ENTOMOLOGY.—*Revision of the genus* Ceratagallia *Kirkaldy (Homoptera: Cicadellidae).*[1] P. W. OMAN, U. S. Bureau of Entomology and Plant Quarantine.

The monobasic genus *Ceratagallia* was established by Kirkaldy[2] for *Agallia bigeloviae* Baker. Because the name was published without a formal description, subsequent authors have considered it a *nomen nudum*. However, the inclusion of the previously described species, *bigeloviae* Baker, satisfies the requirements of the International Rules of Zoological Nomenclature, and *Ceratagallia* is available for the species treated in this paper. Attention is called to the fact that *Ceratagallia* Kirkaldy is an older name than *Aceratagallia* Kirkaldy,[3] although the latter name appeared in Bulletin 3 and the former in Bulletin 4.

Ceratagallia and *Aceratagallia* may be distinguished from other North American agallian leafhoppers by the character of the pronotum, which is transversely striated, and the styles of the male genitalia, which are not forked. In addition, the nymphs are without cephalic processes. *Ceratagallia* is differentiated from *Aceratagallia* by the 4-lobed posterior margin of the seventh sternite of the female and the V-shaped aedeagus of the male. The males may usually be recognized also by the shape of the plates, which are usually about 2 to $2\frac{1}{2}$ times as long as their combined basal width and have the lateral and distal margins turned strongly upward, thus forming a trough-shaped cavity in which lie the distal extremities of the styles. Representatives of typical *Aceratagallia* are widely distributed in the Nearctic region, whereas the species of *Ceratagallia* are confined to the semiarid portions of the United States and adjacent Mexico. Representatives of the latter genus are at hand from Lower California, California, Arizona, Nevada, Utah, Idaho, Colorado, New Mexico, Texas, and Kansas.

Ceratagallia includes the species treated by the writer[4] in 1933 as the *bigeloviae* group of the genus *Aceratagallia*. At the time those studies were made, relatively little material belonging to this group was available. The accumulation of additional material, especially from California, has brought to light a number of new species, as well as specimens which alter somewhat the specific concepts established in the previous work. It seems desirable, therefore, to review the group again in order to incorporate the new species into the scheme

[1] Received June 15, 1939.
[2] Hawaiian Sugar Planters' Assoc. Expt. Sta., Div. Ent. Bull. **4**: 61. May 1907.
[3] Hawaiian Sugar Planters' Assoc. Expt. Sta., Div. Ent. Bull. **3**: 11, 30. Sept. 1907.
[4] U. S. Dept. Agr. Tech. Bull. **372**: 46.

of classification, and to make such changes as are necessary in the interpretation of the previously described forms.

In order to avoid repetition in the specific descriptions that follow, a résumé of certain general characters is given at this point. The bases for the differentiation of *Ceratagallia* from other agallian leafhoppers have already been given. Thus defined, the genus constitutes a remarkably homogeneous group. The species are all rather robust, the slenderest being *lobata* (Oman), which resembles closely *Aceratagallia gillettei* (O. & B.) in general appearance. An accurate idea of the general habitus of the species may be gained by examination of Figures G, H, and I of Plate 2 of the writer's 1933 paper. Although color markings may be either present or absent, and vary from fuscous to brown within a species, when present they form a pattern that is very uniform throughout the genus. In the approximate order of their frequency of appearance in the adults, the color markings are as follows: A pair of round or ovate spots on the crown above the ocelli; a pair of triangular marks at the base of the scutellum; the veins of the corium, with the exception of the base of R+M, which is white, and the base of Cu_1, which is usually sordid yellowish white; a pair of slender stripes along the commissural line in the outer cells of the clavus, these usually fused with fainter markings which occur in the cells of the clavus and parallel the claval veins; irregular and frequently interrupted stripes along the claval suture, and indefinite elongate marks in the cells of the clavus and corium adjacent to the claval suture basally; a pair of narrow stripes along the median line, extending across the pronotum and crown, and fusing, on the face, with the stripes along the base of the clypeus; an interrupted arc on each side of the pronotum basally, this frequently connected with the median stripes, and usually connected with a broad inner vitta and a narrow outer vitta extending from the arc to the posterior margin of the pronotum; an irregular mark in each ocellocular area, with an extension toward the adjacent ocellus and one along the antennal pit; the facial sutures, antennal pits, and transverse bars on the clypeus laterally; the transverse suture of the scutellum, and a pair of small spots just anterior to it; various indefinite areas, which tend to be darker on the dorsum of the abdomen, the distal portions of the female pygofer and ovipositor sheath, the median line of the male plates, and the lateral portions of the sternites.

The nymphs normally have the spots on the crown reduced to oblique dashes. The paired median dorsal stripes are broader than in the

adult and continue to the apex of the abdomen, while the lateral portions of the dorsum are occupied with more or less continuous longitudinal marks which serve to accentuate the unmarked yellowish portion of the dorsum laterad of the median stripes. Other markings on the nymphs are somewhat similar to those of the adults, although the nymphs are more frequently entirely without markings.

Of the various structures of the internal male genitalia, that portion of the style caudad of its point of attachment to the genital capsule seems to be the only part furnishing characters reliable for specific differentiation. This part of the style is frequently boot-shaped in outline, and consists of a relatively slender basal portion, the shank, an expanded distal portion which is usually foot-shaped and hence conveniently termed the "foot" of the style, and usually a ventral projection called the ventral tooth. Of the parts of the foot of the style, the "heel" is formed by the angle adjacent to the serrated margin of the shank, and is usually distinctly less produced than the "toe." Although subject to some variation, the gross outline of the style is usually sufficiently characteristic to permit specific identification from this structure alone. The number and arrangement of the setae on the style and the minute details of the serrations on the inner margin are only helpful in a general way, but in the accompanying drawings they have been portrayed as accurately as possible for the sake of completeness.

The diagnostic characters of the styles of the males are most conveniently studied and illustrated if removed from the genital capsule. Consequently, in this study, following the customary treatment with caustic potash, the styles, connective, and aedeagus have been carefully dissected out and mounted in balsam on microscope slides. The cover glass should be pressed down sufficiently to orient the broadened distal portion of the style in a horizontal plane. These structures are best studied with a compound microscope at magnifications of from 60 to 120 diameters, although less magnification is satisfactory for most purposes.

The illustrations accompanying this paper were made on coordinate paper with the aid of a micrometer scale placed in the ocular of a compound microscope. All drawings show the outline of the distal portion of the right style in dorsal view, and since they are drawn to the same scale they give an accurate idea of the relative size of these structures in the various species.

CONCERNING A KEY

With the exception of the characters presented by the styles of the internal male genitalia, the differences between the various species of this group are usually such that they do not lend themselves well to use in a key. It seems impossible to indicate reasonably positive characters for the separation of the species without relying almost entirely upon the characters of the styles, and there seems no point in presenting a key when equally satisfactory results may be obtained, probably more efficiently, by comparing these structures with the accompanying illustrations. In the absence of a key it is perhaps well to indicate that the most reliable external characters are the size, relative robustness, and presence or absence of markings. Of the internal characters, the general outline of the foot of the style, the size and position of the ventral tooth, and the width and curvature of the shank have proven most useful in differentiating closely related species.

Ceratagallia lobata (Oman), n. comb. Fig. 1

Aceratagallia lobata Oman, U. S. Dept. Agr. Tech. Bull. **372**: 67. 1933.

A relatively slender, dark-colored species. Heel and toe of style of approximately equal size; style obliquely subtruncate distally. Length 2.8–3 mm.

External characters.—General ground color sordid cinereous; markings of brown and fuscous sufficiently extensive to give the entire insect a fuscous appearance. Male plates rather short, tapering slightly from base to apex.

Internal male genitalia.—Shank of style short and comparatively broad. Ventral tooth small and situated at about narrowest part of shank. Posterior margin of style slightly sinuate; inner margin distally finely serrate. Distal part of aedeagus flattened dorsoventrally, apex sagittate in outline.

Localities.—Type locality, Glendale, Nev. Type, U.S.N.M. no. 44650. Other material from the following localities examined. ARIZONA: Ashfork, Oak Creek Canyon, Prescott, Sacaton, Santa Rita Mountains, Yarnell Heights, and Yavapai County. CALIFORNIA: Alpine, Big Bear Lake, Mint Canyon, and San Jacinto Mountains. NEVADA: Glendale, Las Vegas, and Mesquite. UTAH: St. George.

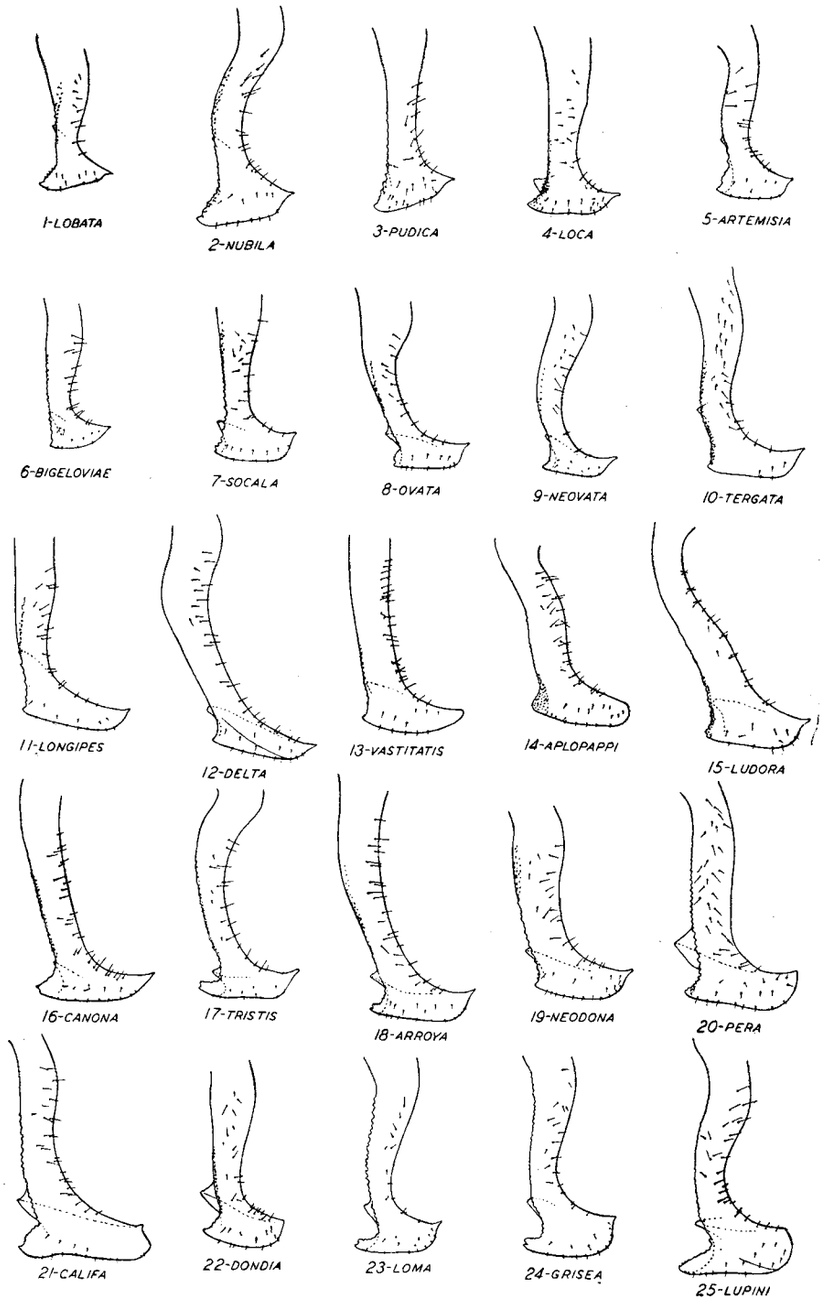
Host.—Unknown.

Ceratagallia nubila, n. sp. Fig. 2

Resembling dark specimens of *dondia* in general appearance, but with the male plates broader distally and the styles more like those of *lobata*, with the heel and toe of nearly equal size. Length 3.25–3.5 mm.

External characters.—General ground color sordid yellowish white; brown and fuscous markings much more clearly delimited than in *lobata*. Male plates long and nearly parallel margined, proportionally wider than those of *lobata*.

Internal male genitalia.—Shank of style slender, rather long, and distinctly sinuate. Ventral tooth very small, and located as in *lobata*. Posterior margin of style obliquely subtruncate, inner margin distally finely serrate. Aedeagus with a blunt tooth on dorsal margin just before apex.



Figs. 1–25.—Leafhoppers of the genus *Ceratagallia* Kirkaldy: Dorsal views of distal portion of right style.

Locality.—Type locality, Wickenburg, Ariz. Holotype male, allotype female, and 2 male and 1 female paratypes taken August 20, 1938, and 2 male paratypes taken June 16, 1937, all collected by D. J. and J. N. Knull. Holotype, allotype, and 2 paratypes in collection of Ohio State University; 3 paratypes in U. S. National Museum, no. 53350.

Host.—Unknown.

Ceratagallia pudica, n. sp. Fig. 3

More robust than *nubila* and without extensive fuscous markings. Style resembling that of *lobata* but with a relatively more slender shank and a less produced heel. Length 2.8–3.2 mm.

External characters.—General ground color sordid yellowish white; markings mostly pale yellowish brown or brown. Head tumid, distinctly longer medially than next the eye. Male plates rather short and broad, tapering slightly from base to apex. Median lobes of seventh sternite of female much shorter than lateral lobes.

Internal male genitalia.—Shank of style nearly straight. Ventral tooth small and situated nearer apex than in *lobata.* Heel distinctly shorter than toe. Posterior margin of style obliquely subtruncate; inner margin finely serrate distally. Apex of aedeagus recurved, forming a slight hook.

Localities.—Type locality, Tucson, Ariz. Holotype male, allotype female, and 1 female paratype collected June 18, 1933, P. W. Oman, U.S.N.M. no. 53351. Also 2 male paratypes from Hualpai Mountain, Ariz., July 4, 1937, and August 6, 1938, D. J. and J. N. Knull, in Ohio State University collection.

Host.—Unknown.

Ceratagallia loca, n. sp. Fig. 4

A robust species, resembling *pudica* in form but with a less tumid head and fewer markings. Apex of style not obliquely subtruncate. Length 2.8 mm.

External characters.—General color pale sordid yellow; markings very pale or absent except for fuscous veins of corium, ovate fuscous spots on crown, and traces of arcs on anterior margin of pronotum. Male plates short, tapering slightly from base to apex. Median lobes of seventh sternite of female divergent, rather sharply pointed, and with margins brown.

Internal male genitalia.—Shank of style relatively stout and straight. Ventral tooth large and pointed, situated just basad of apex of style. Posterior margin of style slightly sinuate and curving cephalad toward attenuate toe; heel short and stout; inner margin finely serrate. Apex of aedeagus recurved, forming a small hook.

Locality.—Type locality, Lancaster, Calif. Holotype male, allotype female, and 1 nymph, June 8, 1935, P. W. Oman, U.S.N.M. no. 53352.

Host.—Unknown.

Ceratagallia artemisia, n. sp. Fig. 5

Aceratagallia bigeloviae Oman (in part, not Baker), U. S. Dept. Agr. Tech. Bull. 372, pl. 2, I. 1933.

Previously confused with *bigeloviae,* but with much darker markings and with the heel of style more produced. Length 2.5–2.7 mm.

External characters.—General color pale cinereous; markings of fuscous or brown mostly distinct and sharply delimited. Form very robust, head somewhat tumid. Male plates short and comparatively broad. Median lobes

of seventh sternite of female nearly as long as lateral lobes, longer and more slender than those of *bigeloviae*.

Internal male genitalia.—Shank of style slightly sinuated and more slender than that of *bigeloviae*. Ventral tooth small and situated more basad than in *bigeloviae*. Posterior margin of style curving less gradually to apex of toe than in *bigeloviae;* heel, although variable in size, usually strongly produced; inner margin irregularly serrate distally. Apex of aedeagus distinctly hooked.

Note.—This is the species represented by Plate 2, I, of the writer's 1933 paper on the group. At that time only a few specimens were available, and they were believed to be dark-colored examples of *bigeloviae*.

Localities.—Type locality, Twin Falls, Idaho. Holotype male, allotype female, and 2 male and 8 female paratypes, May 6, 1937, J. A. Gillett. Also the following paratypes from Idaho. Hollister: 1 male and 1 female, August 27, 1928, D. E. Fox; 2 females, May 19, 1931, D. E. Fox; 1 male, July 24, 1931, D. E. Fox; 1 male, August 23, 1933, D. E. Fox. Wendell: 1 male, May 19, 1933; 2 females, June 9, 1933. Hagerman: 1 male, September 13, 1932. Berger: 1 female, May 20, 1937, J. A. Gillett. Castleford: 1 female, November 14, 1936. There are also at hand 2 males and 1 female from Salt Lake City, April 25, 1936, C. F. Smith. Types in U. S. National Museum, no. 53353, paratypes in collection of Joseph A. Gillett.

Host.—Presumably *Artemisia tridentata,* since most of the above specimens are recorded as being from that plant.

Ceratagallia bigeloviae (Baker) Fig. 6

Agallia bigeloviae Baker, Psyche 7(suppl. 12): 26. 1896.
Ceratagallia bigeloviae (Baker), Kirkaldy, Hawaiian Sugar Planters' Assoc. Expt. Sta., Div. Ent. Bull. **4**: 61. 1907.
Agallia (*Aceratagallia*) *bigeloviae* Baker, Van Duzee, Check List Hemiptera, p. 64. 1916.
Aceratagallia bigeloviae (Baker), Oman, U. S. Dept. Agr. Tech. Bull. **372**: 66. 1933.

A small, robust species marked with brown or fuscous. Style without a prominent heel and with the ventral tooth located distad of narrowest part of shank. Length 2.5–2.75 mm.

External characters.—General color sordid yellowish white; markings, except the pair of fuscous spots on crown, usually pale brown and indefinite but sometimes fuscous. Median portion of face often tinged with pink. Male plates comparatively large, tapering gradually from base to apex. Median lobes of seventh sternite of female shorter than lateral lobes and bluntly pointed.

Internal male genitalia.—Shank of style rather stout, inner margin nearly straight. Ventral tooth small and located distad of the constricted portion of shank. Posterior margin of style evenly curved from heel to toe; heel usually forming a right angle; toe slightly attenuated. Apex of aedeagus slightly hooked.

Localities.—Type locality, Albuquerque, N. Mex. Type, U.S.N.M. no. 44014. Other material examined from the following localities. TEXAS: Marfa and Taylor County. KANSAS: Phillips County. COLORADO: Fort Collins. UTAH: Leeds, Provo, Salt Lake City, Santa Clara, and St. George. ARIZONA: Congress Junction, Grand Canyon, Prescott, and Yavapai County. NEW MEXICO: Carlsbad, Colfax County, Las Cruces, Organ Mountains, Roswell, and White Sands.

Host.—Probably *Chrysothamnus.*

Notes.—There still remains some doubt as to the exact identity of *bigeloviae.* The type is a female and consequently difficult to identify with certainty; other specimens from the type locality are needed. Furthermore, the material studied and here treated as *bigeloviae* shows some variation around a mean which seems best exemplified by specimens from southern New Mexico. Specimens at hand from California are uniformly darker colored than material from other localities and may constitute a distinct form, but at present seem inseparable on the basis of structural characters.

Ceratagallia socala, n. sp. Fig. 7

Related to *artemisia* but less robust and with a more tumid head. Ventral tooth of style larger than that of *artemisia* and located on foot. Length 2.6–2.9 mm.

External characters.—General color pale cinereous; markings mostly very variable, the most constant being those on the pronotum and forewings. Spots on crown above ocelli usually distinctly ovate, occasionally absent. Head tumid, distinctly longer medially than next eye. Male plates proportionally smaller than those of *artemisia.* Median lobes of seventh sternite of female short and blunt.

Internal male genitalia.—Shank of style rather short and straight, tapering gradually from base to narrowest part, then abruptly expanded into the footlike distal part. Ventral tooth rather large and pointed, located on the foot of the style. Inner margin of shank rather coarsely serrate distally; heel scarcely produced; toe broad basally, apex slightly attenuate. Apex of aedeagus pointed.

Localities.—Type locality, Santa Maria, Calif. Holotype male, allotype female, and 16 male and 17 female paratypes collected July 19, 1933, R. H. Beamer. Also 13 male and 8 female paratypes from San Jacinto Mountains, Calif., June 30, 1933, R. H. Beamer. Types in collection of University of Kansas, paratypes in U. S. National Museum, no. 53354.

Host.—Unknown.

Ceratagallia ovata (Oman), n. comb. Fig. 8

Aceratagallia ovata Oman, Journ. Kansas Ent. Soc. **8:** 14. 1935.

A robust species, larger than *bigeloviae.* Shank of style much broader basally than distally; ventral tooth broad. Length 2.75–3 mm.

External characters.—General ground color pale yellow; markings mostly faint or absent except for oval spots on crown, basal triangles on scutellum, and markings on forewings. Clypeus usually tinged with pink. Male plates about twice as long as their combined basal width, tapering rather abruptly. Median lobes of seventh sternite of female shorter than lateral lobes, but well produced and bluntly pointed.

Internal male genitalia.—Shank of style broad basally, but tapering sharply to a rather slender median portion. Ventral tooth broad basally, located just basad of foot of style. Inner margin of shank finely serrate distally; heel scarcely produced; toe large, broader than narrowest part of shank and with tip slightly attenuate. Aedeagus with a blunt tooth near apex.

Locality.—Type locality, Yarnell Heights, Ariz. Type, U.S.N.M. no. 50368. There are also specimens at hand from Mojave, Calif.

Host.—Unknown.

Ceratagallia neovata, n. sp. Fig. 9

Resembling *socala* in general appearance, but with a less tumid head. Style similar to that of *ovata*, but more slender basally. Length 2.7–2.9 mm.

External characters.—General ground color pale cinereous; markings on pronotum faint, others usually distinct but not sharply delimited. Male plates as in *lobata*. Median lobes of seventh sternite of female bluntly pointed and nearly as long as lateral lobes.

Internal male genitalia.—Shank of style much more slender basally than in *ovata*, slightly sinuate and tapering gradually to footlike extremity. Ventral tooth small and bluntly pointed. Inner margin of shank finely serrate distally; heel small; toe slenderer and tip more attenuate than in *ovata*. Aedeagus with blunt tooth near apex.

Localities.—Type locality, Warner Springs, Calif. Holotype male, allotype female, and 1 male paratype, June 3, 1935, P. W. Oman, U.S.N.M. no. 53355. Also 1 male paratype from Beaumont, Calif., July 26, 1933, R. H. Beamer, in collection of the University of Kansas.

Host.—Unknown.

Ceratagallia tergata (Van Duzee), n. comb. Fig. 10

Agallia tergata Van Duzee, Proc. California Acad. Sci. (4) **12**: 172. 1923.
Aceratagallia tergata (Van Duzee), Oman, U. S. Dept. Agr. Tech. Bull. **372**: 69. 1933.

A comparatively large, robust species, usually without markings. Male plates short and broad. Length 3–3.25 mm.

External characters.—General ground color pale, sordid cinereous; markings usually entirely absent but sometimes present, particularly those along median line of head and pronotum and veins of corium. Clypeus sometimes suffused with pale orange. Entire body sometimes with a whitish bloom. Male plates broad, scarcely tapering from base to blunt apex. Median lobes of seventh sternite of female rather short and bluntly pointed, median emargination between these lobes unusually wide and deep.

Internal male genitalia.—Shank of style distinctly sinuate. Ventral tooth rather small, situated well basad of apex of style. Inner margin of shank finely serrate distally; heel small; toe rather long, with apex curved slightly cephalad. Apex of aedeagus hooked.

Localities.—Type locality, Tortuga Island, Gulf of California. Type in collection of the California Academy of Sciences. Other material from the following localities examined: CALIFORNIA: Beaumont, Coachella, Riverside, and Soboba Springs. ARIZONA: Sabino Canyon, Santa Rita Mountains, and Tucson.

Host.—Encelia.

Ceratagallia longipes, n. sp. Fig. 11

Closely related to *tergata*, but with ovate spots on crown always present, and shank of style not sinuate. Length 3–3.25 mm.

External characters.—General ground color pale cinereous. Spots on crown small, other markings usually absent, although the basal triangles on scutellum and faint marks on distal portions of forewings are occasionally present. Clypeus usually very faintly tinged with pink. Male plates more slender than those of *tergata*, and tapering slightly from base to apex. Median lobes of seventh sternite of female as in *tergata*.

Internal male genitalia.—Shank of style relatively straight. Ventral tooth small, located basad of narrowest part of shank. Inner margin of shank serrate distally; heel but little produced; toe greatly produced and slender, thus making the foot of the style very long. Apex of aedeagus hooked.

Localities.—Type locality, Mojave, Calif. Holotype male, allotype female, and 11 male and 5 female paratypes collected July 7, 1933, R. H. Beamer. Other paratypes: 2 males and 5 females from Kelso, Calif., June 9, 1908, E. D. Ball; 1 male from Big Bear Lake, Calif., July 26, 1932, R. H. Beamer; 1 male from Palm Springs, Calif., May 23, 1917, E. P. Van Duzee; and 2 females from Palm Springs, Calif., May 21, 1917, E. P. Van Duzee. Holotype, allotype, and paratypes in collection of the University of Kansas, paratypes in collections of the U. S. National Museum, no. 53356, the California Academy of Sciences, and E. D. Ball.

Host.—Unknown.

Ceratagallia delta, n. sp. Fig. 12

A rather robust, well-marked species with very broad male plates and long median lobes of the seventh sternite of the female. Length 3.1–3.25 mm.

External characters.—General ground color sordid yellowish white; markings mostly of brown or fuscous and distinct, the oval spots on crown comparatively large. Head distinctly produced and tumid medially. Male plates very broad and scarcely tapering from base to apex, caudal opening of pygofer unusually large. Median lobes of seventh sternite of female nearly as long as lateral lobes, rather slender and slightly divergent distally, the median emargination between them narrow.

Internal male genitalia.—Shank of style long and rather slender, with a distinct bend near base. Ventral tooth blunt, located on base of foot of style. Inner margin of shank minutely serrate distally; heel small; toe slender and pointed. Apex of aedeagus blunt.

Locality.—Type locality, Delta, Calif. Holotype male, allotype female, and 41 male and 23 female paratypes collected June 28, 1935, P. W. Oman, U.S.N.M. no. 53357.

Host.—Unknown.

Ceratagallia vastitatis (Oman), n. comb. Fig. 13

Aceratagallia vastitatis Oman, U. S. Dept. Agr. Tech. Bull. **372**: 69. 1933.

Less robust than *delta*, with male plates smaller and the shank of the style nearly straight. One of the largest species in the genus. Length 3.5–3.75 mm.

External characters.—General ground color pale sordid yellow; markings mostly brown and rather indefinite except for the pair of fuscous spots on crown. Head scarcely produced medially. Male plates broad, but not so broad as those of *delta*, tapering slightly from base to apex. Median lobes of seventh sternite of female bluntly pointed, nearly equal to lateral lobes in length.

Internal male genitalia.—Shank of style nearly straight, not tapering distally. Ventral tooth small, located on base of foot. Posterior margin evenly rounded; inner margin of shank very finely serrate distally; heel scarcely produced; toe well produced and bluntly pointed. Apex of aedeagus slightly hooked.

Localities.—Type locality, Lund, Utah. Type, U.S.N.M. no. 44017. Material from the following localities examined: UTAH: Dixie, Leeds, and

Lund. NEVADA: Glendale, Las Vegas, and Overton. CALIFORNIA: Indio, Fort Yuma, and Potholes. ARIZONA: Littlefield and Yuma.

Host.—Pluchea sericea.

Ceratagallia aplopappi (Oman), n. comb. Fig. 14

Aceratagallia aplopappi Oman, U. S. Dept. Agr. Tech. Bull. **372**: 67. 1933.

A robust species, easily separated from other species of the genus by the strongly arched male plates. Length 2.75–3 mm.

External characters.—General ground color pale yellow; markings, except the pair of fuscous spots on crown, varying from pale yellowish brown to fuscous. Male plates strongly arched downward, broad basally, tapering gradually to the rounded and slightly divergent apices. Male pygofer with numerous fine, white hairs laterally. Median lobes of seventh sternite of female as long as lateral lobes, pointed and closely appressed to the pygofer, which is usually shallowly grooved for their reception.

Internal male genitalia.—Shank of style slightly sinuate, not tapered distally. Ventral tooth absent. Inner margin of shank finely serrate distally; heel rounded and serrate, with the adjacent surface of the foot finely dentate; apex of toe bluntly rounded. Apex of aedeagus slightly hooked.

Localities.—Type locality, Pima County, Ariz. Type in collection of the University of Kansas. Material from the following localities examined: ARIZONA: Baboquivari Mountains, Benson, Coconino County, Maricopa County, Mescal, Phoenix, Pima County, Red Rock, Sabino Canyon, Santa Rita Mountains, Sasabe, Tempe, Tucson, and Yarnell Heights. NEW MEXICO: Belen.

Host.—Aplopappus.

Ceratagallia ludora, n. sp. Fig. 15

A robust species with a short, broad head. Shank of style more slender basally than distally. Length 3–3.2 mm.

External characters.—General ground color pale cinereous, head tinged with pale yellow; markings, except the pair of fuscous spots on crown, mostly indefinite. Male plates rather large, about as in *vastitatis*. Median lobes of seventh sternite of female as long as lateral lobes, tips rounded.

Internal male genitalia.—Shank of style with base rather strongly curved and more slender than distal portion. Ventral tooth located on foot of style. Inner margin of shank finely, irregularly serrate distally; heel scarcely produced; toe broad, apex attenuate. Aedeagus with a small tooth near apex.

Localities.—Type locality, Perris, Calif. Holotype male, allotype female, and 3 male and 2 female paratypes collected June 5, 1935, P. W. Oman, U.S.N.M. no. 53358. Also the following paratypes from San Diego County, Calif., collected by E. P. Van Duzee: 1 male, April 22, 1913; 1 male and 1 female, October 3, 1913(?); and 1 male March 11, 1914. In collection of California Academy of Sciences.

Host.—Unknown.

Ceratagallia canona, n. sp. Fig. 16

A rather slender species with head slightly produced. Shank of style nearly straight, foot of style slender. Length 3–3.5 mm.

External characters.—General ground color pale cinereous, head often tinged with pale yellow; markings frequently indistinct, the pair of fuscous spots on crown usually ovate and oblique. Male plates comparatively large

tapering gradually from base to apex. Median lobes of seventh sternite of female slightly shorter than lateral lobes, diverging slightly, tips bluntly pointed.

Internal male genitalia.—Shank of style rather slender. Ventral tooth slender and sharply pointed, located on foot of style. Inner margin of shank finely serrate on distal half; heel well produced and ending in a sharp point; toe rather slender and sharply pointed. Apex of aedeagus blunt.

Localities.—Type locality, Mint Canyon, Calif. Holotype male, allotype female, and 6 male and 5 female paratypes collected June 7, 1935, P. W. Oman, U.S.N.M. no. 53359. Also 4 male and 10 female paratypes from Beaumont, Calif., July 26, 1933, R. H. Beamer, in collection of University of Kansas, and the following paratypes from California, collected by E. P. Van Duzee, and deposited in the California Academy of Sciences: 2 males, San Diego County, June 18, 1913; 1 male, Alpine, September 13, 1923; and 1 male and 1 female, Mint Canyon, April 20, 1932.

Host.—Unknown.

Ceratagallia tristis, n. sp. Fig. 17

A rather slender species, related to *canona*, but darker colored and with the shank of the style more slender and curved. Length 3.2–3.4 mm.

External characters.—General ground color sordid yellowish white, head and anterior portion of pronotum tinged with pink; markings mostly fuscous usually not sharply delimited on fore wings, and sufficiently extensive to give the entire insect a fuscous appearance. White mark on base of R+M conspicuous. Male plates rather slender, tapering gradually from base to apex. Median lobes of seventh sternite of female short and blunt, the median emargination separating them broadly V-shaped, the lateral emarginations narrow.

Internal male genitalia.—Shank of style broadly curved, tapering slightly from base. Ventral tooth prominent, located just basad of outer point. Inner margin of shank irregularly serrate on distal two-thirds; heel well produced and usually bifid; apex of toe slightly attenuate. Apex of aedeagus hooked.

Localities.—Type locality, Perris, Calif. Holotype male, allotype female, and 2 male and 6 female paratypes collected June 5, 1935, P. W. Oman, U.S.N.M. no. 53360. Other paratypes from California as follows: 1 male, San Francisco, April 27, 1908, E. D. Ball, in collection of E. D. Ball; 1 male, San Francisco, April 18, 1917, W. M. Giffard, in collection of California Academy of Sciences; 3 males, Beaumont, July 26, 1933, R. H. Beamer; 1 male, Winters, August 5, 1929, R. H. Beamer; 1 female, Alpine, July 9, 1929, R. H. Beamer, in collection of the University of Kansas.

Host.—Unknown.

Ceratagallia arroya, n. sp. Fig. 18

A robust species, usually heavily marked with fuscous. Style similar to that of *tristis* but stouter and with shank less strongly curved. Length 3.1–3.4 mm.

External characters.—General ground color pale cinereous; markings unusually dark, especially those on the crown and pronotum, the white areas on fore wings thus conspicuous in contrast. Head slightly produced medially. Male plates much wider basally than distally. Median lobes of seventh sternite of female rather short, diverging and bluntly pointed.

Internal male genitalia.—Shank of style slightly curved. Ventral tooth prominent and pointed, located a little more basad than that of *tristis*. Inner

margin of shank finely and irregularly serrate on distal half; heel bifid but proportionally smaller than that of *tristis;* toe slightly attenuate. Apex of aedeagus slightly hooked.

Localities.—Type locality, Saugus, Calif. Holotype male, allotype female, and 17 male and 17 female paratypes collected June 7, 1935, P. W. Oman, U.S.N.M. no. 53361. Also 17 male and 12 female paratypes from Mill Creek Canyon, San Bernardino Mountains, Calif., collected September 23–25, 1923, by E. P. Van Duzee, in collection of California Academy of Sciences. There are also specimens at hand from the following California localities: Lompoc, Ontario, Pasadena, and San Diego County.

Host.—Eriodictyon.

Ceratagallia neodona, n. sp. Fig. 19

Closely related to *dondia,* but style with a longer toe and a much smaller ventral tooth. Length 3.6–3.9 mm.

External characters.—General ground color pale yellowish cinereous; markings, except the pair of small fuscous spots on crown, usually faint or absent, when present brown veins of the forewings and the traces of the lateral arcs on pronotum are most prominent. Male plates rather slender, tapering distally. Median lobes of seventh sternite of female rather small, bluntly pointed and diverging, the lateral emarginations separating them from the lateral lobes very narrow.

Internal male genitalia.—Shank of style stout. Ventral tooth pointed, located just basad of foot of style. Inner margin of shank serrate on distal half; heel small; toe comparatively large and considerably longer than that of *dondia,* apex slightly attenuate. Apex of aedeagus slightly hooked.

Locality.—Type locality, Nixon, Nev. Holotype male, allotype female, and 5 female paratypes collected June 20, 1927, 7 female paratypes collected June 30, 1927, by E. P. Van Duzee. Types in collection of California Academy of Sciences, 4 paratypes in collection of U. S. National Museum, no. 53362.

Host.—Unknown.

Ceratagallia pera, n. sp. Fig. 20

Closely related to *arroya* and *dondia,* but with toe of style very large and ventral tooth of style larger than in either of those species. Length 3.6–3.9 mm.

External characters.—General ground color pale yellow or yellowish cinereous; markings very faint or absent, except the pair of small fuscous spots on crown and sometimes the brown veins of forewings. Male plates comparatively small, tapering sharply from base to apex. Lobes of seventh sternite of female short, median lobes blunt.

Internal male genitalia.—Shank of style stout and of nearly uniform width. Ventral tooth very large and angular, located just basad of foot of style. Inner margin of shank coarsely and irregularly serrate on distal two-thirds; heel rather small; toe very large, apex pointed but not attenuate. Apex of aedeagus blunt.

Locality.—Type locality, Perris, Calif. Holotype male, allotype female, and 14 male and 20 female paratypes collected June 5, 1935, P. W. Oman, U.S.N.M. no. 53363.

Host.—Unknown.

Ceratagallia califa, n. sp. Fig. 21

Related to *pera,* which it resembles in general appearance, but style with a smaller ventral tooth and a larger heel. Length 3.2–3.75 mm.

External characters.—General ground color yellowish white; markings usually either very faint or entirely absent, the pair of spots on crown, when present, small and elongate-ovate in shape. Male plates similar to those of *pera*, but slightly longer. Lobes of seventh sternite of female short and blunt.

Internal male genitalia.—Shank of style more slender and more curved than that of *pera*. Ventral tooth prominent and angular, located just basad of inner point. Posterior margin of style very shallowly emarginate; inner margin of shank irregularly serrate on posterior two-thirds; heel well produced and pointed; toe large and blunt, with a nipplelike projection at latero-cephalic angle. Apex of aedeagus slightly hooked.

Localities.—Type locality, Califa, Calif. Holotype male, allotype female, and 22 male and 36 female paratypes collected June 12, 1935, P. W. Oman, U.S.N.M. no. 53364. Also 4 male and 5 female paratypes from Selma, Calif., June 4, 1929, E. P. Van Duzee, in collection of California Academy of Sciences. Other specimens from Los Banos and Bakersfield, Calif., examined.

Host.—Probably *Dondia*.

Ceratagallia dondia (Oman), n. comb. Fig. 22

Aceratagallia dondia Oman, U. S. Dept. Agr. Tech. Bull. **372**: 68. 1933.

A large, rather robust species. Style with a relatively short toe and a large, angular, ventral tooth, Length 3.4–3.75 mm.

External characters.—General ground color pale yellow; markings, with the exception of the pair of fuscous spots on crown, frequently faint or absent, when present usually brown but occasionally fuscous. Male plates comparatively slender, width basally about twice the apical width. Median lobes of seventh sternite of female shorter than lateral lobes and bluntly rounded.

Internal male genitalia.—Shank of style nearly straight and rather broad basally. Ventral tooth large and angular, located just basad of foot of style at narrowest part of shank. Posterior margin of style broadly and rather uniformly rounded; inner margin of shank finely and irregularly serrate; heel well produced and angular; toe rather short, about as long as greatest width of shank, apex angled but not attenuate.

Localities.—Type locality, Thermal, Calif. Type, U. S. N. M. no. 44016. Other material from the following localities examined. CALIFORNIA: Catalina Island, Coachella, Fort Yuma, and Panamint Mountains. NEVADA: Bunkerville, Las Vegas, and Overton. UTAH: Delta, Grantsville, and Leeds. ARIZONA: Sacaton, Tucson, and Yuma. COLORADO: Grand Junction and Rocky Ford. TEXAS: El Paso.

Host.—Dondia.

Ceratagallia loma, n. sp. Fig. 23

Resembling *artemisia* and *bigeloviae* in size and general form, but more closely related to *grisea* on the basis of the shape of the style. Smaller than grisea and with the shank of the style more coarsely serrate. Length 2.6–2.7 mm.

External characters.—General ground color sordid cinereous, head tinged with yellow; markings mostly fuscous and sharply delimited, the median stripes on crown diverging posteriorly. A robust species with head slightly tumid. Male plates comparatively large, very little narrowed distally. Median emargination in posterior margin of seventh sternite of female broad but not angular; median lobes short and blunt.

Internal male genitalia.—Shank of style slightly sinuately curved, broader basally than near foot. Ventral tooth rather large and angular, located just distad of narrowest part of shank. Inner margin of shank coarsely and irregularly serrate except basally; heel well produced and slightly bifid; toe rather broad, with anterolateral angle attenuated. Apex of aedeagus slightly hooked.

Locality.—Type locality, Warner Springs, Calif. Holotype male, allotype female, and 1 male paratype collected June 3, 1935, P. W. Oman, U.S.N.M. no. 53365.

Host.—Unknown.

Ceratagallia grisea (Oman), n. comb. Fig. 24

Aceratagallia grisea Oman, Journ. Kansas Ent. Soc. **8**: 13. 1935.

A robust gray species marked with fuscous. Style with shank rather slender and toe broad and short. Length 3 mm.

External characters.—General ground color pale gray, clypeus tinged with pink; markings usually sharply delimited. Pronotal markings variable, those most often present being the two median stripes and a spot near each lateral margin which represents a trace of the lateral stripe. Male plates rather long and slender, tapering gradually from base to apex. Median emargination in posterior margin of seventh sternite of female broadly V-shaped, median lobes bluntly pointed and nearly as long as lateral lobes.

Internal male genitalia.—Shank of style slightly sinuate, becoming narrower distally. Ventral tooth blunt, located at base of foot of style. Inner margin of shank irregularly serrate; heel well produced and usually bifid; toe broad and relatively short, the anterolateral angle less attenuated than in *loma*. Apex of aedeagus slightly hooked.

Locality.—Type locality, Ramsey Canyon, Huachuca Mountains, Ariz. Type, U.S.N.M. no. 50367.

Host.—Unknown.

Ceratagallia lupini, n. sp. Fig. 25

A robust species, related to *grisea* but larger and paler, the style with shank more strongly curved and toe broader. Length 3.4–3.9 mm.

External characters.—General ground color sordid white to pale gray, head sometimes tinged with pale yellow. Markings frequently entirely absent, always considerably reduced and usually faint. Head slightly tumid. Male plates as in *grisea*. Male pygofer with numerous fine white hairs laterally. Median lobes of seventh sternite of female bluntly pointed and slightly shorter than lateral lobes, the median emargination separating them not angular.

Internal male genitalia.—Shank of style strongly, sinuately curved. Ventral tooth located on base of foot of style. Inner margin of shank irregularly serrate on distal two-thirds; heel well produced; toe very broad and blunt, the antero-lateral angle not attenuated.

Localities.—Type locality, Three Rivers, Calif. Holotype male, allotype female, and 19 male and 28 female paratypes, collected June 9, 1935, P. W. Oman, U.S.N.M. no. 53366. Other paratypes, 14 males and 14 females from San Francisco, Calif., June 20, 1935, P. W. Oman, and 5 males and 13 females from Santa Maria, Calif., July 19, 1933, R. H. Beamer.

Host.—Lupinus.