

Scientific Note

New species records of *Quadrasetta* Brennan, 1970 (Trombidiformes: Trombiculidae) in South America

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Abstract. The genus *Quadrasetta* Brennan, 1970 (Trombiculidae) is distributed in South American, with a few records from Central America. The larvae (chiggers) are primarily mammal parasites, with one species from birds. Examination of unidentified material at US National Insect and Mite Collection revealed five species to this genus: *Q. brasiliensis* Goff & Gettinger, 1989, *Q. falconensis* Goff & Brennan, 1977, *Q. flochi* (Brennan & Jones, 1960), *Q. mackenziei* (Yunker & Brennan 1964), and *Q. mirandae* Goff & Brennan, 1977. This study resulted in new South American localities and host records for these species.

Keywords: chiggers, ectoparasites, Brazil, Suriname, Venezuela.

Chiggers are the larval stage of the trombiculid mites (Trombidiformes: Trombiculidae s. l.) (Miyajima & Okumura 1917; Bassini-Silva et al. 2021). Chiggers are parasites of terrestrial vertebrates including humans and can cause dermatitis to the host (Shatrov 2000). There are currently 188 valid genera in this family (Nielsen et al. 2021). One of these genera, *Quadrasetta* Brennan, 1970 is occurs in South American, with a few records from Central America (Jacinavicius et al. 2018b; 2021; Silva-de la Fuente et al. 2021). Larval *Quadrasetta* are parasites of small mammals with a single species parasitizing birds (Jacinavicius et al. 2018b; 2021).

Examination of unidentified material deposited at the US National Insect and Mite Collection, Smithsonian Institution, National Museum of Natural History, Washington, DC, USA (USNM), currently located at the Systematic Entomology Laboratory (BARC-USDA-ARS), Beltsville, MD, USA, revealed five species of *Quadrasetta*: *Q. brasiliensis* Goff & Gettinger, 1989, *Q. falconensis* Goff & Brennan, 1977, *Q. flochi* (Brennan & Jones, 1960), *Q. mackenziei* (Yunker & Brennan, 1964), and *Q. mirandae* Goff & Brennan, 1977. Identification was made by comparing specimens with their respective types and published descriptions. No types were available for *Quadrasetta brasiliensis* so we compared our specimens with previously identified material deposited at the USNM and the original description by Goff & Gettinger (1989). The material data examined represents the new records for each species.

Trombiculidae Ewing, 1929

Quadrasetta Brennan, 1970

Quadrasetta brasiliensis Goff & Gettinger, 1989

This species was described from Brasília, Federal District, Brazil, parasitizing the rodent, *Hylaeamys megacephalus* (Fischer, 1814) (Rodentia: Cricetidae), and two marsupial species, the chacoan mouse opossum, *Marmosa agilis* (Tate, 1931) and the Northern three-striped opossum, *Monodelphis americana* (Müller, 1776) (Didelphimorphia: Didelphidae) (Goff & Gettinger 1989). Jacinavicius et al. (2018a) recorded *Q. brasiliensis* parasitizing the russet rice rat,

Euryoryzomys russatus (Wagner, 1848) (Rodentia: Cricetidae), from Adrianópolis Municipality, Paraná State, Cotia, Peruibe, and Sete Barras Municipalities, São Paulo State and in the Serra da Cantareira, São Paulo State. Additional host records from, Sete Barras Municipality, included *Delomys* sp., *Oligoryzomys* sp., and *Oxymycterus* sp., as well as the black-footed pygmy rice rat, *Oligoryzomys nigripes* (Olfers, 1818) (Rodentia: Cricetidae), and Ihering's short-tailed opossum, *Monodelphis iheringi* Thomas, 1888 (Didelphimorphia: Didelphidae). In Cotia Municipality, *Q. brasiliensis* has been recorded parasitizing the montane akodont, *Akodon montensis* Thomas, 1913 (Rodentia: Cricetidae), the Blackish Grass Mouse, *Thaptomys nigrita* (Lichtenstein, 1830), and an unidentified marsupial of the genus *Monodelphis* Burnett, 1829. And in the Serra da Cantareira, *Q. brasiliensis* was recorded parasitizing the agouti, *Cuniculus paca* (L., 1766) (Rodentia: Cuniculidae). Beyond to the localities mentioned above, Jacinavicius et al. (2018a) recorded *Q. brasiliensis* from Itapevi Municipality, São Paulo State, on the marsupial *Monodelphis* sp., and the Brazilian common opossum, *Didelphis aurita* (Wied-Neuwied, 1826) (Didelphimorphia: Didelphidae). In the São Paulo Zoo, São Paulo Municipality, this species was found on the rodent *Akodon* sp. (Jacinavicius et al. 2018a).

In this study, we report *Q. brasiliensis* from the Santo Boma region, Wanica District in Suriname parasitizing the Cayenne spiny rat, *Proechimys guyannensis* (É. Geoffroy, 1803) (Rodentia: Echimyidae) as new locality and host.

Material examined. 1 larva (RML 58520); Suriname, Santo Boma region, Wanica District, Suriname; 8 August 1971; ex. *P. guyannensis*; F. Lukoschus & Kok colls.

Quadrasetta falconensis Goff & Brennan, 1977

This species was described from Falcón state, Venezuela, parasitizing the Eastern cottontail, *Sylvilagus floridanus* (J.A. Allen, 1890) (Lagomorpha: Leporidae) (Goff & Brennan 1977). Recently, Jacinavicius et al. (2019) recorded this species from Brazil, in Petrolina Municipality, Pernambuco State, parasitizing the white-eared opossum, *Didelphis albiventris* Lund, 1840 (Didelphimorphia: Didelphidae).

This study identified this species in material collected from Sierra de Perijá, Zulia State, Venezuela, parasitizing *P. guyannensis*. This record represents a new Venezuelan locality, and a new host record for this species.

Material examined. 1 larva (RML 49102); Sierra de Perijá, Zulia, Venezuela; 17 April 1968; ex. *P. guyannensis*; C. E. Yunker coll.

Quadrasetta flochi (Brennan & Jones, 1960)

Quadrasetta flochi has the broadest geographic distribution among the *Quadrasetta* species, with records from Central America to South America, parasitizing birds and mammals. This species was described from Trinidad and Tobago, parasitizing the black rat, *Rattus rattus* (L., 1758) (Rodentia: Muridae) (Brennan & Jones 1960). In addition, the same authors recorded *Q. flochi* from two birds: the plain-brown woodcreeper, *Dendrocincla fuliginosa* (Vieillot, 1818) (Passeriformes: Furnariidae), and the great kiskadee, *Pitangus sulphuratus* (L., 1766) (Passeriformes: Tyrannidae); and these additional mammals: the common opossum, *Didelphis marsupialis* (L., 1758) (Didelphimorphia: Didelphidae), the Northern grass mouse, *Necomys urichi* (= *Akodon urichi*) (J.A. Allen & Chapman, 1897), the South American water rat, *Nectomys squamipes* (Brants, 1827), the large-headed rice rat, *H. laticeps*, the short-tailed cane mouse, *Zygodontomys brevicauda* J.A. Allen & Chapman, 1893 (Rodentia: Cricetidae), and the Caribbean spiny pocket mouse, *Heteromys anomalus* (Thompson, 1815) (Rodentia: Heteromyidae) all from Trinidad and Tobago.

Other published records for *Q. flochi*. Brennan (1968) includes Colombia from the dusky montane mouse, *Handleyomys fuscatus* (= *Thomasomys fuscatus*) (J.A. Allen, 1912) (Rodentia: Cricetidae). Brennan & Lukoschus (1971) recorded it in Suriname, parasitizing *P. guyannensis*. While Brennan & Reed (1975) recorded this species in different states of Venezuela, parasitizing the following hosts: the Northern red-sided opossum, *Monodelphis brevicaudata* (Erxleben, 1777), Robinson's mouse opossum, *Marmosa robinsoni* Bangs, 1898 (Didelphimorphia: Didelphidae), *N. urichi*, *H. megacephalus*, Tomes's rice rat, *Nephelomys albigularis* (= *Oryzomys albigularis*) (Tomes, 1860), Alston's cotton rat, *Sigmodon alstoni* (= *Sigmomys alstoni*) (Thomas, 1881), hispid cotton rat, *Sigmodon hispidus* Say & Ord, 1825, *Z. brevicauda*, Tome's Spiny Rat, *Proechimys semispinosus* Tomes, 1860 (Rodentia: Echimyidae), and *H. anomalus*. Jacinavicius et al. (2018a; 2021) recorded this species for Brazil. The first record was in Cotia Municipality, São Paulo State, Brazil, parasitizing *E. russatus*, and the second record was in the Piauí State parasitizing the grey short-tailed opossum, *Monodelphis domestica* (Wagner, 1842) (Didelphimorphia: Didelphidae) and the Sao Lourenço punare, *Thrichomys laurentius* Thomas, 1904 (Rodentia: Echimyidae).

We are adding new records of *Q. flochi* from three states and the Federal District in Venezuela. From Icabarú in Bolivar State new host records include the greater dog-like bat, *Peropteryx kappleri* Peters, 1867 (Chiroptera: Emballonuridae), *N. squamipes*, *Z. brevicauda* (Rodentia: Cricetidae) and an unidentified rodent from the genus *Zygodontomys* (Rodentia: Cricetidae). In Sierra de Perijá, in Zulia State *Q. flochi* was collected parasitizing *P. guyannensis*. While in Puerto Ayacucho City, in Amazonas State parasitizing *Z. brevicauda*; and near Quebrada Chacaíto River, Caracas, in the Federal District, *Q. flochi* was collected parasitizing *N. albigularis*. All localities are new for *Q. flochi*, and *P. kappleri* is a new host record.

Material examined. 9 larvae (RML 49830C); Venezuela, Icabarú, Boliva State, Venezuela; 8 May 1968; ex. *Z. brevicauda*; C. E. Yunker coll.; 7 larvae (RML 49911); same locality; 12 May 1968; ex. *Zygodontomys* sp.; C. E. Yunker coll.; 1 larva (RML 49923C); same locality; 17 April 1968; ex. *N. squamipes*; C.E. Yunker coll.; 1 larva (RML 49833); same locality; 8 May 1968; ex. *P. kappleri*; C. E. Yunker coll.; 5 larvae (RML 49102D); Sierra de Perijá, Zulia State, Venezuela; 17 April 1968; ex. *P. guyannensis*; C. E. Yunker coll.; 1 larva (RML 48403); Puerto Ayacucho City, Amazonas State, Venezuela; 5 November 1966; ex. *Z. brevicauda*; Smithsonian Army coll.; 1 larva (RML 52517); Quebrada Chacaíto River, Caracas City, Federal District, Venezuela; 18 May 1967; ex. *N. albigularis*; Smithsonian Army coll.

Quadrasetta mackenziei (Yunker & Brennan, 1964)

This species was described from Beni Department in Bolivia, parasitizing *P. guyannensis* and the large vesper mouse, *Calomys callosus* (Rengger, 1830) (Rodentia: Cricetidae) (Yunker & Brennan 1964).

Here, we are providing new locality and host-association records for *Q. mackenziei* in Brazil. The identified material came from Bragança Municipality, Pará State on *H. laticeps*, and from the Amapá State, on *M. brevicaudata*.

Material examined. 25 larvae (RML 49092); Bragança Municipality, Pará State, Brazil; 1 April 1968; ex. *H. megacephalus*; Aitken coll.; 5 larvae (RML 49372); Amapá State, Brazil; 28 March 1968; ex. *M. brevicaudata*; Aitken coll.

Quadrasetta mirandae Goff & Brennan, 1977

The species *Q. mirandae* was described for Miranda State, Venezuela, parasitizing *N. albigularis* (Goff & Brennan 1977). These same authors identified additional material from several different states in Venezuela. From Bolivar State, this species was collected on *P. guyannensis*; from Falcón State, this species was collected on *M. brevicaudata*, *H. anomalus* and an unidentified rodent *Zygodontomys* sp.; from Lara State, this species was collected on an unidentified rodent *Echimys* sp.; from Caracas, Federal District, this species was collected on *D. marsupialis*, *H. anomalus* and *N. albigularis*; from Sucre State, this species was collected on *M. brevicaudata*, *H. anomalus*, *P. guyannensis*, and *Z. brevicauda*; from Yaracuy State, this species was collected on *M. brevicaudata*; from Zulia State, this species was collected on *P. guyannensis* and *Proechimys* sp. (Rodentia: Echimyidae); and an additional record from Miranda state on *D. marsupialis*. Jacinavicius et al. (2018a) found *Q. mirandae* in the Cotia Municipality, São Paulo State, parasitizing *A. montensis*.

The material examined in this study comes from collections in Venezuela. The new records are an unidentified *Rhipidomys* sp. (Rodentia: Cricetidae) from Caracas, Federal District, and *S. floridanus* from Coro City, Falcon State. Furthermore, this species was collected parasitizing *M. brevicaudata* and *Proechimys* sp. in Trujillo and Amazonas States, respectively. For the first time, *Q. mirandae* was collected on *S. floridanus*, and Trujillo and Amazonas States are new locality records.

Material examined. 1 larva (RML 52796); Caracas, Federal District, Venezuela; 29 July 1965; ex. *Rhipidomys* sp.; Smithsonian Army coll.; 3 larvae (RML 53362); Coro City, Falcón State, Venezuela; 17 July 1968; ex. *S. floridanus*; Smithsonian Army coll.; 1 larva (RML 48244); Trujillo State, Venezuela; 8 September 1965; ex. *M. brevicaudata*; Smithsonian Army coll.; 1 larva (RML 48240); same locality and host; 5 September 1965; 1 larva (RML 52972); near to the Mavaca river, Amazonas State, Venezuela; 20 March 1967; ex. *Proechimys* sp.; Smithsonian army coll.

In conclusion, examination of unidentified material in the USNM collection resulted in new locality and host-association records for five species of *Quadrasetta*. Also, we recorded for the first time *Q. brasiliensis* from Suriname and *Q. mackenziei* from Brazil. First time hosts include the bat (*P. kappleri*) for *Q. flochi* and the rabbit (*S. floridanus*) for *Q. mirandae*.

Despite the additional locality and host records the taxonomy of the group is still confused, and the genus needs revision to provide a better understanding of intraspecific relationships. We prefer not to present a key until all species within the genus *Quadrasetta* are examined and redescribed.

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Authors' Contributions

RLA and MH-B examined the slides and collected the label data and RB-S, FCJ, CW and RO performed the study and confirmed the identification of the mites. RS-R, DMB-B, and FCJ wrote the manuscript with input from all authors.

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