.

t Ward, Colorado, 9000 ft., in). The female was at flowers were taken at flowers of *Gera-* as never been described in full, ed:—

pubescence, bright ochraceous, ack, on dorsum of thorax, light shining, with a distinct central malar space about as broad as y red apically; antennae entirely nts much longer than wide; ed; fifth antennal joint longer than third; prothoracic spines g, with large strong punctures, y, absent in the middle of the a smooth anteriorly, otherwise of mesothorax; postscutellum orax with the usual transverse ations are rather numerous but ver part of triangle) concave and ghened, not very shiny; tegulae little milky, stigma very dark us; b. n. a moderate distance very broad, receiving the first econd r. n. with a very strong ily the claws ferruginous. Abdo- und with very conspicuous pale

ochraceous hair-bands; first two segments transversely sulcate; last ventral segment smooth; ventral segments not strongly bearded laterally.

In Robertson's table runs to *C. eulophi*, Rob., but is distinguished from that by the dense strong punctures of first abdominal segment, dark posterior tarsi, &c.

This is smaller than the type male from Washington State.

Colletes phacellae, sp. n.

♀.—Length slightly over 9 mm.

Similar to *C. salicicola*, Ckll. (with just the same abdominal pubescence, with broad white bands, and much hair at base of second segment; the same white hair on pleura and metathorax, and very light ochreous—exactly the same tint—on mesothorax and top of head), but differing thus:—clypeus with much smaller and closer punctures (in *salicicola* they are very large and sparse, except at extreme sides); malar space shorter, being about twice as broad as long; first abdominal segment, except the depressed hind margin, dull, with small well-separated punctures (very shiny in *salicicola*); black (bare) band on abdominal segment distinctly narrower than the apical hair-band, dullish, with very numerous minute but distinct punctures; apical dorsal segment black (covered with light hair in *salicicola*); second s.m. broader, receiving the first r. n. about the middle (conspicuously beyond the middle in *salicicola*). From *C. americana*, Cresson, it is readily known by the colour of the thoracic pubescence, dull surface of first abdominal segment, much darker stigma, somewhat larger malar space, and labrum with the lateral pits distinct. The anterior coxae have a small apical hairy prominence, but nothing deserving to be called a spine; the wings are whitish hyaline (not at all yellowish); the inner claw-tooth is shorter than the outer, and arises from the middle of the claw; the hind spur is very obliquely microscopically pectinate, but with a hand-lens the appearance of a very fine ciliation is all that can be seen, and that with difficulty; the clypeus is shining, with strong punctures running in grooves, and a median depression.

In Robertson's table this runs to *C. eulophi*, Rob., but the colour of the thoracic pubescence is quite different, the posterior tarsi are black, and the abdominal hair-bands are very broad. The sculpture of the first and second abdominal segments is quite different from that of *C. salicicola geranii*, Ckll.

Hab. Ward, Colorado, 9000 ft., at flowers of *Phacelia circinata*, July (*W. P. & T. D. A. Ckll.*).

Chalicodoma cementaria (Meinecke).

Apis muraria nitida, Retzius, Gen. et Spec. Ins. 1783 (not *Apis nitida*, O. F. Müller, 1776).

Apis cementaria, Meinecke, Naturforscher, 1784, p. 208.

? *Apis tryorum*, Schrank, Enum. Ins. Austr. 1781 (not of Fabricius, 1775, which is a *Xylocopa*).

Chalicodoma muraria (Olivier), auctorum.

Halictus arapahomum, sp. n.

♀.—Belongs to *Halictus* s. str., sens. Robertson, and is allied to *H. fasciatus*, "Nyl.," Rob.*

Length about $6\frac{1}{2}$ mm.

Head, thorax, and abdomen olive-green; hind margins of abdominal segments rather broadly and conspicuously rufescent, but covered with short whitish hair, except the middle of first; base of third and fourth segments also broadly hairy, the hair having a decided yellowish tint; clypeus black, shining and very sparsely but distinctly punctured, supra-clypeal area somewhat brassy; flagellum ferruginous beneath, darker toward base; tegulae large, colourless and transparent, except for a cream-coloured spot. Wings somewhat reddish, stigma and nervures amber-colour; second s.m. narrow, not half as broad as third; outer nervures strong. Legs black, the knees, tibiae at base and apex, and anterior tibiae within, and all the tarsi (except a black mark on basal joint of hind ones) ferruginous; hind spurs strongly curved at end, and with four to six short dark blunt teeth, the last two or three rudimentary. Compared with *H. fasciatus*, "Nyl.," Rob., the clypeus is larger, the punctures of front are somewhat stronger, the area of metathorax is larger (finely reticulate all over, without any plicae), the abdomen is conspicuously broader, and the general colour is much greener. Compared with *H. meliloti*, Ckll. (which occurs at Boulder), the face is longer, with the clypeus much more produced, the tegulae are larger, the area of metathorax is different, &c.

Hab. Boulder, Colorado, June 4, 1905 (*W. P. Cockerell*).

With a compound microscope, the area of metathorax in *meliloti* (type specimen examined) shows fine oblique grooves

* This common species of the Eastern States is no doubt the one lately separated as *H. nearcticus*, Vachal, but Mr. Crawford is confident that the earlier name *H. Provancheri*, D. T. (*constrictus*, Prov. not Sm.), is applicable to it.

or striae at the sides, but the concentric ones, in half-circle. *H. tripartitus*, Ckll., shows the distinctly. It is nearly certain are races of one species.

University of Colorado,
Boulder, Colorado, U.S.A.,
Jan. 1906.

XLI. — Descriptions of new
Mr. G. L. Bates in South Carolina
F.R.S.

Rana

Vomerine teeth in two very separated in the middle, their choanae. Head much depressed, snout obtusely pointed, as long as broad; loreal region distant from the tip of the snout the broad as the upper eyelid; tympanum rather short, obtuse, bordered by first and second equal, fourth one large, oval, flat, subarticular. Toes moderate, the tips dilated into disks, which are embraced by articular tubercles large, over metatarsal tubercle, measuring the inner toe; no outer tubercle the outer side of the fifth toe reaches the tip of the snout; more than half length of shagreened above, with small upper surface of thigh and glandular folds; throat and strong curved fold from the eye brown above, with small dark angular cross-bars on the limbs dotted with white; yellowish.

This remarkable frog is from Efulen, measuring 25 mm. still larger specimen was

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ft., at flowers of *Phacelia*
(Ckll.).

ria (Meinecke).

t Spec. Ins. 1783 (not *Apis nuda*,

schcr, 1784, p. 208.

a. Austr. 1781 (not of Fabricius,

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T. (*constrictus*, Prov. not Sm.), is

or strike at the sides, but the posterior middle has finer
concentric ones, in half-circles with the concavity caudad.
H. tripartitus, Ckll., shows the same sort of thing, but not so
distinctly. It is nearly certain that *meliloti* and *tripartitus*
are races of one species.

University of Colorado,
Boulder, Colorado, U.S.A.,
Jan. 1906.

XLI. — *Descriptions of new Batrachians discovered by*
Mr. G. L. Bates in South Cameroon. By G. A. BOULENGER,
F.R.S.

Rana goliath.

Vomerine teeth in two very strong oblique series, narrowly
separated in the middle, their outer extremities touching the
choanae. Head much depressed, a little broader than long;
snout obtusely pointed, as long as the orbit; canthus rostralis
very obtuse; loreal region deeply grooved; nostril a little
nearer the tip of the snout than the eye; interorbital space as
broad as the upper eyelid; tympanum small, hidden. Fingers
rather short, obtuse, bordered by a very distinct dermal fold,
first and second equal, fourth but slightly shorter than third;
one large, oval, flat, subarticular tubercle under each finger.
Toes moderate, the tips dilated into small but very distinct
disks, which are embraced by the very broad full web; sub-
articular tubercles large, oval, flat; a flat, elliptical inner
metatarsal tubercle, measuring $\frac{2}{3}$ its distance from the end of
the inner toe; no outer tubercle; a strong dermal fringe on
the outer side of the fifth toe. The tibio-tarsal articulation
reaches the tip of the snout; tibia as long as the foot, a little
more than half length of head and body. Skin finely
shagreened above, with small warts, especially on the sides;
upper surface of thigh and tibia with narrow longitudinal
glandular folds; throat and belly with small granules; a
strong curved fold from the eye to the shoulder. Dark olive-
brown above, with small darker spots on the body and irre-
gular cross-bars on the limbs; hinder side of thighs blackish,
dotted with white; yellowish white beneath.

This remarkable frog is described from a single specimen,
from Efulen, measuring 250 mm. from snout to vent. A
still larger specimen was caught along the Kribi River,

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