

# AMERICAN MUSEUM NOVITATES

Number 218

Published by  
THE AMERICAN MUSEUM OF NATURAL HISTORY  
New York City

June 17, 1926

---

59.57,99H(73)

## NORTH AMERICAN BEES OF THE GENUS *HETERANTHIDIUM*

BY HERBERT F. SCHWARZ

Alone among the pulvilli-bearing genera of the subfamily Anthidiinae, *Heteranthidium* is distinguished by having the second recurrent vein interstitial or virtually interstitial with the second transverse cubital vein, an arrangement characteristic also of the pulvilliless genus *Anthidium*. *Heteranthidium* males have the sixth abdominal segment more or less produced medially at the apex, so that it rather overarches the seventh segment. In all of the species thus far grouped in this genus except *ridingsii*, the female of which is sometimes rather brokenly maculated along the apical rims, the abdominal bands in both sexes are at most only barely interrupted on some of the segments; also, they tend to narrow medianly, this attenuation being about as characteristic as their continuity. Sometimes this median narrowing is gradual but decided, giving the bands a rather open U-shaped appearance, as in *zebratum*; in other instances—*occidentale* may serve as an example—the regularity of the curvature is somewhat interrupted by lateral emarginations above; in one case, that of the new species herein recorded from California, the median narrowing is only very slight. But, notwithstanding these differences, the essential unity of the abdominal bands in this genus and their generally simple, symmetrical appearance are rather in contrast to the subdivided and frequently differentiated elements that go to make up the bands in the other groups of Anthidiinae. The tubercles may be obtuse or carinated but in no instance that has come to my attention have they the prone, scalelike appearance of those of *Dianthidium*. Likewise, both sexes lack the spine on the third coxæ that is so characteristic of the bees assigned to *Dianthidium*. Other, less constant, characteristics are the marked broadening usually of the middle and sometimes of the hind tibiae toward the apex, and the conspicuous breadth in some instances of the basal joint of the middle and hind tarsi.

For the most part, the bees of the genus *Heteranthidium* are large, showy creatures, but *bequaerti* from California herein described is not distinguished by size, and *crassipes* too is only a moderately large insect. The erect tubercles, the character of the abdominal bands, and above all

the presence of the pulvillus combined with the venation of *Anthidium* tend to establish the affiliation of *crassipes* with *Heteranthidium*. The female of *larreæ* has "second recurrent going beyond tip of second sub-marginal cell." I have examined the type in the National Museum and am of the impression that its venation more nearly resembles that of *Anthidium* than that of *Dianthidium*. Moreover, its other characters are so closely in accord with those here associated with *Heteranthidium* that there is comparatively little room for doubt that it is a legitimate member of this genus. Both *crassipes* and *larreæ* are therefore included in the following keys. The bee designated *fontemvitæ* is unquestionably *Heteranthidium* but it is in order to point out that the long, slanting apical edge of the mandibles in the female is rather suggestive of that of certain of the females of *Paranthidium*.

#### KEY TO THE MALES

##### (Those of *crassipes* and *bequaerti* unknown)

- 1.—No maculation behind the eye; but clypeus, mandibles except tip, and scape in front, yellow. The thorax immaculate. The apical rims of segments 1-5 faintly cream-colored. Segment 6 with a deep and rather broad median longitudinal depression; the apex of this segment produced truncately in the middle and rather deeply emarginate on each side below. The pygidium black to deep reddish brown, polished and highly shiny, with a conspicuous recurved lobe on each side at the apex. (Southeastern).....*ridingsii*.  
The abdominal bands conspicuous and not confined to the apical rims. Segment 6 not medianly depressed, usually rather elevated medianly.....2.
- 2.—Segment 3 of the venter with two sharp black-tipped but otherwise reddish spines on each side of a median emargination. The ventral segments beyond sternite 3 medianly concave, forming a rather decided depression. Pygidium with a median longitudinal ridge that terminates in a tooth, flanked on each side by a slightly smaller tooth; the sides of the pygidium converging and emarginate. The tibiæ with yellow stripes connecting the basal and apical maculations. The abdominal bands on segments 1-5 squarely emarginate discally above. (Florida).....*fontemvitæ*.  
Sternite 3 without such armature, or with at most blunt, low teeth. The pygidium not distinctly tridentate at the apical middle.....3
- 3.—The legs with a considerable amount of black. The tubercles rounded, black or mostly black.....4.  
The legs yellow varied with fulvous to light reddish. The tubercles sharply carinated, and yellow or mostly yellow.....5.
- 4.—The mesoscutum usually immaculate. The axillæ as well as the scutellum often maculated. The maculations at the base and apex of the tibiæ usually more or less united by a stripe. The bands on the abdominal segments narrowed gradually from sides to center in the form of a sweeping, uninterrupted curve. Pygidium with a median longitudinal ridge, upbent at the apex; a stout,

usually black, blunt, rather rectangular median tooth at the apex and a lobe at the base of the converging and usually black-margined sides (Western).

*zebratum*.

The mesoscutum usually with L-shaped stripes. The axillæ black and usually the scutellum as well. No stripes connecting the tibial maculations. The bands on the abdominal segments discally emarginate above. Pygidium, largely black, with a median ridge, the apex of the segment bent upward, broadly subtruncate to bilobed at the apical middle and with a somewhat broader lobe at the base of its converging sides. (Western).....*occidentale*.

- 5.—The outer spine on the hind tibiæ stout at the base, tapering toward the apex, and sharply curved before the tip is reached; the inner one slender and scythe-like. The elevation in the middle of ventral segment 1 with two black-tipped tuberculate prominences. The pygidium with at most a faint median carina, yellow, concave, with its tip much produced and rather falciform when viewed in profile. The punctation of the abdomen dense,—fine and small at the base of each segment, coarse and large toward the middle. Venter light reddish. (Southeastern).....*dorsale?* (*harbecki*).

The outer spine on the hind tibiæ slender and almost straight. The elevation on sternite 1 at most faintly bilobed and wholly yellow. The pygidium broadly convex along the middle and with a deep pit on each side at the base, the hyaline-bordered apex crenulate, the apical middle broadly emarginate. The abdominal punctation relatively sparse. Venter yellow. (New Mexico and California).....*larrea*.

#### KEY TO THE FEMALES

- 1.—The head, thorax, and legs black; the apical rims of the abdomen pale. Segments 4 and 5 with a notch-like depression toward the apex at its middle. (Georgia, Alabama, Texas).....*ridingsii*.

Head, thorax, and abdomen with maculations.....2.

- 2.—In addition to bands on the lateral margins of the mesoscutum, two parallel yellow stripes running from points near the middle of the anterior margin caudad toward the scutellum. All of the tibiæ wholly yellow on the outside at least. The tubercles carinated.....3.

The mesoscutum without such stripes on its dorsum.....5.

- 3.—Clypeus black; no supraclypeal maculation. The lateral face-marks not filling the space between the clypeus and eye and terminating at the level of the insertion of the antennæ. The clypeus rather decidedly concave in profile as the apex is approached; the latter produced medianly, terminating in four distinct, closely grouped teeth, the inner ones strong and triangular. A broad cream-colored band encircling the head. The scutellum and axillæ wholly maculated. The cream-colored abdominal bands, broad, uninterrupted, without emarginations, and only very slightly narrowed from sides to center, not markedly curvilinear or U-shaped. Segment 6 wholly maculated, with a faint median longitudinal carina, the segment distinctly concave when viewed from the side. The abdomen covered with dense, fine, minute punctures. (California).....*bequaerti*.

Clypeus and triangle above, yellow. The lateral face-marks filling the space between the clypeus and the eye, extending thence somewhat obliquely up-

- ward to about the level of the insertion of the antennæ and in turn narrowly along the inner margin of the eye, only to broaden out rather abruptly at the level of the ocelli as an inward-pointed triangular or subtriangular figure. Maculations yellow.....4.
- 4.—Cheeks yellow, the yellow extending narrowed across the vertex. The metapleura as well as mesopleura yellow. Hammer-shaped yellow marks on posterior truncation of thorax. Abdomen with sparse punctures on a microscopically tessellated ground. (New Mexico and California).....*larreæ*.  
Cheeks largely black, the yellow confined to a more or less extensive spot. The vertex black. Merely a yellow patch on the mesopleura; the metapleura black. No maculations on the hind face of the thorax. Abdomen with dense, strong punctation, the punctures being distinctly smaller at the base and apex of each segment than toward the middle. The anal opening on segment 6 shaped like a cupid's bow. The hind tibiæ broad and angular at the apex. The spine on the hind tibiæ massive, bent at right angles near the tip. (New Jersey, Georgia, Alabama).....*dorsale?* (*harbecki*).
- 5.—The mesopleura with yellow. All of the tibiæ either yellow-striped or wholly to almost wholly yellow. The legs with much red. The tubercles carinated. L-shaped marks along the front margin and sides of the mesoscutum.....6.  
The mesopleura black. The tibiæ (except sometimes the first pair) without yellow stripes. The tubercles rounded above.....7.
- 6.—Robust. The abdomen rather flat above. The mandibles yellow except the apical edge, which is rather slanting and long. A broad patch of yellow above the summit of each eye as far as the lateral ocelli, and a narrow, interrupted band behind each eye. The tibiæ with yellow maculations on a red ground. The abdomen semi-opaque, rather leathery in appearance, with dense, distinct punctation. The abdominal bands broad on the sides, tapering toward the middle, and emarginate on each side above. (Florida.).  
*fontemvitæ*.  
Slender. The abdomen rather convex above. The mandibles black, their apical edge more inclined to the rectangular. Merely an oblong spot above the eye, almost on a line with the mesad-pointed terminus of the lateral face-marks, which reach the level of the posterior ocelli. The tibiæ almost wholly yellow. The abdomen shiny, with rather coarse but distinct punctation. The abdominal bands widely U-shaped, broad at the sides and tapering uninterruptedly (that is, without emarginations) toward the center. (Florida).  
*crassipes*.
- 7.—The tegulæ wholly black. L-shaped marks along the front margin and sides of the mesoscutum. Segments 1-3 of abdomen more or less squarely emarginate discally above. Segment 6 rather straight when viewed from the side. (Western).....*occidentale*.  
The tegulæ with a yellow spot or spots. Marks on the mesoscutum usually confined to a spot, more or less extensive, at or near the antero-lateral angles, and in rare instances absent. Abdominal bands 1-3 narrowed medianly in a sweeping, gradual, even curve. Segment 6 convex when viewed in profile. (Western).....*zebratum*.

***Heteranthidium ridingsii* (Cresson)**

A female from Mobile, Alabama, taken June 12, 1917, and donated to the American Museum by Dr. Joseph Bequaert, closely corresponds to Cresson's description. The male, so far as I know, has not been described. The characters given in the key may suffice to enable identification of it, sharply separated as it is through its structural characters and its rather localized maculations from all of the other species recorded from the United States. The distribution of this species probably extends at least through the Southeast. It was described from Georgia, is known—as here indicated—from Alabama, and is represented at the Academy of Sciences in Philadelphia not only by the type but by a male specimen obtained as far south and west as Texas. In addition to the female from Mobile, the American Museum has received through the courtesy of Doctor Bequaert a male from the same locality.

***Heteranthidium dorsale* (Lepeletier) and*****Heteranthidium harbecki* Crawford**

Lepeletier originally described a male from Georgia as *Anthidium dorsale*, which Cockerell later made the type of *Heteranthidium*. Among the rather characteristic markings of this insect are a stripe on the scape and lines running caudad half-way down the dorsulum in addition to the lines along the sides of the mesoscutum. Lepeletier notes that the seventh abdominal segment is prolonged in the middle, which prompted Friese to conclude, though with an expression of doubt, that it terminates in a single tooth. Before the writer is a male *Heteranthidium* from Georgia (loaned by Cornell University) which corresponds closely with Lepeletier's description as far as that description goes. There is only this important point of difference: the hair on the vertex of the head and thorax above is yellowish white, not red, and the maculations are a strong yellow, not red or yellowish red. Is it possible that Lepeletier had an artificially stained specimen before him and that the specimen loaned by Cornell is, notwithstanding its strong deep-yellow markings, of the same species? The abdomen of Lepeletier's specimen was curved under at the tip, and he states, therefore, that there may be need for further details in the description as these become known. If the specimen loaned by Cornell is indeed *dorsale*, as the writer thinks probable, these details can now be added. The pygidium has a low, indistinct median longitudinal carina, and is yellow and concave, with its tip much produced and rather falciform when viewed in profile. There are

two rather feeble angles a little more than half-way down on the sides of the pygidium. Additional structural features to be noted are two black-tipped tuberculate prominences in the middle of the first sternite and two black teeth toward the middle of the margin of the clypeus.

With this male specimen I associate a female from Mobile, Alabama, taken by Mr. Ernest L. Bell. In structure and markings the insects are so similar that there can be little doubt that they are one species. Yet this female is, I think, undoubtedly what Crawford described from New Jersey as *harbecki*. Crawford's description is unusually painstaking and the only respect in which the insect from Mobile seems to depart from it is in the replacement of the small spots behind the eyes below the summit by a rather broad diamond-shaped patch of yellow, and in the continuous, uninterrupted character of the bands on all of the abdominal segments, those in the type of *harbecki* having interruptions on the first and second segments. I have taken the precaution of examining the type and paratypes at the National Museum, comparing them minutely with the specimen from Alabama, and I feel convinced that these slight points of difference are unessential. There is a moderate range of variability even among Crawford's specimens in respect to the extent and shape of the maculations behind the eye. As Crawford himself noted, there is variability in respect to the abdominal band on the second segment, and in both type and paratypes the interruption on the first segment as well as that on the second (when it occurs) is of so slight a nature as to be virtually negligible.

In the male specimen, as in the female, there is a yellow patch on the mesopleura, though no such maculation is alluded to in Lepeletier's description of *dorsale*. The legs of the male are for the most part red within but, as in the female, there are broad yellow stripes within on the front and middle femora. The tibiae are yellow without, except for a reddish spot near the apex, as are also the basitarsi. There is no black on the femora, as called for in Crawford's description of the female and as evidenced in the specimen of that sex from Mobile.

Apparently *harbecki* Crawford is a synonym of *dorsale* (Lepeletier).

#### ***Heteranthidium bequaerti*, new species**

FEMALE.—Length,  $9\frac{1}{2}$  mm. Small and compact. Abdomen rather flat above. Black with heavy cream-colored markings. The pubescence snow-white except on the underside of the tarsi, where it is pale gold. The punctuation dense and fine, that on the abdomen rather uniform from base to apex. The upper half of the clypeus with a low, but rather broad, median longitudinal carina; the lower half carinaless and rather concave in outline when viewed from the side; the apical margin medianly

produced into four closely grouped teeth, the inner ones several times the width of, but not perceptibly longer than, the outer ones. The tubercles sharply carinated. The basal joint of the hind tarsi unusually broad, nearly equal in breadth with the spreading apex of the hind tibiae. Segment 6 with a longitudinal carina; the segment concave in outline when viewed from the side, the apex being rather strongly reflexed and faintly bilobed when viewed from above.

The clypeus and supra-clypeal area immaculate. The following maculations cream-colored: sides of face, not completely filling the space between the clypeus and inner orbit of the eye and extending upward in subtriangular form to about the level of the insertion of the antennae, a broad, uninterrupted band completely encircling the head, the upper half of the mesopleura, the tubercles, the tegulae except for an enringed brownish spot, two L-shaped marks extending heavily each for one-third of the distance along the anterior margin of the mesoscutum and then as a fine streak backward along the lateral borders, almost to the wholly maculated axillae and scutellum, two caudad stripes on the dorsum of the mesoscutum that begin a little below the inner terminus of the broad anterior bands and extend, with slight outward divergency, toward the scutellum. The legs largely light yellow to cream color, variegated with fulvous to reddish brown on the first femora above, on the second and third femora basally above, on all the tibiae beneath, and more or less on the femora beneath. The front and middle basitarsi with a pale mark near the base, otherwise brownish black covered, externally, with light hair; the hind basitarsi and hind coxae maculated. The broad cream-colored abdominal bands on segments 1-5 exceptionally uniform, extending unbroken, unemarginate, and only very slightly and gradually narrowed medianly from end to end of each segment, that on 5 about twice as broad at the middle as those on 2 or 3 and that on 4 intermediate in breadth. The ventral scopa glittering white.

This description is based on a single specimen presented to the American Museum by Dr. Joseph Bequaert, in whose honor it is named. It was taken at Redondo, California, on June 20, 1919.

From all of the females of *Heteranthidium* thus far described, *bequaerti* differs in its small size, its cream-colored markings, and its wholly immaculate, medianly produced, clypeus. From *occidentale*, *zebratum*, *crassipes*, and *fontemvitae* it stands apart through the presence on the dorsulum of two caudad-running stripes—twin maculations which it shares, however, with *larreae* and *dorsale* (?) = *harbecki*. The dense, minute punctation of its abdomen is quite distinct from the rather sparse punctation of *larreae*, while the slender, almost straight, outer spine on its third tibiae cannot be confused with the shaft-like outer spine, bent at right angles near the apex, that is characteristic of *dorsale* (?) = *harbecki*.

#### ***Heteranthidium larreae* (Cockerell)**

A single male from San Diego County, California, in the collection of the American Museum, is in pretty close agreement with Cockerell's description. A fairly large series of males from California in the collec-

tion of the National Museum shows, however, considerable variability. Thus the stripe on the scape is sometimes lacking; in other instances the upper terminus of the lateral face marks is simple or with only a slight thickening, not mesad-pointed toward the ocelli. The stripes on the dorsulum characteristic of the female type are in some cases present also in the male, though much thinner and with a tendency to detach themselves at their upper extremity from the stripe on the anterior margin of the mesoscutum and at their lower extremity from the maculations on the axillæ and scutellum.

***Heteranthidium fontemvitæ*, new species**

MALE.—Length, about 13 mm. Black with yellow and fulvous markings. Densely punctured on head, thorax and abdomen, the punctation being heaviest and coarsest on the supra-clypeal area and on the thorax, tending to become irregular and subcancellate on the latter. Even the depressed apical rims of the abdomen with dense and subcancellate, minute punctation. Joint 3 of the antennæ about one and a half times as long as 4; joint 4 a trifle shorter than 5. The pubescence mostly white, tinged with yellow on the vertex and thorax above, orange on the under side of the basitarsi, the pubescence being especially long and dense on the mandibles below, cheeks, between the antennæ, sides of face, sides of thorax, and thorax below. The margin of the clypeus fulvous and five-toothed, 2 and 4 being considerably larger than 1, 3, and 5. On the head the following parts are yellow: the mandibles except the large apical and much smaller subapical tooth, the clypeus, the facial marks, which are in the form of a right triangle with its base extending along and slightly beyond the sides of the clypeus, and its apex (somewhat attenuated) almost on a level with the anterior ocellus, a broad suboval maculation above each eye and a narrow, interrupted stripe extending downward behind the eye to the base of the mandibles. The thoracic maculations confined to a daub of yellow on the tubercles, the anterior part of the tegulæ and two-thirds of the way down their outer margin, and a stripe on each side of the mesoscutum (in the female there are L-shaped marks on the mesoscutum and it is possible that, if more specimens were available, it might be found that such more extensive maculations occur also in the male). The anterior and middle femora beneath and all of the tibiæ beneath with fulvous markings. A strong yellow stripe on the hind coxæ and yellow maculations near the apex of the hind trochanters. Yellow stripes posteriorly on the front and middle femora and anteriorly and more abbreviated on the hind femora. Basal and large apical maculations of yellow on the tibiæ, connected in the case of the front and middle tibiæ by a median stripe, in the case of the hind tibiæ by a stripe along the posterior margin. A small fulvous spot on each of the apical maculations of the tibiæ. All of the basitarsi yellow. The bands on segments 1–5 broad on the sides, tapering toward the middle and shallowly emarginate on each side above, the bands on 1 and 2 with an uncompleted median interruption, the bands on 4 and 5 scarcely wider than those preceding. The maculation occupying the apical two-thirds of segment 6 shaped like an inverted W. The pygidium, black at the base, reddish at the apex, with a median longitudinal ridge that terminates in a tooth flanked on each side by a slightly smaller tooth, the sides of the pygidium con-



verging and emarginate. The venter fulvous. Sternite 3 with two black-tipped, thorn-like spines on each side of the median emargination. The ventral segments beyond sternite 3 medianly concave, forming a rather decided depression.

**FEMALE.**—About the same size as the male. The margin of the clypeus blackish with four teeth instead of five, 2 and 3 being separated from each other by about twice the distance that separates 1 from 2 or 3 from 4. The mandibles with their apical edge rather long and back-slanting. Segment 3 of the antennæ subequal to 4+5. The maculations on the head correspond with those of the male. The maculation along the side of the mesoscutum is bent inward slightly at its fore end, extending thus at right angles a little less than a quarter of the way along the anterior margin of the mesoscutum. There is a yellow patch on the mesopleura. The axillæ and scutellum, which in the male specimen are black, bear in the female oval maculations. In addition to the fulvous areas on the legs noted in the case of the male, the female has much red on the outer surface of all the tibiæ and basitarsi. The yellow stripes on the femora beneath correspond with those of the male. The stripes on the front and middle tibiæ do not attain the apex, which in contrast to that of the male is immaculate, as are the front and middle basitarsi. The hind basitarsi have a yellow maculation that does not attain the reddish apex. The hind coxæ have a cloudy reddish spot, the hind trochanters are immaculate. The maculations on abdominal segments 1-5 are very similar to those of the male, the emarginations above being, however, somewhat deeper. Segment 6 with a large yellow maculation, bordered by a semicircle of black apically and deeply notched with black at the base. Ventral scopa yellowish.

The above descriptions are based on a single male from Pensacola, Florida, taken by Mr. F. E. Watson, October 11-14, 1914, and a single female, caught by Mr. A. J. Mutchler at De Funiak Springs, Florida, October 17-19, 1914.

The male of this species is differentiated from all of the described species of the United States by the presence of strong spines on the third sternite (there are obtuse teeth similarly placed in *occidentale*) and by the distinctly tridentate character of the apical tip of the pygidium. The yellow maculations on the legs of the male are much like those of *zebratum* but the abdominal bands more closely resemble those of *occidentale*, though there is no distinct increase in the width of the apical bands over those at the base. In *fontemvitæ* and *zebratum* segment 6 of the male, viewed in profile, is curved in outline; in *occidentale* it is straight. In *zebratum* segment 6 is compressed and subconcave on each side, with the median area elevated and sometimes subcarinate. In *fontemvitæ* segment 6 is only slightly flattened laterally and the median area is broadly rounded without the trace of a carina. From *ridingsii* the male can be separated at once by the fact that in *ridingsii* the median area of segment 6 is deeply depressed and pitlike. From *dorsale* and *larreæ* it differs in its much more subdued and restricted maculations and in the absence of certain structural characters—such as the tubercles on sternite 1 of

*dorsale* and the non-toothed pygidium of *larreæ*, more fully described in the key.

The female is distinguished by the largely yellow mandibles, which are black in the other species, and by the predominance of red over black as well as yellow on its legs. From *ridingsii* and *occidentale* it can be separated by the presence of maculations above and behind the eyes, lacking in these species. From *ridingsii*, *occidentale*, and *zebratum* it is differentiated by the presence of stripes on all the tibiæ, these being absent in the wholly black legs of *ridingsii* and the sparsely maculated legs of *occidentale*, and confined to the front tibiæ in *zebratum*. From *zebratum*, *bequaerti*, *larreæ*, and *dorsale*, it differs in having the abdominal segments emarginate above, and from the last-mentioned also through its more subdued and restricted maculations, as well as in the absence of such distinctive structural features as the massive tibial spines, the apically broad and angular hind tibiæ, and the cupid-bow anal opening.

From *larreæ* and *bequaerti*, as well as *dorsale*, it is perhaps most quickly differentiated by the absence of the stripes that in these species run caudad and more or less parallel, from points near the middle of the anterior margin of the mesoscutum. The completely yellow pleura of *larreæ*, as distinguished from the only partly maculated mesopleura of *fontemvitæ*, and the cream-colored maculations of *bequaerti*, are additional aids in separating these species from *fontemvitæ*. The main differences between *fontemvitæ* and *crassipes* are summarized in the key.

#### ***Heteranthidium occidentale* (Cresson)**

Three males (all taken by Dr. F. E. Lutz, July 21–25, 1922, at Jim Creek, near Boulder, Colorado) and three females (two from Jim Creek and of corresponding date with the males, and one collected by Mr. Albert E. Butler, July 23, 1916, at Estes Park, Colorado) belong to this species.

The three male specimens have certain maculations not mentioned in the original description or at variance with it. All have maculations on the scape and one of them has in addition a ferruginous maculation on the third segment of the antennæ. All have a yellow band on the supra-clypeal area. Two of them have L-shaped marks on the mesoscutum, the third a short line on each side of the anterior margin and a short line above the tegulæ. One of them has maculations on the scutellum. Two of the specimens have maculations on the seventh abdominal segment.

The females show variability in the maculation of the clypeus, noted by Cresson. Two of them have maculations on the axillæ as well as the scutellum. All of the tibiæ within have fulvous maculations and at least the front and middle tibiæ are maculated with yellow at the base externally. Only in one specimen is the band on the first abdominal segment interrupted at the middle.

***Heteranthidium zebratum* (Cresson)**

There are before the writer sixteen males (fifteen from La Junta, Colorado, taken by Dr. F. E. Lutz and Mrs. Lutz on August 12, 1920, and one from Wray, Colorado, caught by Doctor Lutz, August 17-19, 1919) and twelve females (nine from La Junta and three from Wray, taken by the same collectors on the dates corresponding with the capture of the males). One of the females was collected in the course of sweeping one evening in relatively moist places along a river, where the vegetation consisted of grass, sweet clover, etc.

The insects show a great range of variability. Of the males six have a transverse band of yellow above the clypeus, in two specimens this band is obsolescent and interrupted, and in eight specimens it is wholly absent. Eight specimens (but a different grouping from that just mentioned) have an immaculate scape, in six specimens there is a distinct maculation toward the upper end of the scape, and in two specimens this maculation is dimly traceable.

The maculations on the cheeks present a high degree of variability. The normal seems to be a line running somewhat diagonally from a point not far from the top of the eye toward a point about three-quarters of the way down, more or less broadly interrupted toward its lower extremity and ending in the form of a spot on the outer margin of the eye. Still farther down the outer margin of the eye, contiguous to the base of the mandibles, is a yellow area—a maculation peculiar to the male. To nine of the specimens this description would apply, two others have the lower maculations more or less united, in two further cases all three maculations tend to run into one another, while the extreme of maculation is presented by two specimens, one of which (the single male from Wray) has the band broadly continuous to the base of the mandible; the other, constituting a case of asymmetry, has the band continuous only on one side of its head. In contrast, there is at the other extreme a specimen which has not the faintest suggestion of a maculation on the cheeks.

Two of the specimens (the male with the excessively heavy continuous markings along the cheeks and a male in which these markings have the normal interruptions) differ from all of the other specimens in the presence of a sizeable yellow mark on the lateral borders of the meso-scutum, about coextensive with the anterior half of the tegulæ. The tegulæ themselves have in thirteen instances a fairly large maculation anteriorly, in two instances this maculation is small and faded, and in one instance (that of the specimen lacking maculations on the cheeks) the mark is reduced to a dim evanescent speck on one of the tegulæ. In addition to the maculation on the anterior part of the tegulæ, there is on five of the specimens a much smaller but nevertheless fairly distinct spot inward about midway down the tegulæ. In four specimens this spot is dimmed and evanescent, and in the remaining seven specimens wholly lacking. Nine of the specimens have distinct maculations on the axillæ as well as the scutellum, in one specimen the maculations on the scutellum are to some degree united, in another specimen only one of the axillæ is maculated, and in five specimens there is no trace of maculations on the axillæ whatever.

The broad, basally somewhat narrowed stripe that extends practically the complete length of the underside of the front femora is a fairly constant character, nearly as constant as the marks on the clypeus and mandibles. The markings on the front tibiæ are, however, more variable. In two instances the streak of yellow normally connecting the maculations at the base and apex is lacking and in a third case interrupted and much reduced. A large brownish spot in the maculation at the apex of the front tibiæ is present in all the specimens and would seem to be a constant character, and be it said in this connection that a like constancy is shown in the presence of the corresponding marks in the maculations at the apex of the middle and hind tibiæ. Also of constant character are the markings on all the metatarsi, consisting of a broad band of yellow extending nearly to the apex, the apical tips of all the metatarsi being dark and a slightly dark area being traceable also on the hind pair basally. Very variable is the maculation on the under side of the middle femora. In the specimen representing the extreme of maculation it extends broadly from about the middle of the femora nearly to the apex, where it widens out, spreading over to the sides of the femora; in six specimens it begins about the middle of the femora and extends more narrowly and streaklike nearly to the apex but without any terminal broadening; in five specimens it is much reduced or even evanescent; in four specimens it is absent. A maculation of somewhat variable size near the apex of the

outer surface of the middle femora appears on all but three of the specimens. A thin streaklike band connects the basal and apical maculations of the middle tibiae in the case of eight of the specimens, is much interrupted in three of the others, and is merely suggested at the apical extremity in the remaining five instances. In nine specimens there are two subequal parallel linear spots at the apex of the hind femora, supplemented by a third and somewhat larger and broader spot on the anterior side of the femora apically; in three specimens only one of the twinlike markings (that proximal to the larger anterior maculation) and the larger anterior maculation itself appear; in two instances there is only the larger anterior maculation; and in two instances no maculation whatever. Of apparently more constant character is the maculation on the hind tibiae, which takes the form roughly of an inverted and attenuated letter C, extending from base to apex along or close to the posterior margin in contrast to the stripes on the other tibiae, which run down the middle. Sometimes the figure is slightly interrupted toward the basal end of the tibiae, and its upper and lower extremities are irregularly thickened.

The variation of the abdominal markings is, with the exception of the specimen representing the extreme of suppressed maculation, restricted to a comparatively narrow range. All of the bands on the first six segments are continuous. An emargination of variable depth (sometimes absent) occurs at the lateral extremity of one or both of the first two bands, the emargination being from above. More constant and conspicuous emarginations occur above broadly and shallowly not far from the extremities of bands 3-5, and are sometimes adumbrated on band 2. Band 5 has almost invariably a V-shaped emargination above medially. Segment 6 is in many cases completely yellow, in others there is a slight intrusion of black at the basal middle. In addition to the characters noted, the specimen representing the extreme of suppressed maculation has distinct, though shallow, rectangular emarginations above on band 2 about midway between the extremities and the center, that break the sweep of the curve. Similar but less-marked emarginations occur also on band 3. An approach to the extreme represented by this specimen is seen, however, in four other specimens, three of which have a suggestion of such an emargination on band 3 and the fourth not merely on band 3 but also on band 2. The maculation on segment 7 ranges from a broad and deep spread of yellow occupying all but the base, the apical border and a wider area of black on each side, to a complete absence of the mark.

The female specimens also present individual differences. The line behind the eye is broad in some instances, narrow in others, and in one specimen (from Wray) is wholly lacking. In all but three of the maculated specimens it is more or less broadly interrupted at its lower end, terminating in an isolated spot, sometimes obsolescent, at or near the margin of the eye. Of the three exceptional cases, two lack the terminal spot and one has the line continuous to the margin of the eye.

In like manner the markings on the front tibiæ are very variable, sometimes being confined to a small patch at the base, sometimes to a patch supplemented by a narrower maculation just below, and sometimes with this narrower maculation extended well beyond the middle of the tibiæ. It is longest in the specimen that has the long continuous line behind the eyes, extending in that instance almost to the apex of the tibiæ. Another case of striking variability is found in the basal joint of the hind tarsi, which in three specimens has a rather distinct maculation near the base, in six specimens has the maculation obsolescent, and in three specimens lacks it entirely. More constant is the maculation at the base of the middle and hind tibiæ, that on the latter being in all instances prolonged posteriorly, the prolongation often appearing as in independent spot.

The thoracic markings, too, are highly variable. The subtriangular area on the antero-lateral margin being sometimes very extensive. In the case of the specimen already referred to that has especially pronounced maculations and may be regarded as an extreme, this triangle has one of its apices at a point nearly one-third of the distance across the anterior margin of the thorax and the other apex at a point at least half-way down the lateral margin. In contrast to this is a specimen representing the extreme of suppressed maculation in which the mesoscutum is wholly black.

The maculation of the tegulæ presents a variability comparable to that of the basal joint of the hind tarsi, for, in addition to the larger anterior mark, itself variable in shape and form, there is on six of the specimens a distinct, though smaller, spot inward toward the middle and on two of the specimens a faint, somewhat darkened trace of this spot. In four of the specimens, including the three from Wray, this spot is absent. Where the spot does find place, it is wholly independent of the anterior spot and not to be regarded as an outlier or elaboration of it.

In all the specimens except one (the female from Wray that lacks maculations behind the eye as well as on the mesoscutum) there are marks on the axillæ as well as the scutellum, and the principal feature of

variability is the degree to which the inner dots are united to one another or are independent.

The greatest variability in the abdominal maculations is found on the sixth segment, all stages being represented from complete independence of the two raggedly subtriangular or comma-shaped marks to a well-nigh complete blending of them.

***Heteranthidium chippewaense* (Graenicher)**

In view of the very great variability of *zebratum*, as evidenced by the above specimens mostly from a single locality, there is a fair possibility, it seems to me, that *chippewaense*, which Graenicher describes as "very similar to *Protanthidium cockerelli*" (now merged with *zebratum*), may indeed be no other than *zebratum*. Bees recognized as *zebratum* have been reported from Colorado, Nebraska, Texas, and South Dakota. It is, therefore, not unlikely that the range of this species may be even wider and may embrace Wisconsin, the type locality of *chippewaense*.

Swenk, discussing the relationship of *zebratum* and *chippewaense*, comments as follows: "Among the other *Heteranthidium*, *zebratum* is closest to *chippewaense* Graenicher, but differs in the male by the presence of the yellow spots on the mesoscutellum, the always complete band on tergite 1, the lack of distinct emargination anteriorly on the bands of tergites 1-4 and the noncarinate pygidium; the female may be separated by the whitish color of the clypeus and lateral face marks and the presence of four yellow spots on the mesoscutellum instead of only two."

As regards the immaculate scutellum of the male of *chippewaense*, it may be said that the maculation of this region is variable even in *zebratum*, some of the males having merely the scutellum maculated, others the axillæ as well. Moreover, the female of *chippewaense* has maculations on the scutellum. The conclusion, therefore, does not seem invalid that the male, if judged by this character alone, is an exceptional individual of an old species rather than the representative of a new. The second point of distinction, that of the interruption of the band on segment 1 of *chippewaense* as against its continuity in *zebratum*, seems to me possibly negligible if one may be permitted to apply to the case the variability evidenced in this respect by other *Heteranthidium* (see *dorsale* ? = *harbecki*). As to the third point, the emarginations on the abdominal bands of *chippewaense* are not without parallel in some of the specimens discussed under *zebratum*. Among the specimens before me there is distinct evidence, too, of a carina on the pygidium, to which the phrase, "a median carina," used in the description of *chippewaense*, might well

be applied. As for the distinctions believed to separate the females, they seem to me also possibly bridgeable. While in all of the specimens of *zebratum* before me the facial marks are pale, certainly when contrasted with the strong yellow of the abdominal maculations, there are among other Anthidiinæ sometimes many gradations of color within a species. As for the second distinction, there is, among the specimens of *zebratum* from Colorado, at least one specimen that agrees with the female of *chippewaense* in having the axillæ black. At the Academy of Sciences in Philadelphia I was privileged to examine the type of *zebratum* and at the National Museum I had access to one of the insects from Wisconsin identified as *chippewaense*. Comparing each with the specimens in the collection of the American Museum and making allowance for variability, I cannot feel that they are essentially different. At best it seems to me *chippewaense* is merely a variety of *zebratum*.