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KEY TO THE SPECIES OF HADRONEMA UHLER WITH DESCRIPTIONS OF FIVE NEW SPECIES (HEMIPTERA, MIRIDAE).*

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In working up considerable material which the writer collected in the western United States certain new species of *Hadronema* have been recognized, with the result that a key is provided for the thirteen known species of which five are described as new. In 1918, Mr. E. H. Gibson published a key (Can. Ent., xl, pp. 81-84) to the species known to him, describing two new species. The writer examined these types in the U. S. National Museum during 1926 and found that *Hadronema confraterna* Gib. is in fact a good species of *Lopidea*, allied to *Lopidea lepidii* Kngt., but smaller and the left clasper somewhat differently shaped.

Since the appearance of Gibson's paper Mr. Van Duzee has described two species from California, *Hadronema albescens* and *H. infans*. Paratypes of these are at hand for the present study and one of them, *Hadronema infans*, I find belongs in the genus *Lopidea*, in fact I am unable to distinguish between this and *Lopidea minima* Kngt. In *Lopidea* the form of the left clasper is distinctive throughout the large number of known species and on this basis as well as color, *confraterna* Gib. and *infans* Van D. belong in *Lopidea*.

The male genital characters in *Hadronema* are on the whole distinctive of the genus and displaying only minor differences between the species. The genotype, *Hadronema militaris* Uhler, exhibits an unusual character in the cleft nature of the genital segment at base of left clasper, while the right clasper is in general form much like other species of the genus. In *militaris* and allied species the male is provided with a secondary sexual character in the form of a heavy tubercle, bearing one or two spines and situated at base of front femora on lower side; also the basal segment of front tarsi is bilobed and widely expanded. On the basis of these characters, as well as the type of pubescence, the genus may be separated into two groups. The typical subgenus includes *militaris* Uhler, *picta* Uhler, *breviata* n. sp., *simplex* n. sp., *bispinosa* n. sp., *sinuata* n. sp., and probably *splendida* Gibson. The remaining species, *princeps* Uhler, *uhleri* Van D., *uniformis* n. sp., *festiva* Van D., *decorata* Uhler, and *albescens* Van D., are without the secondary sexual characters and form a group of species for which a new subgeneric name is proposed:

AOPLONEMA, new subgenus. Genotype: *Hadronema princeps* Uhler.

In preparing the key all the known species are at hand except *decorata* Uhler and *splendida* Gibson. Types of *decorata* Uhler are preserved in the collection of the California Academy of Sciences where I saw them in 1917. However, for separating this species in the key it has been necessary to draw on the color characters given in the original description.

***Hadronema breviata* new species**

Allied to *picta* Uhler, but distinguished by the short second antennal segment which is not equal to width of head across eyes; rostrum longer, pronotal disk dark except at basal angles.

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♂. Length 2.9 mm., width .98 mm. Head: width .75 mm., vertex .40 mm. Rostrum, length .80 mm., extending to middle of intermediate coxae. Antennae: segment I, .22 mm.; II, .68 mm., not equal to width of head across eyes; III, missing. Pronotum: length .47 mm., width at base .86 mm.; calli more convex, also more depressed between and along front margins of calli than in *picta*.

Dorsum clothed with finer, fuscous pubescence than in *picta*. Black, opaque, surface covered with a dull bluish-gray bloom; pronotum with basal angles and posterior one-third of propleura pale, embolium and outer half of cuneus white. Front femora with a prominent spur at base on ventral surface much as in *picta*, but the right genital clasper is distinctly more slender.

♀. Length 2.8 mm., width 1 mm. Head: width .75 mm., vertex .44 mm. Rostrum reaching to near posterior margins of intermediate coxae. Antennae: segment I, length .19 mm.; II, .62 mm.; III, .53 mm.; IV, .29 mm. Pronotum: length .48 mm., width at base .93 mm. Coloration and pubescence very similar to the male.

Holotype: ♂ July 20-25, 1920, Yellowstone National Park, Wyoming (A. A. Nichol); author's collection.

Allotype: July 1927, Kaibab Forest, rim Grand Canyon, Utah (Vasco M. Tanner).

Paratypes: ♀, taken with the allotype. 4 ♀ Aug. 25, 1926, Kaibab Point, Arizona (A. A. Nichol). ♀, Orderville, Utah (Vasco M. Tanner).

***Hadronema simplex* new species.**

Suggestive of a small form of *militaris* Uhler, but the male genital segment not cleft while the claspers are more like those of *picta* Uhler; antennal segment III not equal to width of head.

♂. Length 3.2 mm., width 1.1 mm. Head: width .81 mm., vertex .45 mm. Rostrum, length .90 mm., reaching between middle coxae. Antennae: segment I, length .26 mm.; II, .89 mm., nearly equal to thickness of segment I, but more slender near base; III, .78 mm.; IV, .44 mm. Pronotum: length .53 mm., width at base .92 mm.; calli less prominent than in *militaris*, disk depressed about their margins.

Dorsum clothed with longer but more sparsely set black hairs than in *militaris*. Coloration very similar to *militaris*; black, posterior half of propleura and more or less on basal angles of disk, reddish or orange colored; embolium, outer basal half of corium, and cuneus except inner margin, white. Front femora with a single strongly developed tuberculate spine on ventral side at base, with a curved claw-like tip and beneath this a smaller curved spine, outer surface of tubercle set with three or four strong bristles. Front tarsus with basal segment strongly dilated, concave beneath, which is also true of the male *militaris*. Genital segment not cleft at base of left clasper which feature is distinctive of *militaris*; claspers slender and only slightly different from those of *picta*.

♀. Length 3.8 mm., width 1.35 mm. Head: width .89 mm., vertex .52 mm. Antennae: segment I, length .27 mm.; II, .95 mm.; III, .78 mm.; IV, .44 mm. Pronotum: length .65 mm., width at base 1.12 mm. More robust than the male but very similar in pubescence and coloration.

Holotype: ♂ August 8, 1927, Yellowstone National Park, Wyoming (H. H. Knight); author's collection.

Allotype: same data as type.

Paratypes: 3 ♂ 2 ♀, taken with the types by sweeping mixed herbage along the roadside between Roosevelt Lodge and Mammoth Hot Springs, on the high, treeless, plateau area. ♀ June-Aug. 1907, Cheyenne, Wyoming (Fanny T. Hartman). ♂, Lethbridge, Alberta (W. Carter).

***Hadronema bispinosa* new species.**

Allied to *picta* Uhler, but distinguished in the male by two strongly developed spines situated at the base of front femora on ventral surface; also differs in the paler color, longer second antennal segment, with femora yellow and marked with blackish.

♂. Length 3.4 mm., width 1.1 mm. Head: width .80 mm., vertex .44 mm.; white to yellowish, tylus, two broad arcuate rays each side of frons and joining at base to include carina and collum, black. Rostrum, length .89 mm.; reaching upon base of middle coxae, white, apical half blackish. Antennae: segment I, length .28 mm.; II, .89 mm.; III, .83 mm.; IV, .37 mm.; black. Pronotum: length .63 mm., width at base .98 mm.

Dorsum clothed with prominent black hairs much as in *picta*. Coloration yellowish to white, calli, spot at top of coxal cleft, base of scutellum more or less, clavus, apical area of corium, inner basal angle of cuneus, and sternum, black. Membrane fuscous, veins and anal area black. Coxae yellowish to white, with black at base; femora yellowish to orange colored, spotted near base, front pair with linear row of spots before and behind, hind pair with blackish apically; hind tibiae black, front pair orange except tip. Front femora strongly swollen, projecting at base on ventral surface and provided with two prominent, slightly curved spines.

♀. Length 3.7 mm., width 1.4 mm. Head: width .87 mm., vertex .50 mm. Rostrum, length 1 mm., reaching to base of middle coxae. Antennae: segment I, length .28 mm.; II, .93 mm.; III, .81 mm.; IV, .40 mm. Pronotum: length .66 mm., width at base 1.18 mm.

Holotypes ♂ July 31, 1927, Moorecroft, Wyoming (H. H. Knight); author's collection.

Allotype: same data as the type.

Paratypes: 66 ♂ ♀, taken with the types on *Petalostemum multiflorum* Nutt., which was the host plant of the species. WYOMING—20 ♂ ♀ July 20, Sundance; ♂ Aug. 1, Kendrick; 22 ♂ ♀ Aug. 3, Sheridan; 15 ♂ ♀ Aug. 16, 1927, Greybull (H. H. Knight). COLORADO—♀ June 29, 1901, Fort Collins. SOUTH DAKOTA—♂ 2 ♀ July 29, 1927, Deadwood (H. H. Knight).

***Hadronema sinuata* new species.**

Suggestive of *splendida* Gibson, but distinguished by the strongly sinuate margins of pronotum, also by the different coloration.

♀. Length 3.8 mm., width 1.3 mm. Head: width .90 mm., vertex .53 mm.; vertex and frons tumid, carina strongly developed, set with six bristles, deeply impressed bordering its front edge; orange colored, tylus except base and side margins, spot on apex of lora, broadly on frons except median line, extending back over vertex to carina and collum, blackish. Rostrum, length 1.05 mm., just attaining hind margin of sternum, blackish, first two segments orange to pale. Antennae: segment I, length .25 mm.; II, .86 mm.; III, .81 mm.; IV, .41 mm.;

black. Pronotum: length .68 mm., width at base 1.14 mm.; disk with lateral margins strongly sulcate-sinuate, basal margins distinctly sinuate at middle; orange colored, basal margin rather broadly and the collar, white, calli and spot at top of coxal cleft black. Scutellum blackish although a tinge of orange shows through the dark color.

Hemelytra blackish, embolium and invading corium, basal angle of corium, and cuneus except narrow inner margin, white; membrane fuscous, veins and within areoles somewhat darker. Dorsum clothed with stiff, erect black hairs, venter with pale pubescence. Ventral surface fuscous, covered with a dull bloom, venter with distal half of each segment pale; sheath of ovipositor tinged with orange. Legs orange yellow, coxae dark at base, femora with obsolete fuscous spots and points, hind pair becoming infuscated on apical half; tibiae blackish, front pair showing orange, tarsi black.

Holotype: ♀ June 24, 1925, alt. 7000 ft., Williams, Arizona (A. A. Nichol); author's collection.

Hadronema (Aoplonea) uniformis new species.

Allied to *princeps* Uhler, but differs in the uniformly black cuneus and orange yellow femora; differs from *uhleri* Van D. in the larger head with more tumid frons, also the median line between calli not impressed.

♂. Length 4 mm., width 1.2 mm. Head: width .93 mm., vertex .44 mm. Rostrum, length 1.63 mm., nearly reaching posterior margins of hind coxae. Antennae: segment I, length .41 mm.; II, 1.5 mm.; III, 1.26 mm.; IV, broken. Pronotum: length .68 mm., width at base 1 mm.; form nearly as in *princeps*.

Black, the cuneus uniformly colored with the corium; femora uniformly orange yellow, pronotum behind calli and the scutellum orange yellow in the hypodermis but more or less obscured by fuscous in the cuticula; juga, lora, first segment of rostrum, and coxae, orange yellow. Clothed with simple pale pubescence and intermixed with shorter, finer and somewhat sericeous pubescence.

♀. Length 4.2 mm., width 1.45 mm. Head: width 1.02 mm., vertex .53 mm. Antennae: segment I, length .35 mm.; II, 1.3 mm.; III, 1.09 mm.; IV, broken. Pronotum: length .78 mm., width at base 1.24 mm. More robust than the male but very similar in pubescence and coloration.

Holotype: ♂ June 16, 1926, Vale, Oregon (R. W. Haegele); author's collection.

Allotype: same data as the type; taken by Mr. Haegele on greasewood (*Sarcobates vermiculatus*) which apparently is the host plant.

Paratypes: ♀ June 16, 1926, Nyssa, Oregon (R. W. Haegele), taken on greasewood. ♂ June 15, 1926, Caldwell, Idaho (R. E. Haegele), taken on greasewood.

KEY TO SPECIES OF HADRONEMA

1. Antennal segment III distinctly shorter than segment II 3.
2. Antennal segment III equal to or longer than segment II 2.
2. Pubescence pale, pronotum fuscous, embolium and outer margin of corium orange colored *festiva* V. D.
- Pubescence black, pronotum except calli reddish *picta* Uhl.

3. Embolium and more or less on outer margin of corium and cuneus, pale or whitish 4.
Embolium and outer margin of corium and cuneus not whitish, sometimes the embolium with pale but its outer edge always blackish 11.
4. Pubescence pale, rather fine 5.
Pubescence black, rather stiff 6.
5. Hemelytra dull black, costal margin narrowly yellowish, inner edge of clavus, a wider line running diagonally back to inner angle of corium, bluish white *decorata* Uhl.
Hemelytra white to lead-colored, a blackish spot on inner angle of corium *albescens* V. D.
6. Femora black 7.
Femora chiefly yellowish to reddish 9.
7. Antennal segment II in length exceeding width of head across eyes 8.
Antennal segment II not equal to width of head; pronotum dark, with dull bluish-gray bloom; small, length 2.8-3 mm. *brevisata* n. sp.
8. Antennal segment III in length greater than width of head; male genital segment deeply cleft at base of left clasper *militaris* Uhl.
Antennal segment III not equal to width of head; male genital segment not cleft *simplex* n. sp.
9. Pronotum with lateral margins strongly sinuate-sulcate, basal margin sinuate at middle; disk orange except calli, basal margin whitish *sinuata* n. sp.
Pronotum not distinctly sinuate at sides or base 10.
10. Pronotum black or gray, without pale or reddish; lower face chiefly black *splendida* Gib.
Pronotum pale to yellowish, calli only black; lower face except tylus, yellowish to whitish; male with two prominent spurs on base of front femora *bispinosa* n. sp.
11. Cuneus uniformly black like the corium 12.
Cuneus pale or reddish on base; female frequently with pale along claval suture *princeps* Uhl.
12. Femora red; median line between calli and forward to collar distinctly impressed *uhleri* Van D.
Femora uniformly orange yellow; median line between calli not impressed *uniformis* n. sp.

Records of distribution for the species of *Hadronema* are not extensive, hence the following data seems worth the printing.

Hadronema militaris Uhler. Records: COLORADO—Stonewall, near Trinidad, Aug. 7; Veta Pass, Aug. 9; Wolf Creek Pass, Aug. 12, Ute Creek. Fort Garland, Aug. 11; Dolores, Aug. 15, 1925 (H. H. Knight). MONTANA—Missoula, Aug. 1, 1920 (A. A. Nichol). Big Fork, June 16, 1904; Bridger Canyon, July 12, 1902; Copperopolis, July 23, 1902; Florence, June 24, 1912; Sidney, June 14, 1912 (Mont. Agr. Expt. Station collectors). IDAHO—Ashton, Aug. 2, 1921 (F. M. Sallee). Stanley, July 10, 1926 (R. W. Haegele). INDIANA—Hessville, May 29, 1910 (W. J. Gerhard). SOUTH DAKOTA—Custer, July 27; Deadwood, July 29, 1927 (H. H. Knight). WYOMING—Yellowstone National Park, July 20-25, 1920 (A. A. Nichol); same, Aug. 8, 1927 (H. H. Knight). Shoshone National For-

est, Aug. 14; Big Horn Mts., Aug. 17, 1927 (H. H. Knight). ALBERTA—Armena, Aug. 27, 1920 (C. E. Hendrickson). Medicine Hat., June, 1912 (F. S. Carr).

Hadronema picta Uhler. Records: ARIZONA—Williams, June 24, 1925 (A. A. Nichol), "on *Hymenoxys floribunda*." KANSAS—Riley County, Aug. 28 (G. A. Dean). Seward County, June 27 (Lantz). NEW MEXICO—Jemez Springs, Aug. 7, 1915 (J. Woodgate).

Hadronema princeps Uhler. Records: COLORADO—Golden, July 25, 1909 (W. J. Gerhard. Dolores, Aug. 15, 1925 (H. H. Knight). Fort Collins, July 9, 1902. Lookout Mt., July 28, 1916 (A. C. Burrill). IDAHO—Council, June 25, 1926 (R. W. Haegele). MONTANA—Beaver Creek, Aug. 1913, alt. 6300 ft. (H. B. Hungerford). Bridger Mts., Aug. 10, 1915, alt. 5500 ft. East Flathead, July 25, 1902 (Mont. Agr. Exp. Sta.). Missoula, July 31, 1920 (A. A. Nichol). OREGON—La Grande, June 26, 1926 (E. W. Davis.) WASHINGTON—Toppenish, June 12, 1926 (E. W. Davis). WYOMING—Shoshone National Forest, Aug. 14, 1927 (H. H. Knight), a good series swept from mixed herbaceous growth. Sundance, July 30; Yellowstone National Park, Aug. 8; Big Horn Mts., Aug. 17, 1927 (H. H. Knight).

Hadronema uhleri Van D. Records: ARIZONA—Grand View, Grand Canyon, Aug. 3, 1917 (H. H. Knight), on *Cowania mexicana*. Williams, June 24, 1925, alt. 7000 ft. (A. A. Nichol).

Hadronema festiva Van D. Mr. A. A. Nichol took a good series at Tombstone, ARIZONA, June 2, 1926, alt. 4500 ft.

"Van Duzee has just recently shown (Pan-Pacific Ent., IV, 1928, p. 182) that *Hadronema robusta* Uhler (1894) belongs in the genus *Lopidea*, while the *robusta* of later authors is described as a new species, *Hadronema uhleri* Van Duzee."