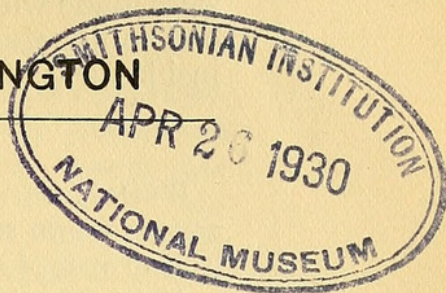


PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTONNOTES ON THE GENUS RHAGOVELIA, WITH DESCRIPTIONS OF SIX NEW SPECIES.¹

BY C. J. DRAKE AND HALBERT M. HARRIS.

In working over some miscellaneous Hemiptera collected by the authors during the past few seasons much difficulty was encountered in determining the specimens belonging to the genus *Rhagovelia*. This led to a rather critical study of all available material with the result that several species new to science have been recognized. The genus *Rhagovelia*, family Veliidae, is readily distinguished by the deeply cleft terminal segment of the intermediate tarsi. This cleft bears a tuft of long hairs which, it is said, extends fan-like into the water when the insect is in motion. Although recent keys characterize the anterior tarsi as uniarticulate they are, as Champion has long ago pointed out, composed of three distinct segments. *Rhagoveliae* prefer fairly rapid parts of streams, where they may be found congregated in schools, especially in eddies near projecting rocks.

During this study the writers have found the characters of the posterior legs in certain species to vary with sex and with wing development. In *obesa* and *distincta*, the posterior legs vary markedly in their degree of incrassateness in individuals from the same locality. Likewise, the hind tibiae also vary from straight to distinctly sinuate and the spines of the femora are slightly variable, even on opposite legs of the same specimen. In other species, long series of specimens have failed to show more than slight variation in these and other characters, even in apterous and macropterous individuals.

The proportional measurements, as given in the descriptions,

¹Contribution from Department of Zoology and Entomology, Iowa State College, Ames, Iowa.

were made with an eye-piece micrometer on which 34 lines equal one millimeter. In the case of the legs the figures represent inside measurement.

***Rhagovelia oriander* Parshley.**

Winged form: Black, the wings dark brownish black. Pronotum with a grayish brown spot on either side in front. Hemelytra reaching slightly beyond apex of genital segments.

Male: Pronotum a little longer than wide, acutely triangularly produced behind, with a fairly distinct median carina, the disc considerably swollen. Length, 3.44 mm.; width 1.48 mm.

Female: Pronotum much longer than wide, the apex produced into a semi-erect, somewhat cylindrical process. Length, 3.89 mm.; width, 1.63 mm.

Morphotypes, macropterous male and female, taken on Olentangy River, Columbus, Ohio, October 10, 1915, by C. J. Drake. *Paramorphotypes*, males and females, taken with morphotypes and at Rockbridge, Hocking Co., Ohio, July 7, 1916.

Apterous males and females were taken with the winged forms. The pronotal process is more developed in some specimens than in others; the hind femora of the males also show a slight variation in size in different specimens taken from the same colony. Specimens of the apterous form from Ames, Iowa, and from the type locality, Brookings, S. D., in addition to many specimens from Le Sueur, Brandon, Red Wing and Benson, Minnesota, and also from Hennepin County, Minnesota, are before us. The Ohio specimens have slightly shorter appendages than those from Iowa and South Dakota.

***Rhagovelia obesa* Uhler.**

Many specimens of winged and wingless individuals from Tennessee are at hand; also apterous forms from New York and Pennsylvania. The hind femora of the apterous males vary markedly in size in different specimens. The posterior tibiae are sinuate in the form having strongly incrassate femora. The bifid pronotal process of the macropterous female varies slightly in size in different individuals.

R. arctoa Bueno, of which twelve paratypes and more than seven hundred other specimens (mostly type material from University of Minnesota collection) have been studied, is inseparable from *obesa* except for color markings. In *arctoa* the legs are slightly darker, the anterior femora are without the pale basal markings and the coxae and trochanters (basal portion of the anterior ones excepted) also are black. In specimens from Ottawa, Ontario, collected by C. H. Curran, August 23, 1925, the coxae and trochanters are distinctly paler than in the Minnesota specimens. A macropterous female from Minnesota has a bifid pronotal process as in typical *obesa*.

Paratypes of *R. flavicincta* Bueno indicate that this form also is extremely close to *R. obesa* Uhler.

***Rhagovelia knighti*, n. sp.**

Form, size, general color, and markings very similar to *R. obesa* Uhl.

Apterous male: Antennae blackish, somewhat shiny, with the usual seta-like hairs, the basal one-third of segment I yellowish, the proportional length of segments:—I:II:III:IV=26:16:18:15. Pronotum broader than long, broadly rounded behind, with two yellowish spots in front. Connexivum narrowly margined with flavous to reddish brown. Body beneath bluish gray, the anterior and posterior coxae, all trochanters, margins of all acetabula and the basal part of anterior femora yellowish. Anterior trochanter with a dark spine. Intermediate legs:—femur:tibia:tarsal II:III=56:41:21:26. Posterior legs:—42 (wide 12):39:6:11. Posterior femora rather strongly incrassate, armed with a row of short teeth along the basal two-fifths, and from there to apex with a row of 8-9 spines which become much shortened distally and also a row of smaller teeth. Last segment of venter depressed on either side, emarginate behind, clothed as in *obesa*. First genital segment brownish, depressed on each side, with a distinct median ridge. Length, 3.20 mm.; width, 1.12 mm.

Apterous female: Pronotum broadly rounded behind, depressed in the middle, with a fairly distinct median ridge, marked in front as in male. Mesonotum emarginate behind; the metanotum truncate. Connexivum broadly margined with flavous, with a tuft of brown hairs at the apex, not so strongly produced at the apex as in *obesa*. Posterior margin of last abdominal segment with a tuft of rather long hairs on each side. Last segment of venter clothed with brownish hairs, its length and width subequal (18:19). Antennae and intermediate legs as in male. Posterior legs:—41 (wide 7):45:5:10; the femora armed with a longer spine at the apical two-fifths, and from thence to apex with 3-4 very short spines. Length, 3.2 mm.; width, 1.18 mm.

Holotype, apterous male; *allotype*, apterous female; *paratypes*, several apterous males and females; all taken at Hollister, Missouri, Sept. 5-10, 1925, H. H. Knight, collector. Holotype and allotype in authors' collection, paratypes in collections of H. H. Knight, Iowa State College, and the authors.

The male of *R. knighti* n. sp. is rather difficult to separate from the male of *R. obesa* Uhler; the female is easily recognized by the rounded posterior margin of the pronotum and the apical angle of the connexivum.

***Rhagovelia rivale* Bueno.**

A long series of apterous males and females taken at Wray, Colorado, August 4, 1925, by C. J. Drake is at hand. The posterior margin of the pronotum, which is acutely rounded in the male and broadly rounded in the female, differentiates *rivale* from closely allied species. A male and female from Lawrence, Kansas, collected by Dr. Hugo Kahl, October 1, 1926, and two paratypes have also been examined.

Rhagovelia choreutes Hussey.

Several specimens of apterous females collected at Gainesville, Florida, July 14, 1918, by C. J. Drake and a long series of apterous males and females, New Braunfels, Texas, June 22, 1917, H. H. Knight, collector, have been studied. In none of the specimens are the middle femora yellow on the basal half as characterized by Hussey (Jl. N. Y. Ent. Soc., XXXIII, p. 67, 1925). However, there is a tendency for the hind femora to be pale along two broad patches at the base.

Rhagovelia distincta Champion.

Several winged males and females and a long series of apterous specimens collected by Dr. Herbert Osborn at Orizaba, V. C., Mexico, January 9-16, 1892, also two cotypes from the same locality, have been studied. The posterior femora of the wingless males are considerably more incrassate in some individuals than in others.

Rhagovelia excellentis, n. sp.

Elongate, dull black with an aeneous lustre, sides of pronotum including acetabula testaceous. Legs black, the anterior and posterior coxae, the anterior trochanters in part, the intermediate and posterior trochanters in part, an inconspicuous spot on base of anterior femora, and margins of all acetabula testaceous to brownish. Entire body clothed with short pubescence, the sides of the pronotum with a few scattered long hairs. Pronotum grayish in front, with a small yellowish spot on each side of median carina. Antennae brownish black, the basal fifth of segment I brownish testaceous. Anterior trochanters unarmed.

Apterous male: Pronotum broader than long, broadly rounded behind, depressed on either side in front. Mesonotum and metanotum truncate behind. Antennal formula:—I:II:III:IV=32:20:19:17. Abdomen narrowed posteriorly, with a shiny blackish spot on each tergite; the connexivum margined with brownish. Last segment of venter depressed posteriorly and with a distinct ridge on either side, the hairs clothing the ridge longer. Formula intermediate leg:—femur:tibia:tarsal II:III—72:56:32:32. Posterior femora moderately incrassate, armed at the basal two-fifths with a long, bent, black spine which is followed by 10 shorter stout spines and preceded by a row of short black teeth. Posterior tibia denticulate within, with a short spur at the apex. Posterior leg formula:—femur:tibia:tarsal II:III=55 (wide 14):57:8:13. Genital segments clothed with longer hairs, dark brownish beneath, the basal segment paler. Length, 4.48 mm.; width, 1.33 mm.

Apterous female: Antennal formula:—I:II:III:IV=38:24:22:18. Pronotum much more broadly rounded than in male, the yellowish spots in front a little larger. Mesonotum and metanotum slightly emarginate behind. Connexivum strongly reflexed but not meeting above, margined with brownish, with slightly longer, thicker, and darker hairs at apices of first, fifth and sixth segments. Last segment of venter beneath darker than others, clothed with longer hairs, slightly raised and faintly produced at

the middle behind, its length greater than its width (26:22). Formula middle leg:—femur:tibia:tarsal II:III=79:60:32:35. Posterior femora slightly swollen, not wider than intermediate ones, slightly sinuate within, armed at the apical two-fifths with a long black spine and from thence to the apex with 4-5 shorter spines. Formula posterior leg:—femur:tibia:tarsal II:III=57 (wide 8):70:8:14. Length, 4.34 mm.; width, 1.65 mm.

Holotype, apterous male; *allotype*, apterous female; *paratypes*, many apterous males and females; collected from irrigation canal and a small stream near Dolores, Colo., August 15, 1925, by C. J. Drake. Types in authors' collection, paratypes in collections of Iowa State College, Colorado Agricultural College and the authors. *Excellentis* is probably most closely related to *distincta* Champ. However in the female the pronotum is more rounded at the base, the intermediate legs are longer, the apex of the last segment of the connexivum is more strongly produced, and the last abdominal segment above is without the heavy patch of hairs. The male of *excellentis* is distinctly longer and has longer legs.

***Rhagovalia calopa*, n. sp.**

Apterous male: Short, stout, fusiform, rather densely clothed with short fine hairs interspersed with numerous long hairs. Body grayish black; the legs darker, somewhat shiny, clothed with long hairs; pronotum with a large yellowish brown spot on each side in front. Head with the usual impressed lines. Pronotum short, slightly more than one-half as long as the head, its basal margin almost straight. Mesonotum very large, three and one-half times as long as the pronotum, truncate behind. Abdomen strongly narrowed posteriorly, connexivum broad, strongly narrowed apically. Venter bluish gray, the last segment and also the genital segments brownish. All coxae, anterior and posterior trochanters, base of anterior femora, and base and two longitudinal stripes on posterior femora yellowish.

Antennae black, somewhat shiny, the basal third of the proximal segment pale, I and II with the usual scattered setae and long hairs; the proportion:—I:II:III:IV=31:18:13:16. Anterior trochanters unarmed. Formula middle leg:—femur:tibia:tarsal II:III=64:47:23:28. Hind leg:—52 (wide 20):54:5:12. Posterior femora greatly swollen, armed with a double row of spines, those of the anterior (outer) row shorter and continuing for the entire length of femora and onto the trochanters; the inner row irregular, with a longer, stouter spine at the basal third and one or two double spines near the middle. Posterior tibiae with a double row of short stout spines, one or two on the apical third being very long; with a long spur at the apex. Length, 2.86 mm.; width, 1.5 mm.

Holotype, male, Los Amates, Guatemala, January 16, 1905, in authors' collection. This species resembles in general appearance *R. femoralis* Champ. from which it may readily be separated by the difference in proportional lengths of antennal segments, by the short, narrow, rectilinear pronotum, the large truncate mesonotum, and the hairy legs. The pronotum is formed as in the apterous specimens of *R. plumbea* Uhl., *R. salina*

Champ., and *R. tenuipes* Champ. However, the enormously incrassate posterior femora distinguishes *R. calopa* n. sp. from these species.

***Rhagovelia gregalis*, n. sp.**

Form and general appearance somewhat similar to *R. tenuipes* Champ.

Apterous male: Brownish black; the pronotum somewhat bluish gray anteriorly, with a transverse yellow spot in front. Body and legs clothed with rather dense pile, the sides of thorax and the legs also with a few scattered long hairs. Antennae brownish black, the basal portion of segment I testaceous, proportion of segments:—I:II:III:IV=38:23:23:20. Pronotum short, more than five times as broad as long, the posterior margin broadly emarginate. Mesonotum broader than long, narrowed posteriorly and truncate behind. Legs black, anterior coxae and trochanters, posterior coxae and trochanters, and margins of all acetabula yellowish. Anterior trochanters unarmed. Intermediate legs:—femur:tibia:tarsal II:III=74:48:32:28. Posterior legs:—55 (wide 9):60:7:10. Posterior femora armed slightly beyond the middle with a long brownish spine and from thence to apex with 8–9 much shorter black spines. Posterior tibia without a distinct spur at the apex. Length, 3.06 mm.; width, 1.27 mm.

Apterous female: General markings as in male, the pale pronotal spot larger, the hairs on abdomen slightly shorter and not so dense. Head with the usual impressed lines. Antennae as in male. Pronotum as in male, its posterior margin slightly emarginate. Connexivum very wide, the outer margin rounded. Body beneath black, the legs brownish black. Intermediate legs:—68:46:30:29. Posterior legs:—54 (wide 8):60:8:11. Posterior femora armed with a long spine at the apical two-fifths and from thence to apex with 6–7 much shorter spines which become shorter distally. Last segment of venter wider (23) than long (18). Length, 3.5 mm.; width, 1.40 mm.

Winged form: Pronotum brownish black, somewhat bluish gray in front, the yellow spot smaller than in apterous form, the humeri prominent. Wings dark brown, the veins distinct, the lateral margins ciliate on basal half; extending much beyond the apex of the abdomen. Venter with last segment blackish. Proportions of antennae and legs as in apterous form. Length, 3.95 mm.; width, 1.54 mm.

Holotype, apterous male; *allotype*, apterous female; *paratypes*, 2 females; *morphotypes*, winged male and female. Type locality, San Pedro, Honduras, February 21–28, 1905. Types in authors' collection.

***Rhagovelia hirtipes*, n. sp.**

Macropterous female: Blackish; the wings brown, the veins darker and rather prominent. Pronotum black with a large transverse, yellowish spot in front; triangularly produced posteriorly, the apex sub-truncate, clothed with long hairs. Antennae brown, the basal portion of first segment testaceous, the proportion:—I:II=30:16, (III and IV wanting). Body beneath bluish gray. Legs brownish black, the margins of all acetabula, all coxae and trochanters, and the basal portions of anterior and posterior femora yellowish, intermediate coxae and trochanters darker.

Intermediate legs:—femur:tibia:tarsal II:III=61:50:30:28. Hind legs:—45 (wide 9):58:8:11. Posterior femora clothed within with numerous long yellowish brown hairs, armed with a long curved brown spine at the basal two-thirds which is preceded by a row of short stout teeth and followed by 4–5 very short spines. Length, 4.28 mm.; width 1.52 mm.

Holotype, winged female, San Pedro, Honduras, September 21–28, 1905, in authors' collection. The patch of long hairs at the apex of the pronotum and the short hind femora with their hairy clothing distinguish this species from *R. gregalis* n. sp.

***Rhagovelia regalis*, n. sp.**

Moderately small, fusiform, grayish black. Head with the usual impressed black lines.

Apterous male: Antennae long, brownish black, with the usual seta-like hairs on the basal segments, segment I with the basal one-third testaceous; proportion:—I:II:III:IV=34:20:20:15. Pronotum short, about five times as wide as long, with a transverse pale spot in front, the posterior margin sinuate. Mesonotum distinctly broader than long, its hind margin subtruncate. Metanotum truncate behind. Connexivum rather broad, margined with brownish, the outer margin rounded. Abdomen above with a transverse brownish, shiny spot on the next to the last segment and a similar, much larger, rectangular spot on the last segment. Legs dark brown, all femora and intermediate trochanters blackish, the margins of all acetabula and the anterior and posterior coxae testaceous. Formula intermediate leg:—femur:tibia:tarsal II:III=65:44:26:26. Posterior leg:—51 (wide 9): 51:4:7. Posterior femora not thicker than intermediate ones, strongest on the basal third and gradually tapering distally; armed at the basal two-fifths with a long, obliquely slanting, dark spine and from thence to apex with 9–10 much shorter spines. Hind tibia with a slender spur at the apex. Venter bluish gray, distinctly depressed on either side behind; the last segment dark brown, more strongly depressed, with a distinct median ridge. Genital segments dark brown. Length, 2.56 mm.; width, 1.24 mm.

Apterous female: Larger, the general color and markings as in male. Antennae as in male. Connexivum broad, not strongly reflexed, abruptly rounded and clothed with longer hairs at the apex, margined with dark brown. Abdomen above with a large, shiny, brownish black spot on each of the last 3–4 segments. Legs slightly darker, the formulae of intermediate and posterior ones as in male; posterior femora slightly less incrassate, the long dark spine placed at the middle and followed by 7–8 very short spines; the hind tibiae slightly longer than in male. Last segment of venter brown, broader (19) than long (16). Length, 3 mm.; width, 1.35 mm.

Holotype: apterous male; *allotype*, apterous female, Honduras, in the collection of Iowa State College. *Paratypes*, one male and eight females, all apterous, taken with types, in collections of Iowa State College and the authors. The short pronotum, the formulae of antennae and legs and the shape of the connexivum distinguish *regalis* from related species.



Drake, Carl J. and Harris, H M. 1927. "Notes on the genus *Rhagovelia*, with descriptions of six new species." *Proceedings of the Biological Society of Washington* 40, 131–137.

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