

A PRELIMINARY REVISION OF THE AMBUSH BUGS OF NORTH AMERICA, (HEMIPTERA, PHYMATIDÆ).*

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INTRODUCTION.

The present paper is the result of a study of as many North American species of this family as could be obtained. Approximately three thousand five hundred specimens were examined, and several undescribed species were encountered in both of the genera found in this region, namely, *Phymata* and *Macrocephalus*. Most of the work on the North American forms has been done by Europeans, especially Handlirsch and Melin. These authors, however, studied relatively few specimens so that several species remained undescribed. These have been lumped under the old names by American workers, as has been shown by the names applied to specimens received for study. Further study of forms that appear new but are represented by too few specimens to warrant hasty conclusions, is necessary before a complete revision is published. The writer hopes to complete such a revision in the near future, and will be very glad to receive material for determination from North and Central America.

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TAXONOMY AND NOMENCLATURE.

Males may be distinguished by the elongate, rounding, external covering of the genitalia, females by the flap-like, sub-triangular covering.

FAMILY PHYMATIDÆ.

KEY TO THE NORTH AMERICAN GENERA.

- Scutellum short and triangular; a small degenerate tarsus present on the forelegs..... Genus *Phymata* Latr.
Scutellum elongate, covering the wings; no tarsus on the forelegs, Genus *Macrocephalus* Swed.

Genus *Phymata* Latrielle.

KEY TO THE SPECIES.

1. Small species, 5-6.5 mm.; colors other than black and yellow or black and green..... 2
Larger species, 6-11.5 mm.; colors of varying combinations, or almost uniformly one..... 3

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2. Abdomen rather broadly rounding; points of connexiva projecting prominently; pronotum roughly finished; membrane of wings with no small round cells at the apex; Figs 13 and 14. *vicina* Handl.
Abdomen slender and tapering; points of connexiva blunt and barely projecting; pronotum almost smooth; membrane of wings with small round cells near the apex; Figs 11 and 12. *luxa* n. sp.
3. With spine-like projections on the pronotum, sides of thorax, fore-femora, and elsewhere. 4
With smooth granules of varying size and in varying numbers on the above named regions. 5
4. Fore-femora with granules and only a few fine spines; sides of thorax with granules rather than spines; anterior half of pronotum with short spines; lateral notch about as deep as wide, (Figs 25 and 26); occurs in Mexico. *granulosa* Handl.
Fore-femora thickly covered with prominent elongate granules bearing spines; sides of thorax the same; pronotum with spines scattered on posterior half as well as the anterior; lateral notch wider than deep, (Figs 27 and 28); occurs in Arizona. *rossi* n. sp.
5. Membrane of wings with many rounding cells, and with the veins interwinding. 6
Membrane of wings with no round cells and the veins not interwinding. 7
6. Frontal processes sharply upturned and pointed; lateral edges of pronotum rather thin and upturned; no distinct lateral notch, (Fig. 10); fourth connexivum ending in one point. *albopicta* Handl.
Frontal processes rather blunt and slightly upturned; lateral edges of pronotum thick and not upturned; a distinct lateral notch, (Fig. 16); fourth connexivum three lobed, the middle one longest. *noualhierii* Handl.
7. Pronotum, as seen from the top and also from the side, with a shallow lateral notch which appears as a slight sinuation of the edge, (Figs. 29 and 30); posterior lobe of pronotum not much raised or widened; occurs in Arizona, Colorado, Idaho, and Utah. *borica* n. sp.
Pronotum with a distinct lateral notch as seen from the top and side. 8
8. Species entirely deep red in color; sharp lateral process to the posterior lobe of pronotum, (Fig. 15); occurs in California. *arctostaphylæ* Van D.
Species other than red in color. 9
9. Posterior lobe of pronotum widely flaring and greatly upturned with long lateral point; lateral notch deep, (Figs. 17, 18, 19 and 20). 10
Posterior lobe of pronotum moderately flaring and upturned, or not; lateral notch moderate, (Figs. 2, 3, 4, 5, 6, 7, 8, examples). 11
10. Lateral process sharply pointed and elongate; deep lateral notch, (Figs. 17 and 18); tips of connexiva only slightly projecting; occurs in Mexico, *fasciata* (Gray)
Lateral process less sharply pointed and shorter; lateral notch not as deep, (Figs. 19 and 20); tips of connexiva more projecting; widely distributed, (see text); another form of this with more rounding posterior lobe keys down later. *fasciata georgiensis* Melin
11. Lateral process and posterior corner of pronotum very sharply pointed, (Figs. 23 and 24); abdomen flaring quite abruptly to the widest point; occurs in Florida, Georgia. *mystica* n. sp.
Lateral process and posterior corner of pronotum moderately pointed or rounding; abdomen not flaring abruptly to the widest point. 12
12. Connexiva projecting in prominent, small tips; posterior lobe of pronotum, as seen from above, and from the side, rounding or with a blunt tip, (Figs. 21 and 22); longitudinal ridges with distinct knobs towards the anterior part; widely distributed. *fasciata georgiensis* Melin
Connexiva, if projecting, only forming a simple angle. 13
13. Ocellar processes slender and noticeably long as seen from above, not much thicker at the base. 14
Ocellar processes short, and not strikingly noticeable as seen from above, arise from a thickened base. 16

14. Terminal antennal segment of the male always longer than the preceding two united, the average one and one-third times as long; in the female the apical antennal segment is about 0.9 as long as the preceding two united; points of connexiva hardly projecting; first three connexiva rarely with a dark spot at the base; East of the Mississippi River; (Figs. 2 and 3)..... *pennsylvanica* Handl.
Terminal antennal segment of the male never one and one-third times as long as the preceding two united, rarely as long as the two united, in the female much shorter; ocellar processes more developed and noticeable... 15
15. Ocellar processes slender and twig-like; longitudinal ridges of pronotum hardly widening at the anterior part; pronotum from the lateral aspect as in Figs. 4 and 5; our most common form, (see distribution),
pennsylvanica americana Melin
Ocellar processes stouter and less twig-like; longitudinal ridges of pronotum noticeably widening at the anterior part; pronotum from lateral aspect as in Figs. 6, 7, 8 and 9; a western form, (see distribution),
pennsylvanica coloradensis Melin
16. Posterior corner of pronotum very blunt, or rounded as seen from above; lateral process of pronotum bluntly pointed, or rounded, (Figs. 31, 32, 35 and 36)..... 17
Posterior corner of pronotum distinctly and sharply pointed; lateral process of pronotum distinctly pointed, (Figs. 33, 34, 37, 38, 39 and 40)... 18
17. Frontal processes noticeably tapering anteriorly; connexiva hardly projecting and only in blunt angles; occurs in Arizona and California; (Figs. 31 and 32)..... *salicis* Ckll.
Frontal process not tapering noticeably anteriorly; connexiva projecting in distinct small points; occurs in Mexico; (Figs. 35 and 36)... *severini* Handl.
18. Membrane of wings hyaline; * color green with black markings, in older specimens the green turning into a very light buff; occurring in Oregon and British Columbia; (Figs. 33 and 34)..... *metcalfi* n. sp.
Membrane of wings brown*..... 19
19. Connexiva and ventral surface of abdomen with very few, if any, small granules; fore-femora with very few, if any, small granules on the outer surface; occurring in California; (Figs. 37 and 38).... *pacifica* n. sp.
Connexiva and ventral surface of abdomen with a varying number of distinct small granules; fore-femora rather thickly covered with granules on the outer surface; occurs in California; (Figs. 39 and 40),
pacifica stanfordi n. sp.

Phymata pennsylvanica Handlirsch.

(Figs. 2 and 3.)

Phymata erosa pennsylvanica Handlirsch, Ann. K. K. Nat. Hofm., Wien, XII, 1897, p. 163.

Phymata americana newyorkensis Melin, Arkiv for Zoologi, Band 22A, No. 2, October 8, 1930, p. 7.

This species was considered under the name *newyorkensis* by Melin who discredits Handlirsch's name *pennsylvanica* on the basis of insufficient description. According to the International Rules of Nomenclature Handlirsch's description and figure are sufficient to make his name valid. The removal of this and related forms from a subspecific position in relation to *erosa* and the demonstration by Melin that *fasciata* also

*Membrane of wings is not transparent and the color seen is that of the membrane itself and not that of the abdomen showing through it.

belongs to a species distinct from *pennsylvanica*, leaves this latter name the prior available name for the species complex to which it belongs. Melin erected the name *americana* to accommodate this species complex but *pennsylvanica* has thirty-three years priority over his name.

This subspecies may be identified from the allied ones by the long apical antennal segment. The ratio of this segment to the preceding two united, averages 1.3:1 in the male. Extremes, in a series measured, average 1.14:1 to 1.42:1 in the male. In the female this segment is noticeably longer and more slender than those of the allied subspecies. It averages 0.9:1. The abdomen is more slender than in *Phymata pennsylvanica americana* and the connexiva form an almost perfectly smooth line. Fourth connexivum is narrower, and more acutely angled than in the above named subspecies. No basal dark spots on connexiva. The specimens examined, totalling about 300, came from the following states: New York, Pennsylvania, District of Columbia, West Virginia, Ohio, Massachusetts, North Carolina, Kentucky, Georgia, Indiana, New Jersey, and Connecticut.

***Phymata pennsylvanica americana* Melin.**

(Figs. 4 and 5.)

Phymata erosa fasciata auctt. (See VanDuzee, 1917).

Phymata americana wisconsina Melin, Arkiv for Zoologi, Band 22A, No. 2, October 8, 1930, p. 6.

Phymata americana ottawensis Melin, *Ibid.*, p. 7.

Melin proposed the name *americana* to include a complex of four subspecies which he called *wisconsina*, *coloradensis*, *ottawensis* and *newyorkensis*. According to Article 52 of the Entomological Code, one of the subspecific names should be a repetition of the species name. One of Melin's subspecific names should therefore be changed to *americana*. Since *wisconsina* is the first subspecies described, it is taken as the typical form and *americana americana* substituted for *americana wisconsina*. Handlirsch's name *pennsylvanica*, however, applies to one of the subspecies of this group, and, since it is the prior name, supplants *americana* as the specific name of the complex. The subspecies *ottawensis* of Melin is included in this one, because the name is based only on a few individual variants.

This subspecies is characterized by the long twig-like ocellar processes in both sexes. Connexiva project in blunt points, and usually bear a small dark basal mark.

Specimens were examined from the following states: Massachusetts, New York, District of Columbia, Virginia, Delaware, New Jersey, Maryland, North Carolina, Pennsylvania, Ohio, Indiana, Illinois, Wisconsin, Michigan, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Kansas, Nebraska, Arkansas, Colorado, and Montana. The total number of specimens examined was in excess of 1200.

***Phymata pennsylvanica coloradensis* Melin.**

(Figs. 6, 7, 8 and 9.)

Phymata americana coloradensis Melin, Arkiv for Zoologi, Band 22A, No. 2, October 8, 1930, p. 7.

This form differs from *pennsylvanica americana* in the following ways. Shape of the pronotum is wider, more flaring (in the typical form, Figs. 6 and 7). Ocellar processes thicker and less twig-like. Longitudinal ridges more distended anteriorly. General size larger.

There is considerable variation in the shape of the pronotum, but a graded series can be made showing the relationship. The two extremes in pronotal shape are illustrated (Figs. 6, 7, 8, 9).

The states represented in the collection were Kansas, Nebraska, Arizona, Colorado, New Mexico, Oregon, Utah, and Washington. 250 specimens were examined.

***Phymata fasciata* (Gray).**

(Figs. 17 and 18.)

Syrtsis erosa fasciata Gray, Griffith's Anim. Kingd., XV, 1832, p. 242.

Phymata fasciata mexicana Melin, Arkiv for Zoologi, Band 22A, No. 2, October 8, 1930, p. 10.

Melin has demonstrated in his recent work that *P. erosa* is a distinct type and limited to Surinam and the nearby territory. He then proposes that *fasciata* Gray become a species complex, and names two subspecies under it, *fasciata georgiensis* and *fasciata mexicana*. According to Article 52 of the Entomological Code, one of the subspecific names should be a repetition of the species name. One of Melin's subspecific names should therefore be changed to *fasciata*. It so happens that the specimens examined from the K. K. Naturhistorischen Hofmuseums, Vienna, and bearing Handlirsch's determination are the subspecies called *mexicana* by Melin. Hence the name *fasciata* is the prior name for this subspecies.

This subspecies is characterized by the flaring pronotum with a sharp, pointed, lateral process, the deep lateral notch (Figs. 17 and 18), the wide, spreading abdomen, and the distribution, which is restricted to Mexico. Eleven specimens were examined, all from Mexico.

***Phymata fasciata georgiensis* Melin.**

(Figs. 19, 20, 21 and 22.)

Phymata erosa fasciata auctt. (See VanDuzee, 1917).

Phymata fasciata georgiensis Melin, Arkiv for Zoologi, Band 22A, No. 2, October 8, 1930, p. 9.

This subspecies may be differentiated from *fasciata* Gray by the pronotum, which is not as flaring, and which has a blunt lateral process, or one which is rounding (Figs. 19, 20, 21 and 23). The lateral notch is slightly smaller, and the abdomen is narrower throughout. This subspecies is quite variable, and certain forms may eventually be separated into another subspecies, but further study is desirable before such a step is taken.

The distribution of this subspecies is quite surprising. Specimens studied came from the following states: District of Columbia, New Jersey, Maryland, Virginia, North Carolina, Georgia, Florida, Louisiana, Mississippi, Ohio, Illinois, Missouri, Nebraska, Kansas, Arkansas, Oklahoma, Texas, and New Mexico. About 385 specimens were examined.

***Phymata mystica* new species.**

(Figs. 23 and 24.)

MALE:

Size and General Color.—Length of body, 7.5 to 8.5 mm. Width of pronotum, 3 to 3.6 mm. Ground color black or dark brown with a contrasting yellow or buff. Head either entirely black with buff colored antennae, or entirely buff colored, or buff with a black basal region. Pronotum either black or varying shades of brown, with the lighter colors at the anterior corners and a light margin along the lateral notch. Sides of thorax either entirely black or brown, or with a combination of these colors. Legs greenish yellow to buff, with no markings. The forelegs may sometimes be darker than the second and third pairs. Scutellum similar to the pronotum. Corium dark or a lighter shade of brown with a cross band of lighter color. Membrane brown. Abdomen entirely yellow or buff except for a black or dark brown transverse band on the fourth and basal half of the fifth segments, and a corresponding mark at the apex, which may extend completely across the tip, or be only a spot on either side.

Head and Antennae.—Frontal processes extending slightly beyond the first antennal segment, and usually rather sharply pointed. Dorsally the head narrows slightly toward the tip. Ocellar processes short

and blunt. Preocellar processes indistinct. Surface of head studded with small smooth granules. Antennae with the terminal segment almost as long as the preceding two united. The ratio is 0.9 to 1.

Thorax and Appendages.—Pronotum with almost no granulation but roughened. Anterior lobe slightly rounding. Lateral notch rather deep and narrow. Posterior lobe greatly raised and with two very sharp and distinct points (Figs. 23 and 24). Longitudinal ridges slightly raised, narrow, and with a distinct raised knob at the anterior at the highest point. Sides of thorax with very few granules, those present being mainly along the edges and at the antennal groove. Legs rather strikingly smooth. Corium without any granules. Scutellum with a vein and a distinct median ridge.

Abdomen strikingly widened with the corners of the first three connexiva sharply projecting, and the fourth acutely angled and much wider. Fifth connexivum almost as wide as the fourth. Fifth and sixth segments forming a rather wide and short apex to the abdomen. Abdomen almost devoid of granules, those found being inconspicuous and scattered.

FEMALE:

Length, 8.5 to 10 mm. Width of pronotum, 3.5 to 4.2 mm. Color as in the male but lighter. Terminal antennal segment about three-fourths as long as the preceding two united. Otherwise as in the male.

Holotype.—♂, Dunedin, Florida, April 12, 1915 (W. S. Blatchley). Deposited in the collection of the Illinois State Natural History Survey, Urbana.

Allotype.—♀, Leesburg, Florida, Sept. 10, 1930 (C. Goff). Deposited with the holotype.

Paratypes.—5 ♂♂, 5 ♀♀, Dunedin, Florida, Oct. 23–30, 1914 (Blatchley); 3 ♂♂, 3 ♀♀, Jacksonville, Florida; 5 ♂♂, 1 ♀, Florida; 1 ♂, 1 ♀, Billy's Island, Okefenokee Swamp, Georgia, June, 1912; 1 ♂, 2 ♀♀, Gainesville, Florida, July 7–28, 1918 (C. J. Drake); 2 ♀♀, Tampa, Florida, Fall 1927 (C. O. Bare); 2 ♂♂, Ft. Myers, Florida, April 1, 1922 (J. N. Knull) and March 31, 1912 (H. G. Barber); 1 ♂, Cleveland, Florida, April, 1925 (J. N. Knull); 1 ♀, same locality, April, 1927 (D. M. DeLong); 1 ♂, 2 ♀♀, Leesburg, Florida, Sept. 10, 1930 (C. Goff); 1 ♂, Punta Gorda, Florida, Nov. 13, 1911 (Wm. T. Davis), 1 ♀, Waynesville, Georgia, Sept. 10, 1909; 1 ♀, St. Augustine, Florida (C. T. Brues); 1 ♂, Miami, Florida (J. C. Hamlin); 1 ♀, Orlando, Florida, April, 1929 (D. M. DeLong); 2 ♂♂, Miami, Florida, Nov. 3, 1912; 2 ♂♂, Orlando, Florida, May 21, 1922 (H. E. Ewing) and Aug. 23, 1907 (Russell). Distributed in the collections of Cornell University; Purdue University; Agricultural Experiment Station, Fort Collins,

Colorado; H. M. Parshley; Bureau of Plant Industry, Harrisburg, Pennsylvania; H. G. Barber; Iowa State College; University of California; University of Kansas; Agricultural Experiment Station, Tucson, Arizona; U. S. National Museum; and the author.

This species is allied to *P. fasciata georgiensis* Melin and can be separated from it by the following characters. Abdomen flaring more abruptly to the widest point, and more rounding to the apex. Projecting tips of connexiva shorter and not as sharply pointed. Posterior lobe with a sharp pointed lateral process and posterior corner. A short deep curve leading from the lateral process to posterior corner. Longitudinal ridges narrower and with a smaller knob at the anterior end. Colors black and yellow rather than a reddish brown and yellow as found in *georgiensis*.

This species has been named *P. guerini* by previous American authors, but is not the *guerini* of Handlirsch. Specimens of the true *guerini* named by Handlirsch and coming from the typic locality, Cuba, differ very markedly from *mystica*.

Phymata arctostaphylæ VanDuzee.

(Fig. 15.)

Phymata erosa arctostaphylæ VanDuzee, Trans. San Diego Soc. Nat. Hist., 2, 1914, p. 11.

This species is being raised from a subspecies of *erosa*, because of Melin's discussion of that form. It appears as a distinct species being distinguished by the upright posterior pronotal lobes with sharp, long, lateral processes, the sharp, posterior corner, very small lateral notch, and the thin, rather sharply raised, longitudinal ridges (Fig. 15). The sharply projecting and acutely angled fourth connexiva are similar to *P. mystica*, which is probably the most closely allied species but it can be distinguished by the above characters and the striking red color which VanDuzee states is diagnostic.

One specimen from California sent to me by Professor E. P. VanDuzee.

Phymata granulosa Handlirsch.

(Figs. 25 and 26.)

Phymata erosa granulosa Handlirsch, Ann. K. K. Hofm., Wien, XII, 1897, p. 163.

Phymata granulosa Melin, Arkiv for Zoologi, Band 22A, No. 2, October 8, 1930, p. 15.

This species is most closely allied to *P. rossi*, but has fewer spines, and these are limited mainly to the anterior half of

the pronotum, and with a relatively few on the fore-femora. The sides of the thorax are granular, rather than spiny, and the edges of the pronotum and abdomen are not as sharply toothed. The lateral notch is larger and the posterior lobe is more sharply raised and pointed (Figs. 25 and 26).

Twenty specimens were examined, all from Mexico.

***Phymata rossi* new species.**

(Figs. 27 and 28.)

MALE:

Size and General Color.—Length of body, 7 to 8 mm. Width of prothorax, 2.9 to 3 mm. Head dark brown and black on top, light brown on the sides. Antennae same as the sides, with the terminal segment slightly darker, and with a distinct sheen present. Pronotum varying shades of brown, the darkest being found at the tips of the posterior lobe. Scutellum a medium brown. Sides of thorax light brown. Legs the same color except the femora, which are a reddish brown. Hemelytra dark with a very pale band across the middle. Membrane brown. First, second and third connexiva yellowish, fourth and basal half of fifth black, the remaining connexiva yellow except for a dark spot on either side of the last segment. Ventral surface of abdomen yellowish except for a continuation of the dark fourth and fifth connexiva, which extends slightly upon the abdomen.

Head and Antennae.—Frontal processes upturned, usually projecting slightly beyond the first antennal segment and with a small notch between them. Ocellar processes medium in length, with several branches. Preocellar processes small and branching. Head covered with small spines on all the surface. Antennae with the terminal segment about as long as the preceding two taken together.

Thorax and Appendages.—Anterior half of pronotum with many spine-like projections, the posterior half with scattered ones. These also occur along the edges, producing a toothed effect. Anterior lobe gently widening. Lateral notch long and shallow (Figs. 27 and 28). Posterior lobe with distinct, sharp lateral processes and sharp posterior corners. Longitudinal ridges slender and only slightly raised. Sides of thorax with many of the spines found above, these also continuing on the coxae, trochanters and femora of all the legs, outer surface of the front femora thickly covered with them, those on the femora of the other legs in rows along each edge. Corium of the wings with a few scattered spines. Scutellum with a narrow, sharp margin trimmed with small spines. The cross-shaped center design is also studded with these spines.

Abdomen.—Edges of connexiva with spines similar to edges of pronotum but to a lesser degree. Posterior corners of first three connexiva projecting in small sharp points. The fourth also projects slightly and sharply. There is a gradual widening of the abdomen to the widest point. The dorsal and ventral surfaces have small granules and a few very small scattered spines.

FEMALE:

Length, 8 to 9 mm. Width of pronotum, 3 to 3.5 mm. Color as in the males, but with the dark colors replaced by a lighter brown. Terminal segment of antennae a little longer than the third segment. Abdomen more rounding. Otherwise as in the male.

Holotype.—♂, Huachaca Mts., Arizona, August 8, 1927 (R. H. Beamer). Deposited in the collection of the University of Kansas, Lawrence.

Allotype.—♀, same data as the holotype.

Paratypes.—2 ♀ ♀, same data as holotype and allotype; 1 ♀, Huachaca Mts., Arizona, July 28, 1907; 2 ♂ ♂, 2 ♀ ♀, Santa Rita Mts., Arizona, June-July (F. H. Snow); 4 ♂ ♂, 1 ♀, Arizona; 1 ♂, 1 ♀, Yavapai Co., Arizona, August 9, 1927 (P. A. Readio); 1 ♀, Zion Natl. Park, Utah, Aug. 13, 1929 (R. H. Beamer); 1 ♂, West side of Organ Mts., New Mexico, July (E. O. Wooton). Deposited in the collections of the University of Kansas, Lawrence; Cornell University, Ithaca, New York; Ohio State University; Stanford University, Palo Alto, California; Iowa State College, Ames; and the author.

This species is most closely related to *P. granulosa* Handlirsch but is slightly smaller, and has the spine-like projections more generally scattered over the entire body. The forelegs are more thickly covered with setiferous granules. The lateral notch is smaller in both directions, and the posterior lobe is not as sharply raised or pointed.

Phymata borica new species.

(Figs. 29 and 30.)

MALE:

Size and General Color.—Length, 8 mm. Width of pronotum, 2.8–3 mm. Color: Basal part of the head black or dark brown, the rest a medium brown. Antennae medium brown with the terminal segment darker. Sides of head and all of the ventral parts a greenish yellow. In older specimens this is more of a reddish brown. Pronotum is somewhat mottled with black, brown, and buff. Scutellum a light yellow or brown. Corium dark brown with light band. Under the wings a dark design is found. Abdomen mainly a greenish yellow with the usual dark band on all of the fourth, and the basal half of the fifth connexiva. First, second, and third connexiva may have a small dark spot at the basal edge, or not. There is a small dark spot on each side of the sixth connexivum. These dark areas show on the ventral surface.

Head and Antennae.—Frontal processes may extend slightly beyond the first antennal segment, or not. Notch between them may be distinct, or may be obliterated. Ocellar processes distinct and stout.

Preocellar processes small and indistinct. Terminal segment of antennae almost as long as the preceding two united. Median part of the dorsal surface of the head almost smooth, the rest of the head with fine granules.

Thorax and Appendages.—Pronotum characterized by the subquadrate shape. Lateral notch very small, and the posterior lobe hardly raising or flaring (Figs. 29 and 30). Lateral process blunt or slightly pointed. Posterior corner distinct. Longitudinal ridges almost smooth, a few granules at the anterior end. They are only slightly raised. Granulation on the pronotum is slight, and limited to the median part of the anterior lobe. On the sides of the thorax the granulation is variable and the granules small. Femora of forelegs almost smooth, a row of small granules occurring on the upper edge. Coxae and trochanters of all legs slightly granular. Femora of the middle and hind legs with a row of small granules on the upper and lower edges. Scutellum as wide as long, with a narrow rim. The raised central area with scattered granules.

Abdomen gently tapering to widest point. The connexiva almost even or only slightly projecting. The fourth connexivum only slightly projecting, and in some specimens somewhat rounded.

FEMALE:

Length, 8.5 to 9 mm. Width of pronotum, 3 to 3.5 mm. Colors lighter than in the male. Abdomen somewhat more rounding. Terminal antennal segment about three-fourths as long as the preceding two united. Otherwise as in the male.

Holotype.—♂, Zion National Park, Utah, July 13, 1929 (R. H. Beamer). Deposited in the collection of the University of Kansas, Lawrence.

Allotype.—♀, Chiric Mts., Arizona. Deposited in the collection of Cornell University, Ithaca, New York.

Paratypes.—2 ♂♂, 3 ♀♀, same data as allotype, two of them dated September 6, 1897; 1 ♀, Arizona (C. F. Baker); 2 ♂♂, Pocatella, Idaho; 1 ♂, Arizona, August, 1902 (F. H. Snow); 2 ♂♂, Glenwood Springs, Colorado (Wickham); 1 ♂, Dixie, Utah, September 10, 1915 (E. D. Ball). Distributed in the collections of Cornell University; University of Kansas; U. S. National Museum; University of Nebraska; H. G. Barber; Agricultural Experiment Station, Tucson, Arizona; and the author.

This species might be confused with some forms of *P. pennsylvanica coloradensis* but can be separated from them by the smaller size; the more reddish brown color; the flattened pronotum with a very small lateral notch; and the shorter, thicker ocellar processes.

Phymata salicis Cockerell.

(Figs. 31 and 32.)

Phymata erosa salicis Cockerell, Entomologist, XXXIII, 1900, p. 66.

On the basis of Melin's discussion of *P. erosa* L. this subspecies is being raised to specific rank. The closest allied form observed is *P. metcalfi* (Figs. 33 and 34). *P. salicis* Cockerell may be distinguished from this allied form by the more rounding posterior lobe, and the more open lateral notch of the pronotum (Figs. 31 and 32), and by the longer and more pointed frontal processes of the head.

Thirty specimens were examined, all from Arizona and California.

Phymata metcalfi new species.

(Figs. 33 and 34.)

MALE:

Size and General Color.—Length, 7.5 to 8 mm. Width of pronotum, 2.8 to 3 mm. Color in specimens collected July 28, 1930, as follows: Head greenish with black ocellar processes and base, and a dark margin. Antennae greenish with the terminal segment brownish. Sides and front of head light brown. Pronotum greenish and marked with dark brown or black. The greenish color forming a margin across the anterior part and along the sides, where it is stopped by an oblique dark band on the anterior lobe. Lateral notch margined by green. Posterior lobe dark except near the lateral notch and just in front of the scutellum. Longitudinal ridges and an area on each side, greenish. Lateral aspect buff with the legs brown or greenish. The green shows up particularly on the second and third pairs of legs and on the tibiae of the forelegs. Scutellum light green. Corium brownish on the basal half with the rest pale green. Abdomen light brown with a dark band on the fourth and the basal part of the fifth connexiva. This continues over the edge and is found ventrally on the connexiva. Remainder of the abdomen, ventrally, is light buff or yellowish. In older specimens the green has faded into a yellowish-brown, and the darker parts have become correspondingly lighter in color.

Head and Antennae.—Frontal processes more or less blunt and projecting slightly beyond the first antennal segment. The notch between them varies considerably, but is usually rather shallow. Ocellar processes quite long and distinct. Preocellar processes also distinct but shorter. Terminal segment of antennae about 0.8 as long as the preceding two taken together.

Thorax and Appendages.—Pronotum with a few very small granules located mainly on the anterior lobe. Anterior lobe gently rounding to the lateral notch, which is rather small both in length and depth. Posterior lobe with a distinct lateral process and posterior corner (Figs. 33 and 34). Longitudinal ridges slightly raised and enlarging very little at the anterior part. Sides of the thorax with very few

granules, these occurring mainly along the edges of the sclerites. Legs with few scattered granules, the fore-femora smooth on the side, and with a row of small knobs on the upper edge. Scutellum with a thin, sharp, margin, and with the center design granular on the raised portions.

Abdomen with small scattered granules on the upper and lower surfaces. Tapering gently to the widest point. First three connexiva extending very slightly at the posterior corner, or not at all. The fourth extending in an acute point.

FEMALE:

Length, 8.2 to 9 mm. Width of pronotum, 3 to 3.5 mm. Color a light green, or yellowish in older specimens, over the entire body. The darker markings are not as prominent as in the males. Fourth segment of antennae about seven-tenths as long as second and third united. Otherwise as in the male.

Holotype.—♂, Summer Lake, Lake Co., Oregon, July 28, 1930 (H. A. Scullen). Deposited in the collection of the Oregon Agricultural College, Corvallis, Oregon.

Allotype.—♀, same data as holotype.

Paratypes.—3 ♂♂, 1 ♀, same data as holotype and allotype; 1 ♂, 2 ♀♀, Ione, Oregon, Aug. 12 (Currin); 2 ♂♂, 1 ♀, Umatilla, Oregon, July 21, 1914 (H. F. Wilson); 1 ♂, 1 ♀, Lillooett, B. C., October 2, 1918. Deposited in the collections of the Oregon Agricultural College, Corvallis; H. M. Parshley, Northampton, Massachusetts; and the author.

This species resembles *P. salicis* Cockerell but can be differentiated from it by the more pointed and sharply upturned posterior lobe of the pronotum, by the less sharply pointed and less projecting frontal processes, the shorter lateral notch, the wider prothorax and abdomen, and the longer fourth antennal segment.

***Phymata severini* Handlirsch.**

(Figs. 35 and 36.)

Phymata erosa severini Handlirsch, Ann. K. K. Nat. Hofm., Wien, XII, 1897, p. 164.
Phymata severini Handlirsch, Melin, Arkiv for Zoologi, Band 22A, No. 2, October 8, 1930, p. 8.

This species is closely allied to *P. pacifica* but may be separated from the two subspecies in that group by the following characters. Pronotum as seen from above has rounding or very bluntly pointed posterior lobes (Figs. 35 and 36), whereas in *pacifica* the lateral process is distinctly pointed. Anterior lobe is somewhat more rounding laterally than in *pacifica*.

Tips of connexiva project more distinctly and in small points. Edges of last three connexiva somewhat sinuate, in *pacifica* broadly rounding. Six specimens were studied, all from Mexico.

Phymata pacifica new species.

(Figs. 37 and 38.)

MALE:

Size and General Color.—Length, 6.5 to 7.5 mm. Width of pronotum, 2.8 to 3 mm. Color in specimens collected in 1929 as follows: Base of head to, and including the ocellar processes, dark brown or black studded with light colored granules. Remainder of head usually a pale cream color, in some a tinge of brown on the dorsal surface. Antennae with the first three segments pale, and the fourth varying shades of brown, but darker than the others. Anterior lobe of pronotum pale cream color, except for a small brown spot on the middle of the edges. Posterior lobe with this same light color along the margins reaching nearly to the lateral process. The posterior margin is also light, as is the entire scutellum. Remainder of pronotum, dorsally, is a reddish brown. Sides of the thorax, and the appendages, are similar to the sides of the head. Corium medium brown with a band that is paler and pinkish. Membrane is brown. Abdomen is yellow-buff, except for a reddish brown band on the fourth and basal half of the fifth connexiva. This band extends underneath a short distance.

Head and Antennae.—Head covered with many small, light colored granules. Frontal processes extend slightly beyond the first antennal segment, and are upturned. From the dorsal aspect, they have a sharp, angular notch between them, and are slightly rounding on the lateral edges. Ocellar processes short and rather heavy. Preocellar processes small, their light color making them indistinct. Fourth segment of antennae 0.8 to 0.9 as long as the second and third together.

Thorax and Appendages.—Pronotum granulate on the anterior lobe, and weakly punctate on the posterior lobe. Anterior lobe rounding, posterior lobe with sharp lateral process, and distinct posterior corner (Figs. 37 and 38). Longitudinal ridges thin, but distinct; slightly granular on the anterior tip. Sides are quite granulate, with small granules, but the appendages are practically devoid of any. Scutellum with a thin rim, the raised portion in the inner part is irregularly granulate.

Abdomen almost smooth, a very few scattered granules being present. Tapers gradually to the widest point. Posterior points of the first three connexiva projecting slightly, and bluntly. Fourth connexiva continuing the line of the first three. Ventral surface is somewhat shiny and with a few very small granules.

FEMALE:

Length, 7.3 to 8 mm. Width of pronotum, 3 to 3.5 mm. Color as in the male, except that the darker areas as found in the male are paler in this sex. Fourth segment of antennae about six-tenths to seven-tenths as long as 3 and 2 united. Otherwise as in the male.

Holotype.—♂, San Diego Co., California, July 4, 1929 (R. H. Beamer). Deposited in the collection of the University of Kansas, Lawrence.

Allotype.—♀, Alpine, California, July 9, 1929 (R. H. Beamer). Deposited with holotype.

Paratypes.—1 ♂, same data as holotype; 1 ♂, 1 ♀, same data as allotype; 1 ♂, San Jacinto Mts., California, July 21, 1929 (R. H. Beamer); 2 ♂♂, 1 ♀, Sonoma Co., California; 1 ♂, San Francisco, California; 1 ♂, Los Angeles Co., California; 1 ♂, Bakersfield, California, August 19–20, 1917 (R. C. Shannon); 1 ♂, 1 ♀, Claremont, California (Baker); 1 ♀, Orange Co., California; 1 ♂, 1 ♀, Tamalpais, California, August 5, 1915 (VanDuzee); 1 ♀, Coahuila, San Diego Co., California, August 18, 1914 (J. C. Bradley); 1 ♀, Ontario, California; 2 ♀♀, San Mateo Co., California; 1 ♀, California; 4 ♂♂, 9 ♀♀, Auburn, California, August 1915 and 1916 (L. Bruner); 1 ♂, 1 ♀, Tamalpais, California; 1 ♀, Giant Forest, California, July 28, 1929 (R. H. Beamer); 2 ♂♂, 1 ♀, San Margarita, California, August 6, 1912 (E. D. Ball); 1 ♂, 1 ♀, Orange Co., California, July 14, 1929 (R. H. Beamer); 1 ♂, Southern California; 1 ♀, Orange Co., California (E. O. Essig). Deposited in the collections of the University of Kansas; Ohio State University; Cornell University, Ithaca, New York; University of Nebraska; H. M. Parshley; Agricultural Experiment Station, Tucson, Arizona; Stanford University; University of California; Agricultural Experiment Station, Ft. Collins, Colorado; R. L. Usinger; and the author.

This species is allied to *P. severini* Handlirsch but differs in having sharper points to the posterior lobe of the pronotum and a more rounding abdomen, which does not taper as much in the last three segments as does *severini*. Prosternal processes are finer. Top of head has a rougher appearance.

***Phymata pacifica* new subspecies *stanfordi*.**

(Figs. 39 and 40.)

MALE:

Size and General Color.—Length, 6.8 to 7.8 mm. Width of pronotum, 2.5 to 3 mm. Color: Head black or dark brown from the base to the ocellar processes and a marginal black line to the tips of the frontal processes. Center part light brown. Antennae light reddish brown for the first three segments, the fourth being darker. Pronotum chiefly a light buff with black markings on the edge of the

anterior lobe about the center, and the edge of the posterior lobe. Sides of the head and thorax a light buff with a reddish tinge. Appendages the same, except the tibiae of the forelegs and the tarsi of all of them, which are green. Scutellum a light buff. Corium a medium brown for the basal half and lighter the rest of the distance. Abdomen only slightly darker than the pronotum for the most part. Fourth connexivum darker, with a light spot, sometimes elongating into a streak, on it. Basal part of fifth connexivum dark. A dark spot on each side of the last connexivum. Ventrally, the abdomen is about the same color as the fore part, but sometimes shows a slightly redder tinge. The dark markings on the fourth, fifth and sixth connexiva show underneath also. In older specimens the customary fading takes place, green showing yellow, and browns becoming lighter and more yellowish.

Body and Appendages as in *pacifica*, the outstanding difference being in the amount of granulation on the dorsal and ventral surfaces. In this subspecies the granulation is noticed readily, particularly from the lateral aspect, and is shown markedly on the forelegs, as well as the others, and on the ventral surface of the abdomen. Coloration is markedly different, in *pacifica* the light areas being a pale cream color, while in this one those areas are a light buff.

Holotype.—♂, Stanford University, California, August 29, 1928 (Carl Duncan). Deposited in the collection of Stanford University.

Allotype.—♀, same locality and collector as holotype. August 18, 1930.

Paratypes.—6 ♂♂, 6 ♀♀, same locality as holotype and allotype September, 1897 (Johnson), August 4 and 13, 1928, September 1, 1929, August 23–25, 1930 (Carl Duncan), and June, 1920; 3 ♀♀, Palo Alto, California, September, 1929 (T. Zschakke); 3 ♂♂, Santa Rosa, California, July, August, September, 1899; 3 ♀♀, Oakland Recreation Camp, California, July 20, 1928 (R. L. Usinger); 1 ♂, 1 ♀ Laguna Mts., California, July 6, 1929 (P. W. Oman); 1 ♂, 1 ♀, Santa Clara, California; 1 ♀, Mariposa Co., California, June 17, 1914; 1 ♂, Santa Cruz Mts., California; 1 ♂, Sacramento, California; 1 ♂, Mt. View, California; 1 ♂, Walnut Creek, California, July 1, 1927 (R. L. Usinger). Distributed in the collections of Stanford University; Agricultural Experiment Station, Tucson, Arizona; Iowa State College; University of California; University of Kansas; Oregon Agricultural College; Ohio State University; R. L. Usinger; and the author.

Phymata albopicta Handlirsch.

(Fig. 10.)

Phymata albopicta Handlirsch, Ann. K. K. Hofm., Wien, XII, 1897, p. 151.

This small species may be told by the flaring abdomen with the first to third connexiva extending in distinct knobs, the fourth widely extending, and the wing membrane having many small closed cells.

Only two specimens were represented, both from Mexico.

Phymata noualhieri Handlirsch.

(Fig. 16.)

Phymata noualhieri Handlirsch, Ann. K. K. Nat. Hofm., Wien, XII, 1897, p. 153.

This species differs from any other North American form studied, and can be recognized by the thick pronotum which is not raised along the edges and is only slightly wider behind than at the front; by the three-lobed fourth connexivum, with the middle lobe the largest; and by the interweaving veins of the membrane, forming closed cells of various sizes.

Five specimens were studied from the following states: North Carolina, Georgia, Florida, and Arizona.

Phymata vicina Handlirsch.

(Figs. 13 and 14.)

Phymata vicina Handlirsch, Ann. K. K. Nat. Hofm., Wien, XII, 1897, p. 150.

This species is allied to *P. luxa* and can be distinguished from the latter form by the color combination of black and white. The veins in the wing membrane are very numerous and fine and do not form closed cells towards the apex as they do in *P. luxa*.

The states from which representatives observed occurred were: Massachusetts, Connecticut, New Jersey, Virginia, Illinois, South Dakota, Nebraska, Kansas, Texas, Arizona, Colorado, Utah, and California. Thirty-five specimens were studied.

Phymata luxa new species.

(Figs. 11 and 12.)

MALE:

Size and General Color.—Length, 5 to 5.6 mm. Width of pronotum, 1.6 to 2 mm. Head mostly brown, medium on top, usually somewhat lighter on the sides. There may be a black mark at the base of the head, and the antennal groove may be black. Antennae the same color as the sides of the head and thorax. Pronotum mottled with two shades of brown, one medium, the other lighter. Scutellum medium brown. Sides of thorax light buff in some, and a reddish brown in

others. Legs same as the sides, the middle and hind femora sometimes mottled with darker. Corium somewhat variable, being a mixture of medium or darker brown with a very pale, almost white color, which may appear as a band, as a mottling, or as the color of the entire basal half. In all variations there are small whitish granules scattered in varying numbers over the corium. Abdomen varies from an almost white or cream color to a buff as the basic color. It is marked with the customary band on connexiva four and five, and has small dark spots along the edges of the connexiva. Underside of the abdomen about the same as the thorax, sometimes lighter.

Head and Antennae.—Frontal processes bluntly rounding, with a distinct notch between them. They extend distinctly beyond the first antennal segment. Ocellar processes appear as rather thick, granular swellings. Preocellar processes are difficult to observe from the dorsal aspect, but from the side they can be seen as small, almost flat structures. Terminal segment of antennae as long or slightly longer than the preceding two united. The head is quite thickly covered with granules.

Thorax and appendages.—Pronotum with no lateral notch, and without a distinct flare in the posterior part (Figs. 11 and 12). The anterior corners rather long and sharp, the lateral process distinct but blunt, and the posterior corners blunt or sharp. Longitudinal ridges only slightly raised, and smooth, except for a few granules at the anterior end. Very few granules on the pronotum and most of them in the middle of the anterior half. Posterior half rather coarsely punctate. Corium with a varying number of small whitish granules scattered over the surface. Membrane with a varying number of closed cells toward the apex. Sides of the thorax irregularly granulate. Coxae and trochanters of all the legs somewhat granulate. Fore-femora and tibiae smooth, the femora of the middle and hind legs with a row of conspicuous granules on the upper and lower edges. Fore-femora appear quite thin. Scutellum with a thin margin trimmed irregularly with small granules on the outer edges. Central raised portion with a distinct raised ridge, and irregularly granulose.

Abdomen tapering gently to the widest part. The first three connexiva with small, knob-like projections at the posterior corners. The fourth projecting slightly and bluntly pointed.

FEMALE:

Length, 6.2 mm. Width of pronotum, 2.2 mm. Colors somewhat lighter; the terminal antennal segment three-fourths as long as the preceding two united; abdomen more rounding. Otherwise as in the male.

Holotype.—♂, Del Rio, Texas, June 22, 1927 (Wickham). Deposited in the collection of the Ohio State University, Columbus.

Allotype.—♀, Colorado. Deposited in the collection of the Colorado Agricultural College, Fort Collins.

Paratypes.—1 ♂, Colorado; 1 ♂, Huachaca Mts., Arizona, June 15, 1930 (E. D. Ball); 1 ♂, San Rita Mts., Arizona, June 11, 1930 (E. D. Ball). Distributed in the collections of the Arizona Agricultural Experiment Station, Tucson; Colorado Agricultural Experiment Station, Fort Collins; and the author.

This species is most closely related to *P. vicina* Handlirsch but is more slender, smaller, and the points of the connexiva much less projecting. The closed cells in the wing membrane are also distinctive. The abdomen is more tapering than in *vicina*.

Genus *Macrocephalus* Swederus.

KEY TO SPECIES.

1. Small species, 6.5 mm. or less in length..... 2
Larger species, 7 mm. or more in length..... 4
2. Scutellum coarsely punctured over the entire surface..... 3
Scutellum coarsely punctured on the basal third, the remainder much more finely punctured; conspicuous spine-like granules on the pronotum, sides of thorax, fore-femora, and elsewhere; occurring in Arizona, *uhleri* Handl.
3. Anterior half and lateral edges of pronotum with distinct pointed granules; color in male a mottling of black and yellowish on the scutellum, female less so, and often with no dark patches; occurring in Mexico. *stali* Handl.
Anterior half and lateral edges of pronotum with small round granules; color on the scutellum of male may be yellow with a black median stripe, or only yellow, female usually without the black stripe; widely distributed..... *prehensilis* (Fabr.)
4. A prominently raised knob or elevation at the anterior end of each longitudinal ridge; a prominent somewhat punctate subtriangular or arrow-shaped callus on the scutellum; color mottled dark and light; occurring in California..... *barberi* n. sp.
Longitudinal ridges with very small knobs or none; callus of scutellum of various shapes..... 5
5. Callus of scutellum sub-triangular or arrow-shaped and quite thickly punctate with very small punctures; terminal antennal segment in male less than 1½ times as long as the preceding two united, in the female about 1¼ times; occurring in Arizona..... *dorannæ* n. sp.
Callus of scutellum other than the above shape, fusiform or spear-shaped; or a single median carina..... 6
6. Callus of scutellum a varying fusiform or spear-shape; callus at its broadest part, covering one-third or more of the width of the scutellum... 7
Callus of scutellum reduced to a single median carina, slightly widening at base..... 8
7. Second and third connexiva as seen from above are as wide as long; occurring in Florida..... *clivicoides* Swed.
Second and third connexiva as seen from above are longer than wide; occurring in Mexico, Panama, Texas..... *notatus* Westw.
8. Slender, elongate species; abdomen barely visible from above; posterior lobe of pronotum with a single sharp point on either side smooth and punctate on scutellum; occurs in Panama..... *angustatus* Champ.
Shorter, broader species; abdomen roundly chordate; surface of scutellum prominently reticulate with raised lines; pronotum granulate, posterior lobe bilobed; occurs in Arizona..... *arizonicus* Ckll.

Macrocephalus cimicoïdes Swederus.

Macrocephalus cimicoïdes auctt. (See VanDuzee, 1917).

Resembles *M. notatus* Westwood very closely. The abdomen in both sexes is wider and more heart-shaped than in *cimicoïdes*. The second and third segments of the connexiva in this species as seen from the dorsal aspect are as wide as long.

Nine specimens were studied, all from Florida.

Macrocephalus notatus Westwood.

Macrocephalus notatus auctt. (See VanDuzee, 1917).

Resembles *M. cimicoïdes* Swederus very closely. The abdomen is not as widely flaring and not as distinctly heart-shaped as in *M. cimicoïdes*. It may be recognized by the fact that the second and third connexiva, as seen from the dorsal aspect, are longer than wide.

Fourteen specimens were studied, from Texas, Mexico, Guatemala, and Canal Zone, Panama.

Macrocephalus manicatus (Fabricius).

Syrtsis manicatus Fabricius, Syst. Rhyng., 1803, p. 123.

Handlirsch lists this as a North American species, but none were present in the collections examined by the writer. It is closely allied to *cimicoïdes* Swed. and *notatus* Westw., but may be distinguished from them by the fact that the scutellar callus at its widest point is less than $\frac{1}{3}$ as wide as the scutellum.

Macrocephalus dorannæ new species.

MALE:

Size and General Color.—Length of body, 7 to 8 mm. Width of prothorax, 2.7 to 3.2 mm. Width of abdomen, 3.2 to 3.9 mm. Color of dorsal surface mainly black or dark brown with grayish or ochraceous, small, smooth granules over the entire surface. Edges of anterior lobe of pronotum, the arrow or spear-headed callus on scutellum, and the first connexivum ochraceous buff. Second and third connexiva black or dark brown. Remainder of connexiva buff with varying amounts of dark color. Exposed part of corium dark brown or black. From the side the colors seen are light buff, mottled with brown. Coxae, trochanters and femora of all legs darker and spotted. Tibiae of fore-legs dark, and of mid and hind legs light brown. Abdomen with lateral portions just under the connexiva a reddish brown, remainder of ventral portion lighter. Antennae dark brown or black, except at the joints, which are light, and a light spot about the middle of the terminal segment.

In fresh specimens the black or dark brown may be replaced by a reddish brown wherever it is to be found, and the scutellum, antennae and legs have a greenish color. The granules do not show up as distinctly in the fresh specimens.

Head and Antennae.—Head typical of the genus, covered with very small, smooth granules. Measurements of the antennae are: second segment about one and one-fifth times as long as wide, third about one and three-fifths times as long as wide, fourth approximately twice as long as wide, and the fourth from one and one-fifth to one and three-eighths as long as two and three combined.

Thorax and Appendages.—Anterior lobe of the pronotum gently slanting to the transverse groove then widening abruptly to form the posterior lobe, which has a distinct lateral process. A small, sharp notch separates this from the posterior corner, which is slightly more rounded. Longitudinal ridges prominent from the transverse groove posteriorly to about the middle of the lobe, where they gradually diminish. Anterior lobe appears smooth beneath the granules, whereas the posterior one is slightly roughened. Sides of thorax thickly covered with small granules. Forelegs with a few larger granules on the coxa, trochanter and femur. Middle and hind legs with large and prominent granules on the coxae, trochanters, and femora, the tibiae with finer granules. Scutellum impressed at the base with a rounding area immediately posterior to this impression. Somewhat irregularly punctate in the impressed area and with very few granules. Callus very distinctive, shaped like an arrow-head, and very thickly punctate with very small punctures. Callus extends about one-half or slightly more across the scutellum, and from the base about two-thirds of the distance back. Many small granules cover the rest of the scutellum, but more occur on the callus.

Abdomen.—Chordate in shape, and thickly covered with granules on both surfaces.

FEMALE:

Length, 8.2 to 9.2 mm. Width of prothorax, 3 to 3.5 mm. Width of abdomen, 4.2 to 4.5 mm. Color in specimens observed, lighter than in male. These specimens apparently have been killed only a year or less and in color resemble the males killed in 1930, so that in fresh specimens the two sexes would be the same in coloration. Otherwise as in the male.

Holotype.—♂, Patagonia, Arizona, September 20, 1930 (E. D. Ball). Deposited in the collection of the Agricultural Experiment Station, Tucson, Arizona.

Allotype.—♀, same data as the holotype.

Paratypes.—7 ♂♂, Arizona; 1 ♂, Nogales, Arizona, October 8, 1898 (Koebele); 1 ♂, Salt River Hill, Arizona, September 26, 1924 (Hunter); 1 ♂, 4 ♀♀, same data as holotype and allotype; 2 ♀♀, Arizona; 1 ♀, Baboquivaria Mts., Arizona (F. H. Snow). Deposited in the collections of Agricultural Experi-

ment Station, Tucson, Arizona; U. S. National Museum; Cornell University, Ithaca, New York; Ohio State University, Columbus; University of Kansas, Lawrence; Stanford University, Palo Alto, California; and the author.

This species is allied to *M. cimicoides* and *M. notatus* and may be distinguished from them by the following characteristics. Callus of pronotum distinctly punctate, and spear or arrow-head shaped. Terminal antennal segment in the male less than $1\frac{1}{2}$ times as long as the second and third united; in the female about $1\frac{1}{4}$ times as long as the preceding two united.

Macrocephalus arizonicus Cockerell.

Macrocephalus arizonicus Cockerell, Entomologist, XXXIII, 1900, p. 66.

This form is allied with *M. prehensilis* (Fabricius) but is larger, and has a very rough-finished appearance over the entire body due to a combination of punctures and reticulate raised lines over the pronotum and scutellum, and a noticeable granulation of the rest of the body.

Three specimens from Arizona were examined.

Macrocephalus angustatus Champion.

Macrocephalus angustatus Champion, Biologia Centrali-Americana, Rhyncota-Heteroptera, Pt. 2, 1901, p. 59.

Elongate, slender species. The abdomen is barely visible from the dorsal view. The posterior lobe of the pronotum has one distinct sharp point on each side. Smoothly finished and shallowly punctate on the pronotum and scutellum.

One specimen from Ancon, Panama.

Macrocephalus barberi new species.

MALE:

Size and General Color.—Length of body, 7 mm. Width of abdomen, 3.5 mm., scutellum approximately two times as long as wide. Ground color of the dorsal surface black or dark brown, with many tiny, smooth granules of a light color scattered over the surface, giving it a mottled appearance. Head black, fading to ochraceous on the sides, which are also mottled with darker areas. First, second, and third segments of antennae black with the exception of the joints, which are light. Fourth segment with a small dorsal spot that is dark, the rest being pale. Pronotum mainly black with the light granules grouped in some places making it appear mottled. Edges of the anterior lobe light ochraceous. Scutellum mottled and with an arrow-head shaped callus which is light at the anterior end and darker at the posterior.

Corium black with many light granules. Front connexiva entirely light colored, the remainder black with the light granules prominent, and the posterior tips of each slightly projecting and tipped with light ochraceous. Ventral surface pale ochraceous with dark spots on the thorax and coxae and femora of legs. Abdomen with a longitudinal row of small dark spots about half way up on each side.

Head and Antennae.—A slight swelling or elevation where the ocelli are located. Antennae rather short with a heavy terminal segment. Terminal segment two and one-fourth times as long as wide, third segment two times as long as wide, the terminal segment about one-fourth times as long as the preceding two taken together.

Thorax and Appendages.—Anterior lobe of pronotum widening gently to the posterior lobe which flares out abruptly and forms a transverse process, from which a slight curve leads to the rounded posterior corner. Longitudinal ridges plainly raised and converging anteriorly. Each ends in a distinct elevation or raised knob at the transverse groove. Top and sides of thorax, as well as legs, thickly covered with small, smooth granules. Fore tibiae and middle and hind tarsi without granules. Portion of corium which is exposed to view thickly set with small, smooth granules. Scutellum about 1.9 times as long as wide, quite deeply impressed near base, a prominent arrow or spear-shaped callus present for about one-half its length, and continuing posteriorly as a smooth, narrow median carina. The callus somewhat punctate, as is also the impressed area. The outer parts and the posterior third are quite thickly granulated.

Abdomen chordate and thickly covered with small granules on both surfaces.

FEMALE:

7.5 mm. long, 4.2 mm. across abdomen. Color mostly light with dark brown or black markings. The head with a small dark area around the ocelli and toward the front. Prothorax mostly light with dark spots variably scattered. Scutellum all light. Corium darker. Connexiva mottled with dark and light, the first connexivum as in male. Otherwise as the male.

Holotype.—♂, Fern Co., California. Deposited in the U. S. National Museum.

Allotype.—♀, Los Angeles Co., California, July. Deposited in the U. S. National Museum.

This species is medium in size, and differs from any of the specimens available for study. The roughness of the pronotum and the raised knobs or elevations on the longitudinal ridges make it distinctly different from our nearctic forms. It is probably allied to some of the Mexican or Central American species that are not included in this collection.

Macrocephalus prehensilis (Fabricius).

Syrtsis prehensilis Fabricius, Syst. Rhyngotorum, 1803, p. 123.

Macrocephalus prehensilis auctt. (See VanDuzee, 1917).

This small species is closely allied to *M. uhleri* Handlirsch. It can be easily distinguished from *M. uhleri*, however, by the fact that the coarse punctures on the scutellum do not diminish in size towards the apex, and also by the absence of spine-like granules on the pronotum, sides of the thorax, and the legs, the fore-femora particularly.

Specimens studied were from the following states: North Carolina, Alabama, Kentucky, Florida, Texas, Oklahoma, Arkansas, and Kansas. Forty specimens were examined.

Macrocephalus uhleri Handlirsch.

Macrocephalus uhleri Handlirsch, Verh. Zool.-Bot. Ges. Wien, XLVIII, 1898, p. 383.

The most closely allied form to this species is *M. prehensilis* (Fabricius) from which it can be differentiated by the prominent covering of spiny granules on the anterior half of the pronotum, the sides of the thorax, and on the legs. Another aid is the fact that the punctures at the base of the scutellum diminish very noticeably in size about one-third of the way back; and are much smaller over the remaining two-thirds.

A series of eighty specimens was observed, all from Arizona.

Macrocephalus stali Handlirsch.

Macrocephalus stali Handlirsch, Ann. K. K. Nat. Hofm., Wien, XII, 1897, p. 195.

This species is closely allied to *M. prehensilis* and *uhleri*. It is easily distinguished from *uhleri* because the scutellum in *stali* is coarsely punctate throughout, whereas *uhleri* is finely punctate on the apical two-thirds. *M. stali* may be separated from *prehensilis* by the pointed, elongate granules on the anterior lobe, and the edges of that lobe, of the pronotum. The color in the male *stali* is a mottled black and yellowish on the scutellum, while in *prehensilis* it is a black stripe along the median carina of the scutellum.

Four specimens from Mexico were studied.

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EXPLANATION OF PLATES.

(All figures of prothorax drawn to same scale.)

PLATE I.

- Fig. 1A. *Phymata* sp., technical terms, (Schematic).*
- Fig. 1B. *Phymata* sp., lateral aspect of prothorax, technical terms.

LATERAL ASPECT OF PROTHORAX.

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|---|---------------------------------------|
| Fig. 2. <i>P. pennsylvanica</i> , ♀. | Fig. 10. <i>P. albopicta</i> , ♂. |
| Fig. 3. <i>P. pennsylvanica</i> , ♂. | Fig. 11. <i>P. luxa</i> , ♀. |
| Fig. 4. <i>P. pennsylvanica americana</i> , ♀. | Fig. 12. <i>P. luxa</i> , ♂. |
| Fig. 5. <i>P. pennsylvanica americana</i> , ♂. | Fig. 13. <i>P. vicina</i> , ♀. |
| Fig. 6. <i>P. pennsylvanica coloradensis</i> , ♀. | Fig. 14. <i>P. vicina</i> , ♂. |
| Fig. 7. <i>P. pennsylvanica coloradensis</i> , ♂. | Fig. 15. <i>P. arctostaphylæ</i> , ♂. |
| Fig. 8. <i>P. pennsylvanica coloradensis</i> , ♀. | Fig. 16. <i>P. noualhieri</i> , ♀. |
| Fig. 9. <i>P. pennsylvanica coloradensis</i> , ♂. | |

PLATE II.

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| Fig. 17. <i>P. fasciata</i> , ♀. | Fig. 29. <i>P. borica</i> , ♂. |
| Fig. 18. <i>P. fasciata</i> , ♂. | Fig. 30. <i>P. borica</i> , ♀. |
| Fig. 19. <i>P. fasciata georgiensis</i> , ♀. | Fig. 31. <i>P. salicis</i> , ♀. |
| Fig. 20. <i>P. fasciata georgiensis</i> , ♂. | Fig. 32. <i>P. salicis</i> , ♂. |
| Fig. 21. <i>P. fasciata georgiensis</i> , ♀. | Fig. 33. <i>P. metcalfi</i> , ♀. |
| Fig. 22. <i>P. fasciata georgiensis</i> , ♂. | Fig. 34. <i>P. metcalfi</i> , ♂. |
| Fig. 23. <i>P. mystica</i> , ♀. | Fig. 35. <i>P. severini</i> , ♀. |
| Fig. 24. <i>P. mystica</i> , ♂. | Fig. 36. <i>P. severini</i> , ♂. |
| Fig. 25. <i>P. granulosa</i> , ♀. | Fig. 37. <i>P. pacifica</i> , ♂. |
| Fig. 26. <i>P. granulosa</i> , ♂. | Fig. 38. <i>P. pacifica</i> , ♀. |
| Fig. 27. <i>P. rossi</i> , ♀. | Fig. 39. <i>P. pacifica stanfordi</i> , ♀. |
| Fig. 28. <i>P. rossi</i> , ♂. | Fig. 40. <i>P. pacifica stanfordi</i> , ♂. |

*Fig. 1A of Plate I modeled after Melin, 1930.



