

THE RHAGOVELIA OF THE WESTERN HEMISPHERE
WITH NOTES ON WORLD DISTRIBUTION
(Hemiptera, Veliidae).

by

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Introduction

The Broad-shouldered Water-striders is the common name of the genus Rhagovelia. This is a group of small aquatic Hemiptera which spend their lives on the surfaces of our fresh-water streams. Due to their small size and their habitat, few collectors take them, or even see them. Often these striders are mistaken for their larger relatives the Gerrids, as the two are frequently found skating together on rapid-moving streams.

The genus Rhagovelia may be easily distinguished by five characters: the 4-segmented antennae, the 3-segmented beak, the 3-segmented tarsi, the basal antennal segment longest, and the third tarsal segment of the intermediate leg split 3/4ths of its length and with feathery hairs in this split. The individuals vary in size from 2.5 mm. to 8.5 mm. and in color from yellowish-brown to black.

The outstanding peculiarity of the genus is the condition of the third tarsal segment of the middle leg. This segment is split for three-fourths of its length and provided with about twenty plumose hairs, arising from the base of the cleft. The purpose of these hairs is the sup-

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port of the insect upon the surface of the water, the hairs being spread out fan-like. Rhagovelia are also excellent divers and can swim readily below the surface of the water, these same hairs being used for swimming.

Another peculiarity present among some members of the genus is the "sutured off" pronotum. This condition is found among a group of small South American forms (and tenuipes from Mexico), these forms probably being more primitive. Among most species the pronotum is as broad as long with a small, or even completely hidden, mesonotum. In this primitive group the pronotum is $1/3$ as long as wide, and the mesonotum is longer than the pronotum, the suture between the two being straight and distinct.

The habitat of these small bugs is rapid-running streams, although three species live on salt water of bays. They are gregarious: groups may be found in the eddies of streams, where they are presumably awaiting the arrival of food which the current brings them. Although the Rhagovelia are predators, they usually will not attack another of their kind, nor will they bother the larger Gerids that are often found in the same pool. Bueno (1907) says "Mating takes place in June or July, when the schools are made up largely of sexes in copula".

Both winged and wingless forms of Rhagovelia are found together, the wingless form being the more common. That the winged forms are good flyers is shown by the fact that Dr. R. H. Beamer in 1927 collected two specimens from a water-tank in Arizona, forty miles from any running water.

Historical

The genus Rhagovelia was erected in 1865 by Mayr for three species described by Burmeister in 1835 in the genus Velia. Uhler was the first to describe a species from the United States, describing the well-known form, obesa, in 1871. In 1879 F. B. White erected the genus Neovelia for the species trailii, which later proved to be a Rhagovelia. In 1894 Uhler added two more species and in 1898 Breddin described Neovelia whitei, which was assigned later to Rhagovelia.

Then in 1898 Champion more than doubled the number of then known species by his addition of nine new species from Central America. About the same time Kirkaldy described two species and published a check list of the Western Hemisphere. Since then several writers have added to our knowledge of the group, two of the more recent writers being Bueno and Drake & Harris, who described three species and six species respectively.

Structural Characters

Although many structures have been used in the past, most descriptions lack good specific characters. Many writers on Rhagovelia were not specializing in the group, but found perhaps a single series of specimens and described them as new. And it is such descriptions that often give trouble to later writers.

In this paper the essential characters have been sought

for and used, in addition to some general characters. Color has been used by all writers and is a character that shows considerable variation. Individuals from different localities are often slightly darker or lighter than the type. Color variation is the basis for creating six new varieties of R. distincta Champ.

A series of structures often used by recent writers are the proportional measurements of related or corresponding parts of the body. Among the Rhagovelia the proportional measurements of the antennae, the intermediate legs, and the hind legs have been commonly used. These proportions are useful for determination, but cannot be depended upon as the only character in the identification of a species. There is considerable variation in these proportions within a species, especially between the males and females. However this relationship between segments is sufficiently constant and specific to be retained. In the antennal proportions the segments are compared with each other, starting with the basal segment as one. Leg proportions compare the femur to the tibia to the second tarsal segment to the third tarsal segment.

The "sutured-off" pronotum is another character that is good in certain instances, such as a group character. This condition is found only among the apterous forms, the winged forms always having a regular pronotum. An exception has been found---Uhler describes the apterous forms of angustipes with a regular pronotum, while Kirkaldy in 1899 says that he examined material with the sutured-off pronotum.

Sexual differences are quite common, for the male and female differ in size, in the incrassated condition and the armature of the posterior femur, in the condition of the connexivum, and perhaps in the anterior tibia. The female is usually longer and narrower. Winged forms are larger than wingless forms.

The condition of the posterior leg varies a great deal within the genus, some species having the femur enormously incrassate and others have it normal. Often the males have numerous large teeth in several rows arming the posterior femur, while several females have no teeth at all. The spiny armature shows great variability even among males of the same species, indicating perhaps that the condition in general is constant, but that individual variation or structural deformities are frequently found.

The connexivum of the male is not used as a specific character so much as the connexivum of the female. In the male the connexivum may be flat and broad, or it may be vertical. In the female this structure may be flat, vertical or reflexed against the abdomen; it may be armed with hairs at the apices of the segments, or it may have a spiny projection at the tip.

The anterior legs often bear structures useful for determination. The trochanters may be armed with spines; the tibia may be dilated, or dilated and grooved beneath; the legs may be short, stout, or normal.

One character that separates the genus into two distinct groups is the presence or absence of a hook-like spur

at the apex of the posterior tibia. Three species have this character, while the others are equally divided into two groups by having, or not having, a straight spur at the apex. Since many of the early writers did not mention this structure, and not all the types have been examined, the spur can not be used in grouping out the species.

Although the genitalia have been used by workers in many groups of insects, no one has definitely stated that they contain characters of good specific value among the Rhagovelia. Therefore since they have proven useful in determining species in related groups, a careful study of the genitalia of the Rhagovelia was made and this conclusion reached---to a certain extent they are distinct for a species. By this is meant that one structure cannot be depended upon throughout, but that one structure plus perhaps another can separate any species.

The one structure that has proven very useful is the external claspers of the male. The claspers are always paired and are fastened to a chitinous membrane within the genital capsule. As a rule they are curved and bent over the anal plates, almost meeting in some species. The shape is constant for a species, but often this shape is similar in seven or eight related species, and then the additional structure must be used. The claspers are hairy on the outside and smooth on the inner surface (Plate 2 A).

Plate 2 is a drawing of the parts of the genitalia as they were dissected and flattened in their same relative position. The internal genitalia are inclosed in three

membranes B, C, and D, the first two being on the bottom side and D on the supper side when the structures are in situ. The internal genitalia consist of three paired parts in the North American forms. The aedagal connective (E) are connected near the middle with the vas deferens, which divides to run through each half. The connective projects out and the vasa deferentia run into the ejaculatory duct. Two paired structures, F and G, are presumeably claspers,[#][#] used in the copulatory act.

In using the genitalis in classification, it has been found that the external claspers are quite similiar in several series of species. In such cases the internal claspers or aedagal connective are used in addition to the external claspers.

Distribution

Specimens of Rhagovelia are not common in our museums. Due to their small size, their color, and their habitat, only the specialist on aquatic and semi-aquatic Hemiptera have made any appreciable collections of them. The insects are probably widely distributed throughout thei country, South America, Central America, and the West Indies.

Rhagovelia seem to be typically a Western Hemisphere group, as 45 species of a total of 51 are from this half of the world. None are recorded from Europe. Some day there may be collectors in the Eastern Hemisphere, that will prove that portion equally important as a home of the Rhagovelia.

Records of all specimens as far as known are given in this paper for the sake of completeness. Included here are 51 species and 8 varieties. Of this number 13 species are described new to science as are also the 8 varieties. One species, R. reitteri Reuter from Addah, is omitted, making a total of 52 known species in the world.

DISTRIBUTION OF THE WORLD SPECIES

	Africa	Asia	Aust	Europe	East Indies	West Indies	Cen Amer	So Amer	No Amer
<u>trista</u>								x	
n. sp.							x		
<u>uncinata</u>							x		
Champ.									x
<u>varipes</u>							x		
Champ.									
<u>vivida</u>							x		
(White)									
<u>whitei</u>							x		
(Breddin)									
<u>williamsi</u>							x		
n. sp.							x		
TOTAL	2	2	1	0	2	6	13	18	14 spec.

DISTRIBUTION IN THE US S. BY STATES.

Ar Ca Co	Il In Io Ka	Ma Mi Mi	Oh
iz li lo Fa	li di wa ns	Me Md ss ch nn Mo NJ NM NY NC io	

<u>arctoa</u>		x		x x					
<u>beameri</u>	x								
<u>choreutes</u>	x						x		
<u>distincta</u>	x								
" <u>arizo</u> -x									
<u>nensis</u>									
" <u>har</u> -x									
" <u>monia</u>									
" <u>proxima</u>	x								
<u>flavicincta</u>								x	
<u>knighti</u>						x			
<u>obesa</u>	x x	x x	x x	x x x x	x x x x	x	x x x x		
<u>oriander</u>		x x	x x	x x	x				x
<u>plumbea</u>	x								
<u>rivale</u>			x						

Ok Pe	Te Te	Ut	Wyo
la nn	SG SD	nn x.	Vt ah Va

<u>armata</u>		x							
<u>choreutes</u>	x								
<u>distincta</u>									
v. <u>cadyi</u>					x				
<u>distincta</u>			x						
<u>distincta</u>			x						
v. <u>valentina</u>			x						
<u>obesa</u>	x x	x x	x x x x	x x x x	x				
<u>oriander</u>		x							

Determinations

Dr. H. B. Hungerford, under whose direction this work was undertaken, spent eight months of 1928 in Europe, studying type material in all important European museums. He carried with him several thousand specimens, representing all groups of aquatic and semi-aquatic Hemiptera in the University of Kansas Museum and many from the Smithsonian Institute. Among the specimens were over one hundred specimens of Rhagovelia, representing every group at hand. These specimens were compared with type and general material in the British Museum, the Berlin Museum, and the Museum of Vienna. Besides comparison with types, Dr. Hungerford made notes on type and other specimens discovered in the foreign museums. He found eleven unnamed specimens of R. gigantea Gould, the description of this species then had not been published. These specimens were loaned to Dr. Hungerford through the courtesy of Dr. Horvath, and many other new specimens were obtained in England.

Determinations in this paper are based whenever possible on the observations of Dr. Hungerford in Europe, credit being given him under each species. Other determinations were made from type material in this country and published descriptions.

The writer is greatly indebted to Dr. Hungerford under whose direction this work has been completed, especially for his helpful suggestions and his examinations of European types. The writer is also indebted to Dr. P. J. Chapman of the Virginia Truck Experiment Station for his helpful suggestions and criticisms in completing this work.

KEY TO AQUATIC AND SEMIAQUATIC HEMIPTERA

(After Hungerford)

A. Antennae shorter than head.

B. Ocelli present; semiaquatic.

C. Antennae exposed; front and middle legs similar.

Ochteridae.

CC. Antennae concealed; front legs raptorial, eyes protuberant.

Gelastocoridae.

BB. Ocelli absent; aquatic.

C. Hind tarsi with indistinct setiform claws. (Save Plea, which is less than 3 mm. long).

D. Head overlapping thorax dorsally. Front tarsi 1-segmented, palaeform.

Corixidae.

DD. Head inserted in thorax. Front tarsi normal.

Notonectidae.

CC. Hind tarsi with distinct claws.

D. Membrane of hemelytra reticulately veined.

E. Apical appendages of abdomen long and slender; tarsi 1-segmented.

Nepidae.

EE. Apical appendages of abdomen short and flat, retractile. Tarsi 2-segmented.

Belostomatidae.

DD. Membrane of hemelytra without veins.

Naucoridae.

AA. Antennae as long or longer than head, exposed.

B. Head as long as entire thorax; both elongated. Length about 10 mm.

Hydrometridae.

- BB. Head shorter than thorax, including scutellum.
- C. Claws of at least the front tarsi distinctly anteapical, with terminal tarsal segment more or less cleft.
- D. Hind femur extending much beyond apex of abdomen; intermediate and hind pairs of legs approximated, very distant from front pair.

Beak 4-segmented. Gerridae.

- DD. Hind femur not extending much beyond apex of abdomen; intermediate pair of legs about equidistant from front and hind pairs (except in Rhagovelia). Beak 3-segmented.

Veliidae.

- CC. Claws all apical, last segment entire.
- D. Antennae 5-segmented (save Merragata, which has 4). First and second segments of antennae thicker than the others; clavus similar in texture to the membrane, which is without veins; head and thorax sulcate beneath.

Hebridae.

- DD. Antennae 4-segmented. Hemelytra not as above.
- E. Membrane of wing without cells, or apterous.

Mesovelidiidae.

- EE. Membrane of wing with 4 or 5 long closed cells. Salidae.

Family VELIIDAE Am. & Serv. 1843.

(After Hungerford)

"Family Characteristics. Surface dwellers which are usually plump bodied, and broadest at the shoulders. The antennae are 4-segmented, and the head is shorter than the thorax, including the scutellum. The middle legs are placed about equidistant from front and hind pairs (except in Rhagovelia). The hind femora do not extend much beyond the apex of the abdomen. The ocelli are obsolete or absent. Beak 3-segmented; tarsi 1- or 2-segmented in front, and 2- or 3-segmented in the others. Most of these bugs are small."

Key to Genera.

A. Last antennal segment longest.

B. Ocelli in contact with inner margin of the eyes.

Macrovelia.

BB. Ocelli absent.

Microvelia.

AA. First antennal segment longest.

B. Third segment of middle tarsus split and with feathery hairs set in the slit.

Rhagovelia.

BB. Intermediate tarsi not split.

Velia.

Rhagovelia Mayr, G.

"Diagnosen neuer Hemipteren,"

Verhandlungen der k.k. zoologisch-botanischen
Gesellschaft in Wien,

Vol. XV, p. 445, 1865.

"*Veliae proxima*. Caput antice truncatum infra re-
tractum; oculi approximati. Tarsi antici breves triar-
ticulati, articulis 1 et 2 brevissimis globulosis, ar-
ticuli apicali fusiformi, infra medio exciso biunguicu-
lato, tarsi intermedii triarticulati posticis triplo
longiores, articulo basali minutissimo, secundo longo
cylindrico, apicali secundo longo cylindrico, apicali
secundo aequilongo, subfusciformi, ab apice ad basin
fissura longitudinali, e qua oriuntur unguiculi 2 lon-
gissimi parum curvati.

"R. armata Burm. (Velia armata Burm.).

"R. collaris Burm. (Velia collaris Burm., Velia
Fieberi Guer.).

"R. nigricans Burm. (Velia nigricans Burm.).

Translation: "Nearest Velia. Headtruncate anteriorly
retracted below; eyes approximate. Anterior tarsi of three
short segments, segments 1 and 2 shortest and globular,
the apical segment fusiform, two claws dropping down from
the middle below, intermediate tarsi three-segmented three
times longer than posterior, basal segment very small,
the second long and cylindrical, apical of equal length

the apical segment long and cylindrical as the second, and
of equal length, subfusiform, longitudinal suture below
towards the apex, from which come two long, slightly
curved claws."

LIST OF WORLD SPECIES

Rhagovelia Mayr.

1865, Verh. Zool.-bot. Ges. Wien, XV, p. 445

Baecula Stal, 1865, Hem. Afr. III, p. 157Neovelia White, F.B., 1879, Jour. Linn. Soc. Lond., Zool., XIV, p. 487Trochopus Carpenter, 1898, Ent. Mo. Mag., XXXIV, p. 78aeneipes Haglund

1895, Ofv. Ak. Forh., p. 476. Habitat: Guinea.

amazonensis new species

1929, Habitat: Brazil.

angustipes Uhler PH.1894, Proc. Zool. Soc. Lond., P. 215. Habitat: Mex., Panama, St. Vincent, Grenada, and Venezuela.
New record: Ecuador.arctoa Torre-Bueno1925, Trans. Am. Ent. Soc., 50:250. Habitat:
Minn., Mich., and Ontario Canada.armata (Velia) Burmeister)

1835, Handbuch der Entomologie, 2:212

----- (Burmeister) Rhagovelia Mayr

1865, Verh. Zool.-bot. Ges. Wein, XV. p. 445.

----- (Burmeister) Rhagovelia, Champion1898, Biologia Cen.-Am., Hem.-Het., II., p. 138.
Habitat: Mexico and Texas.australia Kirkaldy, G.W.1908, Sydney Proc. Linn. Soc., 32:783. Habitat:
Queensland.bakeri Bergroth, E.

1914, Psyche, 21:74. Habitat: Nicaragua.

beameri new species

1929. Habitat: Arizona.

calopa Drake & Harris1927, Proc. Biol. Soc. Wash., 40:131-136.
Habitat: Guatemala.castanea new species

1929. Habitat: Ecuador.

choreutes Hussey, J.

1925, Jour. N. Y. Ent. Soc., 33:June. Habitat:
Florida. New records: Oklahoma and New Mexico.

collaris (*Velia*) Burmeister)

1835, Hand. der Ent., 2:212.

fiebrii (*Velia*) Guerin

1857, Sagra's Hist. Cuba, Pt. 2, VII, p. 174.

collaris (Burmeister) *Rhagovelia*, Mayr

1865, Verh. Zool. bot. Ges. Wien, XV, p. 445.

Habitat: Cuba, Santo Domingo, and Jamaica.

collaris var. planipes new variety

1929. Habitat: Salvador and Ecuador.

collaris var. pulchra new variety

1929. Habitat: Dominica Roseau, B. W. I., and
Porto Rico.

confusa new species

1929. Habitat: Ecuador.

crassipes Champion

1898, Biol. Cent.-Am., Hem.-Het., II, p. 131, 133.
Habitat: Panama.

distincta Champion

1898, Biol. Cent.-Am., Hem.-Het., II, P. 132, 134/
Habitat: Mexico, Colorado.

excellentis Drake & Harris

1927, Proc. Bio. Soc. Wash., 40:131-136.

distincta var. arizonensis new variety

1929. Habitat: Arizona.

distincta var. cadyi new variety

1929. Habitat: Wyoming.

distincta var. harmonia new variety

1929. Habitat: Arizona.

distincta var. modesta new variety

1929. Habitat: San Antonio, Mexico.

distincta var. proxima new variety

1929. Habitat: Colorado.

distincta var. valentina new variety

1929. Habitat: Texas and Arizona.

elegans Uhler

1894, Proc. Zool. Soc. Lond., p. 216. Habitat:
Grenada.

excellentis Drake & Harris (See distincta Champ.)

femoralis Champion

1898, Biol. Cen.-Am., Hem., 2:132. Habitat;
Panama.

festae Kirkaldy

1899, Boll. Mus. Zool. Anat. Comp. Torino, 14:350:4.
Habitat: Ecuador.

flavicincta Bueno

1924, Trans. Am. Ent. Soc., 50:243-252.
Habitat: North Carolina.

gigantea Gould

1928, Ann. Am. Ent. Soc., 21:417. Habitat: Columbia

gregalis Drake & Harris

1927, Proc. Biol. Soc. Wash., 40:131-136.
Habitat: Honduras.

hirtipes Drake & Harris

1927, Proc. Biol. Soc. Wash., 40:131-136.
Habitat: Honduras.

insignis Distant

Referred to Microvelia (new combination)

Rhagovelia (Distant), 1903, Fascic. Malay. Zool.,
1:256. Habitat: Malay States.

insularis Champion

1898, Biol. Cen.-Am. Hem. 2:132. Habitat: Panama.
New Records: Brazil, Trinidad, and Columbia.

knighti Drake & Harris

1927, Proc. Bio. Soc. Wash., 40:131-136.
Habitat: Missouri.

longipes new species

1929. Habitat: Ecuador.

lucida new species

1929. Habitat: Brazil.

maculata Distant

1903, Ann. Mag. Nat. Hist., (7):12:472.
Habitat: Nigeria (Africa).

nigricans (Velia) Burmeister

1835, Hand. der Ent., 2:212.

----- (Burmeister), Rhagovelia Mayr

1865, Verh. Zoo.-bot. Ges. Wein, XV, p. 445
Habitat: Africa. New records: Egypt, Ceylon and
Seychelle Islands.

- obesa Uhler
 1871, Proc. Bost. Soc. Nat Hist., 14:107.
 Habitat: Ontario, Mass., N.Y., N.J., Maryland,
 D.C., Va., N.C., S.C., Mich., Tenn., Cal., Fla.,
 Maine, Ohio, Penn., Vermont, Utah.
- obscura new species
 1929. Habitat: Ecuador.
- Oriander Parshley
 1922, S.D. State College, Tech. Bul. 2, p. 19.
 Habitat: S. D., Ohio, Iowa, Minn., Ill., Ind.
 New record: Kansas.
- peggiae Kirkaldy
 1901, Ann. Mus. Genova, 40:805. Habitat:
 New Guinea.
- plumbea Uhler
 1894, Proc. Zool. Soc. Lond., p. 217. Habitat:
 Florida, Nassau, Bahamas, Jamaica, Grenada, St.
 Vincent.
- marinus (Trochopus) Carpenter
 1898, Ent. Mon. Mag., p. 79.
- ravana Kirkaldy
 1901, Entomologist, p. 209. Habitat: Ceylon.
- regalis Drake & Harris
 1927, Proc. Biol. Soc. Wash., 40:131-136.
 Habitat: Honduras.
- reitteri Reuter
 , Ofv. Fin. Soc., 25:39. Habitat: Addah.
- relicta new species
 1929. Habitat: Brazil.
- rivale Bueno
 Trans. Am. Ent. Soc., 50:243-252.
 Habitat: Kansas.
- robusta new species
 1929. Habitat: Paraguay.
- salina (Trochopus) Champion
 1898, Bio. Cen.-Am., Hemi., 2:140. Habitat:
 #Panama. New record: Jamaica.
- salina (Champion), Rhagovelia Kirkaldy
 1900, Ent., XXXIV, p. 308.
- sinuata new species
 1929. Habitat: Ecuador.

spinigera Champion

1898, Biol. Cent.-Am., Hemi., 2:132.

Habitat: Guatemala, San Geronimo in Vera Paz.

New record: Costa Rica.

spinosa new species

1929. Habitat: Ecuador.

tayloriella Kirkaldy

1900, Ent., 33:72. Habitat: Jamaica.

tenuipes Champion

1898, Biol. Cent-Am., Hemi., 2:132, 137.

Habitat: Mexico.

trailii (Neovelia) White, F. B.

1879, Jour. Linn. Soc. Lond., Zool., 14:487.

Habitat: Brazil.

----- (White), Rhagovelia Kirkaldy

1900, Ent., 34:308.

trista new species

1929. Habitat: Ecuador.

uncinata Champion

1898, Biol. Cen-Am. Hemi., 2:132, 138.

Habitat: Panama.

varipes Champion

1898, Biol. Cen-Am., Hemi., 2:132, 133.

Habitat: Mexico.

vivida (Velia) White, B.

(Do not have reference)

Habitat: Nicaragua.

----- (White, B.), Rhagovelia (det. by Hungerford, 1928)whitei (Neovelia) Breddin

1898, Jahrb. Magdeburg Soc., p. 14.

Habitat: South America.

----- (Breddin), Rhagovelia Kirkaldy

1900, Ent., 34:308.

williamsi new species

1929. Habitat: Ecuador.

Key to the Species of RHAGOVELIA

of the Western Hemisphere

1. Posterior tibia armed at apex with a hook 2.
Posterior tibia with or without a distinct spur 4.
2. Terminal genital segment mucronate uncinata.
Terminal genital segment not mucronate 3.
3. Pronotum fuscous; posterior femur armed with seven long teeth, the two inner ones longer and thicker elegans Uhler.
Pronotum rufo-castaneous; posterior femur armed with five or six long teeth, the first, second and fourth longest, the first and second being a little more distant than the others insularis Champ.
4. Pronotum sutured off from mesonotum in apterous forms 5.
Pronotum not sutured off from mesonotum 16.
5. Antennal segment III as long as II and longer than IV 6.
Antennal segment III shorter than II or IV 13.
6. Tarsal segment II of intermediate leg much longer than segment III 7.
Tarsal segment II less than, equal to, or slightly longer than segment III 8.
7. Posterior femur unarmed longipes n. sp.
Posterior femur armed with one long and three or four short teeth tenuipes Champ.
8. Tarsal segment II of intermediate leg less than III 9.
Tarsal segment II equal to segment III 10.
9. Posterior femur armed with one long and three short teeth spinosa n. sp.
Posterior femur armed with one long and eight to ten short teeth angustipes Uhler.
10. Apex of posterior tibia armed with straight spur 11.

10. Apex of posterior tibia unarmed gregalis Drake & Harris.
11. Connexivum abruptly rounded and clothed at apex with longer hairs; length 2.5-3 mm. regalis Drake & Harris.
Connexivum without longer hairs at apex; length 3.5 mm. to 3.9 mm. 12.
12. Anterior tibia with groove; posterior tibia with serrate teeth throughout obscura n. sp.
Anterior tibia without groove; posterior tibia slightly sinuate and with only a few small teeth confusa n. sp.
13. Posterior femur enormously incrassate calopa D. & H.
Posterior femur normal or slightly incrassate 14.
14. Posterior femur unarmed; length 2.6 mm. festae Kirk.
Posterior femur armed 15.
15. Posterior femur slightly incrassate and armed with one long and a series of short spines salina (Champ.).
Posterior femur not incrassate, armed with three spines plumbea Uhler.
16. Pronotal length much less than width 17.
Pronotal length subequal to width 18.
17. Antennal segment one thickened and segment III club-shaped lucida n. sp.
Antennal segments normal trista n. sp.
18. Anterior tibia strongly dilated, especially in male; connexivum of female much narrowed in from the base at first, afterwards continuing subparallel 19.
Anterior tibia not dilated; connexivum reflexed or vertical, and parallel 22.
19. Posterior tibia sinuate in the male 20.
Posterior tibia straight 21.
20. Posterior femur armed with regular teeth, and posterior tibia slightly sinuate in the male with regular teeth collaris (Burm.).
Posterior femur greatly incrassate, armed with several

20. large teeth; posterior tibia strongly sinuate and armed with a stout spine at apical 2/5
collaris var. planipes n. var. 21.
21. Second tarsal segment of intermediate leg equal to or slightly longer than third tayloriella Kirk.
 Second tarsal segment of intermediate leg shorter than the third collaris var. pulchra n. var. 22.
22. Intermediate femur constricted at middle spinigera Champ.
 Intermediate femur not constricted 23.
23. Posterior femur greatly incrassate and dentate, and posterior tibia also conspicuously dentate in the male 24.
 Posterior femur not incrassate and dentate, or only moderately so; posterior tibia not dentate, or only minutely 31.
24. Intermediate tarsal segment II shorter than III 25.
 Intermediate tarsal segment II longer than III
varipes Champ.
25. Posterior femur with large, stout tooth at apical third, preceded by five stout teeth; length 8 mm.
gigantea Gould.
 Posterior femur not so armed; length 7 mm. or less 26.
26. Denticulations on posterior tibia regular bakeri Berg.
 Denticulations on posterior tibia with some large teeth 27.
27. Posterior tibia denticulate and with three long teeth
crassipes Champ.
 Posterior tibia with only one long tooth 28.
28. Posterior tibia straight femoralis Champ.
 Posterior tibia sinuate 29.
29. Posterior femur armed with two irregular rows of teeth and one large tooth on the middle above
robusta n. sp.
 Posterior femur armed otherwise 30.
30. Posterior femur armed with a row of six large spines, the second being longest, and also one large spine on the lower surface
castanea n. sp.

30. Posterior femur armed with two irregular rows of teeth, the first and third being longest
relicta n. sp.

31. Apterous female with connexivum vertical and male usually flat and broad
Apterous female with connexivum reflexed

32. Connexivum of apterous female much narrowed in from the base at first, afterwards continuing subparallel
Connexivum subparallel, or gradually tapering posteriorly

33. Connexivum of female ending in stout blunt spine; posterior femur of male armed with about nine spines in two rows
williamsi n. sp.

Connexivum of female not projecting posteriorly; posterior femur of male armed with seven spines in a single row
amazonensis n. sp.

34. Posterior tibia sinuate; anterior tibia normal
Posterior tibia straight; anterior tibia dilated
armata Champ.

35. Posterior femur with a regular row of teeth
beameri n. sp.

Posterior femur with two rows of teeth and with one large tooth at basal third and another at the middle
sinuata n. sp.

36. Intermediate tibia twice as long as third tarsal segment; connexiva in female not meeting above abdomen
rivale Bueno.

Intermediate tibia less than twice as long as last tarsal segment

37. Connexivum not meeting above last abdominal segment
Connexivum meeting above the last abdominal segment

38. Connexivum with papices of segments I, V, and VI with longer hairs; antennal segments III and IV both less than II
distincta Champ.

Connexivum without hairs; antennal segments III and IV equal to segment II
flavicincta Bueno.

39. Pronotum produced posteriorly into a spiniform process, at least in the winged forms 40.
 Pronotum not produced posteriorly 42.
40. Hind femur with double row of teeth in part; apterous female with a spiniform process on pronotum oriander Parshley.
 Hind femur with one long spine, followed by a row of shorter spines 41.
41. Pronotal spine emarginate, forming two distinct points; connexivum compressed strongly, apex produced into a long slender spine obesa Uhler.
 Pronotal spine not emarginate; connexivum not strongly reflexed angustipes Uhler.
42. Connexivum of female reflexed over last abdominal segments, and produced posteriorly to form a spine 43.
 Connexivum of female ending in a tuft of brown hairs, not in a spine knighti Drake & Harris.
43. Spines formed by apex of connexivum long and di-varicating; connexivum sometimes meeting over last three segments; anterior trochanter of male armed with black spine arctoa Bueno.
 Spines at apex of connexivum short and blunt; anterior trochanters unarmed choreutes Hussey.

#/#

Note 1. This key is in part copied after Champion and Bueno, but additions and rearrangements have been made. Most of the work is original.

Note 2. Four species have been left out of this key, due to the fact that the descriptions are inadequate for obtaining characters distinctive enough to use in a key. These species are hirtipes Drake & Harris, trailii (White), whitei (Breddin), and

vivida (White). Notes are listed under each of these species. Excellentis Drake & Harris is also omitted, being listed as a synonym of R. distincta Champ.

Note 3. A key to the species of the Eastern Hemisphere were not included at this time because of the absence of the original descriptions. There are nine species listed from the Eastern Hemisphere.

Rhagovelia amazonensis s. sp.

Antennae:- 20:12:12:12

Intermediate leg:- 44:33:13:19

Posterior leg:- 36:28:2:8

General color dark brown, sometimes lighter; clothed with yellow pubescence. Pronotum with narrow transverse, light brown or yellow band across anterior margin. All coxae, anterior trochanter, intermediate and posterior trochanters in part, the acetabula in part, base of anterior and posterior femora, base of antennae, and edge of connexivum, light brown. Pronotum obtusely rounded behind, covering the mesonotum; metanotum slightly emarginate behind. Venter varying from greyish-black to brown with grey sutures. Anterior trochanter unarmed; posterior tibia armed at apex with a spur.

Apterous male: Connexiva broader at the center, tapering slightly anteriorly and posteriorly. Posterior trochanter armed on inner side with one stout spine. Posterior femur slightly incrassate, armed at basal third with a long spine followed by six small, stout spines.

Apterous female: Abdomen broad, subparallel. Connexiva nearly vertical. First and fourth dorsal segments of the abdomen grey; segment two with numerous long fine hairs. Posterior femur much as in male, with spines a trifle longer. Connexiva and abdomen ending with numerous stiff hairs. First genital segment flat and obtusely rounded; below with median carina. Posterior sinuate, denticulate on inner margin and armed at apex with a long stout spur.

Length 3.5-3.6 mm.; width 1.25 mm.

Holotype apterous male, Allotype apterous female, Paratypes forty apterous females; all from Solimoes River, Manacapuru, Amazonas Brazil, April 1926, S. M. Klages.

This species is close to R. williamsi n. sp., even the male claspers being similar in shape, but differing in size. The connexiva gradually decrease in size in this species, while in williamsi the connexiva end in a sharp spine.

Rhagovelia angustipes Uhler, P. R.

"The Hemiptera-Heteroptera of Grenada,"
Proceedings of the Zoological Society of
London, 1894, p. 215.

"In form similar to R. obesa Uhler; black, opaque, closely pubescent. Head including the eyes a little wider than the front of the pronotum, the middle line elevated into a callosity which runs back, tapering, to near the occiput; eyes prominent, coarsely granulated; antennae black, set with remote, erect bristles, with the basal joint curved, yellow at base, and the second and third joints shorter, subequal in length; rostrum piceous black, extending to behind the anterior coxae. Pronotum moderately convex, yellow back of the head, trapezoidal in front of the humeral angles, triangular and a little shorter behind them, with the posterior margin flat, a little reflexed on the edge, and with the tip a little bent and almost acute, a little sinuated. Underside plumbeous. Scutellum concealed. Legs hairy; the coxae, trochanters and base of anterior femora bright yellow, the posterior femora very slightly thickened, armed beneath with a row of very fine teeth; the tibiae especially clothed with stiff hairs. Hemelytra long and rather narrow, the costal vein stout, clothed at base with stiff bristles. Venter smooth, plumbeous, with the genital pieces and the middle of the border of the apical segment orange.

"Length to tip of venter 3-3½ mm.; width of pronotum 1¼ mm.

"Numerous specimens were obtained at Balthazar, August 7, at an altitude of 250 feet on running water; also on the Mount Gay estate, April 5, at the same altitude; and at Mount Maitland, August 20-25, at an altitude of 150 feet, on the surface of a stream of spring water."

Four specimens from Tena, Ecuador, were compared with the type by Dr. Hungerford and determined to be the same. These specimens differ from the description given in having the pronotum sutured off from the mesonotum. However this variation in R. angustipes Uhler was noted by a previous writer.

Further description of the Ecuador specimens:

Antennae:- (male) 20:11:13:13; (female) 20:10:12:13

Intermediate leg:- 42:28:13:19; 41:27:12:20

Posterior leg:- 34:34:4:9; 32:33:4:9

Apterous male: Genital segments large. Posterior femur slightly incrassate, being about equal to intermediate femur at base; armed with one tooth at the apical two-fifths, followed by 8 or 10 short teeth. Posterior tibia armed only with slender spur at apex. Venter with distinct median carina, the last segment excavate each side.

Apterous female; Dorsum of last five abdominal segments with shining black spot; dorsum humped on the first and second segments. Posterior femur armed with one tooth at apical third, followed by four, and possibly more, minute teeth.

Told from related species by shorter second tarsal segment, by antennal proportions, and male clasper.

Rhagovelia arctoa Bueno

"The Nearctic Rhagoveliae,"

Transactions of The American Entomological
Society, Vol. L, pp. 243-252, 1924.

"Antennal formula: male, I:II:III:IV::16:9:10:9; fe-
male, 17:10:9:8.

"Intermediate legs: femur:tibia:tars. seg. II;tars.
seg. III::35:25:15:15.

"Males, apterous: Femoral spine not very slender,
straighter, followed by six blunt spines, stouter in com-
parison, more prominent; femoral spine three-fifths length
of femur from apex; posterior tibia denticulate; posterior
tars. seg. II: seg. III::3:6; anterior trochanters with a
stout black spine on the outer aspect; abdominal segments
two to five subequal, six twice as long as the preceding
one.

"Females, apterous: Pronotum posteriorly sinuately
truncate, feebly carinate longitudinally. Posterior fe-
mora with a sharp curved spine followed by smaller ones,
as in male; not much stouter than intermediate femora. An-
terior trochanters without a spine; connexivum reflexed,
meeting above last abdominal segment and terminating acutely
in two long divaricating spines; genital segment trape-
zoidal, polished above; edge of first segment of connexivum
with long hairs appressed to form a seeming spine.

"Long, males, 3.8-4.4 mm.; females 4.2-4.4 mm.

"Wide, males, 1.1 mm; females, 1.4 mm.

"Type, apterous male, Little Devil Track Creek, Cook County, Minnesota, August 11, 1922, H. B. Hungerford collector; paratypes, sixteen apterous males and six females, same data; four females, two males, August 12, 1922, same locality, W. E. Hoffman collector; six males, six females, Bengal, Minnesota, August 18, 1922, Hoffman collector.

"Type, in collection of University of Kansas; paratypes in the same, and collections of W. E. Hoffman, H. M. Parshley, J. R. de la Torre Bueno and the American Entomological Society."

This species, of which the type and 13 paratypes as well as 150 specimens collected by Dr. Hungerford at the type locality, has been carefully studied and found to be very close to R. obesa Uhler. The claspers of the males of the two species are decidedly different, that of arctoa being much longer (long 3, wide over 3; obesa long 5, wide 2 $\frac{1}{2}$).

Externally the two species may be told apart by the darker legs of arctoa, which lack the pale basal markings of the anterior femora, and the black coxae and trochanters of the intermediate and posterior legs. In obesa the coxae, trochanters, and the base of the anterior femora are marked with flavous.

Locality: Minnesota, Michigan, Ontario Canada.

Rhagovelia armata (Burmeister)

(Velia armata Burmeister),

Handbuch der Entomologie,

Vol. II, p. 212, 1835.

"Fusca, coxis trochanteribus femoribus anticus et posticis basi, abdominisque margine fulvis; pronotum maximum, postice clavatum. Long. 2 1/3'".

"Von Mexico. Die Mannchen haben stark verdickte, stachelige hinterschenkel."

Description by Champion,

Biologia Centrali-Americanica,

Heteroptera, Vol. II, p. 136.

"Winged form. Male. Moderately elongate, brownish-black, the legs with an aeneous lustre, the base of the antennae, a transverse band on the front of the pronotum, the prosternum, all the coxae and trochanters, the basal half of the anterior femora, the hind femora at the base, within and beneath, the connexivum, the last three ventral segments broadly in the middle, and the genital segments beneath, flavous or fulvous; the pleura and sides of the abdomen bluish-grey; the elytra blackish-brown, the nervures darker; the head and pronotum somewhat thickly clothed with short yellow pubescence, the head and propleura with a few long bristly hairs; the costal margins of the elytra, the sides of the body, the legs

and the antennae pubescent, the two basal joints of the antennae, the margins of the genital and sixth connexival segments, and the legs clothed also with long scattered setae. Head with a smooth impressed median line; antennae moderately elongate, joint 1 rather more than one-half longer than 2, 2 and 3 subequal, 4 a little shorter than 3, pointed at the tip. Pronotum produced behind into a long spiniform process which is armed with a stout spine beneath. Legs moderately stout; anterior tibiae dilated in their outer half, grooved beneath; posterior femora moderately incrassate, armed with a long tooth at the middle, and with a row of short teeth extending thence to the apex, these teeth diminishing in length outwards; posterior tibiae slightly sinuate and finely denticulate within, straight on their outer edge, and with a short straight tooth at the inner apical angle; posterior trochanters obsoletely denticulate beneath; intermediate tarsi with joint 2 and 3 subequal in length. Ventral segments 1 and 2 and the intercoxal portion of the metasternum depressed, the two segments with indications of a median ridge, the sixth ventral segment feebly emarginate at the apex and depressed along the middle behind.

"Apterous form. Female. Fusiform, the pronotum abbreviated and rounded behind; the posterior femora a little less incrassate, with the first (or median) tooth longer and those near the apex shorter; posterior tibiae straight and finely denticulate on their inner edge.

"Length $5\frac{1}{2}$, breadth (of pronotum of winged male)

2 millim.

"Habitat: Mexico."

Champion says that R. armata is nearest allied to R. femoralis, from which it differs in the more elongate body, the longer legs and antennae, the less incrassate posterior femora in the male and the hind tibiae without long teeth. Near R. distincta also.

Rhagovelia bakeri Bergroth, E

"Four New American Hemiptera,"

Psyche, Vol. 21, p. 74, 1914.

"Above black, beneath greyish black, legs greenish black, somewhat aenescens, pronotum with an apical whitish fascia interrupted in the middle, abdomen at the sides immediately within the margin narrowly and obscurely streaked with yellowish brown, basal part of first antennal joint, anterior acetabula, all coxae and trochanters, and basal part of fore femora yellow, hind femora at the base above and beneath also tinged with yellow. Head with an impressed median line in front, rostrum passing the middle of the mesosternum, antennae with the first two joints pubescent, with scattered longer hairs, outer margin of the last three joints straight, inner margin slightly convex, first joint one-half longer than second, third a little shorter than second, fourth hardly shorter than third, pointed at tip. Mesosternum with the ridges between the anterior and the middle coxae well marked, pubescent, curved inwardly, strongly divergent posteriorly. Abdomen gradually tapering to the tip, not carinated beneath. Legs pubescent, with scattered longer hairs, middle femora thickened toward the base, middle tarsi a little longer than the tibiae, the second joint a little shorter than the third, posterior tibiae with a short straight spur at the apex."

"Apterous male. Pronotum a little broader than long, rounded behind. Last dorsal segment of abdomen truncate at apex, last ventral segment arcuately emarginate at apex. First genital segment ferruginous beneath at the base. Posterior femora very strongly incrassate, not reaching the tip of the apical genital segment, spined beneath from the apex to a little beyond the middle, the first spine (near the middle) the longest, the following gradually diminishing in length toward the apex. Posterior tibiae straight, finely denticulate beneath down their whole length, without large teeth, the teeth of the middle third slightly longer, the apical third slightly narrower than the rest.

"Length, 4 mm.

"Locality: Nicaragua (Granada).

"Allied to R. femoralis Champ., but the antennae are differently constructed; the venter is not ridged in the middle; the posterior tibiae have not large teeth, etc."

Rhagovelia beameri Gould

(Unpublished, May 1, 1929, but
manuscript to publisher)

Antennae:- 46:28:32:26

Intermediate leg:- 88:72:31:37

Posterior leg:- 77:96:10:19

General color blackish, with brown pubescence; Head with usual impressed lines. Antennae, legs, and sides of body clothed with longer hairs, with a few scattered setae (except on the two apical antennal segments). Base of antennae, base of anterior femora, all coxae, anterior and posterior trochanters, propleura, edge of connexivum, and two spots on the pronotum, brown. Venter black shading to brown posteriorly. Pronotum obtusely rounded in apterous forms. Anterior trochanters unarmed; posterior tibia with a stout spur.

Apterous male: Posterior femora enormously incrassated, armed with numerous short teeth arranged in two regular rows, the upper row longer and with eight teeth, the lower row of minute teeth and extending nearly across the femur. Posterior tibiae bowed inwards to beyond the middle and thence curved slightly outward to the apex, denticulation small near the base and increasing in size toward the apex. Connexivum broad but little reflexed. Sixth dorsal segment truncate at the apex. Genital segments and last abdominal segment clothed with bristly hairs. Venter carinated basally.

Apterous female: Posterior femora slightly incrassate,

a little thicker than the intermediate, and armed with three short spines and usually three minute spines on the apical third. Posterior tibia straight and unarmed. First genital segment set in between ends of connexiva and rounded posteriorly; ventrally with a distinct longitudinal suture-like groove. Connexiva semi-vertical. First ventral abdominal segment carinated.

Winged forms: Much as in apterous forms. Posterior femora not so much incrassated. Pronotum of male and female long and bluntly angular (long 37, wide 35). Elytra extending beyond the tip of the abdomen.

Length, male 6 mm.; female and winged forms 6.3 mm.

Width, male and female 1.8 mm.; winged forms 2.3 mm.

Genitalia: The clasper of the male resembles no other specimen studied. Its size is nearly twice as large as any other North American species. See plate .

Holotype, apterous male, Cochise Co., Ariz., July 29, 1927, R. H. Beamer; Allotype, apterous female, same data; morphotypes winged female, same data; Paratypes, apterous males and females, same data; also one apterous female, Huachuca Mts., Ariz., Aug. 1, 1927, L. D. Anderson. All types in the University of Kansas collection.

Comparative notes: This species is very similiar to R. armata (Burm), being like it in color, size and the posterior legs. It differs from armata in the shape of the pronotum, which is produced posteriorly to an acute angle,

but not into a spiniform process. Also the anterior tibiae are not dilated in their apical half, and the posterior tibiae are more sinuate.

This species is also close to R. varipes Champion, differing in having the second tarsal segment of the intermediate leg shorter than the third.

Rhagovelia calopa Drake & Harris

"Notes on the Genus Rhagovelia",

Proceedings of the Biological Society

of Washington, Vol. 40, pp. 131-138.

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: $\frac{2}{3}$ 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 en-

tire 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 short 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 be readily 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 castanea n. sp.

Antennae:- 42:27:24:22

Intermediate leg:-(Male) 100:72:25:34

(Female) 95:68:25:36

Posterior leg:-(Male) 78 (24):60:6:12

(Female) 78 (20): 70:6:12

General color dark reddish-brown, almost a black; all appendages dark brown. Most sutures black. Body clothed with short brown pubescence; sides of body, legs, and genital segments with longer hairs; legs and segments one and two of antennae with scattered setae. Pronotum obtusely rounded and with a lighter band in front, wider than long (8:7). Anterior and intermediate acetabula of lighter brown. Venter of same color as dorsum. Posterior tibia armed at apex with short spur; anterior trochanter unarmed.

Apterous male:- Connexivum broad but not reflexed. Body lines straight, tapering posteriorly with no break between last abdominal and first genital segment. First abdominal segment angular at middle. Posterior trochanter armed on inner surface. Posterior femur greatly incrassate and armed with two apparent rows of spines, the lowermost with two spines preceded to the base by short teeth, the upper row starting at apical third consisting of a series of stout spines. Posterior tibia sinuate and with two rows of teeth, two teeth near the apex larger.

Apterous female: Sixth abdominal segment ending with many curved hairs. Connexivum slightly deeper and more ver-

tical than in the male. Posterior femur moderately incrassate, armed with five larger spines and several small, much as in the male; teeth on basal third few and small. Posterior tibia sinuate and denticulate.

Length 4.6 mm.; width 1.4 mm.

Holotype, apterous male; Allotype, apterous female;
Paratypes, apterous males and females; all from Mera,
Ecuador, 1923, F. X. Williams.

In this species the mesonotum is covered by the pronotum; the metanotum emarginate behind.

The specimens included in this species were first thought to be two species, due to a great variation in color and a slight difference in the armature of the posterior femur. Six specimens are dark, while twelve were light brown in color. The lighter bugs have a larger posterior femur. Comparison of the genitalia of the two forms reveal them to be the same.

R. castanea n. sp. may be close to R. collaris (Burm.), but a good description of the latter is lacking.

Rhagovelia choreutes Hussey, R. F.

"Some New or Little Known Hemiptera from
Florida and Georgia,"

Journal of the New York Entomological Society,
Vol. 33, June, 1925.

"Color dull black or very dark gray, the dorsum with very short sparse yellow pale and with longer black hairs, the hairs longest on the pleura (especially in the male); basal third of first antennal segment, all the coxae and trochantera, and the basal half of the fore and middle femora yellow; propleura, a large spot on either side of the median line at the anterior pronotal margin, and the outer one-half to one-third of the connexivum orange-yellow; apex of frons plumbeous, shading into orange-yellow on the genae. Occasionally one or both of the anterior pronotal spots may be pale yellow, pale gray, or even plumbeous."

"Head $2\frac{1}{2}$ to $2\frac{3}{4}$ times as broad as long (in dorsal aspect), vertex somewhat more tumid and less flattened above than in R. obesa; width of an eye about $\frac{2}{3}$ as great as the posterior width of the vertex, or somewhat greater than its anterior width. First antennal segment about $\frac{7}{8}$ longer than fourth. Pronotum rounded behind, entirely concealing the mesonotum, its length equal to its humeral width, distinctly but rather remotely punctate, the punctures most distinct on the posterior part. Propleura with a curving row of punctures arising behind

the coxa and extending upward nearly parallel to the posterior margin; mesopleura with several punctures in front of the coxal cleft, and with a similar row of punctures paralleling the posterior margin. Odoriferous orifices located distinctly below the middle of the outer face of the posterior coxal cavities, with a tuft of six or eight long setae (much longer and more distinct in the female than in the male), directly upward and outward, commonly more or less agglutinated to resemble a slender yellow spine. Anterior trochantera unarmed in either sex. Posterior femora with a long straight or slightly curved spine, at or slightly before the middle of the femur, followed by five or six smaller spines, diminishing in length toward the distal end of the femur; posterior tibiae minutely denticulate on the basal one-third or one half of the posterior face. Intermediate tarsal segment III cleft for three-fourths of its length.

"Male. Fusiform, more robust than the apterous males of R. obesa, but the legs shorter and thicker. Antennal formula, segments I:II:III:IV equals 35:21:19:19. Legs, femur : tibia : tarsal segment II : tarsal segment III equals (intermediate pair) 71:53:25:35, (posterior pair) 54:56:7:14. Posterior femora moderately incrassate, about one-half thicker than the intermediate femora at the base; long spine situated just before the middle of the femur. Genital segments together about one-third longer than the last dorsal abdominal segment.

"Female. Quite similar in form to the apterous fe-

male of R. obesa, but the legs shorter and thicker, the connexivum differently formed, and the pronotum and the first abdominal segments otherwise constricted. Antennal formula, segments I:II:III:IV equals 38:22:20:20. Legs, femur : tibia : tarsal segments II : tarsal segment III equals (intermediate pair) 72:56:28:40, (posterior pair) 57:65:8:16. Posterior femora not thicker than intermediate femora at the base. Basal dorsal segments of the abdomen not tumid; first connexival segment without a tuft of hairs on the margin. Connexivum meeting above the last abdominal segment, occasionally above the last three segments, but not (as in obesa) meeting above the fourth segment, then diverging slightly to meet again above the sixth; apex obliquely truncate at an angle of about 45° , forming two short blunt spines, about as long as the width of the connexivum, not diverging posteriorly, pilose at their tips. Apex of the sixth abdominal segment with a tuft of long curved cilia on each side at the upper lateral angle of the first genital segment, and with several shorter cilia at each side below; the dorso-lateral cilia may be more or less agglutinated, resembling a slender curved spine at either side of the genital segment.

"Macropterous form. Unknown.

"Length 3.8 mm., humeral width 1.3 mm.

"Florida."

In the University of Kansas collection are two groups that belong to choreutes. One group of 56 specimens was collected in the Arbuckle Mts., Davis, Okla., in 1925 by R. H. Beamer. These are considered typical of the specimens described by Hussey. The other group of over 110 specimens are from Eddy Co., N. Mex., collected by P. A. Readio in 1927. The specimens are slightly larger and more near a black in color, but are probably the same species, or at least a variety of the former. The genitalia are quite similiar.

Rhagovelia collaris (Burmeister)

(Velia collaris Burmeister),

Handbuch der Entomologie,

Vol. II, p. 212, 1835.

"Fusca, ventre, pronoti margine antico, abdominis
laterali, antennarum pedumque basi fulvis. Long. 1 $\frac{3}{4}$ '''.

"Von Prinzenhafen auf St. Domingo. Männchen ebenso
unterschieden. Ich sah nur ungeflugelte Individuen,
deren Füsse indess völlig ausgebildet waren."

Notes by Mayr, 1867

Reise der Österreichischen Fregatte

Novara, Zoologischer Theil,

Zweiter Band, Hemiptera, p. 180.

"Rio de Janeiro.

"Die mir vorliegenden Exemplare, von welche nur
einige geflügelt sind, stimmen nicht vollkommen mit den
Beschreibungen von Burmeister und Guerin überein, denn
beide geben an, dass die Basis der Beine gelb-braun sei,
während ich die ganzen Schenkel gelb-braun, die Basis der
Hinterschenkel und die Hüften aller Beine braunlich-gelb
finde; es sind dies jedoch Abweichungen, welche gewiss
nur unwesentlich sind, da sich im kaiserlich-zoologischen
museum zwei ungeflugelte Stücke aus Mexico vorfinden,
welche den Übergang bilden, da die Hüften und Schenkel-
ringe, so wie die Vorderschenkel, bei diesen gelb und

letztere nur aussen an der Endhalbte und innen nahe dem Kniegelenke schwarz oder braun sind und einen schwach blaulichen Blanz haben, welcher sick auch an der schwarzen Oberseite der Mittelschenkel findet; die Unterseite der Mittelschenkel ist röthlich-braungelb, die Hinterschenkel sind oben eben so gefarbt wie die Mittelschenkel, nur an der Basis schmal gelb, an der Unterseite sind sie ebenfalls gelb. Überdies zeigen auch einige aus Rio de Janeiro stammende Larven eine solche aber blassere Färbung der Beine, so wie auch der Kopf, der Thorax und der Hinterleib röthlich-gelb gefärbt sind."

In his examination of specimens in the Berlin Museum, Dr. Hungerford found four types of Velia collaris Burm. They were labelled as follows:

1. Wingless a. White label with "3406" printed.
female b. Green label with "Port au Pr.", also the word "Ehoerb."
c. Green label with "V. collaris Er."
d. White label with "V. armata Burm."
2. Wingless a. White label with "Cat. No. 3406" written
female b. Green label with "Port au Pr. Ehrenburg".
c. White label with "Velia armata Burm."
3. Wingless a. White label with "Cat. No. 3406" written.
male b. Green label with "Port au Pr. Ehrenburg".
c. White label with "Velia armata Burm."

Dr. Hungerford says that his specimen 28,293 female from Port au Prince, Haiti, is similiar to No. 1. The male of 28,293 is not like No. 3 however, but the male of 28,306 from Salvador is. Therefore the specimens from Haiti are called Rhagovelia collaris (Burm.) and the other specimens are made a new variety of collaris.

Since no good description of collaris has been given in English, the following notes are given, based on the Haiti specimens:

Antennae:- 28:16:18:14

Intermediate leg:- 60:45:21:25

Posterior leg:- 50:53:6:13

General color grayish-black with golden pubescence.

Transverse flavous band on pronotum conspicuous. Mesonotum hidden. Base of antennae, base of anterior and posterior femora, edge of connexivum, and all coxae and trochanters, light brown. Legs and antennae of a brownish color. Posterior tibia with spur at apex.

Apterous male; Anterior tibia greatly dilated apically and grooved on inner side. Posterior femur greatly incrassate and armed with two rows of spines, the lower row small and equal throughout, the upper row of about 12 teeth decreasing in size apically. Posterior tibia armed with stout regular spines throughout and slightly sinuate.

Apterous female: Anterior tibia somewhat dilated. Connexiva vertical and much narrowed in from the base at first, afterwards continuing subparallel. Posterior femur slightly incrassate, armed with four large teeth and four or five minute teeth. Posterior tibia as in male.

Length, male 4.7 mm., female 5.3 mm.; width 1.6 mm.

Dr. Hungerford says the collaris specimens in the Vienna Museum determined in 1865 by Mayr, are ~~not~~ not the same as the type.

Rhagovelia collaris var. planipes n. var.

Antennae; - 30:18:---:--

Intermediate leg:- 62:44:21;21

Posterior leg:- 56:50:6:13

General color reddish-brown, clothed with brown pubescence. Transverse band on pronotum light brown. Mesonotum covered by pronotum, metanotum slightly emarginate. Posterior tibia armed with short spur at apex.

Apterous male: Anterior tibia greatly dilated and excavate beneath. Posterior femur enormously incrassate and armed on the basal third with minute spines followed by two rows of stout spines; the upper row of spines of equal size, but larger than the lower row, at the basal third is one large spine just above the first spine in the upper row. Posterior tibia very strongly sinuate and armed with prominent, with those on the apical third larger.

Apterous female: Anterior tibia slightly dilated and grooved. Connexiva vertical and much narrowed in from the base at first, afterwards continuing subparallel. Posterior femur slightly incrassate, armed at apical $\frac{2}{3}$ with a long spine followed by 6-10 spines decreasing apically. Posterior tibia nearly straight and with prominent small teeth only on basal half.

Length 5.6 mm., width 1.7 mm.

This variety is near type NO. 3, of which Dr. Hungerford says, "thick hind femora with all spines but two short,

one near the outer end and one near the base. Hind tibia curved and armed with blunt spurs on distal third."

Holotype, apterous male; Allotype, apterous female; both from Mt. Cacaguatique Dept., St. Miguel, Salvador, Dec. 14, 1925, R. A. Stirton.

These specimens were made a variety of collaris, because of similarity of genitalia and claspers, the proportional measurements, and same shape. The male differs from type No. 3 in having only one large spine on the posterior femur.

Also there are three specimens from Huigra, Ecuador, F. X. Williams---a winged male, and an apterous male and female.

Rhagovelia collaris var. pulchra n. var.

Antennae:- 32:16:17:16

Intermediate leg:- 62:44:21:26

Posterior leg:- 54:50:7:13

General color brownish-black, with the dorsum of abdomen a reddish-brown, and clothed with golden pubescence. Pronotum broadly rounded behind covering the mesonotum, and with a bright yellow-brown transverse band on the anterior margin. Base of antennae, base of anterior and posterior femora, all coxae and trochanters, light brown. Venter, connexiva and most of pleura, light brown.

Apterous male: Anterior tibia greatly dilated and excavate beneath. Posterior femur greatly incrassate and armed with a long tooth at the basal 2/5, followed by ten teeth decreasing in size apically, and preceded by a row of minute teeth to the base; also a lower row of small teeth. Denticulations on posterior trochanter. Posterior tibia armed with stout, small teeth not in a regular row and at apex with a stout spur; not sinuate.

Apterous female: Anterior tibia slightly dilated and grooved. Connexiva vertical and much narrowed in from the base at first, afterwards continuing subparallel. Posterior femur slightly incrassate and armed with seven teeth. Posterior tibia straight and with no visible denticulations.

Winged male: Much as in apterous male. Pronotum produced behind into a slightly elevated spine. Posterior

femur not so much incrassate.

Length, male 5 mm., female 5.4 mm.; width 1.6-1.8 mm.

This variety is distinct because of its color markings. Many of the individuals have white eyes, while the normal color is brownish-black.

This variety was placed under collaris because of similarity of shape, claspers, genitalia, and proportional measurements. It differs from R. collaris var. planipes n. var. in color and in the armature and incrassate condition of the posterior femur. Also in this variety the anterior tibia of the male is not dilated quite so much.

Holotype, apterous male; apterous female, Allotype; Morphotype, winged male; paratypes, apterous males and females. All are from Dominica Roseau, B. W. I., Jan. 29, 1926, P. G. Howes.

Among the specimens from the British Museum, I find a nearly mature apterous male. It appears to be this variety and is therefore listed. It is from Nat. Forest, Lugohl P. R., Mar. 10, 1927, N. A. Hoffman.

Rhagovelia confusa n. sp.

Antennae:- 28:16:18:15

Intermediate leg:- 60:38:24:24

Posterior leg:- 47:44:6:10

General color greyish-black, clothed with brown pubescence; venter bluish-grey. Pronotum with narrow transverse band of flavous with yellow spots each side of median line. Base of antennae, the anterior and posterior coxae and trochanters, brown. Sides of body, legs, and two basal segments of antennae with long hairs and a few scattered setae. Head with usual impressed median line crossed with a V-shaped suture on the upper surface. Anterior trochanter unarmed; anterior tibia not dilated. Posterior tibia armed with a short spur at apex. Pronotum in apterous forms sutured off from mesonotum.

Apterous male: Pronotum wider transversely (6:1), sutured off from mesonotum, which is wider transversely also (4:3); mesonotum nearly covering the median portion of metanotum, both truncate on posterior margin. Connexiva wide near base but tapering posteriorly. Sternal sutures marked by ridges. Venter with slight median carina. Last abdominal segment and first genital segment glabrous beneath; genital segments large. Posterior femur slightly incrassate, armed near middle with one long tooth followed by 5 to 8 short teeth. Posterior tibia very slightly sinuate and often with minute teeth.

Apterous female: Connexivum semi-vertical, otherwise as

in the male. Last three segments of abdomen with shining spots above. Genital segments small. Posterior femur nearly as in the male.

Winged forms: Pronotum as broad as long. Elytra extending for some distance beyond the genital segments. Legs as in apterous forms.

Length: winged forms 4.4-4.7 mm.; apterous females 3.7-3.9 mm.; apterous males 3.3-3.4 mm. Width: winged forms 1.6 mm.; apterous forms 1.4-1.6 mm.

Holotype apterous male, Allotype apterous female, Morphotypes winged male and female, Paratypes winged and apterous males and females, all collected in Ecuador in 1923 by F. X. Williams. Localities included are Mera, Tena, Oriente, and Napo, Ecuador.

This species belongs to the tenuipes group and differs from that species in having the intermediate tarsal segments equal. It differs from gregalis D. & H. by having the apex of the posterior tibia armed with a spur, and from regalis D. & H. in size and antennal proportions. Besides the above mentioned, this species differs in many other characters.

Many of the recent writers on the Genus Rhagovelia have been using proportional measurements as a specific character. The above proportions are averages from a series of 27 specimens as given below. It can readily be seen that the proportions alone are not good characters and are often misleading especially in a case where only one or two specimens are to be examined.

Rhagovelia confusa n. sp.

Variations in Proportional Measurements

No.	Antennae				Intermediate Leg				Posterior Leg				Sex
	I	II	III	IV	Femur	Tibia	TSI	TSII	Femur	Tibia	TI	TII	
1.	28	16	17	15	60	37	23	24	46	44	6	12	F
2.	28	18			65	40	25	25	51	47	6	11	F
3.	28	16	18	15	60	37	24	25	46	45	5	10	FW
4.	28	14			56	35	20	23	44	40	5	10	F
5.	28	15	17	15	56	37	23	23	44	43	5	10	FW
6.	28	15			59	36	20	22	46	44	5	10	M
7.	32	19	20	17	64	40	26	24	50	47	6	10	M
8.	28	14	16	14	55	36	20	22	45	41	5	10	FW
9.	30	16	20	16					50	46	6	10	F
10.	28	14			58	36	22	22	46	43	5	10	Mw
11.	29	16			60	38	27	22	48	44	6	10	Mw
12.	28	18	19	16	64	38	26	24	51	44	6	10	Mw
13.	28	17	18	14	62	38	24	24	46	45	6	10	FW
14.					63	40	26	25	48	44	6	10	Mw
15.	28	14	17	14	57	36	23	20	45	40	5	10	M
16.	29	18	19	16	58	36	22	22	46	42	6	10	M
17.	30	18			61	39	24	23	49	44	6	10	M
18.	28	16	18	15	63	38	23	24	50	48			F
19.	30	18	20		64	40	24	25	48	49	6	10	F
20.					64	38	24	25	47	48	6	10	F
21.					64	40	24	25	48	48	6	10	F
22.	28	18			63	38	24	24	47	44			F
23.	28	18	19	16	59	37	24	24	46	44	6	10	M
24.	32	18	19	16	63	40	28	24	54	44	5	9	M
25.	28	17	19	17	63	39	26	26	51	48	6	10	M
26.	28	17	18		58	38	24	23	46	42	6	9	M
27.	28	14			56	35	22	21	47	44	5	9	M
Ave.	28	16	18	15	60	38	24	24	47	44	6	10	

M--male

F--female

W--winged

Rhagovelia crassipes Champion

Biologia Centrali-Americanana,

Heteroptera, Vol. II, p. 133.

"Winged form. Elongate, robust, brownish-black, the front of the head and the posterior margin of the pronotum, and sometimes a narrow evanescent median line on the disc of the latter anteriorly, obscure ferruginous; the pronotum with a transverse fulvous fascia in front, this becoming whitish at the sides; the venter, except the sides, and the connexival margins fulvous; the pleura and the sides of the venter bluish-grey; the antennae nigro-fuscous, testaceous at the base; the legs fuscous or nigro-fuscous, much paler beneath, the trochanters and coxae, and the base of the anterior and hind femora testaceous; the elytra blackish-brown, with black nervures; the entire body, legs, and antennae clothed with short, fine, brownish or pallid pubescence, the head, pronotum and sides of the body sparsely, and joints 1-3 of the antennae thickly, clothed also with long hairs, the legs and joints 1 and 2 of the antennae with scattered setae. Head with a smooth impressed median line; antennae moderately long, joint 1 rather more than one-half longer than 2, 3 a little shorter than 2, 4 shorter than 3, pointed at the tip. Pronotum produced behind into a long, raised, spiniform process, which is armed beneath at some distant before the tip

with a stout tooth; the surface impressed with a few scattered punctures. Elytra extending to some little distance beyond the apex of the abdomen, the nervures prominent. Legs stout, the hind pair comparatively elongate; intermediate tarsi with joint 2 slightly shorter than 3.

Male. Posterior femora enormously incrassated, armed with numerous short teeth, the innermost of these arranged in two regular rows, and with one longer tooth towards the base and three or four others towards the apex; posterior tibiae bowed inwards to beyond the middle and curved outwards thence to the apex, shortly dentate on their inner edge, and armed with one long tooth at about one-third from the apex, a shorter one close to it, one near the apex, and another at the apical angle; posterior coxae and trochanter very stout, the coxae rather narrowly separated, trochanters obsoletely dentate beneath. Metasternum with a smooth, rufous, tuberculiform prominence in the middle behind. Ventral segment one third keeled down the center. Sixth ventral segment arcuate-emarginate at the apex, the sides of this segment, like those of the genital segments, thickly clothed with bristly hairs. Sixth dorsal segment truncate at the apex.

"Female. Posterior femora moderately incrassate, slightly hollowed on the inner side towards the apex, armed with numerous short teeth, which extend from the middle to the apex, and with one long slightly curved

tooth a little before the middle; posterior tibiae straight shortly denticulate within, and with a short straight tooth at the apical angle; posterior coxae widely separated. Sixth dorsal segment rounded at the apex.

"Length 6-7, breadth (of the pronotum) 2 1/5 to 2 2/5 millim.

"Apterous form. Fusiform, the pronotum abbreviated and rounded behind, the sutures and sides of the dorsal abdominal segments grey or bluish-grey, the latter inclining to ferruginous down the center."

"Habitat: Panama, Tole and Pena Blanca (Champion)."

According to Champion "this species is well characterized by the enormously thickened hind femora and the bowed hind tibiae in the male sex, both the tibiae and femora being armed with numerous teeth."

Rhagovelia distincta Champion,
Biologia Centrali-Americanana,
Heteroptera, Vol. II, p. 135

Velia distincta Uhler,
Walker Cat. Hemipt.-Hetero., VIII

Rhagovelia mexicana Sign.,
Bull. Soc. Ent. Fr., 1877, p. lv

"Winged form. Moderately elongate, black, the legs with a green or bluish-green lustre, the pronotum with a narrow transverse fulvous mark on each side of the disc in front, the base of the antennae, the prosternum, the coxae and trochanters entirely or in part, the base of the antennae, the prosternum, the coxae and trochanters entirely or in part, the base of the anterior femora, the connexival margins, and in the males the terminal ventral segment in the middle and the underside fo the first genital segment, more or less flavous; the pleura and under surface bluish-grey; the body, legs, and antennae very finely pubescent, and also clothed (the two apical joints of the antennae excepted) with long scattered setae, the pronotum usually with a transverse patch of greyish or silvery pubescence on each side in front. Head with a smooth impressed median line; antennae moderately long, joint 1 about one-half longer than 2, 2 and 3 equal in length, 4 shorter than 2, stout fusiform. Pronotum with a distinct median ridge, and produced behind into a spiniform process, the surface

sparingly and finely punctured. Legs long and rather slender, the hind tibiae with a very short, indistinct tooth at the apex; intermediate tarsi with joints 2 and 3 subequal in length.

"Male. Anterior tibiae dilated in their apical half; posterior femora moderately incrassate, armed on the inner side with a long, partly flavous, tooth at about one-third from the base, and with a row of short teeth extending thence to the apex (in some of the well-developed apterous examples also closely and finely denticulate and slightly sinuous within). Pronotal spine short. Sixth ventral segment broadly flattened along the middle and feebly arcuate-emarginate at the apex.

"Female. Posterior femora not stouter than the intermediate femora, armed with a very long, acute, blackish tooth at about the middle, and very finely denticulate thence to the apex; posterior tibiae straight, obsoletely denticulate within. Pronotal spine very long, stout, and raised, armed with a strong tooth at the base beneath.

"Length 5, breadth (of the pronotum) $1\frac{1}{2}$ to $1\frac{3}{4}$ mm.

"Apterous form. Male and female. Fusiform, the pronotum abbreviated and rounded behind; the abdomen metallic green above, with a stripe of greyish pubescence running down each side of the dorsal surface; the connexivum very broad in the females, extending inwards and overlapping the dorsal surface of the abdomen, the two portions nearly or quite meeting along the median line.

"Habitat: North America, Indiana, Mexico, Orizaba.

"Var. Apterous form. Male and female. The anterior femora dark to the base; the coxae and trochanters darker, the latter at most, flavous at the base; the sixth ventral segment broadly flattened, the flattened portion limited on each side anteriorly by a short, angular, longitudinal ridge.

"Habitat: Mexico, Cuidad in Durango 8100 feet."

There is a series of specimens in the University of Kansas Museum collected by R. C. Moore in Colorado. These specimens were identified by Bueno as R. distincta Champ. several years ago. In 1928 Dr. Hungerford compared these specimens with the type material in the British Museum and says that these specimens are probably distincta. In 1927 Drake & Harris describe R. excellentis also from Colorado. After careful examination of three paratypes of excellentis from Drake, it was found that the two series of insects are identical. Therefore R. excellentis Drake & Harris is made a synonym of R. distincta Champ.

Rhagovelia distincta Champion
Rhagovelia excellentis Drake & Harris

"Notes on the Genus Rhagovelia"

Proceedings of the Biological Society
of Washington, Vol. 40, 1927

"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

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Rhagovelia excellentis D. & H. --cont.

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

Rhagovelia distincta var. arizonensis n. var.

Antennae:- 32:18:17:14.

Intermediate leg:- 68:47:23:24.

Posterior leg:- 55(13):48:6:12.

General color dark brown, the legs with a metallic green lustre; clothed with fine golden brown pubescence.

Pronotum with narrow transverse flavous band, with a brown spot in the middle. Pleura and venter brownish-gray, shading off to dull brown posteriorly. Anterior tibia dilated and excavate within.

Apterous male: Mesonotum and metanotum truncate, the former partly covered by the pronotum. Abdomen with a shiny spot on each tergite. Posterior femur strongly incrassate, armed at basal 2/5 with a long brown spine, followed by 12 or 13 shorter stout spines and preceded by a row of minute brown spines. Length 4.7, width 1.3 mm.

Apterous female: Mesonotum and metanotum slightly emarginate behind. Connexivum strongly reflexed, and nearly meeting over the 4th and 5th segments in some specimens, while nearly vertical in others. Length 5.4, width 1.5 mm.

Winged forms: Male with pronotum prolonged posteriorly to form an acute angle. Posterior femur slightly incrassate. Female with pronotum prolonged posteriorly into a spiniform process, which is armed beneath. Length 5, width 1.8 mm.

Type apterous male, Shinono Creek, 1000 ft. above mouth of Grand Canyon (Arizona), Sept. 3, 1923, R. C. Moore; Allotype apterous female, same data; Morphotypes winged male and female, same data; Paratypes many winged and apterous males and females, same data, and also from Enes Chasm, Ariz., 500 feet from Colo. River, Shinono Quadrangle, Sept. 5, 1923, R. C. Moore.

This variety is broader than the distincta specimens, and is brown in color. It is somewhat similar to the variety harmonia, also from the Grand Canyon.

Rhagovelia distincta var. cadyi n. var.

Antennae:- 29:15:17:15; (Female) 32:18:18:16

Intermediate leg:- 66:50:26:24; 76:54:25:25

Posterior leg:- 50:51:7:11; (Female) 56:61:8:11

General color black, the legs with a greenish lustre; pronotum with narrow transverse, flavous mark on each side of a slight median carina.

Apterous male: Mesonotum nearly covered by pronotum and truncate behind. Abdomen with a shiny spot on each tergite. Last segment of venter depressed posteriorly and with a distinct ridge on either side. Posterior femur moderately incrassate, armed at the basal 2/5 with a long, bent black spine which is followed by 10 shorter stout spines and preceded by a row of short black teeth. Length 4.8 mm., width 1.4 mm.

Apterous female: Mesonotum and metanotum slightly emarginate posteriorly. Apices of first, fourth and fifth segments of the connexiva with tufts of fine hair. Posterior femur slightly incrassate, armed at near the middle with a long spine followed by 5 or 6 small spines. Length 5.2 mm., width 1.5 mm.

Holotype apterous male; Allotype apterous female; Paratypes apterous males and females, all from North Platte, Wyo., Sept. 2. 1926, Geo. Cady.

The male of this variety is much like distincta; the connexiva of female not so much reflexed and is semivertical.

Rhagovelia distincta var. harmonia n. var.

Antennae:- 29:18:16:14

Intermediate leg:- 62:44:25:26

Posterior leg:- 50(16):56:6:12.

General color dark brown, with all appendages of a reddish brown color. Anterior tibia somewhat dilated.

Apterous male: Much as in var. arizonensis, but the posterior femur slightly more incrassate. Length 4.7, width 1.3 mm.

Apterous female: Connexivum much reflexed and nearly meeting over the third segment. Abdomen narrower than in arizonensis. Length 5.3, width 1.5 mm.

Apterous male Holotype; apterous female Allotype;
Paratypes apterous males and females, all from Grand Canyon, Arizona, Aug. 11, 1927, P. A. Readie; also specimens from Yavapai Co., Ariz., Aug. 9, 1927, L. D. Anderson.

Rhagovelia distincta var. modesta n. var.

Antennae:- 24:15:15:14

Intermediate Leg:- 56:38:20:23

Posterior leg:- 46:42:6:10

General color grayish-black, the legs with a brownish lustre. Base of antennae, edge of acetabula, anterior and posterior coxae, trochanters, base of anterior and posterior femur, edge of connexiva, and underside of genital segment, light brown. Anterior tibia dilated apically.

Apterous male: Pronotum broader than long, covering most of mesonotum; metanotum truncate. Last segment of venter depressed posteriorly and with a distinct carina each side. Posterior femur moderately incrassate, armed at basal $2/3$ with a long brown spine, which is followed by 10 to 12 shorter, stout spines and preceded by a row of minute black spines. Length 4.6, width 1.3 mm.

Apterous female: Connexiva strongly reflexed but not meeting and running subparallel over the abdomen; hairs on apices of first segment slightly longer. Supra-anal plate with lateral tufts of stiff brown hair. Intermediate femur somewhat flattened near the middle. Posterior femur more incrassate than intermediate, slightly swollen at the middle and armed with a long spine at apical $2/5$ and 5 or 6 shorter to the apex. Length 4.8, width 1.4 mm.

Holotype apterous male; Allotype apterous female;
Paratypes apterous males and females, all from San Antonio, Mexico, July 17, 1927, R. H. Beamer.

This variety is somewhat like distincta and is very similiar to variety vlaentina n. var. Valentina differs from this variety in the female having a longer and narrower abdomen, and the posterior femur armed with 2 large and 5 small teeth, and in the male having the posterior femur more incrassate.

Rhagovelia distincta var. proxima n. var.

Antennae:- 29:16:17:16; (female) 32:18:18:16

Intermediate leg:- 60:48:25:24; 66:49:25:24

Posterior leg:- 50(16):49:8:12; 55:63:8:12

General color black, the legs with a greenish lustre; pronotum with narrow transverse, flavous mark on each side of a slight median carina.

Apterous male: Mesonotum covered by pronotum; metanotum truncate behind. Abdomen with a shiny spot on each tergite. Last segment of venter depressed posteriorly and with a distinct ridge on either side. Posterior femur moderately incrassate, armed at the basal 2/5 with a long bent, black spine, which is followed by 10 to 12 shorter stout apines and preceded by a row of short black teeth. Length 4.8 mm., width 1.4 mm.

Apterous female: Mesonotum and metanotum slightly emarginate posteriorly. Apices of first, fourth and fifth segments of the connexiva with tufts of fine hair; genital segments also with some fine hair. Connexiva strongly reflexed. Posterior femur slightly incrassate, armed at near the middle with a long spine followed by 7 or 8 small spines. Length 4.8 mm., width 1.4 mm.

Winged forms: Much as in apterous forms. Posterior femur of male not so much incrassated. Pronotum of male with a slight backward projecting point; female with a backward projecting spine, armed beneath. Length 5 mm., width 1.6 mm.

Holotype apterous male; Allotype apterous female;
Morphotype winged male and female; Paratypes apterous and
winged males and females, all Boulder Creek, Colo., 1925,
Beamer and Lawson.

This variety is very near distincta, differing in size.
It is also near the variety cadyi, from which it differs by
the male being more robust and the female with the con-
nexiva more reflexed.

Rhagovelia distincta var. valentina n. var.

Antennae:- 30:16:16:14

Intermediate leg:- 64:41:20:24

Posterior leg:- 53:49:8:11

General color black, the legs with a greenish lustre; pronotum with narrow transverse fulvous mark and yellow spot on each side of a slight median carina. Base of antennae, prosternum, the trochanters and coxae entirely or in part, the base of the anterior femur, edge of the first genital segment, and edge of connexivum, yellowish brown. Clothed with fine gray pubescence. Anterior tibia dilated and hollowed on inner surface.

Apterous male: Mesonotum and part of metanotum covered by pronotum. Last segment of venter depressed posteriorly and with a distinct ridge each side. Posterior femur strongly incrassate, armed at the basal 2/5 with a long bent, brown spine which is followed by 8 or 9 shorter, stout spines, and preceded by a few of minute black spines. Length 4.5, width 1.4 mm.

Apterous female: Mesontom and metanotum slightly emarginate behind. Connexivum strongly reflexed and nearly meeting over the 4th and 5th segments; with slightly longer hairs on the apex of the first segment. The last abdominal segment and first genital segment with more hairs, the latter usually with a group of long stiff black hairs extending laterally. Last segment of venter darker, and broadly rounded. First genital segment beneath brownish and with a

distinct carina. Posterior femur more incrassate than the intermediate, slightly swollen within, and armed at the apical $\frac{2}{5}$ with a long curved, brownish spine, followed by 5 or 6 short stout, black spines. Length 4.8, width 1.5 mm.

Winged form (Cochise Co., Ariz.) : Much as in apterous forms. Pronotum produced posteriorly in the male into an acute process; in the female produced into a long spiniform process, which is armed at base beneath. Length 5 mm., width 1.6 mm.

Holotype apterous male, Valentine, Texas, July 23, 1927, R. H. Beamer; Allotype apterous female, same data; Paratypes apterous males and females, same data. Also examined winged specimens from Presidio Co., Texas and Cochise, Co., Ariz., all collected by R. H. Beamer in 1927.

This variety is near variety modesta n. var. See notes under that form.

Rhagovelia elegans Uhler

Proceedings of the Zoological Society
of London, 1894, p. 216.

"Larger and more robust than R. angustipes. Fuscous or dark rusty brown, hairy. The head short, across the eyes hardly wider than the front of pronotum, the callous ridge between the eyes not tapering posteriorly, almost touching the pronotum (female); the eyes wider apart, with the space between them broad, coarsely granulated, and destitute of a callous ridge (male); the cheeks and most of the face yellow; antennae of medium thickness, remotely set with long bristles, with the basal joint yellow at base, about one third longer than the second, the second a little less thick, much longer than the third, the third and fourth a little more slender, both contracted at base, the third with a slender tooth at tip, the fourth much shorter and acute on the apex; the rostrum yellow, piceous at tip, reaching behind the anterior coxae. Pronotum stout, convex, coarsely transversely wrinkled, bordered all round with yellow, this color covering the anterior lobe as a broad band and extending down over the pleura; the propleura constituting a thick and broad callous smooth segment to carry the front legs, the surface behind this punctate in a curved line; middle line obsoletely carinated, the posterior margin almost equilaterally triangular, with the edge recurved and the space before the tip usually depressed;

the humeral angle bluntly reflexed, obtuse, cut apart from the side below by an incised line; pleura and sternum yellow, with piceous streaks running down upon the coxas. Legs stout, pubescent, dark brown, with the coxal plates mostly yellow; the posterior femora thick, clavate, tinged with bronze, polished paler beneath, and armed there with about seven, chiefly long, teeth, of which the two inner ones are longer and thicker. Hemelytra dark fuscous brown, long almost parallel-sided, and with thick prominent veins. Venter yellow, sometimes dusky, polished, with a stripe of brown each side running parallel with the outer margin; the border of connexivum brighter yellow, as also the genital segments.

"Length to tip of venter $4\frac{1}{2}$ -5 mm.; width of pronotum 1 $\frac{3}{4}$ to 2 mm.

"The prothorax is much shorter and more blunt on the posterior margin in the unwinged individuals.

"Balthazar."

Champion says that this species has the posterior tibiae armed with a long, slender hook at the apex in both sexes as in his R. insularis and R. uncinata. He says that this species is told from R. insularis by its more elongate form, longer legs, and color of pronotum---these characters are good if both specimens are at hand.

Rhagovelia femoralis Champion,
Biologia Centrali-Americanana,
Heteroptera, Vol. II, p. 134.

"Apterous form. Male. Moderately elongate, robust, fusiform, black, the base of the antennae, a narrow transverse band on the pronotum just before the apex, the front of the prosternum, the anterior coxae and trochanters, the anterior femora broadly at the base and in great part beneath, the middle coxae, the hind coxae and trochanters, the hind femora within, beneath and at the base, and the venter in the middle at the apex, flavous or fulvous; the pleura and the sides of the abdomen bluish-grey; the body, legs, and antennae clothed with short, very fine, brownish pubescence, the sides of the body, the head, the basal joints of the antennae, and the legs clothed also with long hairs and setae. Head with a smooth impressed median line; antennae comparatively short, joint 1 about twice as long as 2, 2-4 subequal in length, 4 fusiform, pointed at the tip. Pronotum abbreviated and rounded behind. Legs stout, the middle pair very long, the hind pair comparatively short; posterior tibiae almost straight, denticulate within and armed with one long tooth at some distance from the apex and another at the apical angle; posterior femora enormously incrassated, armed with two rows of rather long teeth, extending from about the basal third to near the apex, and with one much longer tooth at the basal third; posterior trochanters denticulate beneath; intermediate

tarsi with joint 2 slightly shorter than 3. Ventral segments 1-5 with a median ridge, which becomes evanescent posteriorly.

"Length 4 1/3, breadth (of the pronotum) 1 $\frac{1}{2}$ millim.

"Habitat: Panama, Pena Blanca (Champion)."

Of this species Champion says, "Allied to R. crassipes, but much smaller, with relatively shorter hind legs, the armature of both femora and tibiae very different, the antennae shorter, the intermediate tibiae relatively shorter, the metasternum without tubercle in the male, etc. R. collaris from the Antilles and South America, one of the types of which is before me, is very like the present species, but it has the anterior tibiae strongly dilated and the hind tibiae sinuous (as in R. crassipes) in the male, the connexival margins pale, etc."

Rhagovelia festae Kirkaldy,

"Aquatic Rhynchota",

Bollettino dei Musei di Zoologia ed Anatomia comparata della R. Universita
di Torino,

Vol. XIV, No. 350, p. 4, 1899.

"Apterous. Fusiform, a little dilated.

"Head anteriorly truncate, with a deeply-impressed inverted arrow (\downarrow) on the notocephalon, a large impressed point on each side of the posterior margin of the head. Head and nota minutely punctured. First antennal segment curved, one-half longer than second, which is one-fourth longer than the 3d; 4th fusiform, one-half longer than 3rd. Penultimate segment of rostrum reaching beyond the base of prosternum. Pronotum not carinate, distinctly sutured off from mesonotum (this, as I shall show later, is not a specific character, but it is well to note it here), the latter rounded basally covering the mesonotum (except basally at the sides). Mesosternum with a curved, diagonal carina extending from the interO-basal margin of anterior ambulacra almost to the base of intermediate ambulacra. Anterior coxae very large and round, femora a little shorter than tibiae, about 4 times as long as tarsi.

"Female. Abdomen not carinate ventrally, 6th segment (ventrally) about 2^{ce} as long as 5th, apical margin sub-sinuate. Posterior femora not incrassate, not dentate;

tibiae not dentate.

"Length 2.6 mill.

"Ecuador---Foreste Rio Peripa.

"Dark slate-gray, slightly covered with yellowish pubescence. Antennae (except the yellowish white base of first segment) and legs (except brownish coxae and yellowish-brown pilosity) shining bluish-black. Antenniferous tubercles shining brownish."

Rhagovelia flavigincincta Bueno

"The Nearctic Rhagoveliae,"

Transactions of the American Entomological

Society, Vol. L, pp. 243-252, 1924.

"Antennal formula: male, I:II:III:IV::13:9:9:9, or 13:8:8:8, or 13:8:9:8; female, 15:9:10:10.

"Intermediate legs: femur:tibia:tars. seg. II:tars. seg. III::(male) 30:22:12:13; (female) 33:25:12:15.

"Males, apterous: Femoral spine long, curved, black-tipped, three-fifths its length from apex, followed apically by five or six smaller ones of nearly equal length; hind femora incrassate, nearly twice as thick as intermediate; posterior femora:tibiae:tarsal segment II:tarsal segment III::25:22:3:5; posterior tibiae with a straight spur at apex; anterior trochanters with a stout black spine.

"Females, apterous: Pronotum truncate; posterior femora slightly enlarged; femoral spine slender, curved, followed by about five minute spines which grow smaller toward the apex; spine placed two-fifths of its length from tibial joint; posterior tarsus II, post. tars. III::3:5₄. No spine on anterior trochanters. Connexivum not quite meeting over last abdominal segment; last connexival angle produced into a stout black spine; first segment of connexivum fringed with closely appressed long black hairs, which have the appearance of a long black spine; connexivum broadly margined with flavous, glabrous.

"Long, males, 3.2-3.5 mm.; females, 3.5-3.85 mm.

"Wide, males, 1.1 mm.; females, 1.2-1.25 mm."

"Aside from the structural characters and smaller size, the species is readily distinguished by its broadly flavous connexivum and the flavous bases of antennae and legs, and the coxae and trochanters and the coxal plates as well."

"Type, female, Raleigh, North Carolina, June 5, 1906, C. S. Brimley collector; paratypes, one male, same data; male, same place, October 20, 1920, Brimley collector; three males, same place, October 13, 1915, R. W. Leiby collector; two males, Raleigh, June 5, 1906, Brimley; one female same place, October 13, 1915, Leiby; four females, October 5, 1920, Leiby."

Known from the type locality only.

Rhagovelia gigantea Gould

"A New Species of Rhagovelia,"

Transactions of the Entomological Society
of America, Vol. 21, p. 417-418, 1928.

"Antennal formula: seg. I:seg. II:seg. III:seg. IV:
42:35:24:18.

"Intermediate leg: femur:tibia:tarsal seg. II:seg.
III::74:76:19:22.

"Posterior leg: 74 (wide 22):74:17:18.

"Apterous male: General color light brown, covered with short brown pubescence; legs, sides of body, and two basal segments of the antennae with longer hairs and a few scattered setae. Head with median impressed line, crossed by two inverted V's, the posterior one at the posterior margin of the head. Connexiva nearly vertical and about three-fourths the width of dorsum, extending beyond the last abdominal segment to form a long stout projection equaling in length the genital segments. Venter covered with long hairs of the same color as on the dorsum; venter with a faint carina that terminates in a small round projection on the last abdominal segment.

"Pronotum longer than wide (10:9), rounded behind and covering most of the mesonotum; anterior margin with silvery iridescent band interrupted by the median carina and broadening at the humeral angles. Small yellow scale-like pads project from under the pronotum in the normal position of wings (length .8 mm., width .2 mm.), The hind margin of the metanotum, the first abdominal segment except the median

line, and lateral margins of the second abdominal segment, silvery iridescent.

"Posterior femur greatly incrassate but abruptly narrowed in the apical third, this being marked by a short, stout curved tooth; from this tooth to the base are five stout teeth, diminishing in size toward the base. Numerous minute teeth scattered on femur below larger teeth. Posterior tibia armed with rounded teeth of irregular size, usually consisting of two small teeth between two large ones; at the base of the tibia are several larger teeth; the apex armed with a very minute tooth.

"Genital segments hairy. Claspers long, meeting some distance above the body.

"Length 8.4mm., width 2.2 mm.

"Type, apterous male, Cincinnati, Colombia, Feb. 1924, H. W. Athinson collector; type in the U. S. National Museum."

Further descriptions unpublished
(May 1, 1929)

Apterous female: General color light brown, covered with short brown pubescence; legs, sides of body, and two basal segments of the antennae with longer hairs and a few scattered setae. The connexiva meeting over the last two abdominal segments and projecting out over the first genital segment. Silvery iridescent markings much as in the male, but not so bright. Small scale-like pads appear to be rudimentary wings.

The posterior femur not much thicker than the intermediate femur at its widest part; armed with three teeth equally spaced

near the middle; several series of minute teeth also present. Posterior tibia armed with barely visible teeth.

"Genital segments small, the second somewhat telescoped into the first. On its dorso-lateral margin the first genital segment with projections posteriorly, protecting the second. On the ventral surface of the first genital segment a carina.

Length 8 mm.; width 2.1 mm.

Winged forms: General color much as in the apterous forms. The silvery iridescent markings brighter. Pronotum profusely punctate, such markings extending only into the posterior distal angles of the iridescent area. Pronotum produced posteriorly into an angle, the tip of which is turned slightly upward. Elytra a dark brownish-black, almost black. Veins distinct but not prominent. The basal fourth of each elytron and a spot in the closed R(?) cell silvery.

Posterior femur of both sexes moderately incrassate, with two large teeth at about the apical third and three smaller teeth below. Trochanter armed with minute teeth. Tibia with several rows of teeth on its posterior surface, the middle row being slightly larger and the teeth increasing in size proximally.

Length 8.4; width 2.8 mm.

Proportional measurements for all forms as follows:

Antennae:- 28:23:16:14

Intermediate leg:- 47:47:12:14

Posterior leg:- 45:49:11:12

Holotype, apterous male, Cincinnati, Columbia; Allotype and 2 Paratypes, apterous females, Sierra S. Lorenzo, Columbia, Ujhelyi. Morphotypes, winged male and female with the same data as allotype. Allotypes, paratypes and morphotypes in the Budapest Museum.

The males from the Budapest Museum show that the character of the enormously incrassate posterior femur is not constant, for some males have the femora only proportionally larger than intermediate femora. One character not noted in the original description is the presence of three horns on the supra-anal plate. The tips of the lateral horns are diverging, while the central horn projects backward.

The scale-like pads are found on all apterous forms and resemble rudimentary wings. They come out from under the metathorax as a true appendage, and are smooth, yellow and wax-like in appearance.

Rhagovelia gigantea Gould differs from all known species in many of its characters. It is of somewhat the same size as R. foveata n. sp., but differs from it in the scale-like pads of the apterous forms, in color, and in the armature of the posterior femora and tibiae. The clasper of the male is quite distinct.

Rhagovelia gregalis Drake & Harris

"Notes on the Genus Rhagovelia",

Proc. of the Biol. Soc. of Washington,
Vol. 40, pp. 131-138, 1927.

"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 the thorax and the legs also with a few scattered long hairs. Antennae brownish black, the basal portion of segment I testaceous, proportions 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):60:8:10. 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, 1.4 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 female and male. Type locality, San Pedro, Honduras, February 21-28, 1905. Types in authors' collection".

Rhagovelia hirtipes Drake & Harris

"Notes on the Genus Rhagovelia,"

Proc. of the Biol. Soc. of Washington,

Vol. 40, pp. 131-138, 1927.

"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."

Microvelia insignis (Distant)

(Rhagovelia insignis Distant)

Fasc. Malayana Zoology, I, p. 256 (1903)

(The original description is lacking at this time).

Dr. H. B. Hungerford examined the type of Rhagovelia insignis Distant in the British Museum and found the species belongs to the Genus Microvelia.

Therefore Rhagovelia insignis Distant becomes a synonym of Microvelia insignis (Distant).

Rhagovelia insularis Champion

Biologia Centrali-Americanica,

Heteroptera, Vol. II, p. 135.

"Winged form. Moderately elongate; the head brownish-black, flavous in front; the pronotum rufo-castaneous, bordered broadly in front and narrowly behind with flavo-fulvous, and with a similarly-colored, evanescent median line anteriorly; the elytra blackish-brown; the body beneath and the connexivum flavous, the venter and pleura greyish-white; the antennae and legs black with a faint aeneous lustre, the antennae at the base, the anterior femora beneath and at the base above, the hind femora beneath, the coxae, the anterior trochanters, and the intermediate and hind trochanters in part, flavous; the body, legs, and antennae very finely pubescent, the head, the sides of the body, the three basal joints of the antennae, and the legs somewhat thickly clothed with long hairs, the legs and joints 1 and 2 of the antennae also with long scattered setae. Head with a smooth impressed median line; antennae rather slender, joint 1 one-half longer than 2, 2 to 4 decreasing in length, 4 pointed at the tip. Pronotum sparsely punctured, the posterior position triangular, obtuse at the apex. Elytra extending to a little beyond the apex of the abdomen. Legs rather stout; the posterior tibiae armed with a long, slender hook at the apex in both sexes; the intermediate tarsi

with joint 2 shorter than 3.

"Male and female. Posterior femora moderately incrassate, armed with five or six acute, curved teeth of unequal length, these extending from about the middle to near the apex, the first, second, and fourth the longest, the inner two a little more distant than the others; posterior tibiae finely and obsoletely denticulate on their inner edge."

"Apterous form. Fusiform; the pronotum abbreviated and rounded behind, the mesonotum and the dorsal surface of the abdomen reddish brown, the sutures and lateral margins of the segments grey.

"Length 4 to $4\frac{1}{2}$; breadth of the pronotum of the winged form $1\frac{1}{2}$ to $1\frac{2}{3}$, of that of the apterous form $1\frac{1}{3}$ mm."

"Habitat: Panama, San Miguel in the pearl Islands.

Specimens in the collection of the University of Kansas from Brazil and the island of Trinidad. The proportional characters of legs and antennae vary much in the different individuals.

Antennal formula:---32:22:19:17; winged 33:24:20:18.

Intermediate leg:---70:50:19:29; winged 74:56:20:30.

Hind leg:---64:56:5:12; winged 68:64:5:12.

Champion's characters are more comparative than exact and related species are needed for identification. The color of the individuals vary in many cases.

Specimens from Panama, Trinidad and Brazil were compared by Dr. Hungerford with R. insularis Cham. in the British Museum. Dr. Hungerford believes the specimen from Panama to be R. insularis and probably the other specimens also, although he says they are darker.

The Panama specimen (No. 1) is a winged male measureing 5.6 mm. in length, 1.9 mm. in width, and has the spines on the posterior femur as in the type specimen, i.e. first, second and fourth of equal size and longer than three. The wingless male (no. 2) from Trinidad is 4.7 mm. in length, 1.3 mm. in width, and the armature of the posterior femur is as in No. 1. A winged male from Brazil (No. 3) is 5.1 mm. in length, 1.7 mm. in width, and has spines one and two equal and longest, spines 3 and 4 equal and somewhat shorter, and spines 5 and 6 equal and quite small. A wingless female from Brazil (No. 4) has spines 1 and 2 longest with 2 slightly longer than 1, 3 and 4 equal, and spines 5 and 6 equal and small. The measurements of No. 4 are the same as No. 2. All other specimens from Brazil have the arrangement of spines as in No. 3.

It can be seen from the above that there is a wide variation in armature and as previously remarked, a variation in color. However the claspers and genitalia of specimens are the same in every detail and therefore these thirteen specimens are called one species---R. insularis Champion as determined by Hungerford.

Also apterous female: Gorgona Is., Columbia, Cheesman.

Rhagovelia knighti Drake & Harris
"Notes on the Genus Rhagovelia,"
Proceedings of the Biological Society
of Washington, Vol. 40, 1927

"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, colthed as in obesa. First genital segment brownish, depressed on each side, with a distinct median ridge. Length, 3.20 mm.; width, 1.12 mm.

Rhagovelia knighti D. & H. --cont.

"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 then 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 longipes n. sp.

Antennae:- (male) 24:12:16:17; (female) 24:11:16:15

Intermediate leg:- 67:41:27:20; 64:40:24:21

Posterior leg:- 40:64:3:6; 40:58:3:6

General color greyish-black, clothed with brown pubescence and long hairs on the sides of the body, legs, and two basal segments of the antennae. Base of first antennal segment brown; venter bluish-black, except the median portion of last abdominal segment, which is shining black. Pronotum with slight median carina and rounded posteriorly. Elytra brown. Posterior tibia unarmed.

Winged male: Body compressed vertically. Posterior femur not so large as base of intermediate femur, and unarmed. Intermediate leg and posterior tibia very long.

Winged female: Body compressed as in the male. Posterior femur not incrassate and unarmed.

Length of body (tips of wings broken) 3.75 mm.; width 1.56 mm.

Holotype winged male, Allotype winged female, Paratype winged male, all from Tena, Ecuador, Near Oriente, Mar. 29, 1923, F. X. Williams.

This species is very close to other new species from Ecuador that are characterized by the small pronotum which is sutured off from the mesonotum. Even though only the winged forms of this species is known, it probably comes in the tenuipes-festae group. In addition to the pronotal character,

R. longipes is told from all other species by its proportional measurements, its long posterior tibia, long intermediate legs, and the unarmed posterior femur.

Rhagovelia lucida n. sp.

Antennae:- 24:12:15:13

Intermediate leg:- 52:41:21:23

Posterior leg:- 38:40:4:10

General color brownish-black, covered with golden brown pubescence. Pronotal band indistinct, but with a yellow spot each side of center. Pronotum short (9:16) and obtusely rounded behind; mesonotum broadly rounded and broader than long (16:5); metanotum nearly covered. Antennal segment one curved and thickened apically; segment three widened and club-shaped. Connexivum not reflexed and of the same color throughout. Base of antennae, base of anterior and posterior (slight) femora, all coxae, and the anterior and posterior trochanters, reddish brown. Venter of slightly darker color. Anterior trochanter unarmed; posterior tibia with a short spur at apex.

Apterous male: Genital segments large. Posterior femur slightly incrassate and armed at middle with a moderately long spine, followed by about five spines apically and a row of distinct spines basally.

Type, apterous male, Theresopolis, Rio de Janeiro, Brazil, 8 IX 1923, G. L. R. Hancock.

This species is somewhat like trista n. sp. in the structure of the pronotum, but differs in the claspers, proportional measurements, and the armature of the posterior femur.

Rhagovelia nigricans (Burm.)

(Velia nigricans Burmeister)

Handbuch der Entomologie, Vol. 2, p. 212.

"Fusca, pronoti macula utrinque antica, antennarum pedumque basi fulvis. Long. 1 $\frac{1}{2}$ '''."

Von Fajun aus Ubnssinien. Mannchen mit dicken Schenkeln woran 1 grosser Dorn und mehrere kleine.

In the Museum of Vienna Dr. Hungerford found five specimens from Ceylon determined by Mayr in 1861. Also there was a single female from Egypt that looks like the same thing.

In the University of Kansas collection there are six specimens, labelled from Scott, England, and determined by Bueno. One specimen is from Ceylon and five are from the Seychelle Islands. I find the following:

Antennae:- 20:13:16:14

Intermediate leg:- 44:36:14:21

Posterior leg:- 36:40:3:7

Color black with brownish pubescence. Base of antennae transverse band of pronotum, edge of connexivum, all coxae and trochanters, and the base of the anterior and posterior femora, light brown. Venter gray, except the median portion of the last abdominal and the genital segments. Anterior trochanter unarmed; posterior tibia armed at apex with a short spur.

Apterous male: Much as R. obesa Uhler. Posterior

femur slightly incrassate and armed at center with one long spine and from thence to the apex with 11-15 small teeth. Posterior tibia with stronger teeth basally.

Apterous female: Connexiva reflexed against the abdomen but not meeting. Second-third abdominal segments slightly humped. Posterior femur with 5 teeth; posterior tibia unarmed except at apex.

Length 3.3-3.8 mm.; width 1.1 mm.

Rhagovelia obesa Uhler

Proceedings of the Boston Society of

Natural History,

Vol. XIX, part IV, p. 434.

"Allied to R. collaris Mayr (Burm.), but differs in in the colors, in the more contracted abdomen, with its acutely produced posterior tips of the connexivum, and in the absence of dense long hairs at the tip of venter in the same sex."

"Brownish, or bronze-black; the under side bluish, sericeous; when very mature less polished, but more densely powdered with bluish, or cinerous bloom. Head black, velvety, the front almost truncated, cinereous, with an impressed longitudinal line running almost to the base, a few long hairs about the sides and above; the cranium a little elevated on the middle, extending back in the form of a triangle; the base of the occiput transversely a little carinately elevated. Labrum and lateral lobes yellowish, or rufo-piceous; rostrum black, reaching to the tip of the anterior coxae. Eyes round, brown. Antennae black, excepting the base of the basal joint, less hairy than in R. collaris; the basal joint stoutest, curved, about twice as long as the second joint, the second subequal to the third, the fourth decidedly shorter than the third. Thorax obese, the pronotum velvety blackish, sparingly clothed about the sides with fine golden pubescence; collum with an orange band which is interrupted in the middle; middle line faintly carinated; the tip of pronotum produced at

tip, curved upwards, its extreme end expanded, emarginated, and each process granulated; the humeri prominent in the winged individuals, in the unwinged it is obliquely rounded. Pectus bluish, sericeous, each side of prosternum broadly orange. Coxae, trochanters, and usually the base of femora yellow; the femora bronzed or bluish-black, minutely hoary pubescent; the tibiae and tarsi duller black; posterior femora of the males stouter than of the females, in both with a yellow, black-tipped, curved spur beyond the middle and from it to near the tip series of minute teeth. Abdomen moderately compressed (very strongly compressed in unwinged females), minutely sericeous, pubescent, excepting on the middle of tergum, which is bald, shining black; the raised upper edge of the connexivum orange, in the female its posterior tips produced into long slender spines. The middle of the antegenital ventral segment of the male quadrately, broadly flattened, each side of which a little elevated. Basal genital segment of the female broadly black on the middle. The cerci of the male are long, slender, curved hairy processes.

"Length, $3\frac{1}{2}$ to 4 mm. Breadth of pronotum, $1\frac{3}{4}$ mm."

Localities, taken from Van Duzee: Ontario, Maine, Massachusetts, Vermont, New York, New Jersey, Pennsylvania, Maryland, District of Columbia, Virginia, North Carolina, Florida, South Carolina, Ohio, Michigan, Tennessee, Utah, and California.

Rhagovelia obscura n. sp.

Antennae:- 27:16:19:15

Intermediate leg:- 58:38:23:23

Posterior leg:- 48:43:6:10

General color greyish-black, clothed with brown pubescence and with long hairs on the sides of the body, legs, and two basal segments of antennae. Dorsum of abdomen and edge of connexiva glabrous and brown. Venter bluish-grey, except the median portion of last abdominal and the genital segments. Pronotum sutured off from mesonotum and with a dark brown spot anteriorly. Mesonotum and metanotum cut off squarely on posterior margin. Long hairs on acetabula of posterior leg resembling a spine. Posterior tibia armed with straight spur. Anterior tibia with a slight groove near apex.

Apterous male: Abdomen gradually tapering. Genital segments large. Posterior femur slightly incrassate, straight on anterior margin, and armed with one long, curved spine at about the center, followed by about 8 short teeth. Posterior tibia with serrate teeth of equal size throughout.

Apterous female: Abdomen broad as in the male. Posterior femur slightly incrassate, armed with one long and 5 short teeth. Genital segments small.

Length 3.5-3.75 mm.; width 1.2-1.4 mm.

Holotype apterous male, Allotype apterous female, Paratype apterous males and females, all from Naranjapata, Ecuador, Dec. 14, 1923, F. X. Williams.

This species is near R. confusa n. sp., but differing from

it in the armature of the posterior tibia, the anterior tibia with a groove, and the genitalia. The proportional measurements of the specimens included in this species varied, but the numbers given above are averages. No two specimens were constant, but the variation in size was only slight.

Rhagovelia oriander Parshley

"Report on a Collection of Hemiptera-

Heteroptera from South Dakota",

Technical Bulletin No. 2, 1922,

South Dakota State College.

"Wingless form. Very dark blackish brown, the appendages, and, in the male, the dorsal surface of the abdomen, shining, slightly metallic; pronotum anteriorly with a transverse, very obscure, yellowish band, interrupted on median line; first antennal segment at base, front femora at base, and front and hind coxae and trochanters yellow; narrow margin of connexivum dull yellowish in female. Body and appendages finely pubescent and provided sparsely with large black setae, except on third and fourth antennal segments.

"Head with median lone and two lateral areas smooth and depressed; first antennal segment strongly curved; proportions of antennal segments--18:10:10:9. Pronotum minutely and rather irregularly punctate. Legs long and rather slender; middle femora sometimes compressed at middle; hind tibiae with small tooth at apex; second and third segments of middle tarsi equal in length.

"Male. Pronotum moderately developed, angulate posteriorly extending to or somewhat over the metanotum on median line; mesonotum deposed in part. Connexivum moderately reflexed; disc of abdomen broad, the sixth tergite about twice as wide as the connexivum at its

widest. Front tibiae moderately dilated in apical half, here a little broader than the femora. Hind femora strongly incrassate, armed inwardly with a large acute tooth at about one-half distance from base, and with a series of about 8 smaller teeth diminishing in size toward apex; between the large tooth and base is a distinct series of fine, equal, closely set teeth, which somewhat reduced, continues by the large tooth toward apex of femur, thus forming a double row of teeth in apical half.

Hind tibiae straight, serrately denticulate inwardly, the teeth larger and more widely spaced toward apex. Ventral antegenital segment distinctly excavated on each side, the elevated median line broadened basally, posterior margin slightly emarginate.

"Length 3.6 mm.

"Female. Pronotum greatly developed, continued posteriorly in a knobbed and elevated process which is entire at apex; mesonotum concealed. Connexiva strongly reflexed against dorsal surface of abdomen, not or scarcely meeting on median line, even at apex, distinctly separated farther forward. First dorsal genital segment large, more than twice as wide as second. Hind femora slender, not thicker than middle femora, armed with a long, slender, sharply bent spine at two-thirds distance from base, and with a series of about 7 small acute spines diminishing in size toward apex. Hind tibiae straight, unarmed.

"Length 3.7 mm.

"Winged form. Unknown.

"Holotype: male, Brookings, South Dakota, 7-VIII-'21, (H. C. Severin) in my collection.

"Allotype: data same, in my collection.

"Paratypes: males and females, same data, in the collection of the South Dakota Agricultural Experiment Station, in de la Torre-Bueno's collection, and in mine."

Drake & Harris give the following description in "Proceedings of the Biological Society of Washington", Vol. 40:

"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".

Localities: By Drake & Harris, Ohio, Iowa and Minnesota; Kansas (University of Kansas collection); South Dakota (type locality).

This species is easily told by the knobbed and elevated process of the apterous female. The male has a slight projection posteriorly on the pronotum, but not near so striking as the female. The pronotum of the male is not fused with the mesonotum, but is projected up over the mesonotum. Width of the apterous specimens: male 1.1 mm.; female 1.3 mm. Antennal formula: 30:20:20:18. Intermediate leg: 56;44:24:30. Posterior leg: 48:46:5:11.

Rhagovelia plumbea Uhler, P. R.

"Hemiptera-Heteroptera of Grenada,"

Proc. of the Zool. Soc. of London,

1894, p. 217.

"Only the unwinged form is at present known. It is short and thick, subconical posteriorly, bluish plumbeous, opaque, minutely hairy, with the sides of the abdomen broadly reflexed. The head wide, convex, with a slender black line on the front, the orbits of the eyes bordered with yellow; the rostrum testaceous, reaching considerably behind the anterior coxae; antennae moderately long, brownish finely pubescent, the basal joint yellow at base, much longer than the third, which is also much longer than the second, the fourth about as long as the second, thick distended in the middle. Pronotum very moderately convex behind the middle, sloping posteriorly; the anterior lobe short, collar-like, with oblique sides, a yellow spot on the middle, and feebly carinate lateral margins, it is separated from the posterior lobe by a deeply incised line; the posterior lobe is somewhat abruptly wider, with strongly reflexed lateral margins, and subacute humeral angles, with the posterior margins abruptly deflexed; a broad segment behind this has in the depressed outer corner a tumid callosity which occupies the position of the wing-pad. The propleura flap is mostly yellow, as is the cap of the intermediate and posterior coxae and also the coxae, trochanters, base of anterior femora, and the immediate base of the

posterior femora; other parts of legs fuscous, sericeous pubescent, and the posterior femora unarmed. The posterior border of last ventral segment and sometimes the genital segment yellow.

"Length to end of abdomen, male $2\frac{1}{2}$, female $3\frac{1}{4}$ mm.; width of pronotum, male 1, female $1\frac{1}{4}$ mm."

Localities: Florida, Grenada, St. Vincent, Jamaica.

Rhagovelia regalis Drake & Harris

"Notes on the Genus Rhagovelia,"

Proc. of the Biol. Soc. of Washington,

Vol. 40, pp. 131-138, 1927.

"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 collection of Iowa State College and the authors. The short pronotum, the formulae of antennae and legs, and the shape of the connexivum distinguish segalis from related species."

Rhagovelia relicta n. sp.

Antennae:- 22:14:-:-

Intermediate leg:- 50:34:13:22

Posterior leg:- 39:36:4:12

General color brownish-black, clothed with golden pubescence. Genital segments, antennae and legs with longer hairs and a few scattered setae. Pronotum with a bright yellow-brown, transverse band; broader than long (15:13) and broadly rounded behind. Mesonotum completely hidden; metanotum small. Base of antennae, base of anterior and posterior femora, all coxae, anterior and posterior trochanters, pronotal band and edge of connexivum, light brown. Venter nearly black and with a slight median carina. Anterior trochanters unarmed; posterior tibia with long, stout spur at apex.

Apterous male: Connexivum broad and not reflexed. Posterior femora strongly incrassate and armed with two irregular rows of long teeth varying in size, the first two on the upper row being longest. Posterior tibia slightly sinuate and armed at apical 1/5 by a long spine, preceded by a single row of stout teeth to base, and followed by two or three small teeth; apex armed with a stout spur.

Apterous female: Connexivum semivertical. Posterior femur slightly incrassate and armed with one long tooth near the middle and eight to ten apically. Posterior tibia straight and without prominent teeth.

Length 3.7--4 mm. Width 1.3 mm.

Holotype, apterous male; Allotype, apterous female; both from Campinas, Estado do Sao Paulo, Brazil, Mar. 10, 1924, F. X. Williams.

Dr. Hungerford compared these specimens with type and general material in the British Museum, the Berlin Museam, and the Museum of Vienna, and found them to be different.

This species is perhaps similiar to R. femoralis Ch., but differs in the armature of the posterior femur. It is somewhat like R. robusta n. sp., but differs in color, size, armature of the posterior leg, and the claspers. The claspers are somewhat like those of R. sinuata n. sp., but the specimens differ in size, proportional measurements, and the armature of the posterior legs.

Rhagovelia rivale Bueno

"The Nearctic Rhagoveliae,"

Transactions of The American Entomological Society, Vol. L, pp. 243-252, 1924.

"Antennal formula: I:II:III:IV::15:10:10:10.

"Intermediate legs: femur:tibia:tarsal seg. II:tarsal seg. III::(male) 33:24:12:12:(female) 33:26:15:13.

"Males, apterous. Pronotum sharply curved posteriorly, broader than long; posterior femora thicker than tibiae, with usual long, slender curved spine, followed distally by four or five smaller, slender curved spines growing shorter apically, femoral spine nearer base than apex; posterior tibiae with a stout, straight spical spine; formula posterior leg:--tibia:tarsal seg. II:tarsal seg. III:22:3:5; anterior trochanters with a stout black spine on the outer aspect."

"Females, apterous: Pronotum posteriorly more gradually curved than in male, broader than long; posterior femora not thicker than intermediate, with a sharp curved spine one third of its length from joint of tibia; connexivum reflexed, but not meeting above the abdomen, its terminal spines small."

"Both sexes dull sericeous black."

"Apterous, long, males, 3.3-3.6 mm.; females, 4.3-4.6 mm."

"Apterous, wide, males, 1.32 mm.; females, 1.65 mm."

"The winged form has two characteristics in addition to the stouter thorax with prominent humeri and an obsolete

longitudinal median carina. The wings are the usual dull brown pilose; the venation is well-marked; and they extend beyond the apex of the abdomen. In addition, in the male the thorax is angularly produced posteriorly with the pointed end turned up; and in the female it is produced into a long knob, of equal diameter throughout, also turned up.

"Long, males, 4 mm.; females, 4.45 mm.

"Wide, males, 1.43 mm.; females, 1.65 mm. at humeri.

"Type, apterous female, Dykeman's Bridge, Kansas, July, 1922; morphotype, winged female, same data; paratypes, six apterous males, three apterous females, one winged male and one winged female, same data.

"Type in collection University of Kansas; paratypes in same and collection of J. R. de la Torre Bueno."

I find Bueno to be mistaken in several details. In his key he says rivale is without a spine on its anterior trochanter; yet in the above description he says with a "stout black spine on the outer aspect." I find upon study of the types that the anterior trochanters are unarmed. Furthermore his proportional measurements are incorrect.

Antennal formula: 18:10:10:8.

Intermediate leg: (male) 33:24:12:12; female 40:28:15:14.

Hind leg: male 24:24:4:7; female 30:30:4:7.

Specimens studied, type, morphotype, five paratypes, and miscellaneous new material. This species seems to be generally distributed over Kansas.

The claspers of the male are distinct. See plate.

Localities: Kansas and Colorado. In Kansas specimens from Douglas, Republic, Osborne, Wilson, Dickinson, Marshall, and Kiowa Counties.

Rhagovelia robusta n. sp.

Antennae:- (male) 24:15:15:15; (female) 24:15:16:15

Intermediate leg:- 56:40:16:23; 51:38:16:23

Posterior leg:- 48:44:3:8; 44:40:3:8

General color brownish-black, clothed with yellow pubescence; legs and antennae light brown. Sides of the body, legs, antennae and genital segments with longer hairs and a few scattered setae. Head with median impressed line crossed by a V-shaped suture. Pronotum with a narrow transverse brown band; broader than long (9:8), and broadly rounding behind. Connexivum broad but not reflexed, and with margin of light brown. Acetabula, coxae, anterior and posterior trochanters, and intermediate trochanter in part, base of antennae, anterior femur at base, and the basal and lower portion of the posterior femur, light brown. Anterior trochanter unarmed; posterior tibia armed with short spur at apex.

Apterous male: Metanotum slightly emarginate behind and mesonotum covered by pronotum. Genital segments longer than sixth abdominal segment (4:3). Last ventral abdominal segment flattened apically. Posterior femur greatly incrassate and armed with two irregular rows of long teeth of varying size and no definite arrangement. Posterior trochanter armed on inner side with several small teeth. Posterior tibia armed with an irregular row of teeth with one stout tooth near the apex and a stout spur at apex.

Apterous female: Similar to the male. Posterior femur moderately incrassate and armed with a series of about eight

spines. Posterior tibia with a row of regular serrate teeth. Genital segments small.

Holotype, apterous male; Allotype, apterous female; Paratypes, apterous males and females; all from Villarrica, Paraguay, S.A., 1921, Fran. Schade.

This is the first species of Rhagovelia described from this portion of the world, i.e. the East Central part of South America. This species is not strikingly different from other South American forms and yet has some distinctive characters. The claspers and genitalia of the male are different, and the color is unusual.

Rhagovelia salinus (Champion)

(Trochopus salinus Champion)

Biologia Centrali-Americanana,

Heteroptera, Vol II, p. 138.

"Ovate (female), subfusiform (male), black or brownish-black, mottled with grey, beneath entirely grey, the pronotum, except at the sides, the connexival margins broadly, and the apex of the abdomen more or less, above and beneath, ferruginous; the antennae brownish-black, with the basal half or more of the first joint flavous or ferruginous; the legs brownish-black, the anterior and hind femora in great part, and the intermediate femora at the base, ferruginous or flavo-ferruginous; the coxae and trochanters flavous; the upper surface thickly clothed with pale brownish pubescence; the head, pronotum and pleura also with bristly hairs, the under surface with greyish pubescence; the antennae and legs thickly pubescent, and also clothed (the two outer joints of the antennae excepted) with long fine hairs and a few setae. Head with a smooth impressed median line; antennae long and slender, joint 1 twice as long as 2, 2 and 4 subequal in length, 3 considerably longer, 4 fusiform, 2 and 3 separated by a distinct jointlet. Pronotum separated from the mesonotum by a deep transverse suture, the mesonotum slightly sinuate behind. Connexivum raised and broadly expanded. Legs long and rather stout, the intermediate pair very long,

with the penultimate tarsal joint much longer than the apical one.

"Male. Anterior trochanters armed with a long, acute, outwardly-directed tooth; posterior femora slightly incrassate, armed with a row of minute teeth, and with a longer and rather prominent tooth at the middle.

"Female. Posterior femora feebly incrassate, unarmed, or at most with one or two minute teeth about the middle.

"Length 3 1/5 to 3 4/5, breadth 1 2/5 to 1 4/5 mm.

"Habitat: Panama, San Miguel in Pearl Islands."

Four female specimens of this species from Jamaica, B. W. I., Dec. 24, 1928, L. G. Perkins, were examined. It is an unusual shaped specimen with the connexiva broadly rounded. The body is mottled with a gray material that comes off easily. The proportional measurements, the sahpe, and the connexiva separate it from all other species. Proportional measurements are as follows:

Antennae:- 20:12:16:12

Intermediate leg: 52:41:24:20

Posterior leg: 29:42:3:8.

Rhagovelia sinuata n. sp.

Antennae:- 40:25:27:22

Intermediate leg:- (male) 90:75:23:33
(female) 85:68:20:31

Posterior leg:- (male) 85(32): 70:6:16
(female) 70:66:6:16

General color dark brown and clothed with short yellowish pubescence, with longer hairs on the sides of body and legs. Legs and two basal segments of antennae with a few scattered setae. Head with usual impressed lines. Pronotum sparsely punctured and of the same color throughout. Connexivum broad, but not reflexed and similar in both sexes. Venter slightly darkened brown and with a trace of a longitudinal carina. Sixth ventral abdominal segment excavated each side of middle. Tarsi and apical segments of antennae darker, almost black. Rostrum black and its tip extending beyond the coxal cavities. Anterior trochanter unarmed; pronotal band almost indistinct with no spots.

Apterous male: Pronotum obtusely rounded, wider than long (11:8). Last abdominal segment and genital segments with long hairs. Posterior femora greatly incrassate and armed with two rows of spines, the lower row very small in the apical third; first spine of upper row large, followed by four short spines, a very large, stout spine, and a series of shorter spines. Posterior tibia strongly sinuate and armed with two rows of teeth with a large one at apex. Posterior trochanters armed with several knob-like teeth.

Apterous female: Venter slightly carinated with the last abdominal segment notched in center apically. Posterior femur incrassate in middle, and armed just beyond the middle with a long spine followed by seven small ones. Posterior tibia with fewer teeth than male, especially near the apex; blunt tooth at apex.

Winged female: Posterior angle of pronotum about 90°, not elevated at tip. Elytra brownish-black, nervures distinct. Posterior femur moderately incrassate and armed in same manner as apterous female. Posterior tibia slightly but distinctly sinuate and armed as in male. Posterior trochanter with denticulations.

Length, winged female 5.2 mm.; apterous forms 4.5 mm. Width, winged female 1.6 mm.; apterous forms 1.4 mm.

Holotype, apterous male; Allotype, apterous female; Morphotype, winged female; paratypes, apterous males and females; All from Banos, Ecuador, 1923, F. X. Williams.

Comparative notes: Included in this species are two groups---a lighter reddish-brown and the brown forms. The specimens were compared with type and general material in the British Museum, the Museum of Vienna, and the Berlin Museum by Dr. Hungerford in 1928. He says the reddish specimens (28,300) are near, but not, R. fieberi Guer. type in the Vienna Museum.

This species is possibly near R. femoralis Champion, but differs from that species in having the posterior tibia sinuate.

Rhagovelia spinigera Champion,

Biologia Centrali-Americanica,

Heteroptera, Vol. II, p. 137

"Winged form. Female. Moderately elongate, brownish-black, the legs with a bluish-green lustre, the base of the antennae, a transverse mark on each side of the disc of the pronotum before the apex, the prosternum in great part, all the coxae and trochanters, the anterior femora broadly at the base, the antecoxal portions of the meso- and metasternum, the connexival margins, and the apex of the venter, flavous; the pleura and sides of the abdomen bluish-grey; the elytra (the nervures included) blackish-brown; the head and pronotum microscopically pubescent, the pronotum greyish-pruinose at the sides in front, and clothed laterally with a few bristly hairs; antennae and legs finely pubescent, the femora, tibiae, and the two basal joints of the antennae also with long scattered setae. Head with a smooth impressed median line; antennae moderately long, joint 1 nearly twice as long as 2, 2 and 3 subequal, 4 shorter than 2, fusiform, pointed at the tip. Pronotum produced behind into a long, semi-erect, spinifrom process, the surface thickly punctured, except along the slightly raised median line, each puncture placed in a small rounded depression. Elytra extending beyond the genital segments, the nervures not very prominent. Legs comparatively slender, the hind pair rather

short; anterior femora feebly sinuous; intermediate femora curved in front and concave within, abruptly compressed at the middle; posterior femora curved in front, concave on the inner side from the base to near the middle and also before the apex, scarcely stouter than the intermediate pair, and armed with a long curved tooth at the middle, and five or six short teeth between this and the apex, these latter diminishing in length outwards; posterior tibiae straight, obsoletely denticulate towards the base, and with a very short straight tooth at the apical angle; intermediate tarsi with joint 2 shorter than 3.

"Length $4\frac{1}{2}$, breadth (of the pronotum) $1\frac{2}{3}$ mm.

"Habitat: Guatemala, San Geronimo in Vera Paz."

Two winged females in the University of Kansas collection have the label "San Jose, C. R., Jan. 1905, P. Biolley collector." In addition to the above characters I find the posterior femora to have a second row of minute teeth. The first genital segment has a carina beneath that broadens apically. The intermediate coxae are dark brown.

Formula, antennae:---34:20:19:18.

Intermediate leg:---68:46:22:32.

Posterior leg:---56 (12):60:7:14.

Pronotum wide 60, long 76 (including process).

The above specimens were compared by Dr. Hungerford with the types in the British Museum and found the same.

Rhagovelia spinosa n. sp.

Antennae:- 20:11:12:10

Intermediate leg:- 36:27:14:18

Posterior leg:- 26:31:3:7

Apterous male: General color black, densely clothed with light brown pubescence and with numerous long hairs on body, legs, and antennae. Base of first antennal segment, anterior coxa and trochanter, posterior trochanter in part, and a spot near the base of posterior femur, brown. Venter grey with lighter pubescence. Pronotum sutured off from mesonotum. Posterior tibia unarmed. Hairs on the posterior acetabula forming a large, stout, spine-like group. Anterior trochanter armed with a very long hair.

Abdomen terminating ventrally in a large, stout, slightly curved spine. Posterior femur slightly incrassate, being about equal with intermediate femur at base; armed at apical third by one spine, followed by about three minute teeth. Genital segments large.

Length 2.6 mm.; width 1 mm.

Holotype, apterous male, Tena, near Oriente, Ecuador, Mar. 29-Apr. 10, F. X. Williams; Paratype, apterous male, same data.

This species belongs in the group characterized by the sutured off mesonotum. It may be told from other species by the proportional measurements, the very hairy body, and

the spine on the posterior edge of the abdomen. This species is also close to festae Kirkaldy, but differs in the proportional measurements of the antennae, in having the posterior femur armed, and in the spine on the underside of the abdomen.

Rhagovelia tayloriella Kirkaldy

Entomologist,

Vol. XXXIII, 1900, p. 72.

"Elongate, head above distinctly sulcate (? generic character). Basal segments of antennae and legs with long scattered bristly hairs. First antennal segment one-half longer than second, which is very slightly longer than the third, the latter a trifle longer than the fourth. Rostrum reaching to the middle of the mesosternum. Intermediate femora 2/5 longer than tibiae, not constricted medially; tibiae subequal to the tarsi, armed with a short straight spine at apex; third tarsal segment 1/7 longer than the second. Posterior femora very slightly longer than the tibiae, which are nearly three times as long as the tarsi; second tarsal segment 3/5 longer than the first; posterior tibiae straight. Macropterous form: pronotum somewhat obsoletely carinate longitudinally. long 5 mill.

"Male. Third antennal segment noticeably incrassate; anterior tibiae considerably dilated (especially towards the apex), and excavated beneath. Posterior femora considerably incrassate, and armed beneath with 10 to 11 strong teeth from the center to the apex, diminishing regularly in size towards the apex; tibiae conspicuously denticulate; trochanters denticulate. Sixth (? seventh) abdominal segment greatly depressed on its apical half (except at the lateral margins), apical margin slightly excavated; first three

segments longitudinally carinate; connexivum semivertical.

Macropterous form: pronotum produced basally into a short acute porrect spine; elytral neuration distinct.

"Female. Third antennal segment and anterior tibiae not so strongly dilated as in the male, but more so than in other species of the genus. Posterior femora incrassate (similarly to the same sex of R. distincta), armed beneath with one large and 2 or 3 small teeth. Sixth (?seventh) abdominal segment very long, nearly twice as long as the fifth, slightly biexcavate apically; abdomen scarcely (except slightly towards the base) carinate ventrally.

Connexiva vertical in apterous form, and much narrowed in from the base at first, afterwards continuing subparallel.

Macropterous form: pronotum produced basally in a long stout process, which is about equal in length to the space between its origin and the humeral angles of the pronotum. It arises at an angle of 45° , curves around near its apex and is then deflected downwards slightly. Elytral neuration feebler than in the male.

"Habitat: Rio Cobre, Spanish Town, St. Catherine, Nov. 7, 1892; clear water--no surface growth--sluggish current.

"Black; the posterior and intermediate femora and tibiae slightly greenish blue (metallic lustre), furnished somewhat sparsely (more closely on the nota) with pale gold pubescence. Base of first antennal segment, base of anterior femora and anterior margin of pronotum, ventral surface of the ambulacra, coxae, trochanters (usually,

Rhagovelia tenuipes Champion

Biologia Centrali-Americanica,

Heteroptera, Vol. II, p. 137.

"Winged form. Moderately elongate, black, the legs with an aeneous lustre, the base of the antennae pale flavous, the pronotum with a narrow fulvous transverse mark in front, the anterior and hind coxae and the trochanters more or less flavous; the pleura and under surface bluish-grey; the body, legs, and antennae clothed with very fine brownish pubescence, and also (the apical two joints of the antennae excepted) with a few long, scattered setae. Head with a smooth impressed median line; antennae long and slender, joint 1 nearly twice as long as 2, 2 and 3 equal in length, 4 considerably shorter than 3, curved, pointed at the tip. Pronotum with the posterior portion obtuse behind, the surface with very fine scattered punctures. Elytra extending to far beyond the apex of the abdomen, the neuration irregular. Abdomen short. Legs very long and slender, the hind tibiae unarmed at the tip; intermediate tarsi with joint 2 considerably longer than 3.

"Apterous form. Subfusiform male, oblong-ovate female; the pronotum abbreviated and rounded behind, the anterior lobe separated by a distinct suture; the upper surface uniformly clothed with brownish pubescence, the pronotum with greyish pubescence on each side in front.

"Male and female. Posterior femora comparatively slender, not stouter than the intermediate femora, armed with a long, slender, acute tooth at about the middle, and with a row of very short teeth extending thence to near the apex; posterior tibiae unarmed on their inner edge."

"Habitat: Mexico, Teapa in Tabasco."

Rhagovelia trailii (White)

Neovelis Trailii White, F. B.,

"Descriptions of New Hemiptera,"

Linn. Soc. Journ. Zool.,

Vol. XIV, 1878, p. 487.

"Nigro-brunea, pubescentia conferata concolori vestita,
capite, antennis, pedibus, pronoto postice abdominisque
lateribus parce nigro-setulosis; pronoto antice, pro-
stethio, connexivo, ventre ad medium, antennarum articulo
primo ad basin, coxis, trochanteribus, femorum anticorum
macula et vitta subtus, femorum posticorum basi et spinis
ad basin flavidofulvis; pronoti carina centrali subelevata
plus minus, praecique antrorsum, rufo-fulva. Male
long. 4, lat. 1½ millim."

"Hab. Brasiliam borealem. (Manaos, August 1874,
'at light', J. W. H. Trail)".

Rhagovelia trista n. sp.

Antennae:- 32:18:20:18

Intermediate leg:- 68:48:23:28

Posterior leg:- 56:42:3:10

General color black, covered with brownish pubescence, and with longer hairs on sides of body, legs, and two basal segments of the antennae. Edge of connexivum pubescent, dorsum of abdomen nearly glabrous. Pronotum short (8 wide, 4 long) and obtusely rounded behind; mesonotum truncate behind (8 wide, 3 long); metanotum broadly truncate behind, one third as long as mesonotum. Base of antennae, anterior and posterior coxae, intermediate coxae in part, anterior and posterior trochanters in part, and base of anterior femora, flavous to dark yellow. Pronotum with pale band and usual spots each side of the middle. A row of punctures on and parallel to anterior margin of pronotum resemble a suture, giving the appearance of a minute segment. Anterior trochanter unarmed. Venter greyish-black; last abdominal segment black.

Apterous male: Posterior femora incrassate and having a long sharp spine at the basal third, followed by three distinct, sharp teeth and four smaller ones. Posterior tibiae somewhat sinuous, armed with teeth decreasing in size apically; apex with sharp spur. Connexiva broad, not much reflexed.

Apterous female: Much as in the male. Connexivum nearly vertical. Posterior femur (as in male) armed with

one long, sharp spine, followed by three somewhat smaller but still distinct spines, and then four minute teeth.

Genital segments small and bluntly rounded.

Length, male 3.3 mm., female 3.6 mm. Width 1 - 1.2 mm.

Holotype, apterous male; Allotype, apterous female; Paratypes, apterous males and females; all from Mera, Ecuador, 1923, F. X. Williams. Also specimens from Ecuador and from Banos, Ecuador, by F. X. Williams.

Comparative notes: This species was compared with type and general material in the British Museum, The Museum of Vienna, and the Berlin Museum. No similiar specimens found.

This species is not like any of the described specimens. It is somewhat like R. williamsi n. sp., but differing in color markings, armature of posterior femur, and some in the structure of the pronotum.

Rhagovelia uncinata Champion

Biologia Centrali-Americana,

Heteroptera, Vol. II, p. 135.

"Winged form. Moderately elongate, nigro-fuscous or rufo-fuscous, the front of the head, the base of the antennae, the pronotum with a broad band in front, the lateral and posterior margins, and an evanescent median line, the connexival margins broadly, and the under surface, flavous or testaceous, the venter sometimes with a fuscous stripe on each side; the legs black above, flavous beneath, the anterior femora at the base above, the posterior femora at the base and within, and the coxae and trochanters also more or less flavous; the elytra blackish-brown; the body, legs, and antennae finely pubescent, the head and sides of the body, and the three basal joints of the antennae somewhat thickly clothed with long hairs, the legs and joints 1 and 2 of the antennae also with scattered setae. Head with a smooth impressed median line; antennae rather slender, joint 1 one-half longer than 2, 2 to 4 decreasing in length, 4 pointed at the tip. Pronotum sparsely punctured, the posterior portion triangular, obtuse at the apex. Elytra extending as far as the apex of the terminal process of the abdomen. Terminal genital segment in both sexes produced into a sharp spine at the apex. Legs rather slender; the posterior tibiae armed with a long, slender hook at the apex in both sexes; the intermediate tarsi with joint 2 much

shorter than 3.

"Male. Posterior femora moderately incrassate, armed with seven or eight acute, curved teeth, the two inner ones much longer than the others and widely separated (one at the middle, and one at about the basal third), the two or three apical ones very short; posterior tibiae finely and obsoletely denticulate on their inner edge, the denticulation becoming more distinct towards the base."

"Female. Posterior femora less thickened, with the teeth usually a little shorter."

"Apterous form. Male, female. Fusiform; the pronotum abbreviated and rounded behind, bordered with flavous all round, the mesonotum also bordered with flavous behind; the abdomen with a pale stripe down the center."

"Length 4 to 5 1/8; breadth of pronotum of winged form 1 $\frac{1}{2}$ to 2, of that of the apterous form 1 $\frac{1}{4}$ to 1 $\frac{1}{2}$ mm."

"Habitat: Panama, Bugaba."

Rhagovelia varipes Champion,

Biologia Centrali- Americana,

Heteroptera, Vol. II, p. 133.

"Apterous form. Male. Elongate, moderately robust, fusiform, black, the abdomen piceous at the apex above, the base of the antennae, the prosternum, the coxae, the trochanters (the apex of intermediate pair excepted), the anterior femora with about the basal half above and beneath, the intermediate femora at the base beneath, and the posterior femora at the base, beneath, and within, more or less flavous; the pronotum with a transverse fascia in front, the connexivum, and the venter, except at the sides anteriorly, fulvous; the body clothed with fine brownish pubescence, the head and the sides of the pronotum and the terminal abdominal segments with long hairs; the antennae clothed with fine hairs, the two basal joints also with scattered setae; the legs thickly clothed with long hairs and scattered setae. Head with a smooth impressed median line; antennae with joint 2 about one-half the length of 1 (the other joints broken off). Pronotum abbreviated and rounded behind, with indications of a median ridge anteriorly. Abdomen gradually narrowing from the base; the first and second ventral segments strongly, longitudinally carinate down the middle, the sixth segment deeply triangularly emarginate at the apex, leaving the first genital segment exposed. Anterior tibiae slightly hollowed at the apex beneath. Intermediate

tarsi with the second joint slightly longer than the third. Posterior femora greatly incrassate, armed with numerous teeth, which are placed in two rows along the center, those of the upper row unequal in length, there being three longer teeth towards the middle and two beyond it; posterior tibiae denticulate and strongly sinuous, the teeth along the apical third slightly longer than the others, the apex unarmed.

"Length nearly 6, breadth 1 and three fourths millim."

"Habitat: Mexico (Bilimek, in Mus. Vind. Caes.)."

Rhagovelia vivida (White) new combination
(Velia vivida White, B.)

(The reference and original description are lacking at the present time).

Dr. H. B. Hungerford, after a careful study of White's type of Velia vivida in the British Museum, finds it to belong to the Genus Rhagovelia. The type is a very large female (8 mm.) from Nicaragua. Hungerford's notes are as follows:

"Is dark gray in color with lighter gray patches on sides of thorax and abdomen; yellow band gray-margined on collar of thorax. Margin of connexivum yellow - not spinous pointed - Shoulders with stout erect, sharp, somewhat backwardly-directed elevations. Hind femur with two stout spines, femur not greatly incrassate."

Rhagovelia whitei (Breddin)

Neovelia Whitei Breddin, G.,

"*Studia hemipterologica*",

Jahrbuch des Naturwissenschaftlichen

Vereins zu Magdeburg, 1898, p. 14.

"Male, apterous: Antennarum articulus primus secundo
distincte longior (5:3), articulo secundo apicalibus duo-
bus, gracilibus robustiore. Pronoto carina mediana sub-
elevata destituto, modice convexo, pone humeros late-ro-
tundato-producto et retrorsum fere acetabulorum inter-
mediorum marginem apicalem aequante; pronoto toto lati-
tudine humerali quinta vel quarta fere parte breviore.
Prothoracis marginibus omnino deletis pronotum paullatim
atque indistincte in convexitatem acetabulariam transit;
prostethio postice supra coxas linea intramarginali cur-
vata punctorum impressorum subtilium fuscorum notato.
Spinulis dimidii apicalis femorum posticorum parvis,
omnibus fere aequilongis, sub apicem extus spinula unica
maiore."

"Nigra, opaca, ubique pilis brevibus, adpressis,
sordide ferruginescens tibus dense vestita; femoribus
posticis subtus tibiisque omnibus longius pilosis;
capite supra, antennarumque articulis basalibus setis
nonnullis subrectis instructis, femoribus anticus
subtus serie eiusmodi setarum erectarum et extus et
intus, femoribus intermediis serie unica setarum semi-
cumbentium munitis. Capite (verticis basi excepta), an-

tennarum articuli primi fere dimidio basali, rostro (apice excepto), pronoti margine lato antico, pedtore (sternis meso- et metastethii lateribusque metastethii, his sor- dide castaneis, exceptis), coxis et trochanteribus om- nibus, connexivi margine, segmenti ventralis sexti medio late annuloque basali segmenti genitalis ferrugineo- luteis. Trochanteribus anterioribus apice annulo, intus obsoleto, nigro. Femoribus omnibus (intermediis sordide) ferruginescenti-luteis, anticorum vitta lata dimidi spicalis supra atque extus, intermediorum parte omni superiore (vel posteriore), posticorum macula magna, submicante partis superioris atque anterioris, basin non attingente, nigris. Tibiis ab infero visis sordide ferruginescientibus, a supero visis nigris vel fuscis.

"Long. 4 $\frac{3}{4}$ mm.

"'Lagoa santa' (coll. Instituti Zoologici Halensis)".

Rhagovelia williamsi n. sp.

Antennae:- 21:12:13:13

Intermediate leg:- 47:34:12:20

Posterior leg:- 38:32:2:7

General color brownish black, clothed with yellow pubescence. Pronotum with narrow transverse silver-grey band. Legs, sides of body, and two basal antennal segments with longer hairs and a few scattered setae. Basal antennal segment swollen at a point $2/3$ of its length and with 3 long setae at this point. Pronotum broader than long (10:6), obtusely rounded behind and covering the mesonotum; metanotum emarginate behind. Coxae, acetabula, anterior and posterior trochanters, base of anterior femur, and base of antennae, flavous. Venter greyish-black. Anterior trochanter and posterior tibia unarmed.

Apterous male: Genital segments large, being as long as the last two abdominal segments. Posterior femur greatly incrassate, armed at the basal third with one long spine, at the middle with a longer, spine, and this followed by seven shorter, stout spines; spines in two rows. Last ventral segment of abdomen and first genital segment brown.

Apterous female: Body cylindrical; connexivum nearly vertical, its edge with long hairs, and apex ending in a sharp stout spine, extending back half the length of the first genital segment. First and fourth abdominal segments grey, as are also the lateral margins of the second and third segments, and all dorsal abdominal sutures. Posterior femur strongly in-

crassate and armed much as the male. First genital segment on the ventral surface carinated and slightly depressed just beyond the base.

Length 3.6-3.7 mm.; width 1.3 mm.

Holotype apterous male, Allotype apterous female, Paratypes apterous males and females, all from Tena, Ecuador, Feb. 28, 1923, F. X. Williams.

This species is similar to R. amazonensis n. sp., but differs in the large genital segments of the male, the size of the male claspers, and in the female the spine-like projections of the connexiva.

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PLATE 1

Some Representative Species of Rhagovelia

1. beameri n. sp., female and male
2. choreutes Hussey, female and male
3. obesa Uhler, female and male
4. distincta Champion, male
5. arctoa Bueno, female and male
6. rivale Bueno, female and male
7. collaris var. pulchra n. var., female and male
8. insularis Champion, winged male and apterous male.
9. insularis Champion, winged female and apterous female
10. collaris (Burm.), female and male
11. salina (Champ.), female
12. williamsi n. sp., female and male
13. obscura n. sp., female and male
14. castanea n. sp., male and female

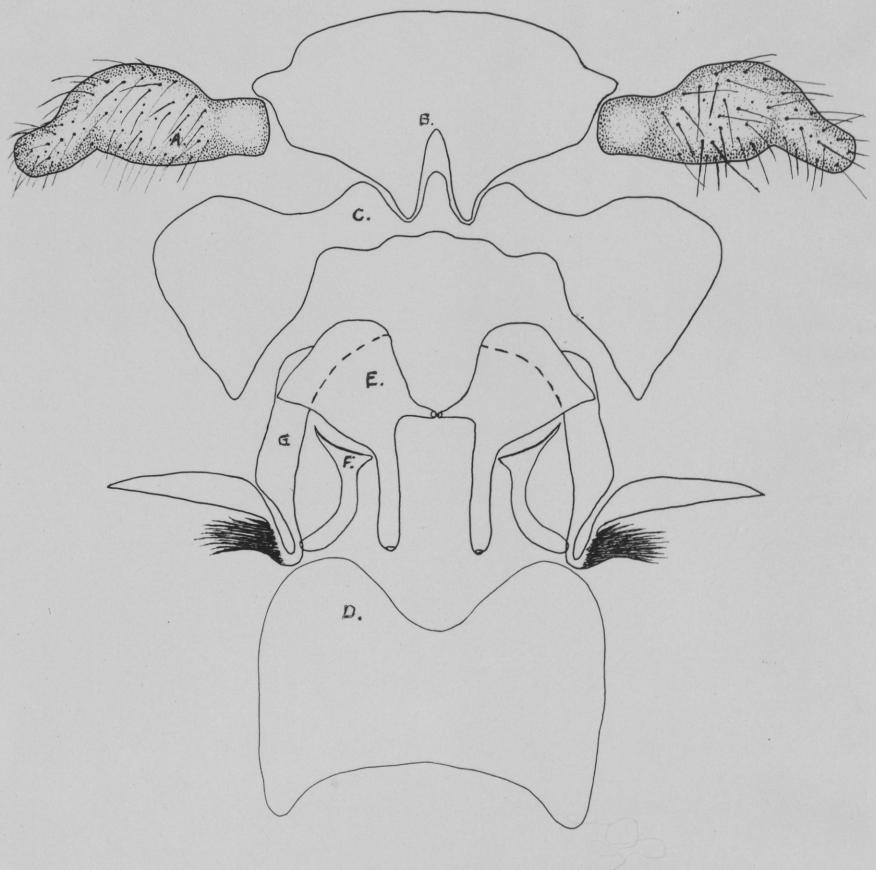


PLATE 2

The External and Internal Structures of the Genitalia

Example: R. distincta var. cadyi n. var.

The genitalia are inclosed in the second genital segment known as the hypandrium. This structure is shaped like a scoop and is covered over by the anal plates, surrounding the anal tube. The external claspers are hairy, chitinized structures, arising from the posterior part of the hypandrium and attaching to a connective membrane that lies just within the hypandrium. The external claspers on each side ^{A.} ^{B.} ^{C.} ^{D.} are curved toward the middle, around the anal plates, and in some species, almost meet above the supra-anal plate.

The internal genitalia are inclosed in three membranous structures that may have the function of expulsion in the copulatory act. As a rule all parts of the internal genitalia are paired and are three in number: namely, two pairs of claspers and the aedagal connective. The outer claspers (or styles?) have the hair-like tufts on their inner surface, while the inner claspers ^{E.} ^{F.} ^{G.} are smaller and horn-shaped. The vas deferens leads to the connective, splitting to run up through each side. At the outer end of the connective, the vasa deferentia unite in the ejaculatory duct (not shown), a membranous structure which is usually covered with small teeth-like projections.

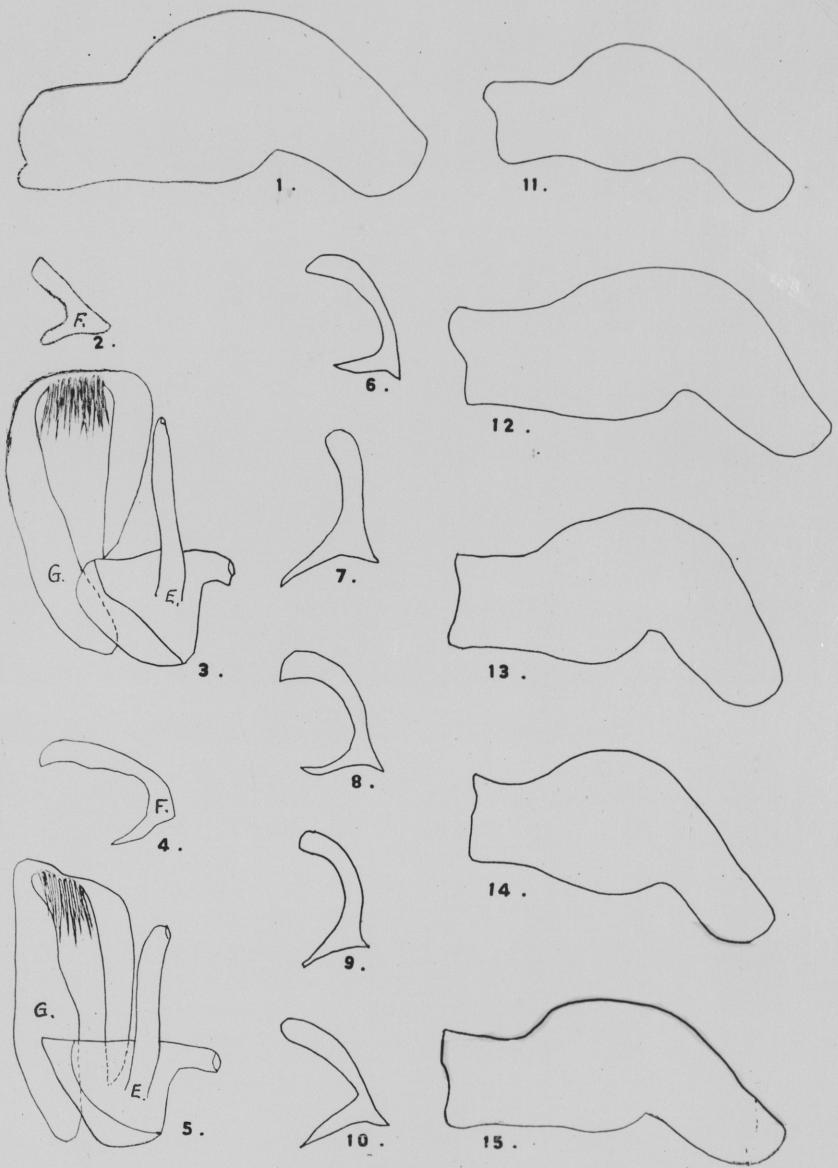


PLATE 3

North American Forms

1. R. distincta var. cadyi n. var., clasper
2. R. distincta var. cadyi n. var., internal clasper.
3. R. distincta var. cadyi n. var., connective and internal clasper.
4. R. distincta var. valentina n. var., internal clasper
5. R. distincta var. valentina n. var., connective and internal clasper.
6. R. distincta var. proxima n. var., internal clasper.
7. R. distincta (a paratype specimen of R. excellentis D.&H.)
8. R. distincta var. harmonia n. var., internal clasper.
9. R. distincta (compared with type by Hungerford), internal clasper
10. R. distincta var. arizonensis n. var., internal clasper.
11. R. distincta var. harmonia n. var., external clasper.
12. R. distincta var. proxima n. var., external clasper.
13. R. distincta (a paratype specimen of R. excellentis D.& H.), external clasper.
14. R. distincta var arizonensis n. var., external clasper.
15. R. distincta var. valentina n. var., external clasper

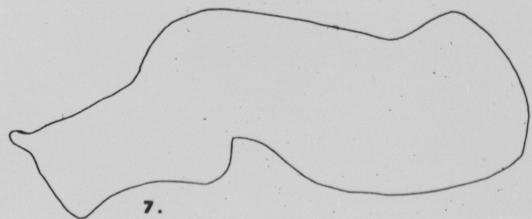
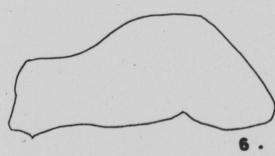
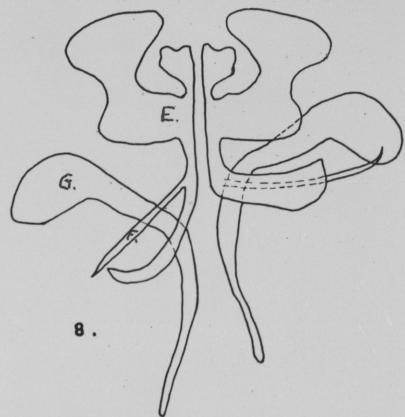
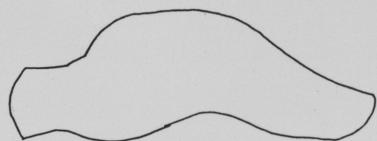
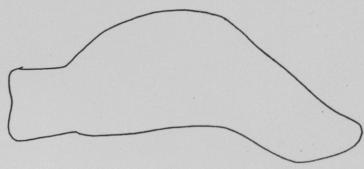
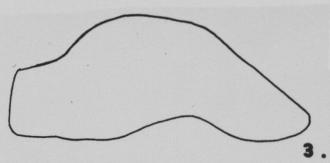
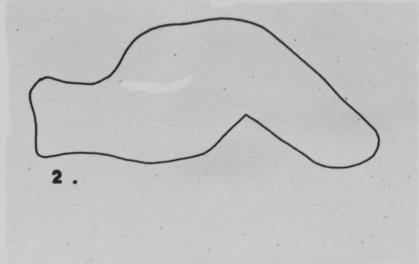
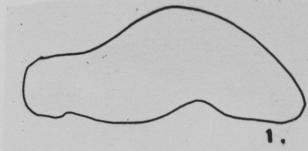


PLATE 4

North American Forms

1. R. choreutes Hussey, external clasper.
2. R. distincta var. modesta n. var., external clasper.
3. R. oriander Parshley, external clasper.
4. R. arctoa Bueno, external clasper.
5. R. obesa Uhler, external clasper.
6. R. rivale Bueno, external clasper.
7. R. beameri n. sp., external clasper.
8. R. beameri n. sp., internal genitalia (this is symmetrical, but torn apart here for drawing).

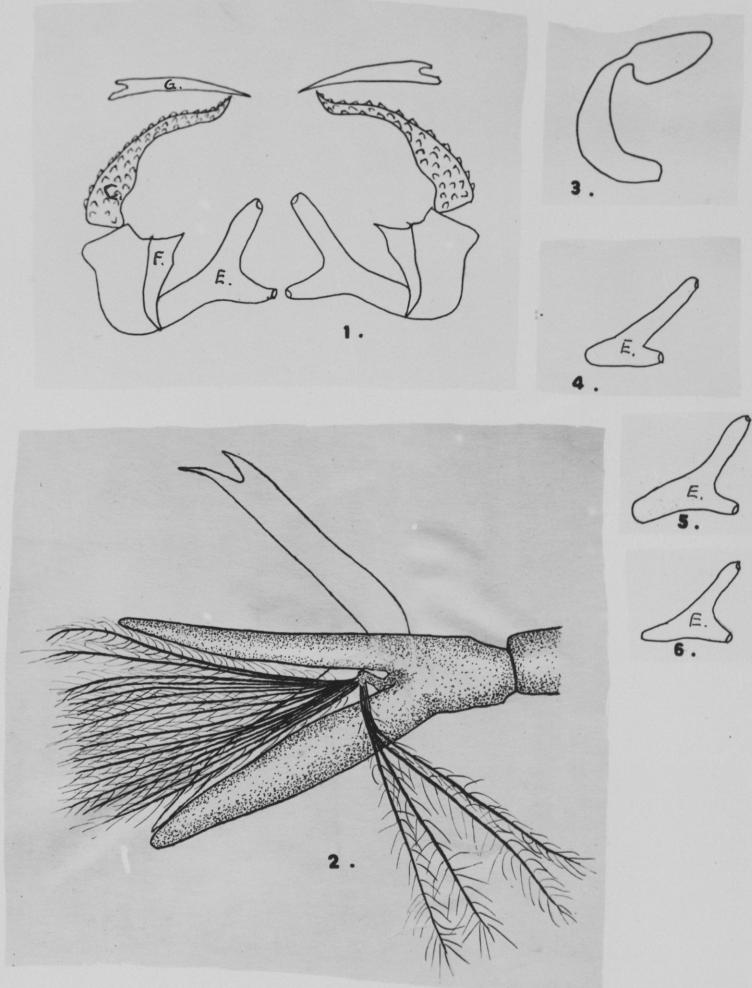


PLATE 5

North American Forms

1. R. obesa Uhler, internal genitalia.
2. Third tarsal segment of intermediate leg of a Rhagovelia, showing the characteristic cleft segment with the plumose hairs arising from base of cleft.
3. R. choreutes Hussey, connective.
4. R. oriander Parshley, connective
5. R. arctoa Bueno, connective.
6. R. rivale Bueno, connective.

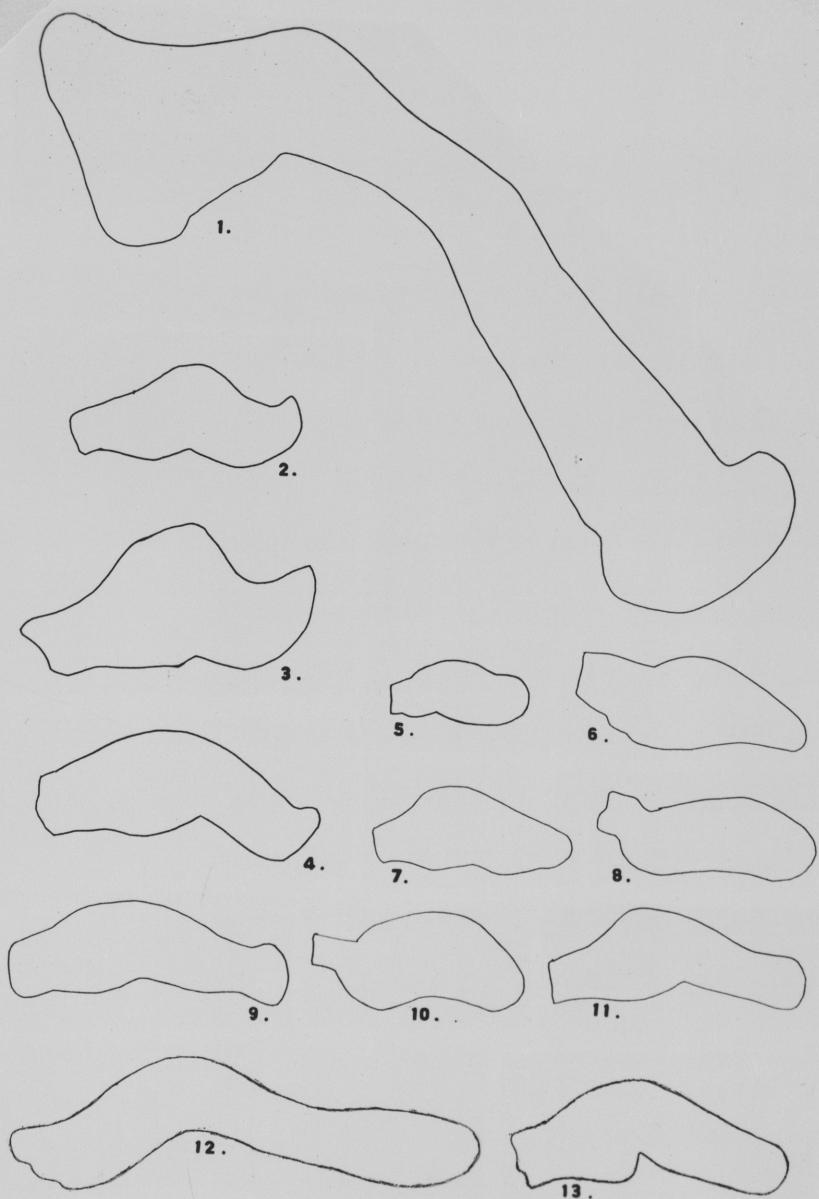
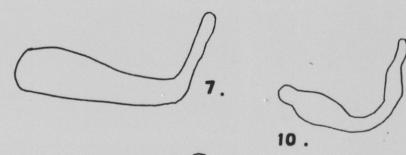
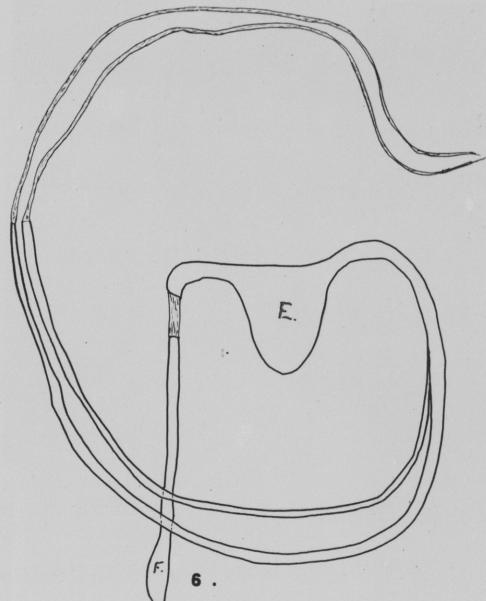
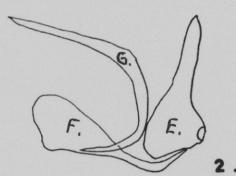
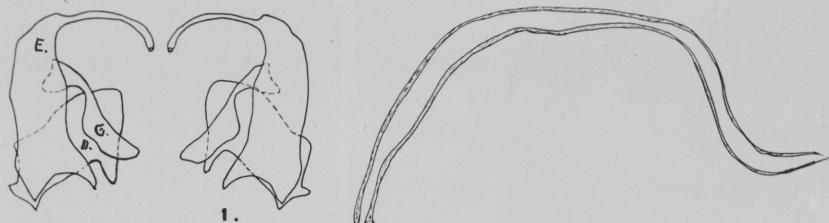


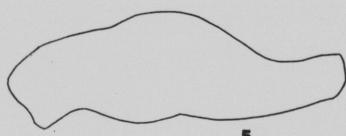
PLATE 6

Forms from South America And West Indies

1. R. gigantea Gould, external clasper
2. R. amazonensis n. sp., external clasper
3. R. williamsi n. sp., external clasper
4. R. lucida n. sp., external clasper
5. R. angustipes Uhler, external clasper
6. R. obscura n. sp., external clasper
7. R. longipes n. sp., external clasper
8. R. confusa n. sp., external clasper
9. R. sinuata n. sp., external clasper
10. R. spinosa n. sp., external clasper
11. R. trista n. sp., external clasper
12. R. collaris (Burm.), external clasper
13. R. insularis Champ., external clasper



10.



11.



PLATE 7

South American Forms

1. R. williamsi n. sp., entire internal genitalia
2. R. insularis Champ., internal genitalia
3. R. robusta n. sp., external clasper
4. R. lucida n. sp., external clasper
5. R. castanea n. sp., external clasper
6. R. gigantea Gould, internal genitalia
7. R. longipes n. sp., connective
8. R. spinosa n. sp., connective
9. R. angustipes Uhler, connective
10. R. obscura n. sp., connective
11. R. confusa n. sp., connective

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