

ARTÍCULO

***Bonnetina papalutlensis* a new species of tarantula from Guerrero, Mexico, with notes on reproduction (Araneae, Theraphosidae, Theraphosinae).**

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## ***Bonnetina papalutlensis* a new species of tarantula from Guerrero, Mexico, with notes on reproduction (Araneae, Theraphosidae, Theraphosinae).**

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### **Abstract**

A new tarantula species of the genus *Bonnetina* Vol (2000) – *B. papalutlensis* **sp. nov.** – from Guerrero, Mexico is described and figured. Characteristics of its habitat and reproduction are discussed.

**Key words:** Taxonomy, tarantula, habitat, reproduction.

**Taxonomy:** *Bonnetina papalutlensis* **sp. nov.**

### ***Bonnetina papalutlensis* una nueva especie de tarántula de Guerrero, México, con notas de su reproducción (Araneae, Theraphosidae, Theraphosinae).**

### **Resumen**

Se describe una nueva especie de tarántula del género *Bonnetina* Vol (2000) – *B. papalutlensis* **sp. nov.** – de Guerrero, México. Se discuten características de su hábitat y reproducción.

**Palabras clave:** Taxonomía, tarántula, hábitat, reproducción.

**Taxonomía:** *Bonnetina papalutlensis* **sp. nov.**

### **Introduction**

Mexico has the second highest count of known tarantula species worldwide (about 70 species, Platnick, 2011). This number has been increasing annually, with new descriptions displaying the growing importance and diversity of Mexican theraphosid species (Locht, 2007).

Some species of *Bonnetina* Vol, 2000 were recently studied in Mexico increasing the number of their species (Locht & Medina, 2008; Estrada-Alvarez & Locht 2010). Diagnostic features of *Bonnetina* are: i) male pedipalpal bulb tapered with two prolateral keels, ii) female fused spermathecae with single receptacle, iii) leg IV noticeably longer than all others, iv) males with three tibial apophysis on leg I, v) males with slightly thickened femur III and vi) type III urticating hairs present. (Vol, 2000; Locht, 2007; Estrada-Alvarez & Locht, 2011).

Currently the genus is represented by four species endemic to Mexico: *Bonnetina cyaneifemur* Vol, 2000 from Colima, *Bonnetina rudloffi* Vol, 2001 from Michoacán, *Bonnetina alagoni* Locht & Medina, 2008 from Morelos and *Bonnetina aviae* Estrada-Alvarez & Locht, 2011 from Estado de México

The study of several specimens collected in the north of Guerrero in 2007 revealed diagnostic features of *Bonnetina* but also clear differences to the other described species suggesting the existence of a new tarantula species, *Bonnetina papalutlensis* **sp. nov.** Here we describe the new species, discuss its habitat and environment preferences and report the first observations on the reproductive behavior of the genus, in captivity.

## Material and methods

**Systematics.** All measurements are in millimeters and were taken using an ocular micrometer on a stereomicroscope Nikon SMZ800 and with a digital caliper with an error of 0.1mm. Leg and palp measurements were taken along the dorsal central axis of the left side. Abbreviations: AME= anterior median eyes; ALE= anterior lateral eyes; PME: posterior median eyes; PLE= posterior lateral eyes; d = dorsal; p = prolateral; r = retrolateral; v = ventral; Rap = Retrolateral tibial apophysis; Vap= ventral tibial apophysis; Pap= prolateral tibial apophysis; Tsp= triangular spines; Gn = Granular nodule; SA= subapical keel; PS= prolateral superior keel; PI= prolateral inferior keel; Tap= tegular apophysis; CNAN = Colección Nacional de Arácnidos, México DF; UNAM= Universidad Nacional Autónoma de México. Spination description follows Pérez-Miles & Locht (2003); that of tarsal scopulae, from Pérez-Miles (1994). Male palpal bulb keel terminology follows Bertani (2000). Geographical coordinates were obtained with Garmin GPS 12XL. The photographs of figures 3, 4, 6, 7 and 8 were taken with a Nikon Coolpix S10 VR digital camera coupled to a stereomicroscope. Photographs of figures 5, 9, 10, 11 and 12 were taken with a camera Sony DSC-S600. Drawings were made with a camera lucida. Types were deposited in the CNAN.

**Reproduction.** An adult female and adult male *Bonnetina papalutlensis* *sp. nov.* were captured in Papalutla, Guerrero, México, on 14 September 2007. They were maintained separately in clear plastic containers with numerous air holes in the lid (28cm large x 17cm width x 20cm high) with 10cm of peat moss as substrate and a small container with water. Adults of *Achaeta domestica* (Orthoptera) were provided weekly for food. The female molted on 21 September 2007, reverting to a virgin. Room temperature, during captivity until mating, was maintained close to 26°C, but temperature was only taken twice. After copulating the female was fed only with adult female crickets. Substrate moisture was risen an average of 70%. Behavioral patterns of reproduction follows Costa & Pérez-Miles (1992) and Yañez, Locht & Macías-Ordoñez (1999).

Observations in the habitat were made from five visits to the site in 2007 to 2009, without a regular period.

## Taxonomy

### *Bonnetina papalutlensis* *sp. nov.* (Figs. 1-10)

**DIAGNOSIS.** Male differs from *B. cyaneifemur* in the presence of a wider embolous and subapical keel with fine dentitions, similar to *B. rudloffi*. Differs from *B. rudloffi* in the presence of only two spiral keels at the apex of the embolous. Prolateral superior keel less developed than in *B. rudloffi*. Not completely divided tarsus IV as *B. rudloffi*. From *B. alagoni* in the presence of granular nodule on metatarsi I, swollen femur III and metatarsus I is not curved. The shape of the embolous is

not geniculate as in *B. aviae*. The bulb present tegular apophysis. Retrolateral tibial apophysis with four to five broad triangular spines. Palpal tibia with retrolateral process. Femur III is slightly swollen and is bluish iridescent in color (most noticeable in sunlight).

Females differ from other species of *Bonnetina* in the single receptacle with wide base and tapered top with finger shape.

**EXAMINED MATERIAL:** Holotype male (CNAN-T0662), close to Río Mezcala (18°00' N, 98°51' W), Jorge I. Mendoza-Marroquín; Paratype female (CNAN-T0664) "Camino a las Palmas" (18°01' N, 98°54' W), close to Papalutla, Copalillo, Guerrero, Mexico, 14 september 2007, same collector.

**ADDITIONAL EXAMINED MATERIAL:** *Bonnetina papalutlensis* *sp. nov.* Five males (CNAN-T0663), one juvenile male and one spiderling, "Barranca de la leña", outside Papalutla, Copalillo, Guerrero, Mexico (18°01' N, 98° 52' W), 26 october 2007; one male and juvenile collected by Víctor Hugo Jiménez; four males and spiderling collected by Jorge I. Mendoza-Marroquín. Female exuviae collected by Jorge I. Mendoza-Marroquín in "Las Palmas", Papalutla, Copalillo, Guerrero, Mexico (18°02'16" N, 98°54'12" W), 14 september 2007. *Bonnetina aviae*, holotype male, CNAN-T0693, two paratype males, CNAN-T0694 and two paratype females, CNAN-T0695. México: Ecatepec de Morelos, Estado de México, 17 january 2009, J. Estrada-Álvarez. *Bonnetina alagoni* holotype and paratypes were never deposited in the CNAN.

**ETYMOLOGY:** The specific epithet is a name referring to the site of the species natural distribution in Papalutla, Guerrero, Mexico.

**DESCRIPTION.** HOLOTYPE male (Figs 1-7): body length (not including chelicerae and spinnerets): 27, carapace: 13.25 long, 11 wide. Caput not markedly elevated; fovea straight, 2.03 wide. Carapace covered with brown rose setae.

Eyes: anterior eye row, procurved 1.73, posterior eye row recurved 1.75. Eyes sizes and inter-distances: AME: 0.37; ALE: 0.46; PME: 0.37; PLE: 0.46; AME-AME: 0.24; AME-ALE: 0.15; PME-PME: 0.71; PME-PLE: 0.5; ALE-PLE: 0.27. Eye tubercle, width: 1.59; length: 1.25; clypeus: 0.46 wide. Labium: length 2.4; width 1.95; cuspules: 54. Maxillae with approximately 165 cuspules on the inner corner. Sternum length: 5.85. Sigillae oval, second, third and four pair hardly visible; fourth pair one and half distance from the margin (Fig 6). Chelicerae teeth: 8 (7 larger and 1 smaller, distal to proximal) (Fig 7).

Legs: formula: IV, I, II, III. Length of legs and palpal segments (femur, patella, tibia, metatarsus, tarsus, total): I: 11.15, 6.6, 8.4, 8.65, 5.5, 40.3. II: 10.95, 5.4, 7.75, 7.75, 6, 37.85. III: 9.65, 5.45, 6.95, 9.25, 5.95, 37.25. IV: 11.6, 5.95, 10, 12.45, 6.6, 46.6. Palp: 7.95, 4.75, 6.9, -, 3.1, 22.7.

Scopulae: tarsi I-IV densely scopulate, IV divided by narrow band of setae. Metatarsi I-II densely scopulate; III scopulate on distal half and IV scopulate 1/4 their length on distal.

Leg I with two tibial apophysis and four to five retrolateral teeth. Metatarsi I with proximal granular nodule toward the retrolateral region.

Chaetotaxy (left side): femur: I 4d; II 1d, 3p, 1r; III 3p, 3r; IV 3d; palp 2p; patella: I 2p, 2v; II 3v; III 2p, 1r; tibia: I 3p, 10v, 1r; II 3p, 1.5v; III 4p, 13v, 5r; IV 3p, 11v, 4r; palp 3p, 5v, 2r; metatarsi: I 1v; II 2p, 13v; III 5p, 11v, 3r; IV 2d, 4p, 14v, 3r.

Urticating hairs: Type III on the posterior dorsum of the abdomen. Urticating hairs with copper metallic iridescence.

Color pattern: In live specimens, carapace with copper sheen, slightly pink with reddish setae around carapace border; ventral coxae, labium, maxillae and sternum black; abdomen dorsally black with reddish setae, ventrally brown. Legs and palpi: femur, patellae, tibiae and metatarsi with metallic dark blue iridescence, most notable in femur and tibia. Slight blue coloration dorsally on chelicerae.

PARATYPE female (Figs 8-9): body length, (not including chelicerae and spinnerets): 26.47, carapace: 10.82 long, 9.46 wide. Caput not markedly elevated; fovea straight, 1.95 wide. Carapace covered with brown rose setae.

Eyes: anterior eye row, procurved 3.3, posterior eye row, recurved 3.22. Eyes sizes and inter-distances: AME: 0.49; ALE: 1.02; PME: 0.66; PLE: 0.86; AME-AME: 0.37; AME-ALE: 0.33; PME-PME: 1.33; PME-PL: 0.15; ALE-PLP: 0.35. Eye tubercle, width: 3.29; length: 2.51; clypeus: 0.71 wide. Labium: length: 1.59; width: 1.78; cuspules: 82. Maxillae with approximately 169 cuspules on the inner corner. Chelicerae teeth: 8 (7 larger and 1 smaller, distal to proximal). Sternum length: 5.21. Sigillae oval, second, third and four pair hardly visible; fourth pair one and half distance from the margin.

Legs: formula: IV I II III. Length of legs and palpal segments (femur, patella, tibia, metatarsus, tarsus, total): I: 9.05, 4.7, 6.35, 5.55, 4.85, 30.5. II: 8.45, 5.2, 5.6, 5.65, 4.75, 29.65. III: 7.55, 4.2, 4.95, 6.95, 4.9, 28.55. IV: 10, 5.05, 7.85, 9.55, 5.6, 38.05. Palp: 6.95, 4.45, 4.95, -, 5.35, 21.7.

Scopulae: tarsi I-IV densely scopulate, IV divided by narrow band of setae. Metatarsi I-II densely scopulate; III scopulate on distal half and IV scopulate 1/4 their length on distal, divided by narrow setae. Scopula on tarsi I possess very narrow setae that seem to divide it. Genitalia: spermathecae wide at base but tapered on the top, sclerotized and fused with single elongated receptacle, with finger shape.

Chaetotaxy (left side): femur: I 3d; II 1d; III 1d, 2p, 1r; IV 1r; palp 1p; tibia: I 1p, 3v; II 2p, 5v; III 2p, 8v, 3r; IV 7v, 2r; palp 1p, 4v, 1r; metatarsi: I 2v; II 2p, 6v; III 4p, 9v, 3r; IV 4p, 10v, 3r.

Urticating hairs: Type III on the posterior dorsum of the

abdomen. Urticating hairs with copper metallic iridescence.

Color pattern: In live specimens, carapace with copper sheen, slightly pink with reddish setae around carapace border; ventral: coxae, labium, maxillae and sternum black; abdomen dorsally black with reddish setae, ventrally brown. Legs and palpi: femur, patellae, tibiae and metatarsi with metallic dark blue-green iridescence, most notable on femur and tibia. Slight blue coloration on chelicerae dorsally.

#### DISTRIBUTION

Found near Papalutla, northeast of Guerrero State (study area found between 17°58' to 18°02' north latitude and between 98°50' to 98°55' west longitude), Mexico.

#### HABITAT

*Bonnetina papalutlensis sp. nov.* predominates in rough land with marked elevations and vast canyons, divided by the Río Balsas, which is known locally as Río Mezcala (Papalutla). The Río Balsas divides the region into two principal areas: north and south, the former markedly steeper than the latter. The altitudinal variation ranges from 630 to 1600m (Martinez et al., 1997). The holotype male was collected walking during rain season at 630m above sea level, among predominant tropical deciduous forest vegetation. The paratype female was collected under a rock into her burrow at 1200m above sea level, in the limited tropical deciduous forest and palm grove. Populations may be distributed beyond the 1500 m altitude (specimens have been observed up to 1550 m altitude in the oak forest area). Both adults and spiderlings are fossorial, with burrows located under rocks where moisture is always conserved. Although livestock are present at 1550m, there is seemingly little pressure from human impact distribution, keeping that area well-preserved for the species (Fig. 11).

#### REPRODUCTION

In the wild, breeding season begins in September and ends in November, as inferred by the fact that mature males were only observed during those months in 2007, 2008 and 2009. The first offspring are apparently born in late April, coinciding with the onset of the rains.

On 16 October 2007 the male and female of *Bonnetina papalutlensis sp. nov.* were placed together. Immediately after being placed inside female's plastic box, the male started drumming (up and down alternating movements of the palpi on the substratum) and performing body vibrations. The female responded by leg drumming with pairs I and II, the two legs of the same pair were rapidly raised and lowered. The male vibrated his entire body and pedipalps, then drumming again with legs I. The female responded twice more with a drumming using the first two pairs of legs.

The male approached the female and touched her with his first two pair of legs, the female moved slightly towards the male and positioned herself in front of him. Before clasping his tibial spurs to the open fangs of the female, the male touched her first pair of legs and trem-

bled again. The male clasped with his tibial spurs the female's open fangs. The female's fangs penetrated between Vap and Pap, by the retrolateral side of male forelegs, and closed around Vap. Then the male alternately struck the female sternum with his pedipalps for up to 3 minutes before palpal insertions. When palpal insertion occurred the female body flexed more. There were three alternated insertions beginning with the left palpus and the average duration of each was *ca.* 25 seconds. The insertion of bulbs did not present observable mechanical difficulties for the male.

The male then began to leave the female, but they could not separate, so he continued to hold her, finally leaving her as quickly as possible in the opposite direction. The entire mating process since male was introduced into the female's tank lasted 24 minutes.

Towards the beginning of spring (14 March 2008, 150 days after copulation), the female laid a single egg sac. The female kept her palpi and legs in contact with the egg sac. Spiderlings emerged 40 days following oviposition (23 April 2008). The count was 173 spiderlings of about 1cm in body length (Fig 10).

## Discussion.

The variation in the number of triangular spines of Rap is usually considered an important character for the separation of species (Vol. 2000, 2001; Locht & Medina, 2008 and Estrada-Alvarez & Locht, 2011). However, *Bonnetina papalutlensis sp nov.* shows variation in the number of triangular spines of Rap. Estrada-Alvarez & Locht 2011 also reported variation of these spines in the males of *B. aviae*. This variation within the same species implies that this character is not stable enough to have taxonomic value. Therefore it is necessary to further study and review large series of different *Bonnetina* males.

Estrada-Alvarez & Locht 2011 considered the number of cheliceral teeth as a relevant diagnostic character in *Bonnetina* species. However, the number of cheliceral teeth has high intra-specific variation and hardly will be a good character for theraphosid taxonomy (Bertani,

2001). The number of cheliceral teeth in *Bonnetina papalutlensis sp nov.* showed variation even within the same specimen, the left and right bearing different numbers of cheliceral teeth.

Once in contact with the female's silk, male begins courtship behavior by drumming on the silk possibly a tachochemical response by contact. This behavior has been observed in other theraphosids (Costa & Pérez-Miles, 1992; Yañez *et al.* 1999). Palpation and body vibration could be similar to the behavior described in the courtship of other Theraphosidae (Costa & Pérez-Miles, 1992; Ferreti & Ferrero, 2008).

The number of insertions was similar to that reported for other species of Theraphosidae (Costa & Pérez-Miles, 1992; Yañez *et al.* 1999; Ferreti & Ferrero, 2008) but the copulation duration was different and unusually high for Theraphosidae. Here, it was not seen the female attack or injure the male as in other Theraphosids (Costa & Pérez-Miles, 1992; Ferreti & Ferrero, 2008). It is clear that a single mating observation is not enough to generalize the courtship behavior of the species even less the genus. However, this is the first report of courtship and mating behavior of *Bonnetina*. The other only study that reports mating behavior in Mexican theraphosids was Yañez *et al.* 1999 in *Brachypelma klaasi*. It is considered necessary to perform more laboratory and field observations of reproductive behavior in this and other species of Mexican Theraphosids.

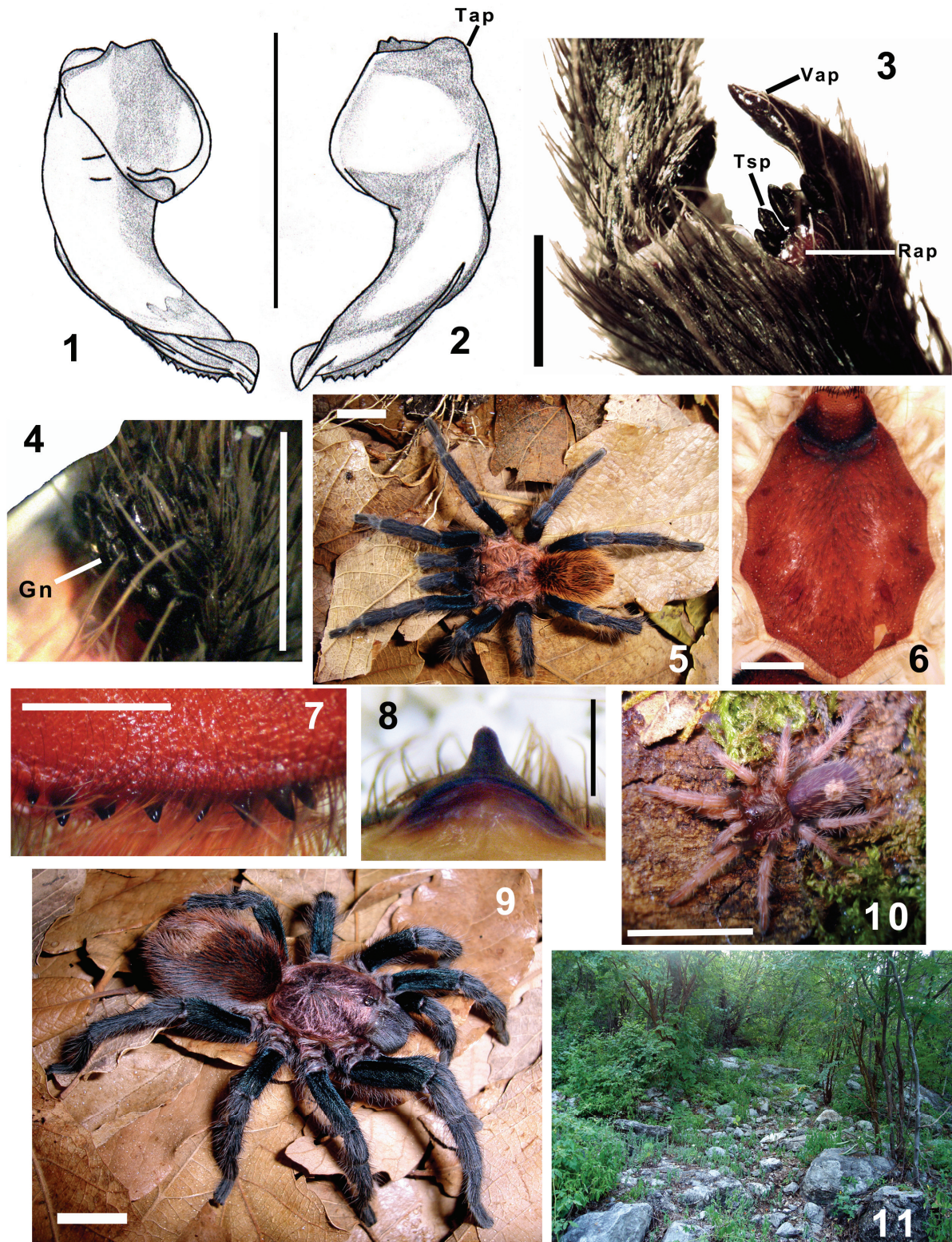
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**Figures 1-11.** *Bonnetina papalutlensis* *sp. nov.* 1-7 Holotype male. 1-2 Male palpal bulb. 1, prolateral; 2, retrolateral. 3 Male palpal tibial apophysis, retrolateral. 4 Metatarsus I retrolateral. 5 Habitus. 6 Sternum and sigilae. 7 Cheliceral teeth, showing 8 well developed teeth on promargin. 8 Spermatheca, frontal. 9 Habitus. 10 captive breeding spiderling. 11 Habitat, Guerrero, Papalutla. Scale = 2.5mm (Figs 1-2), 1mm (Figs 3-4, 6-8), 10mm (Figs 5, 9-10). Tap = Tegular apophysis; Gn = Granular nodule; Vap = Ventral apophysis; Rap = Retrolateral apophysis; Tsp = Triangular spines.