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NORTH AMERICAN *DIANTHIDIUM*, *ANTHIDIELLUM*, AND *PARANTHIDIUM*

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DIANTHIDIUM

This genus, as delimited in this paper, is confined to that group of the Anthidiinae which, in addition to the characteristic extension of the second recurrent nervure beyond the second transverse cubital nervure and to the presence of a pulvillus between the tarsal claws, is equipped with a spine (well developed and unmistakable in the case of the male) on the hind coxae. This group also seems to be differentiated through the presence of a flat-lying, at most slightly recurved scale over the tubercles that extends beyond the anterior margin of the mesoscutum.

In the following keys are included only such species as are discussed in this paper or the types of which I have had a chance to examine.

KEY TO THE MALES

- 1.—Legs ferruginous to the exclusion of yellow or cream-colored maculations. The thorax with ferruginous maculations.....2.
Legs not ferruginous to the exclusion of yellow or cream-colored maculations. The thorax without ferruginous maculations except sometimes the tegulae. 3.
- 2.—Abdomen with distinctly yellow maculations superimposed usually on a reddish and black (rarely wholly reddish or wholly black) ground, the black largely confined to the basal area, the red to the apical region of each segment. Segment 5 maculated. (Western species)..... *sayi*.
Abdomen with deep red maculations, sometimes slightly diluted with yellow, those on 1 and 2 vague in outline. Segment 5 usually without maculations. (Florida species)..... *floridiense*, new species.
- 3.—The median tooth of segment 7 not separated by distinct notches from the sides, appearing merely as a median projection on an otherwise continuous truncate surface.....4.
The median tooth of segment 7 either separated by distinct notches, even though small, or by deeper emarginations from the sides, often trilobate or tridentate.....5.
- 4.—The punctuation of the vertex dense but fine, minute and delicate compared with the granular, opaque surface of the thorax (Western)..... *ulkei*.
The punctuation of the vertex large and coarse, not very different from that on the rather shiny, deeply punctated thorax.....6.

- 5.—Rather large, about 12 mm. Segment 2 usually three-spotted, the central maculation with a tendency to be subinterrupted in the middle and notched at each end, suggestive of a butterfly with wings spread. The heavy median tooth of segment 7 broadly separated from the conspicuously divergent lateral lobes by deep triangular emarginations. Third coxal spines especially long. Maculations strongly yellow. (Western species).

cressoni.

Smaller, usually less than 10 mm., and not having this combination of characters.

6.

- 6.—The lateral face marks broadly yellow throughout their length, not tapering, and usually rounded rather than pointed at their upper end. The mesoscutum with two large maculations on the anterior margin, each extending usually about one-third of the distance across and sometimes prolonged in the form of a much narrowed line along the side of the mesoscutum for a short distance. The legs with reddish on the tibiae beneath and at times with some reddish on the normally wholly yellow exterior of the tibiae. The rather blunt middle tooth of segment 7 separated from the truncate sides by shallow rounded notches and extending beyond them. (South-eastern species).....*curvatum*.

The lateral face marks distinctly narrowed above. The maculations on the front margin of the mesoscutum relatively small, not attaining the sides. .7.

- 7.—The pygidium truncate with the central tooth protruding well beyond the apical edge and separated from the sides by very shallow notches, not in the least tridentate. Head, thorax, and abdomen strongly punctated. (Mass., Conn., Maine, Ontario, Michigan).....*simile*.

The pygidium with the middle tooth ending on a level with the sides and distinctly separated from them or, if the middle tooth protrudes beyond the sides, tridentate in appearance.....8.

- 8.—The median tooth of the pygidium separated from the lateral lobes rather broadly, by about the width of the lateral lobes at their apex, somewhat down-slanting (best seen when the insect is viewed from the side), and long, extending well beyond the lateral lobes.....9.

The main tooth of the pygidium separated from the lateral lobes by considerably less than their width, not down-slanting, virtually on the same plane as the lateral lobes and about coextensive with them.....11.

- 9.—The middle tooth of the pygidium very long, fully twice the length of the lateral lobes. The mesopleura often with a yellow patch. Hind tibiae wholly yellow on their outer face. Abdominal markings yellow. (California).

consimile.

The middle tooth of the pygidium only a little longer than the lateral lobes, rather more strongly down-slanting. The mesopleura wholly black. The hind tibiae with a broad area of black separating the maculations at the base and apex.....10.

- 10.—Abdominal markings light cream color. (Colorado to California)..*pudicum*. Abdominal markings yellow. (California).....*provancheri*.

- 11.—The scutellum black. Tooth on third coxæ broad and short, its length not very much greater than its breadth at the base, rather bulbous. The median apical tooth rather thick and slightly bilobed at the extremity;

at its apex about one half the width of the lateral lobes at their apex. Maculations of abdomen deep yellow. (Utah) . . . *semiparvum*, new species. Narrow, usually interrupted, band along posterior margin of scutellum, but in rare instances absent. Tooth on third coxæ slender, tapering gradually to a sharp point and distinctly longer than broad. Median tooth of segment 7 rather more slender, though variable in breadth, at its apex rarely more than a third as broad as the lateral lobes at their apex. Maculations on the abdomen yellow (Rocky Mountains to Pacific Coast) *parvum*.

KEY TO THE FEMALES

- 1.—The legs wholly or almost wholly ferruginous. The thorax with ferruginous maculations 2.
 The legs with considerable yellow and black in addition to sometimes ferruginous. The thorax without ferruginous except sometimes on tegulæ 3.
- 2.—Abdominal markings deep red. Segments 5 as well as 6 usually immaculate. The clypeus and sides of face deep red. (Florida) . . . *floridiense*, new species. The maculations on abdominal segments 1–5 distinctly yellow, but segments 1–2 and often 3 with usually much red apically and sometimes basally. Segment 5 with maculations similar to those on the other segments. (Rocky Mountain region and eastward to Missouri and Texas) *sayi*.
- 3.—The lateral face marks of nearly uniform breadth, not sharply narrowed or tapering. The tibiæ ferruginous with often considerable yellow. The maculation on each side of the anterior margin of the mesoscutum extending from the antero-lateral angle about one-third of the way across. (South-eastern) *curvatum*.
 The lateral face marks tapering toward their upper end. The tibiæ yellow, or yellow and black. The maculation on each side of the anterior margin of the mesoscutum relatively restricted, either spotlike or terminated by black before attaining the antero-lateral angle 4.
- 4.—Large; about 11 mm.; with strong yellow maculations. Segment 2 usually three-spotted, the central maculation often narrowly interrupted or sub-interrupted and outwardly notched, the resulting figure suggestive of a butterfly with wings spread. Segments 3–6 with broad, basally rounded, medianly subinterrupted maculations, each of the halves of which encloses near the apex a short black line. The third coxal tooth yellow, stubby but exceptionally well developed for the female sex. (Colorado and Utah).
cressoni.
- Relatively small, 9 mm. and less. Segment 2 almost invariably with a medianly interrupted band the halves of which are usually emarginate behind. When four-spotted, the maculations pale cream-color, not deep yellow. . . 5.
- 5.—The maculations on the clypeus, sometimes wholly absent, usually reduced to small spots on the sides. The maculations of the tibiæ confined to the base. The subapical tooth of the mandibles absent or obsolescent, the surface beyond the apical tooth being smooth and practically uninterrupted. (Possibly this smoothness is due to the wearing down of a tooth but it is characteristic not only of the specimens in the American Museum but also of the type of *parvum*; the female allotype of *pubicum* I have not examined.) 6.

- The clypeus usually with sizeable yellow spots. The front and middle tibiae yellow on the outside or with yellow stripes as distinguished from basal spots, these stripes usually extending at least half-way to the apex. The mandibles with a distinct subapical tooth.....7.
- 6.—The maculations, particularly those of the abdomen, yellow. (Rocky Mountains to Pacific Coast).....*parvum*.
- The maculations pale cream-colored, that on segment 2 sometimes four-spotted due to the complete penetration of the halves of the band by the posterior emarginations. (Rocky Mountains to California).....*pudicum*.
- 7.—The axillæ and scutellum black. Segment 6 with two small roundish yellow spots. About $5\frac{1}{2}$ mm. (Description based on a single specimen from Utah doubtfully associated with some males from the same region that also lack maculations on the scutellum but which are considerably larger).
- semiparvum*, new species.
- The scutellum with distinct maculations and the axillæ usually yellow. About 8–9 mm.....8.
- 8.—The punctation on the vertex dense but fine. Usually a mark above the clypeus, in front of the middle ocellus, on the mesopleura, beneath the front and middle femora, either singly or in combination. Tibiæ and basitarsi often wholly yellow on the outside; but not infrequently the tibiæ have merely a more or less extensive stripe and the basitarsi may be immaculate. The abdominal bands often not posteriorly emarginate. Segment 6 often two-spotted. (Middle West to Rocky Mountain region, and presumably on to the Pacific).....*ulkei*.
- The punctation, including that on the vertex, very heavy and coarse. The facial markings indicated for *ulkei* usually lacking. The abdominal bands always posteriorly emarginate. Segment 6 immaculate. (Maine, Massachusetts, Connecticut, Michigan, and Ontario).....*simile*.

***Dianthidium sayi* Cockerell**

Seven males (five from La Junta, Colo., August 12, 1920; one from Bonita, Ariz., July 12, 1917; and one from Del Rio, Tex., June 22–27) and fourteen females (three from Salt Lake City, Utah, July 28, 1920; seven from La Junta, Colo., August 12, 1920; one from Boulder, Colo., August 7–12, 1919; one from Colorado Springs, Colo., June 15–30, 1896; one from Green River, Wyo., July 2, 1920; and one from Del Rio, Tex., June 22–27) belong to this species. The Texas specimens and the female from Colorado Springs were collected by Mr. H. F. Wickham; the Arizona specimen by Dr. J. Bequaert; the remaining specimens by Dr. and Mrs. F. E. Lutz.

In the male specimen from Arizona the following parts, in addition to those mentioned in the description, are red: the vertex and the entire region behind the eyes, there being no interruption in the band; the greater part of the mesopleura and metapleura; the propodeal truncation; and the entire abdomen except for the yellow maculations.

In contrast to this specimen, some of the other males show a slightly greater suppression of red than is indicated in the description. In some of them the red on the scape is much reduced and in one of them the L-shaped figure on the thorax shrinks to a mere line on the anterior margin. In the male the red on the abdomen is largely confined dorsally to the apex of each segment and has a tendency to be stronger and more extensive on the first two or three segments than on those that follow. In the female there is no red beyond the third segment, sometimes not beyond the second, and even in one or two of the males the segments from the third on have no red dorsally whatever. In one of the females the antennal markings are nearly as strong as in the male. The clypeus of the female has sometimes merely a quadrate black spot at the base and in other instances is black medianly from base to apex. In all of the female specimens at hand there is a broad, rather blunt, transparent reddish, spine-like projection on the hind coxæ, at variance with Say's statement as applied to *Megachile interrupta* (which name has been superceded by *Dianthidium sayi*) that the posterior coxæ are unarmed.

***Dianthidium floridiense*, new species**

MALE.—Length, $11\frac{1}{2}$ mm. Black with yellow and ferruginous markings. Mandibles except tips, clypeus, broad lateral face marks except their upper ends, which terminate at the level of the anterior ocellus, and long coxal spines, yellow. The following parts ferruginous: labrum (usually); supra-clypeal triangle (not always present); scape; first three or four joints of antennæ; a broad, medianly somewhat narrowed, band extending usually unbroken across the vertex and behind the eyes for about half of their length; the scale-like tubercles; the entire tegulæ (which have a darker red spot in the middle); L-shaped bands extending one-third of the way across the anterior margin of the mesoscutum and then somewhat less broadly along the sides, becoming confluent with the wholly maculated axillæ and somewhat bilobed and heavily maculated scutellum; a spot on the mesopleura (often absent); legs from the apex of the coxæ (except for the coxal spines) to the wine-red tips of the tarsal claws; and sometimes the pygidial enclosure. Segments 1 and 2 of the abdomen prevalently ferruginous but rather unevenly so, with cloudy, rather vaguely outlined intensifications of red, suggestive of lateral emarginations, posteriorly. Segments 3 and 4 with rather heavy curvilinear bands, interrupted in the middle, that on 4 being somewhat more broadly interrupted than that on 3, the lateral halves emarginate behind. Segments 5 and 6 usually black, sometimes with faint reddish markings. Segment 7 yellowish to ferruginous with the basal margin black, and the apical and lateral borders hyaline. The venter ferruginous. The insect is sparsely covered with thin, short, light pubescence, that on the under side of the tarsi of a light orange hue. The punctation heavy and coarse, that on the vertex larger and less dense than that on the thorax above, about subequal to that on the mesopleura, with the spaces between the punctures shiny. The punctation on the scutellum larger than that on the mesoscutum and equally dense. The punctation of the abdomen

smaller and more dense near the apex of the several segments than at the base. Segments 5 and 6 somewhat more densely punctated than those that precede. The rims of the segments impunctate. Segment 6 with a rather feeble, glistening carina. Segment 7 with the sides at the apex slightly rounded and with a blunt median tooth, set off by shallow rounded emarginations from the otherwise truncate apical border, beyond which the tooth extends slightly. The longitudinal carina on segment 7, which extends to the tip of the tooth, rather hyaline.

FEMALE.—Length, 10 mm. Marked like the male, with the following exceptions: mandibles usually black but sometimes slightly ferruginous; labrum black; no supra-clypeal mark; band on vertex uninterrupted; entire clypeus and face marks throughout their length ferruginous, as are also the stumpy, hyaline third coxal spines; usually a wine-red spot on the mesopleura (sometimes extended into a broad area of ferruginous); the median interruptions of the maculations on segments 3 and 4 subequal and these maculations heavier on the inner than on the outer side; segment 5 sometimes with two roundish, much reduced and feeble, ferruginous spots, but often black, as is segment 6; only segment 1 of the venter ferruginous (the others black). The ventral scopa light golden yellow.

The descriptions are based on eleven males (one from Estero, Fla., two from Punta Gorda, Fla., April 15–16; two from Sanford, Fla., April 26–30, 1908; two from Royal Palm Park, Fla., April 12–18, 1923; one from Lake Worth, Fla.; one from Homestead, Fla., April 18, 1923; one from Allen River to Deep Lake, Fla., April 12, 1912; and one from Tampa, Fla., March 13), and twenty-four females (one from Fort Myers, Fla., April 2, 1912; two from Allen River to Deep Lake, Fla., April 12, 1912; one from Lake Worth, Fla.; one from Biscayne Bay, Fla.; three from Punta Gorda, Fla., April 13–16; eleven from Royal Palm Park, Fla., April 12–18, 1923; four from Homestead, Fla., April 18, 1923; and one from Bradentown, Fla., Aug. 15, 1910,—the last-mentioned loaned by Cornell University). Four of these insects were taken by Mr. J. A. Grossbeck, three by Mr. M. C. Van Duzee, three by Mrs. A. T. Slosson, one by Dr. J. Bequaert, one by Prof. J. C. Bradley, twelve by Dr. F. E. Lutz, five by Mr. F. M. Jones, and six by Mr. H. F. Schwarz. Some of the specimens were taken at Sumac; some, at Thistle.

In the color and character of its markings this insect is very similar to *Anthidiellum perplexum*, for which, superficially examined, it might easily be mistaken. But, apart from the generic characters, which separate it beyond dispute, the marks on the sides of the face extend much higher than in *perplexum* and the maculations on segments 3 and 4 are more extensive. The new species is closely related to *Dianthidium sayi* (*interruptum* Say), but may be separated by the fact that the abdominal markings are ferruginous, not yellow on a ferruginous background as in *sayi*; that segment 5, if maculated, is two-spotted, not with a medially interrupted band; that the clypeus of the female is wholly ferruginous,

not yellow with a median area of black (though *sayi* shows variability in this respect); and that the middle tooth of the pygidium is rather more clearly separated from the broad lateral lobes than is the case in *sayi*. *Dianthidium sayi* is a western species.

***Dianthidium curvatum* (Smith)**

Before the writer are six males and six females, which depart in some respects from Smith's description but seem to belong nevertheless to *curvatum*. Six of the specimens are from Southern Pines, N. C., caught by the Rev. A. H. Manee, June 27, 1918–Aug. 27, 1918; two from Deenwood, Waycross, Ga., taken by Mr. F. E. Watson, July 16–18, 1916; one from the Valley of the Black Mts., N. C., collected by Mr. William Beutenmuller, Aug. 26, 1906; one from Unadilla, Ga., secured by Prof. J. C. Bradley, June 25, 1910; and two (loaned by Cornell University) from Billy's Island, Okefenokee Swamp, Ga., June, 1912. Several of the specimens were caught on *Aster*.

Smith described the maculations on the sides of the face in *curvatum* as "broadly yellow" nearly to the vertex. The present specimens, both male and female, have these maculations broad throughout and rather rounded at the tip instead of tapering to a point as in most specimens of *Dianthidium*. Smith speaks of the "collar" as yellow and slightly interrupted. "Collar" is used by some writers to designate the prothorax but it would seem that Smith intended to designate by this term the anterior margin of the mesoscutum. Thus, in connection with *Anthidiellum perplexum* he speaks of the "collar" when the reference is very clearly to the fore part of the mesoscutum. The specimens under discussion are rather exceptional among examples of *Dianthidium* in having not small maculations on the anterior margin of the mesoscutum but in the case of the females at least—and that was the sex described by Smith—a broad medianly interrupted band that terminates at the sides and is not extended L-shaped fashion along the lateral borders. If one keeps in mind Smith's use of the term "collar," his description of *curvatum* fits the females and also several of the males in respect to this rather unusual maculation.

Smith speaks of the clypeus of the female as yellow with "a broad black stripe down the middle." In the females before the writer the clypeus is either wholly yellow, or narrowly banded with black at the apex, or with the black stripe that Smith refers to terminated half-way up; and only three of the female specimens have a yellow spot in front of the middle ocellus. The thoracic markings correspond with Smith's

description except that two of the specimens have in addition a yellow spot on the mesopleura.

Smith refers to the legs of *curvatum* as yellow, "varied with ferruginous." In the specimens at hand, there are yellow stripes on the front and middle femora beneath; yellow, often strongly vitiate with or wholly replaced by fulvous to reddish, on the apical tips of the femora; and more or less extensive yellow stripes on the outer surface of the tibiæ. In general, however, it is reddish rather than yellow that predominates on the legs, this being the color of the under side of the tibiæ, much of the outer surface of the tibiæ, and of the tarsi both outside and in. The basal portion of the femora, described by Smith as "fusco-ferruginous," is deep reddish-brown to black, and this color prevails in most of the specimens pretty well down toward the apex of the femora except for the maculations already noted.

The band on the first segment of the abdomen, described as deeply emarginate laterally, is continuous in only one of the specimens; in the others the emarginations are so deep that the band is subdivided into three parts. The bands on the second and third segments are pointed at their extremity within, as specified in the description, but that on the fourth segment is in most of the specimens rounded and rather blunt at the inner end. The "central oblique stripes" on the fifth segment are recognizable on some of the specimens but in others there is preserved part at least of the outer curvature that is normal on the second, third, and fourth segments. In all of the specimens the sixth segment is immaculate, as specified in the description.

The male, which was not described by Smith, has a small supra-clypeal maculation. In two of the specimens the normally broad maculations on the anterior margin of the mesoscutum do not quite reach the antero-lateral angle, while in several of those specimens where the maculations in question do attain it, they are extended backward a short distance along the lateral margin in the form of a rather thin and vaguely defined line. As in the female, the maculations on the axillæ are wider than the semicircle of yellow on the posterior border of the scutellum with which they are confluent. There is normally more yellow on the legs of the male than on those of the female, all of the outer tibiæ and the hind basitarsi (sometimes also the front and middle basitarsi) being of that color. Vitiating by red occurs, however, in the parts normally yellow, and the under side of the tibiæ, the lower joints of the tarsi, and also usually the femora above (especially their apical portion) are reddish. In all of the specimens the band on the first segment tends to divide

itself into three parts. The maculations on the subsequent segments are much as in the female but less broadly interrupted medianly; especially is this true of the maculations on the second segment, the inner ends of which (in most cases) practically touch one another. On the fifth segment the maculations are complete, not deprived of their outer curvature, and usually thinner and finer than those on the preceding segments. The apical segment is broadly truncate; the middle tooth, separated from the sides by very shallow rounded notches, extends somewhat beyond them. Indeed the pygidium is much like that of *simile*, and the two insects are evidently closely related, the punctuation in both being also very similar.

***Dianthidium simile* (Cresson)**

A male and a female from Douglas Lake, Mich.; taken July 16-17 by Mrs. M. D. Ellis; a female from Browns Mills, N. J., caught Aug. 15, 1920, by Dr. F. E. Lutz at *Clethra*; and a male from Ogunquit, Me., collected Sept. 6, 1925, by Dr. J. Bequaert, still further extend the geographical range of this widely distributed species. The male from Michigan has a broad triangle of black extending from the base of the pygidium to the very tip of the middle tooth and has maculations on the axillæ that are lacking in the specimen from Maine. The tibial stripes in both sexes from Michigan are rather restricted, and neither the female from Michigan nor the one from New Jersey has the tarsi yellowish. The characteristic formation of the pygidium of the males indicates their affiliation with *simile* notwithstanding a certain amount of variability in their markings.

***Dianthidium ulkei* (Cresson)**

The collection in the American Museum includes a large series of these bees. There are nine males (three from Meeker, Colo., July 20-21, 1919; one from Boulder, Colo., Aug. 7-12, 1919; one from Mesa Verde, Colo., July 3-7, 1919; one from Glenwood Springs, Colo., July 22-29, 1919; one from Ogden, Utah, July 25, 1920; one from Sheridan, Wyo; and one from Keddie, Cal.). The females number twenty-seven (ten from Meeker, Colo., July 20-21, 1919; five from Glenwood Springs, Colo., Aug. 5, 1920; two from Tennessee Pass., Colo., July 30-Aug. 2, 1919; two from Grand Junction, Colo., July 17, 1919; one from Rifle, Colo., July 19-21, 1919; one from Boulder, Colo., Aug. 7-12, 1919; two from Mesa Verde, Colo., July 3-7, 1919; one from Ogden, Utah, Aug. 29-30, 1916; one from Huntsville, Utah, July 26, 1920; one from Sierra Madre,

near Los Angeles, Calif., Aug. 23, 1916; and one from Keddie, Calif.). The insects were taken by the following collectors: Dr. F. E. Lutz (twenty-two), Mrs. F. E. Lutz (one), Mr. Metz (one), Mr. F. M. Jones (two), Mr. Pearce Bailey, Jr. (four), Mr. H. F. Schwarz (six).

Some of these bees were taken on *Cleome serrulata* and *Grindelia serrulata*.

The bees, particularly the females, show the wide range of variability noted by Swenk. The male and female from Keddie and the female from Sierra Madre, Cal., are with some hesitation included in the list. They represent the extreme of maculation. In the two females the marks on the sides of the clypeus are united below; the mandibles are maculated except for the tips; the supraclypeal mark and the mark below the anterior ocellus are present; the femora are maculated below, and the tibiae and at least the hind basitarsi are externally yellow; the abdominal bands are without emarginations. The junction of the lateral marks on the clypeus is unusual, but is noticeable in a specimen of *ulkei* from Tennessee Pass, Colo. All of the other maculations, to the inclusion of the maculated mandibles, are represented by several specimens from Colorado assigned to *ulkei*.

The male from Keddie was caught in copulation with the female. It is very like *davidsoni* and makes one wonder whether that species may not be *ulkei*, or a variety of it. In the type of *davidsoni* in the National Museum the central tooth of the pygidium extends somewhat beyond the truncation, as in *ulkei*, and is very shallowly separated from the sides. The specimen from Keddie corresponds with this type except for the fact that the mesopleura are immaculate and the sixth segment is less maculated. On the other hand, it is in as close agreement with various specimens of *ulkei* from Colorado and Utah. In the description of *davidsoni*, which was based on two males, reference is made to the apical segment as "truncate and faintly trilobed." Before me is a male specimen from Sierra Madre, Cal., which, except for its wholly black mesopleura, very closely parallels in its maculations those of the type of *davidsoni*. But its structure differs. The median tooth of its pygidium is broad and is clearly set off from the sides, terminating on a level with them. The insect in this respect is suggestive of *parvum* rather than *ulkei*. The coxal spine of this specimen is bulbous, not acute as in the type of *davidsoni*.

In the National Museum are two male specimens that have been associated with *davidsoni*. Like the specimen from Sierra Madre, they have a pygidium that is distinctly tridentate; but one of them has a

bulbous coxal tooth, in the other this tooth is acute. Are they to be regarded as *davidsoni*, which in turn seems closely linked to *ulkei*? The wide variability in the maculations of *ulkei* makes the suggestion that there may be similar lapses in structure from the standard seem less revolutionary. On the other hand, Swenk, who had a series of twenty-four males of *ulkei* before him, concludes that "the male of *ulkei* differs at once from *parvum* ♂ in the quite different pygidium, *parvum* having distinct notches on the sides of the median apical tooth, which are lacking in *ulkei*."

I confess myself unable to decide whether (1) to regard the males from Keddie and Sierra Madre each as specifically distinct, (2) to regard them both as *ulkei*, with the implication that the variability of that species is greater than was previously believed to be the case, or (3) to assign them to *davidsoni* on the theory that large structural variability may exist in that species and that one of its extremes virtually coincides with *ulkei*.

It is in order to note in conclusion that one of the specimens of *ulkei* from Glenwood Springs is a gynandromorph. The mandibles are those of the male. The left half of the clypeus shows the typical black with yellow lateral marking of the female. This side lacks a supraclypeal mark. The right half of the clypeus is wholly yellow, as in the male, and this half has a supraclypeal mark. The antennæ are twelve-jointed, and all of the other structural features and markings are those of the female sex. Hicks has recently recorded a gynandromorph of *Dianthidium sayi* (Amer. Naturalist, LX, p. 199).

***Dianthidium parvum* (Cresson)**

Eight males (two from Meeker, Colo., July 20–21, 1919; two from Glenwood Springs, Colo., July 22–29, 1919 and Aug. 5, 1920 respectively; one from Ward, Colo., Aug. 8–10, 1919; one from Jim Creek Canyon, near Boulder, Colo., Aug. 3, 1922; one from Estes Park, Colo., Aug. 18, 1919; and one from Grand Junction, Colo., July 17, 1919) and one female from Boulder, Colo., Aug. 7–12, 1919, belong to this species, which is discussed more in detail in connection with *semiparvum*. Here be it said, however, that one of the males from Meeker has the maculation on the scutellum continuous, not interrupted, while one from Glenwood Springs has a yellow line before the anterior ocellus, recalling a similar maculation in the female of *parvum baculifrons* Cockerell. Three of the specimens have lines on the front femora beneath, and two others lines on the middle femora beneath as well as on the front femora beneath.

Of the nine specimens six were collected by Dr. F. E. Lutz (two of them at *Grindelia serrulata*) and three by Mr. H. F. Schwarz.

***Dianthidium semiparvum*, new species**

Five males from Utah (two from Huntsville, taken on July 26, 1920 by Dr. F. E. Lutz, one from Ogden, captured by the same collector, Aug. 29–30, 1916, and two from Salt Lake City, collected on Aug. 24, 1917 and kindly loaned by Dr. J. Bequaert) are very closely related to *parvum*. They can be differentiated, however, by the somewhat deeper yellow of their abdominal markings; by the absence of maculations on the scutellum; by the bulbous shape of the third coxal spines, which are only a little longer than their breadth at the base, not slender, long, and tapering as in *parvum*; and by the rather blunt, thick middle tooth of the pygidium, which at its apex is about half the width of the lateral lobes at their apex.

This combination of characters is found in no specimen of *parvum* from Colorado that has come to my attention, but one or two specimens share one or another of these characters. Thus, a specimen from Ward, grouped with *parvum*, has the scutellum immaculate, while in one of the Meeker specimens the middle tooth of the pygidium is nearly as broad as in the Utah specimens.

This species is very close to Swenk's *subparvum* from Washington and British Columbia. Like *subparvum*, it has the scutellum immaculate and the median tooth of the pygidium broad and slightly emarginate at the apex. The spines on the third coxæ, though "stout," are, however, not "large," if by large is implied length, and the emarginations that separate the central tooth from the lateral lobes are, if anything, rather more shallow, instead of deeper, than in *parvum*. Swenk, in his description of the male of *subparvum*, says nothing regarding maculations on the femora. Two out of the five specimens from Utah have stripes on the front and middle femora beneath, and four of them have a supraclypeal triangle. The carina on segment 6 is not heavier than in specimens of *parvum*.

A female from Huntsville, Utah, taken on the same date as the two males from that locality, is placed with considerable hesitation in the same species as these. It is much smaller, being only about $5\frac{1}{2}$ mm. as against 9 mm. in the case of the male. Its maculations are slightly lighter in color, more nearly resembling in this respect those of the male of *parvum*. Like the male of *semiparvum* and like both sexes of *subparvum*, it has the scutellum immaculate. Again, in agreement with the male of *semiparvum* and in agreement now with both sexes of *parvum*, it has yellow spots on the anterior margin of the mesoscutum. Instead of short stripes on the front and middle tibiæ as in *subparvum*, or basal

spots on these joints as in *parvum*, it has stripes extending nearly to the apex, and even on the third tibiæ the basal spot is prolonged posteriorly in the form of a narrow stripe which very nearly attains the apex. The front femora have an apical stripe beneath. The interrupted band on segment 5 of this specimen, unlike that of *parvum*, has enclosed spots instead of posterior emarginations, segment 5 of *subparvum* having "exteriorly emarginate spots." Structurally, the Huntsville female differs from the type of *parvum* in having a distinct subapical tooth on the mandibles. In the type of *parvum* and in *pudicum* the edge of the mandibles beyond the apical tooth is smooth and even, or practically so. The ventral scopa of the Huntsville female is, so far as can be determined, pale yellow to whitish.

On the field card covering the three specimens from Huntsville, as well as other insects including bees, I find this comment: "Most of the bees, except *Bombus*, on *Grindelia*."

***Dianthidium pudicum* (Cresson)**

Nine male specimens (two from Trout Creek, Juab Co., Utah, July 6-9, 1922; two from Aspen, Colo., July 24-27, 1919; one from Leadville, Colo., Aug. 3-5, 1919; one from Estes Park, Colo., Aug. 17, 1919; one from Palisades, Colo., July 18, 1919; one from Glenwood Springs, Colo., Aug. 5, 1920; and one from Prescott, Ariz., emerged April, 1923) and nine females (two from Trout Creek, Juab Co., Utah, July 14, 1922 and Aug. 16, 1922; three from Aspen, Colo., July 24-27, 1919; one from Glenwood Springs, Colo., Aug. 5, 1920; one from Boulder, Colo., June 21-23, 1922; and two from Prescott, Ariz.) belong to this species. Of these specimens four were collected by Dr. F. E. Lutz, four by Mr. Pearce Bailey, Jr., four by Mr. Tom Spalding, three by Dr. J. Bequaert, and three by Mr. H. F. Schwarz.

All of the males have lines on the scutellum (which Cresson in describing the species refers to as "sometimes" present) and four of them have lines on the axillæ as well; four of them have a thin stripe on the front femora below; four of them have the basal and apical spots on the hind tibiæ connected by a narrow posterior stripe; and two of them have the spots on the first abdominal segment connected.

The females are all less than 8 mm., ranging rather from 6 mm. to 7 mm. All except one of them agree with Cockerell's description of the allotype in having the sixth segment black and all but three of them in having the lateral part of the light marks on the fifth segment wanting. One or two of them agree with the females from Worland, Wyo., referred

to by Swenk, in having the basal spots on the tibiæ prolonged. The clypeal markings are very much reduced in seven of the specimens and absent in the remaining two. In all of the specimens the axillæ as well as the scutellum have maculations. In four of the specimens the normally disconnected maculations of the first segment are united.

The paler markings serve to differentiate both sexes from the closely related *parvum*. The spaces separating the middle lobe of the pygidium of the male of *pudicum* from the lateral lobes are not only relatively wider and deeper than in *parvum*, but the middle lobe is finger-like and extends, unlike that of *parvum*, considerably beyond the terminus of the lateral lobes and slightly downward.

In my estimation *Dianthidium provancheri* is a variety of *pudicum* rather than a distinct species. I have examined the type of *provancheri* in the U. S. National Museum and find it a virtual duplicate of those specimens of *pudicum* that have a stripe on the under side of the front femora. The only important point of difference—and it seems to me to have varietal importance only—is that the maculations of *pudicum* are cream-colored, those of *provancheri* yellow.

***Dianthidium cressoni* (Dalla Torre)**

A female from Aspen, Colo., taken July 24–27, 1919, by Mr. Pearce Bailey, Jr., agrees with Cresson's type (*venustum*) in essential respects. In the type the black of the clypeus is confined to the base, whereas in the specimen from Aspen the clypeus consists of three subequal triangles, the lateral ones yellow, the median one inverted and black. The specimen from Aspen lacks a mesopleural area of yellow that characterizes the type, and the median interruption of its abdominal bands is not completed on segments 4 and 5.

A specimen from Ward, Colo., taken Aug. 8–10, 1919, by Mr. Pearce Bailey, Jr., and two specimens from Trout Creek, Ibapah Mountains, Utah, taken on July 9, 1922 and Sept. 15, 1922, respectively, by Mr. Tom Spalding, are, I think, undoubtedly the male of *cressoni*, which hitherto has not been described. The male is comparable to the female in size (about 12 mm. or more) and has for the most part the rather individual markings of that sex. The marks beginning at the summit of the eyes and extending about half-way down behind the eye, the marks on the thorax and legs, and those on the first two abdominal segments are virtually identical in the female and two of the male specimens. Especially to be noted is the approximate identity of the maculations on the second segment, which is three-spotted, the central maculation more or

less subinterrupted in the middle and more or less notched at each outer end, suggestive of a butterfly with wings spread. In the third male specimen the central maculation on the second segment is united with those on the sides, assuming the more commonplace appearance of a band with posterior emarginations; the yellow line behind the eye extends all the way down; and the axillæ, which in the other specimens are wholly black, have yellow maculations confluent with those on the scutellum, forming with these a practically unbroken semicircular band. The maculations on the third, fourth, fifth, and sixth segments of the female enclose black lines. The corresponding maculations of the male, as represented by the three specimens of that sex, are posteriorly emarginate on each side, but the lower extremities of these maculations are bent sharply inward and, if prolonged, would result—and in one case very nearly do result—in maculations identical with those of the female. In all of the specimens the middle femora (and not merely the anterior femora, as noted in the description of the female of *venustum*) have a stripe beneath. The males have a supraclypeal triangle of yellow which is lacking in the female specimen. The yellow spines on the coxæ of the male are unusually long even for that sex, being about two to two and a half times their breadth at the base. The effect of length is aided in their case by the extension of the yellow to the apical region of the coxæ. The spines of the female are stubbier and blunter, scarcely longer than wide and much less conspicuous than in the male; nevertheless, this armature is much more developed than in most of the females of *Dianthidium* and in this respect parallels the tendency of the male. The structure of the seventh segment of the male will further assist in the identification of this insect. It consists of a rather heavy blunt central tooth, broadly separated from the lateral lobes by deep triangular emarginations. The lateral lobes are divergent, their somewhat rounded tips pointing outward. The segment is wholly yellow, except for a narrow strip of black at the base, a hyaline median longitudinal carina and a hyaline border with reddish reflections along the apex. The structure of this segment is not unlike that figured by Cresson for *concinnum*, but *cressoni* may be separated at once from that species by the absence of red on the legs and abdomen, the peculiarly marked second segment, and its greater size.

ANTHIDIELLUM

This genus is easily differentiated from *Dianthidium* by its produced and sharply truncate scutellum. It lacks the spines on the hind coxæ that characterize *Dianthidium*, and, so far at least as the species listed below

KEY TO THE FEMALES

- 1.—The lateral face marks extending to the level of the anterior ocellus. 2.
 The lateral face marks truncated at the level of the insertion of the antennæ or produced only a little beyond, terminating well before the level of the anterior ocellus is reached. 3.
- 2.—The antennæ (almost wholly), the facial, thoracic, and abdominal markings, as well as the legs below the trochanters, usually strongly red, but sometimes only the greater number of these maculations strongly red, others tending to orange. The band on segment 1 usually continuous. (Florida).
notatum rufimaculatum, new variety.
 The maculations yellow, sometimes faintly tinged with ferruginous. Segment 1 with a maculation at each lateral extremity, separated by a broad median area of black. (Mass., N. Y., Penn., Del., N. J., and N. C.) . . . *notatum*.
- 3.—The clypeus wholly black. The legs largely black, with a stripe (usually not extending quite to the apex) on the front tibiæ, a stripe extending from base to apex on the middle tibiæ, and a basal and sometimes an apical maculation on the hind tibiæ. Segment 6 usually with two rather x-shaped maculations. (Colorado to California and Oregon) *robertsoni*.
 The clypeus maculated. The legs with a considerable amount of red. 4.
- 4.—The lateral face marks truncated at the level of the insertion of the antennæ. The maculations lemon-yellow. Front femora blackened; a yellow stripe externally on the front and middle tibiæ, a yellow spot at base of the hind tibiæ. Segment 1 of abdomen with an oblong spot at each side. (New Mexico and Texas) *gilense*.
 The lateral face marks ending above the insertion of the antennæ, rather rounded at the upper end. Maculations with a strong tendency toward red. The legs almost wholly red below the trochanters. A broad band of red on segment 1 that turns to yellow at its lateral extremities. (North Carolina to Florida) *perplexum*.

***Anthidiellum robertsoni* (Cockerell)**

Cockerell has recently called attention to the wide distribution of this species, represented in the collection of the California Academy of Sciences by specimens from Oregon, California, and Utah. Of the four male specimens in the collection of the American Museum one is from Salt Lake City, taken by Dr. F. E. Lutz on July 28, 1920, the other three are from localities in Colorado, secured by the same collector. Thus the range of this insect extends somewhat farther eastward than the previous records indicated. The Colorado specimens are from Fruita, July 16, 1919, Grand Junction, July 17, 1919, and Glenwood Springs, Aug. 5, 1920. Two of them have the triangles occupying the corners of the supra-clypeal area united by a narrow yellow band and in addition have small yellow spots on the axillæ. In addition to the male specimens there are two females: one from Shasta County, Calif., acquired in the Henry

Edwards Collection, and one from Trout Creek, Ibabah Mountains, Utah, taken by Mr. Tom Spaulding, Aug. 16, 1922.

***Anthidiellum perplexum* (Smith)**

Thirteen males (three from Southern Pines, N. C., June 10, June 12, and Aug. 26, 1918; one from Deenwood, Waycross, Ga., July 16-18, 1916; two from Jacksonville, Fla.; two from Island Grove, Fla.; one from Miami, Fla.; one from Monticello, Fla., Oct. 4-8, 1914; one from Titusville, Fla., Nov. 8, 1911; one from Ormond, Fla.; and one from Gainesville, Fla., Sept. 26-Oct. 2, 1914) and three females (one from La Belle, Fla., Sept. 14, 1911; one from Sanford, Fla., April 26; and one from Island Grove, Fla., collected by Mr. O. Seifert) belong to this species.

In the males the ferruginous coloration of the antennæ does not extend beyond the third joint of the flagellum and in some cases the yellow maculations on the extreme lateral margins of the abdomen have been completely superceded by ferruginous.

The females from Sanford and Island Creek have the basal two-thirds of the clypeus and the supraclypeal area yellow-ferruginous and all three specimens have small ferruginous marks on the fifth segment, departing in these respects from Smith's description.

***Anthidiellum notatum* (Latreille)**

Six males (one from Hyannisport, Mass., taken by the Rev. J. L. Zabriskie, Aug. 10, 1899; one from Forest Hills, Mass., collected by Professor William Morton Wheeler, July 31, 1901; one from Lakehurst, N. J.; three from Southern Pines, N. C., secured by the Rev. A. H. Manee, June 12, 1912, June 25, 1909, and Sept. 6, 1918) and four females (two from Southern Pines, N. C., obtained by the Rev. A. H. Manee, June 10, 1913 and June 24, 1909; one from Huguenot, N. Y., taken by the Rev. J. L. Zabriskie, Aug. 5, 1904; and one from Browns Mills, N. J., caught by Dr. F. E. Lutz, Aug. 15, 1921) belong to this species.

The male from Forest Hills lacks the transverse line above the clypeus.

***Anthidiellum notatum rufimaculatum*, new variety**

Fourteen specimens of *Anthidiellum* from various localities in Florida are structurally so much like *notatum* as to resist classification as an independent species, but their deep red markings readily differentiate them from the common form of *notatum* with its yellow maculations, even when these maculations are more or less vitiate with rose color. For the most part, these Florida specimens have pure red maculations but occasionally some of the maculations (particularly those beyond the second segment of the abdomen) may incline to orange, and the clypeus and lateral face marks

of the male at least, are usually yellow with rose suffusion, the yellow being least vitiated in that part of the face-marks that lies below the point of insertion of the antennæ. The band across the vertex is rather longer in these specimens than in *notatum* proper, terminating not just beyond the summit of the eye but extending from a third to half-way down. In all of these specimens save one (a female) the band on the first segment of the abdomen is continuous, not reduced to two lateral maculations broadly separated by black, as in *notatum* proper. This female, too, is an exception to the other specimens from Florida in having the femora basally black, recalling the usual condition of *notatum*. The other specimens have the legs wholly red except for the tips of the tarsal claws and sometimes the coxæ. Excepting the aberrant female, all of the specimens have the antennæ (including the scape) red, slightly darkened toward the apex of the flagellum. Even in the aberrant female the scape and basal joints of the flagellum are red. In *notatum* they are black. The males of *notatum rufimaculatum* range in length from 7 to 8 mm.; the females from 8 to 8½ mm. The specimens are on the average considerably larger than the more northern forms of *notatum* before me.

Of these insects, one was collected by Mrs. A. T. Slosson at Biscayne Bay, Fla., two (one representing the extreme of orange maculation in the male and the other, the aberrant female) were taken by Mr. Frank Morton Jones at Lakeland, Fla., on May 3, and the remainder were caught by Dr. F. E. Lutz at the following localities and on the following dates: six at Royal Palm Park, Fla., April 12-18, 1923; one at Homestead, Fla., April 18, 1923; four at Miami, Fla., Nov. 5, 1911, and April 11-21, 1923. Of the specimens taken at Miami, two were collected on or near the Brickell Hammock and two in a patch of weeds along the shore northeast of the city. Four of the specimens were visiting the flowers of the Sumac, and the pair from Lakeland was copulating on this plant when caught.

PARANTHIDIUM

In 1901 Professor Cockerell and Mrs. Cockerell erected *Paranthidium* as a new subgenus of *Dianthidium* and designated as the type *Dianthidium perpictum* (*Anthidium perpictum* Ckll.). In 1914, in a paper entitled "Names Applied to the North American Bees of the Genera *Lithurgus*, *Anthidium*, and Allies" (Proc. U. S. Nat. Mus., XLVII, p. 91), Professor Cockerell coupled *Paranthidium* and *Anthidiellum* as subgenera of *Dianthidium*. In 1925, in a paper on "Anthidiine Bees in the Collection of the California Academy of Sciences" (Proc. Cal. Acad. of Sciences, Fourth Series, Vol. XIV, No. 15, pp. 345-67), he elevated *Anthidiellum* to generic rank. It would seem in order to dignify *Paranthidium* in a similar manner.

Very closely related to *perpictum* (the type species) are *gabbii* and *lepidum*. The males of these two species have, like the male of *perpic-*

tum, erect, sharp-edged tubercles. All three have a deep depression near the apex of the venter, the pit being occupied in part by a smooth, shining plate, the lower end of which has a row of closely-placed teeth suggestive of a comb. In all three the apical segment is extended medianly in the form of a cone-like projection that is flanked on each side at the base by a minute spine—characters mentioned also in the description of the male of *jugatorium*.

In commenting on *Dianthidium perpictum* in 1901 Cockerell stated: "This has the primitive character of 3-jointed maxillary palpi, but the venation of *Dianthidium*." Comparison of the mouth-parts of *arizonicum*, described as a *Dianthidium*, with those of *perpictum* indicates that the two are substantially the same. Hence, *arizonicum* is here included under *Paranthidium*. I have not had available for relaxation a specimen of *texanum* but because of the very close relationship of this species to *arizonicum*, there is little room for doubt that it, too, belongs to any group in which *arizonicum* might legitimately find place. Both of these species are apparently more closely related to *Paranthidium* than to the other divisions of the Anthidiinæ, even if judged merely by their external characters. Thus, they can be separated from *Dianthidium*, as delimited in this paper, by the absence in both sexes of the spine on the hind coxæ. From *Heteranthidium* they differ in their venation, which is that of *Dianthidium*; from *Anthidiellum* in the much less broadly and sharply truncate character of the scutellum, which is merely of normal length, not strongly produced posteriorly; from *Callanthidium*, in the presence of pulvilli between the tarsal claws. The males of *texanum* and *arizonicum*, like those of *jugatorium*, *lepidum*, *gabbii*, and *perpictum*, have the pygidium medianly much produced, but in *texanum* and *arizonicum* this structure is pointed rather than cone-like, with low, lateral lobes on each side in place of the minute spines that characterize the other four species mentioned. In *texanum* and *arizonicum* the tubercles are not erect, although rather strongly recurved anteriorly; on the other hand, they are not nearly so developed as those of *Dianthidium*, terminating well before the anterior margin of the mesoscutum, being in this respect again more suggestive of *Paranthidium* as represented by *perpictum* and the group closely related to it.

KEY TO THE MALES

- 1.—The inner side of the socket of each antenna flanked by a diagonal ridge, the two ridges converging toward a point just below the level of the antennæ. The lateral face marks broad below, abruptly narrowed just above the level of the insertion of the antennæ, continuing thence in the form of a narrow

- line along the inner margin of the eye to terminate in a clavate swelling at the level of the anterior ocellus. Segment 7 produced medianly, carinated, and rather pointed, with low lateral lobes on each side at the base. 2.
- No carina-like elevations in the region between the antennæ. The lateral face marks either tapering gradually to a point or broad throughout. The strong median process on segment 7 rather cone-like with small, sharp spines on each side at the base. 3.
- 2.—The ridges between the antennæ minutely tessellated but impunctate. The entire surface between these ridges, as indeed the entire area between the antennæ and the ocelli very finely and exceedingly densely punctated. (Arizona). *arizonicum*.
- The ridges strongly punctured. The area between the ocelli and the antennæ covered with coarse, heavy punctation (Texas). *texanum*.
- 3.—A continuous band extending across the vertex and half-way down the cheeks. (Southeastern). *lepidum*.
- No continuous band over the vertex, merely two widely separated maculations, one above each eye. 4.
- 4.—The pygidium wholly or mostly yellow. (New Mexico and Colorado). *perpictum*.
The pygidium black. (Missouri, Nebraska, Wisconsin, New Jersey) *jugatorium*.

KEY TO THE FEMALES

- 1.—A diagonal ridge or blister-like swelling flanking the inner socket of each antenna. The scale on the tubercles small and recurved but not sharply erect. The abdominal bands with emarginations on each side behind or with enclosed black spots. 2.
- No elevation in the region between the antennæ. The tubercles knife-sharp and perpendicular. The abdominal bands on at least segments 4, 5, and 6 with their posterior surface unbroken by emarginations. 3.
- 2.—The ridges between the antennæ tessellated but impunctate. (Arizona).
arizonicum.
- The ridges strongly punctured. (Texas). *texanum*.
- 3.—The lateral face marks of uniform breadth, not in the least tapering, broadly rounded at their upper end, which is on a level with the rather obsolete anterior ocellus. A yellow band extending across the vertex and half-way down the sides behind the eye (Georgia, Tennessee). *lepidum*.
- The lateral face marks tapering to a point at their upper extremity. No continuous band over the vertex, merely a relatively short line behind the eye near its summit. 4.
- 4.—The tubercles black. The axillæ black. Smaller, $8\frac{1}{2}$ to 9 mm. (Missouri, Nebraska, Wisconsin, New Jersey). *jugatorium*.
- The tubercles reddish. The axillæ sometimes spotted. A stripe sometimes on the mesopleura as well as a spot occasionally on the metapleura. The front and middle femora occasionally striped beneath. Somewhat larger and more robust. (New Mexico and Colorado). *perpictum*.

***Paranthidium perpictum* (Cockerell)**

Eighteen males and two females affiliate themselves with this species. Of the males, seven, bearing date of July 20–21, 1919, are from Meeker, Colo., the remaining eleven, caught July 21–25, 1922, are from Jim Creek, near Boulder, Colo. The specimens from Meeker show greater variability in size, averaging between 7 and 10 inches, while those from Jim Creek range between 8½ and 9½ inches. The specimens from Meeker are on the whole less fully maculated. Six of the seven lack a stripe or have merely a rudimentary stripe on the front and middle femora beneath, which are present and well developed on all of the specimens from Jim Creek. Two of the Meeker insects have yellow on the axillæ, while eight of the Jim Creek bees are thus distinguished. All of the specimens from Meeker, and three of those from Jim Creek, have the compressed, knife-sharp tubercles wholly immaculate, whereas the others have varying amounts of yellow on this structure. The amount of yellow on the pygidium is variable, too, but for the most part the black, if present, is confined to the extreme apex or the extreme base, or both. In one case the thorn-like lateral spines are not hyaline but opaque and black. One of the males from Meeker presents the unusual feature of a continuous band on the first segment.

The females are from Ward, Colo., Aug. 8–10, 1919, and from Jim Creek, Colo., July 25, 1922. They have a strong suffusion of red on the legs below the femora—in these respects, as in the presence of marks on the axillæ as well as on the scutellum, resembling *perpictum coloradense*. Two marks that have no parallel in the male specimens characterize these females: a thin wavy line of yellow running crosswise of the mesopleura about midway between the tegulæ and the coxæ of the middle legs, and a subquadrate spot on the metapleura just below the second pair of wings. The specimen from Ward has yellow maculations at the base of the broad overlapping mandibles.

***Paranthidium lepidum* (Cresson)**

It seems probable that a specimen from Johnson City, Tenn., taken Aug. 17, by Mr. G. P. Engelhardt, is the female of *lepidum*, which hitherto has not been described. Of the three closely-related species of *Paranthidium* from the United States—*jugatorium*, *perpictum*, and *lepidum*—only the last mentioned has a band extending across the vertex and half-way down the eye. This maculation, characteristic of the male of *lepidum*, which was collected in Georgia, is paralleled in this female from the adjoining state of Tennessee.

The lateral face marks of this female extend broadly, not taperingly, to the level of the anterior ocellus, their rounded upper tips being of the same width as the lower extremity of the face marks. There are large yellow maculations on the clypeus that unite narrowly below to form an inverted, rather ponderous, horse-shoe-shaped figure. A short stripe is present below the rather obsolescent anterior ocellus. There are broad L-shaped figures on each side of the mesoscutum that are practically confluent with the barely interrupted maculations on the axillæ and scutellum. There is a spot on the tubercles, a scarcely traceable spot on the otherwise dark-red tegulæ, and a maculation on the mesopleura. In the maculations of the legs red struggles with yellow for mastery. There are yellowish-reddish areas at the apices of all the femora, and stripes exteriorly on the front and middle tibiæ extending from base to apex. Exteriorly, the hind tibiæ are maculated only at the base, but beneath they are almost wholly light red, and the black of the upper surface has a strong reddish suffusion. The posterior coxæ are maculated as in the male. The sublunate spots on the first segment extend rather far inward, the separating area of black being rather shorter than either of the maculations in question. The bands on the second to fifth segments are unemarginate and their median interruptions are progressively narrowed, the interruption on the fifth segment being hair-fine apically though triangular basally. The sixth segment has the maculation entire. The ventral scopa is light, as in *perpictum*.

***Paranthidium jugatorium* (Say)**

A small female (about 8½ mm. in length) collected by Dr. J. Bequaert at Palisades, N. J., Sept. 15, 1920, as it was visiting *Helianthus strumosus*, presumably should be placed in this species. It has the tubercles, tegulæ, axillæ, mesopleura, and the under side of the femora, black. There is no mention of maculations on these parts in the description of *jugatorium*, and the presumption, therefore, is that they are black as in the specimen at hand. The description of the legs of *jugatorium* is a little vague: "Feet blackish, with dull rufous joints, and tarsal hair; anterior feet before dull rufous." The present specimen has dull yellow stripes, vitiate with rose color, that extend from base to apex along the anterior margin of the front tibiæ, and a dull yellow spot at the base of the middle and hind tibiæ. The femora at the apex have a slight reddish discoloration. The abdominal bands are as set down in the description of *jugatorium* and in Swenk's key to the Nebraska species of *Dianthidium*.

Paranthidium jugatorium was originally described from Missouri and has been recognized by Graenicher from Wisconsin. It is interesting to note that among the floral records made by Graenicher is *Helianthus strumosus*, the plant on which the New Jersey specimen was taken.

In structure the specimen from New Jersey is curiously like the females here assigned to *lepidum* and *perpictum*. If the identifications of *perpictum* and *jugatorium* are correct and the designation of the specimen from Tennessee as the allotype of *lepidum* is sustained, one cannot help wondering whether consideration of these insects as different varieties of a single species would not more accurately represent their close relationship than does the present classification as distinct species. Particularly close are *jugatorium* and *perpictum*. Thus, the type of *perpictum* in the National Museum, like the specimen from New Jersey here assigned to *jugatorium*, has the tubercles, tegulæ, axillæ, mesopleura, and under side of the femora immaculate. The male specimens of *perpictum*, as previously discussed in this paper, show, too, marked variability in the direction of *jugatorium*. The tegulæ of the female from New Jersey are coal black; those of the type of *perpictum*, red. This distinction has been retained in the key, although with some doubt whether it is applicable, for variability in this respect is traceable in other species. All of the males of *perpictum* covered in this paper have yellow predominating over black on the pygidium. Swenk in his key gives black as the color of the pygidium of *jugatorium*.

***Paranthidium arizonicum* (Rohwer)**

A female, taken at Post Creek Canyon, Pinealeno Mountains, Fort Grant, Ariz., July 15–18, 1917, and presented to the American Museum by Dr. J. Bequaert, is evidently the female of this species, which has not been previously described. It is readily recognized as such by the identity in both sexes of the tessellated but impunctate converging ridges—a little suggestive of the wrinkles produced between the eyebrows when a person is frowning—that occupy the space between the antennæ. The mandibles of the female are black, and the edge beyond the apical tooth is smooth and sharp. The yellow on the clypeus is reduced to a spot on each side but the lateral face marks are as in the male: broad below but narrowed sharply just above the point of insertion of the antennæ, only to become clavate again near the tip, their upper half and that portion of the lower half margining the eye being of a glistening transparency. The thoracic markings are identical: those on the anterior margin of the

mesoscutum well developed, extending each about one-third of the distance across; those on the sides of the scutellum narrower than those on the axillæ and terminating abruptly, not continued along the posterior margin of the scutellum. The maculations on the legs are as described for the male except that there is a well-developed stripe on the under side of the middle as well as the front femora, and the tibiæ are wholly red. The tarsal joints are inclined to be sooty; particularly marked is this tendency on the hind tarsi, where there is a sharp line of demarcation between the red on the basal half of the basitarsi and the black that distinguishes the apical half and the two succeeding joints. There are medially interrupted bands with lateral emarginations posteriorly on the first five segments, the median interruptions being greater on the second, third, and fourth segments than on the first and fifth. The sixth segment is immaculate. The ventral scopa is silvery white.

