



## Two new species of *Rhaphiomidas* (Diptera: Mydidae)

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### Abstract

Two new species of Mydidae, *Rhaphiomidas pachyrhynchus* **sp. nov.** and *Rhaphiomidas moapa* **sp. nov.** are described and illustrated here for the first time. *Rhaphiomidas pachyrhynchus* represents the southeastern most record of the genus. Notes on the adult ecology of *R. moapa* are given.

**Key words:** Diptera, Mydidae, *Rhaphiomidas*, Nuevo Leon, Moapa, sand dune

### Introduction

The genus *Rhaphiomidas* Osten Sacken, now consists of 22 known species and 5 subspecies. Cazier (1985) did the most recent revision of the genus. There have been two *Rhaphiomidas* species added to the genus after his review (Rogers 1993). Another two species have been discovered recently and are described in this paper. The genus *Rhaphiomidas* was moved out of the Apiceridae and placed in the Mydidae (Ovtshinnikova 2003, Yeats and Irwin 1996). *Rhaphiomidas* is distributed throughout the deserts of the Southwest United States and Northern Mexico (Rogers and Mattoni 1993, Cazier 1985).

Many species of *Rhaphiomidas* feed on floral nectar. *Rhaphiomidas* species fly between spring and fall and are most active according to spring and fall bloom. Many species are absent in dry years and can have huge emergences in wet years (pers. obs. Van Dam, Rogers, Ballmer, Osborne). It is unknown if mass emergences are due from the diapauses of larvae or pupa from multiple years or from a single productive year. Adults are active for only a few weeks. Multiple studies have been conducted on the adults' behavior (Kingsley 1996, 2002, Rogers and Mattoni 1993, Steinberg et. al. 1998, Ballmer et. al. 1994, Toft and Kimsey 1982).

*Rhaphiomidas terminatus abdominalis* Cazier is the only species of Diptera federally listed under the U.S. Endangered Species Act of 1973, in the continental United States (Federal Register, 58(183): 49881). Two taxa similar to *R. terminatus abdominalis* (Cazier 1985), are *Rhaphiomidas terminatus terminatus* Cazier and *R. trochilus* (Coquillett), are also near extinction. *R. terminatus terminatus* is only known from 20 ha in the middle of a golf course (George and Mattoni 2006). According to Section 18 of the Endangered Species Act the U.S. Fish and Wild Life Service has spent \$2,515,666 on *R. terminatus abdominalis* from 1996–2004. It was ranked as the 81<sup>st</sup> out of 1,271 Threatened and Endangered species (top 6%) in total expenditure in 2004 (U.S. Fish and Wildlife Service 2004). The species remains Endangered because of dwindling habitat as a result of urban development (US Fish and Wildlife Service 1997). Extensive efforts to find *Rhaphiomidas moapa* **sp. nov.** in surrounding areas has lead to the conclusion that this species may be restricted to a very small range, as it is only known from a single wash. Its fate is also imperiled because of mining operations, off road vehicle activity and development.

This paper describes two new species of *Rhaphiomidas*, they are *Rhaphiomidas pachyrhynchus* **sp. nov** and *Rhaphiomidas moapa* **sp. nov**. *Rhaphiomidas pachyrhynchus* represents the most southeastern record of *Rhaphiomidas*. This species is only known from a single specimen. *Rhaphiomidas moapa* is found only a short distance from Las Vegas, and may have remained undiscovered until recently because of its discrete flight season and specific habitat preference. The presence of these new species suggests that there may yet be additional undescribed species of *Rhaphiomidas*.

## Material and methods

The terminology follows that of Cazier (1985). The museum abbreviations are as follows: National Museum of Natural History, Smithsonian Institution (USNM), University of California Berkeley, Essig Museum of Entomology (EMEC), Natural History Museum of Los Angeles County (LACM).

## Taxonomy

### *Rhaphiomidas pachyrhynchus* **sp. nov.**

**Diagnosis:** This medium sized species is easily recognized by the very thick (>1mm) proboscis and by the pair of bullae on the second abdominal tergite, which is unique in the genus. The front tibia and tarsi are densely clothed with long golden pile. The basal half of the hemitergites exterior surface is densely clothed with long orange pile, whereas the distal half is unclothed. The terminalia are heart-shaped with subdorsal, longitudinal carina extending from the base to the middle of each hemitergite. The aedeagus is curved strongly upward.

**Description of holotype:** Male (Fig. 1a): Head: vertex, frons and face dark gray pruinose; posterior surface of head lighter gray pruinose; dense pale yellow pile on all surfaces except vertex which has numerous dark brown to black hairs. Antennae: scape dark gray, slightly shining, ventral surface with dense pale yellow pile, dorsal surface with a small number of white macrochaetae; pedicel, dark gray, pruinose, reddish brown at apex, ventral surface with tuft of pale yellow macrochaetae, reddish near bases, dorsal surface with a small number of pale yellow macrochaetae, also red near bases; segment three, dull black, reddish brown near base. Proboscis: short, about 8 mm (twice the length of the antennae), and thick, almost 1 mm at widest part near the base. Thorax: humeral callosities not deeply incised posteriorly. Mesonotum cinereous, with a slight olivaceous tint, weakly shining, without markings, densely covered with straw-colored pile, postalar callosities with six long, pale yellow macrochaetae on each side, above a tuft of pale yellow pile. Scutellum deeply divided from posterior mesonotal margin, similar in color and pilosity to mesonotum. Lateral thoracic sclerites dark gray, weakly shining, becoming reddish brown around the postnotal conical swellings and meta-thoracic spiracles; lateral thoracic sclerites with seven dense tufts of straw to white pile; postnotal conical swellings large and robust, weakly shining, with very short gray pile; halteres with stalk reddish brown, club orange in color. Wings with costal vein black pilose in basal third, the remaining portion short, black pilose. Legs: coxae dark gray, weakly shining; fore and mid coxa densely clothed with pale yellow pile; hind coxa with three tufts of pale yellow pile, and a considerable amount of black pile. Trochanters piceous, nitid; fore trochanter densely pale yellow pilose, mid trochanter with small amount of pale yellow pile, mostly dark brown pilose, hind trochanter dark brown pilose, with four black macrochaetae. Femora piceous, nitid, weakly wrinkled, shallowly grooved longitudinally along most of the length, apical area of fore and mid femur shining amber; fore femur with small amount of black hairs basally, entire length densely covered with pale yellow sinuous pile, inside surface with seven to nine light brown macrochaetae arranged in a zigzag formation; mid femur with dense pale yellow sinuous pile dorsally, moderately dense shorter black hairs laterally and

ventrally, three to four light brown macrochaetae laterally on apical portion, double row of four to five black macrochaetae ventrally; hind femur with light brown pile turning pale yellow apically on dorsal and lateral surfaces, ventral surface with mix of short and long black hairs basally, with apical third long sinuous pale yellow; pile, with double row of ten light brown to black macrochaetae. Fore tibia weakly shining with a scaly surface, gray basally, turning orange apically, dorsal surface with dense pale yellow pile, ventral surface with longer sinuous pile, with a small number of pale yellow macrochaetae; mid tibia same as above, but with pale yellow pile shorter, ventral surface with a few black hairs, also with six short black spines; hind tibia dark brown, same surface texture as above, short dense pale yellow pile anteriorly, long, dense, sinuous pile laterally and ventrally, about fifteen pale yellow macrochaetae on all surfaces except the inside which has a double row of short black spines. Fore tarsus pale orange, dorsal surface with short porrect pale yellow pile, lateral and ventral surfaces with long reclinate pale yellow pile, extending to fifth tarsal segment, a variable number of small pale yellow macrochaetae are present; mid tarsus pale orange with much shorter pale yellow porrect pile, and a triple row of short light to dark brown spines; hind tarsus pale orange, dorsally with short porrect pale yellow pile, ventral surface with long proclinate hairs on first tarsal segment, a variable number of rather small pale yellow macrochaetae are arranged in a zigzag formation on all segments, and a double row of eleven to thirteen short black spines are on the interior ventral surface of the first segment; pulvilli and claws of all tarsi pale orange, pulvilli large, greatly expanded apically. **Abdomen:** all tergites black, highly polished, with narrow apical borders of reddish brown on tergites II and III, tergite II with a pair of reddish brown oval bulla (Fig. 1d), one on each side near the apical portion of the tergite; tergite I with pale yellow erect sinuous pile, denser on the sides; tergite II densely covered with pale yellow sinuous pile, proclinate basally, erect medially, and reclinate apically; tergite III with pale yellow sinuous pile, erect except for fringe of pile slightly above apical border, which is reclinate; tergite IV same as tergite III; remaining tergites the same except for the lack of an apical fringe of pile; sternites mostly black, highly polished, pilosity the same as tergites, sternite II with irregular orange spots (one on each side) laterally; sternite III with oval spots of orange basally and laterally; sternite IV with small basal orange spots laterally; remaining sternites black, with increasingly dense orange pile. **Terminalia:** hemitergites heart-shaped (Fig. 1b), black, weakly shining, reddish brown border on lower margin, continuing up almost to apex; inside surfaces of hemitergites with prominent subdorsal carina, which extend from the base to the middle of each hemitergite; dense orange pile basally, going across the hemitergite diagonally to lower margin, but not extending to apex; short black hairs are present on the exposed portion of the hemitergites. Aedeagus light reddish brown, base laterally compressed, the rest of the length extremely recurved (Fig. 1c). Gonostyles about half the length of the hemitergites, slender, shining reddish brown, with orange sinuous pile, basal projections ear-shaped, small, about one fourth the length of the gonostyles.

Length overall: 25 mm, mesonotal width 6 mm.

Female: Unknown.

**Holotype:** (male) Mexico, Nuevo Leon, 60 miles south of San Roberto junction, elevation 5800 feet, September 26, 1967, Reginald E. and Elizabeth M. Painter, collectors (Deposited USNM)

**Etymology:** *pachy* (Greek) = thick), *rhynchos* (Greek) = snout), the name referring to the thickness of the proboscis, thicker than any other known species of this genus.

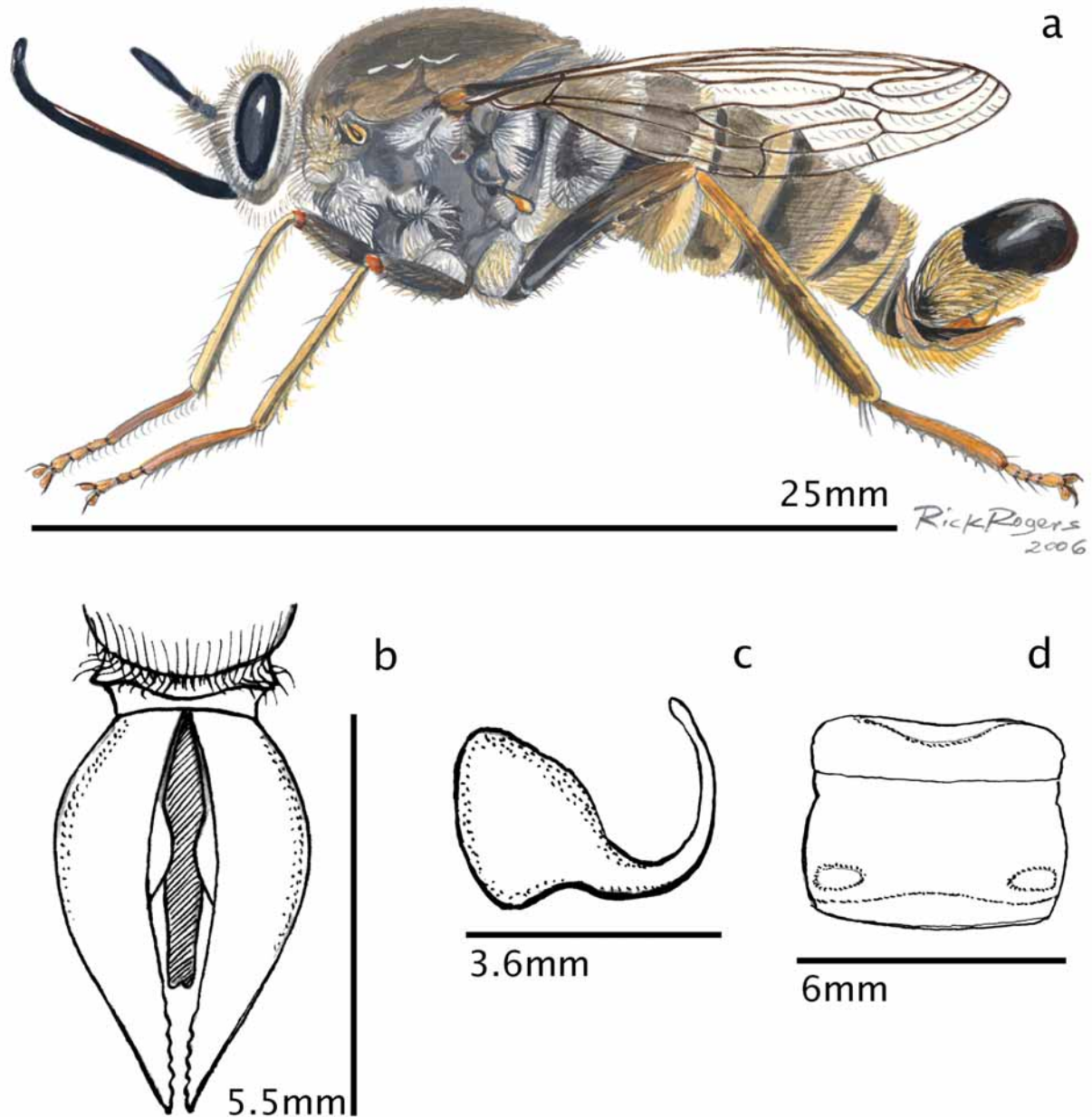
**Ecology:** Unknown.

**Relationships:** *Rhaphiomidas pachyrhynchus* **sp. nov.** is a very distinct species, apparently not closely related to other species in the genus. It is the only species in the genus to possess bullae. This character separates it from all other species in the genus. Other characters that are used to identify it are the hemitergites, which are distinctively covered in dense orange pile basally and are bare in the distal half. The aedeagus is also unique in the genus for being extremely recurved. The proboscis is also thicker compared to other species in the genus. The relationship to other species in *Rhaphiomidas* is unclear and further investigation is needed.

*Rhaphiomidas pachyrhynchus* does not easily key out in the key of Cazier (1985). The distinctiveness of

some characters does however allow for it to be easily separated. A new couplet in the key of Cazier (1985) would be as follows.

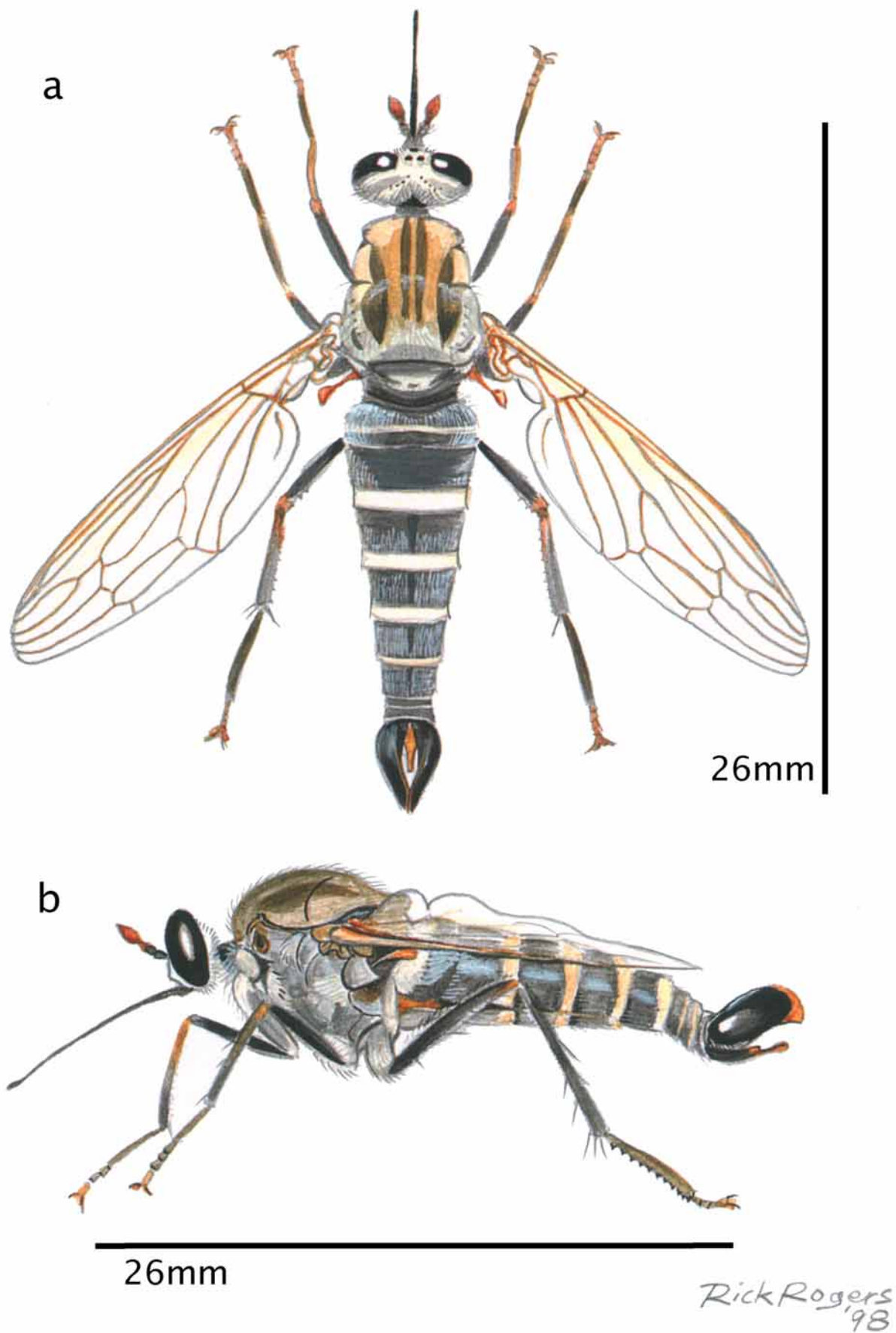
1. Bullae clearly present on abdominal tergite II..... *pachyrhynchus* sp. nov.
- Bullae not clearly present on abdominal tergite II..... 2



**FIGURE 1.** *Rhapsiomidas pachyrhynchus* sp. nov., (a) male, lateral habitus (b) hemitergites, dorsal view (c) aedeagus, lateral view (d) abdominal tergite II with bullae, dorsal view.

***Rhapsiomidas moapa* sp. nov.**

**DIAGNOSIS:** This species is separated by narrow abdominal tergites primarily gray with slight bluish reflections. Each tergite is bordered apically with a light yellow vitta. The hemitergites inner surface is deeply concave without spines or carinae and non-overlapping apices. The combination of the narrow gray abdominal tergites and non-overlapping hemitergites distinguish this species from all other *Rhapsiomidas*.



**FIGURE 2.** *Rhapsiomidas moapa* sp. nov., (a) male, dorsal habitus (b) male, lateral habitus.

**Description of holotype:** Male (Fig. 2a–b): Head: vertex, frons and face entirely pruinose, moderately covered with long white pile. Compound eyes separated from the lateral ocelli on vertex by about the width of a lateral ocellus; antennae with segments one and two gray pruinose, segment three orange; proboscis long, up to 9 mm in length. Thorax: humeral callosities deeply incised posteriorly, surface brownish gray pruinose, sparsely white pilose and macrochaetose; mesonotum with two medium longitudinal dark vittae and two lateral vittae one on each side; scutellum deeply acutely delimited from posterior mesonotal margin, sparsely clothed with white setae; mesopleural sclerites gray pruinose, sparse white pilosity around basalare and dorso-caudal angle, postnotal conical swelling gradually constricted to acute apical point, halteres pale orange. Wings: costal vein gold micro-pilose in basal portion, all veins brownish-orange in color. Legs: fore and mid legs see Fig. 2b; hind leg with femur slightly swollen, tibia ventral surface with double row of short black spines, first tarsal segment elongate longer than combined length of remaining segments, ventral surface covered with long re-curved pile and double row of short black spines, dorsal and lateral surfaces moderately densely covered with small gold setae. Remaining tarsal segments luteous with gold macrochaetae. Abdomen: All tergites primarily gray, weakly pruinose, each narrowly bordered apically with pale yellow transverse bands, moderately densely clothed with long semierect white pile, longer laterally, sternites as in tergites in color and pilosity. Terminalia: narrow, heart-shaped, sutural margins not overlapping, hemitergites (Fig. 3a), shining black medially, narrowly bordered apically and ventrally with reddish-brown, surface moderately clothed with white setae becoming longer laterally, gonostyles slender, clavate apically, extending three quarters the length of hemitergites, reddish brown with swollen lobes near base and swollen apical ends luteous, ventral surfaces densely covered with white pile, aedeagus small, light yellow in color (Fig. 3b). Length 26mm, Mesonotal width 6.5mm

Female: similar to male, except for the following; compound eyes separated from lateral ocelli on vertex by more than the width of a lateral ocelli. Fore and mid tibia and tarsi light brownish orange, femora dark gray, hind legs dark gray. Last three abdominal segments with small retorse setae; terminalia with acanthophorites small and reddish-brown.

**Holotype:** (male) USA, Nevada, Clark County, wash <0.1mi. south of Overton, HWY 169, May 24, 1998, 36°30'34"N 114°25'33"W, 1240 ft., R. Rogers (LACM)

**Paratypes:** (2 males, 1 female), USA, Nevada, Clark County, wash <0.1mi. south of Overton, HWY 169, May 24, 2005, 36°30'34"N 114°25'33"W, 1240 ft., M. Van Dam (EMEC)

(1 female) USA, Nevada, Clark County, wash <0.1mi. south of Overton, HWY 169, May 24, 1998, 36°30'34"N 114°25'33"W, 1240 ft., R. Rogers (LACM)

(5 males, 7 females) USA, Nevada, Clark County, wash <0.1mi. south of Overton, HWY 169, May 24, 1998, 36°30'34"N 114°25'33"W, 1240 ft., R. Rogers (personal collection Rick Rogers)

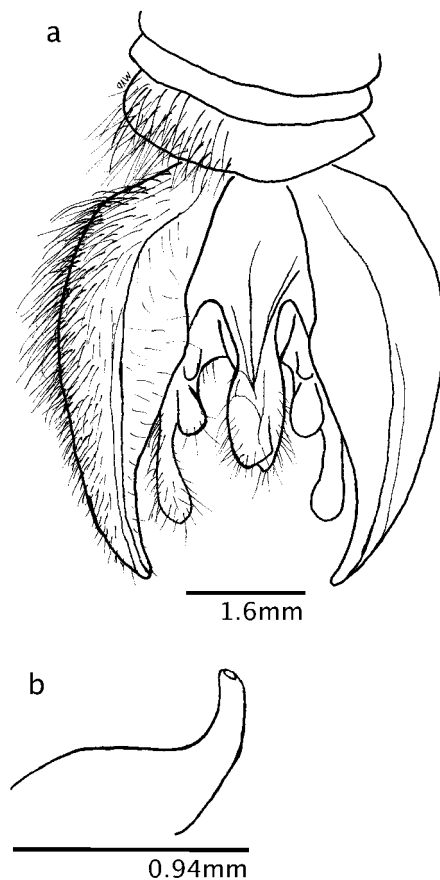
(1 female) USA, Nevada, Clark County, wash <0.1mi. south of Overton, HWY 169, May 28, 1998, 36°30'34"N 114°25'33"W, 1240 ft., Rick Rogers (personal collection Rick Rogers)

(1 male, 1 female) USA, Nevada, Clark County, wash <0.1mi. south of Overton, HWY 169, May 24, 2005, 36°30'34"N 114°25'33"W, 1240 ft., Rick Rogers (personal collection Rick Rogers)

**Etymology:** This species is named in honor of the Moapa Tribe of Native Americans.

**Ecology:** *Rhaphiomidas moapa* sp. nov. is only known from the type location. It has not been recorded in any other washes in the area and may be highly restricted. Despite surveying of the area by several collectors (Rogers, Ballmer, Osborne, Van Dam and others) no other locations have been found. *R. moapa* is absent in years of drought and is only active in years of moderate or heavy precipitation. This species has only been collected in mid to late May. *R. moapa* prefers to fly along the sides of a wash where fine sand is deposited in small dunes. Several specimens were collected in open dune areas removed from the wash (Osborne per. obs). Observed nectar sources are *Eriastrum* sp., *Chilopsis linearis* (Cav.) Sweet and *Petalonyx parryi* A. Gray. An observed predator of *R. moapa* is *Proctocanthus nearno* Martin (Asilidae). The distribution of *R. moapa* is sympatric with *R. auratus* Cazier, they also have been seen feeding out of the same flowers. Four empty pupal

cases (all female) were recovered from the sand dune area at the northwest side of the wash. As usual for the genus, the cases were found by looking for holes in the harder top crust of the sand. All were near the bases of *Ambrosia dumosa* (A. Gray) plants. The pupa is distinguished from *R. auratus* by the much shorter proboscis sheath.



**FIGURE 3.** *Rhapsiomidas moapa* sp. nov., (a) hemitergites, dorsal view (b) aedeagus, lateral view.

**Relationships:** *Rhapsiomidas moapa* is another distinctive species that does not have any clear similarities with other species in the genus. The overall body shape and coloration is similar to that of *R. parkeri* Cazier. However the hemitergites are overlapping in *R. parkeri* and are heart shaped in *R. moapa*. Also on the ventral surface of all femora, tibiae and first tarsi possesses a double row of short dark spines. The spines are most pronounced in the hind legs. This character is absent in the legs *R. parkeri*. Another species *R. moapa* resembles is *R. brevirostris* Cazier. The two can be easily differentiated because *R. moapa* has non-overlapping hemitergites. Also the third antennal segment is elongate with the widest part medially, in *R. brevirostris* the widest part is anterior to the middle. Further study is needed to understand the relationship that *R. moapa* has in the genus.

This species keys out with *R. trochilus* in the key of Cazier (1985). An additional couplet for this species would be as follows.

- 14. Abdominal tergites gray, narrowly bordered apically with pale yellow transverse bands ....*moapa* sp. nov.  
Abdominal tergites black or dark brown in the basal three-quarters to two-thirds bordered along apical margin with pale yellow, or abdominal tergites orange..... 15
- 15. Abdominal tergites black or dark brown in basal three-quarters to two-thirds, narrowly bordered along apical margin of each segment with pale yellow or cream color; terminalia elongate, narrow ..... *trochilus*

Abdominal tergites orange with at most small medial dark isolated spots on segments three and four; terminalia robust, wide.....*nigricaudis*

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