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On the Identity of *Neostenotarsus guianensis* (Caporiacco, 1954), with a Redescription of the Holotype Male and the First Records from Guyana (Araneae: Theraphosidae) †

Danniella Sherwood * and Ray Gabriel

Arachnology Research Association, 124 City Road, London EC1V 2NX, UK
* Correspondence: danni.sherwood@hotmail.com
† Zoobank: urn:lsid:zoobank.org:pub:20DE5F43-EFAB-49A5-9EAD-4604399D8EA5.

Abstract: Herein, we redescribe *Neostenotarsus guianensis* (Caporiacco, 1954) nearly seven decades after its original description. In the original description of *Neostenotarsus scissistylus* Tesmoingt & Schmidt, 2002, we found characters incongruent with *N. guianensis*, namely, the purported presence of serration on the prolateral keels of the palpal bulb; a narrower apical third of the embolus; the absence of a patch of bristles on the retrolateral face of the palpal tibia and of a baso-retrolateral protuberance on metatarsus I; and a shorter and more apically situated megaspine on the retrolateral branch of the tibial apophyses. The characters from its original description are discussed. *N. scissistylus* stat. rev. has been revalidated until such time as the type material, or topotypic material, can be examined by future workers.

Keywords: taxonomy; morphology; biogeography; new record; French Guiana; tarantula

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1. Introduction

The family Theraphosidae Thorell, 1869, is currently represented in French Guiana and Guyana by 13 and 14 species, respectively [1], and a rich variety of works have been published on the taxonomy of theraphosids from these and neighbouring countries over the last two centuries (e.g., [2–27]). It is interesting to note that Suriname, situated between these two countries, has only five valid species recorded at present: *Avicularia avicularia* (Linnaeus, 1758), *Ephebopus murinus* (Walckenaer, 1837), *Holothele longipes* (L. Koch, 1875), *Tapinauchenius plumipes* (C. L. Koch, 1842), and *Theraphosa blondi* (Latreille, 1804) [1]. We are certain this is an artefact of under-recording, as we have examined theraphosid material of other genera from Suriname (this work is being prepared). This has already been speculated, but not yet confirmed, for *Acanthoscurria simoensi* Vol, 2000, given its presence in Brazil, French Guiana, and Guyana [21].

Caporiacco [28] (p. 49–50) described *Hapalopus guianensis* Caporiacco, 1954, based on a single male from "vallée de l'Oyapock" in French Guiana, deposited in the Muséum national d'Histoire naturelle, Paris (MNHN). Forty-eight years later, Tesmoingt & Schmidt [29] described a new species, *Stenotarsus scissistylus* Tesmoingt & Schmidt, 2002, with specimens of both sexes, as the type species of the monotypic genus *Stenotarsus* Tesmoingt & Schmidt, 2002. *Stenotarsus scissistylus* was established based on pet trade material (allegedly) from "Agoli" in French Guiana. Soon after, Schmidt [30] listed the newly combined (although this is not made explicit) *Neostenotarsus guianensis*, reproducing illustrations from Tesmoingt & Schmidt [29] and listing *S. scissistylus* in its synonymy list. Despite this, Schmidt [30] also does not elaborate further or use unambiguous designations for a synonymy such as 'syn. nov.' or 'syn. n.'.

It is thus unsurprising that Platnick (2004–2014) [31] and the World Spider Catalog (2014–2016) [1] continued to list *Neostenotarsus* (initially listed as *Stenotarsus*) as being monotypic and Caporiacco's taxon as being in the genus *Hapalopus* Ausserer, 1875, for

another decade. Later versions of the World Spider Catalog from 7.5 onward did state that *Neostenotarsus scissistylus* "may be a junior synonym", but no formal change was accepted [1,31]. Following Schmidt's work [30], the generic name *Stenotarsus* Tesmoingt & Schmidt, 2002, was shortly thereafter validly replaced with the nomen novum *Neostenotarsus* Pribik & Weinmann, 2004, as it was a junior homonym of *Stenotarsus* Perty, 1832 (Coleoptera: Endomychidae).

Years later, Schmidt [30] (p. 15) lamented that many of his taxonomic proposals for theraphosids (almost exclusively published in non-peer-reviewed hobby magazines, and often without adequate illustrations or photographs) were not being accepted by the World Spider Catalog on his say so. In the same work, Schmidt [30] attempted again to synonymise *N. scissistylus* with *N. guianensis*. Specifically, Schmidt [30] stated (translated here from German): "The male was described as *Hapalopus guianensis* by DI CAPORIACCO in 1954. The female was studied by TESMOINGT & SCHMIDT but could not be assigned to any of the known tarantula genera; it was thus assigned to the new genus *Stenotarsus*, which had to be changed into *Neostenotarsus* in 2004 by PRIBIK & WEINMANN because *Stenotarsus* was preoccupied. Shortly after publication, SCHMIDT was informed by VOL that this supposed new species was in fact the species described by DI CAPORIACCO; further investigation by SCHMIDT confirmed this assessment. The correct name of the species is thus *Neostenotarsus guianensis* (DI CAPORIACCO, 1954)".

The synonymy was still not accepted by the arachnological community for some time, only being incorporated in version 17.5 of the World Spider Catalog in 2017 [1], but it is still accepted in the present version, 24.5 [1]. It is important to note that Schmidt does not elaborate on what 'investigations' he carried out or if he examined the holotype of *N. guianensis*. No elaboration is made on what information he received from French arachnologist Fabian Vol or when it was received. For context, it is important to note that Fabian Vol is a taxonomist who spent considerable time studying the MNHN collection of theraphosids in the 1990s and 2000s, work that included producing images of much of the Simon type material held in the collection. Subsequently, Vol generously made this information available to some colleagues thereafter (see acknowledgements).

In this work, we redescribe and diagnose *N. guianensis* based on a direct examination of the holotype. Based on differences in the palpal bulb and tibial apophysis described in the work of Tesmoingt & Schmidt [29] and the unknown status of the type of material, leaving only details in the original description for interpretation, we restore *Neostenotarsus scissistylus* stat. rev. until the type (or topotypic) material can be examined.

2. Materials and Methods

Specimens were examined under binocular microscopes. Photographs of the palpal bulb and both tibial apophyses were captured by RG using a Leica M125C auto-montage and those of opisthosomal patterning by DS with a Canon EOS 6D Mark II attached to a Leica MZ12.5 stereomicroscope, with images stacked using Helicon Focus. The general habitus was photographed by RG with a Fuji Finepix S4000. Description style follows the work by Sherwood et al. [32]. Abbreviations used are as follows: Institutes—BMNH = Natural History Museum, London, United Kingdom; MNHN = Muséum national d'Histoire naturelle, Paris, France. Structures: ALE = anterior lateral eyes, AME = anterior median eyes, PLE = posterior lateral eyes, and PME = posterior median eyes; PB = prolateral branch (of tibial apophysis) and RB = retrolateral branch (of tibial apophysis). Other: coll. = collector. Leg spine terminology follows the definition given by Petrunkevitch [33] with the modifications proposed by Bertani [34]: d = dorsal, v = ventral, r = retrolateral, and p = prolateral. Palpal bulb terminology follows the definitions provided by Bertani [35], i.e., A = apical keel, PI = prolateral inferior keel, PS = prolateral superior keel, and TH = tegular heel, with an addition proposed by Gabriel & Sherwood [36], namely, PC = prolateral crease. Leg formulae start with the longest leg to the shortest in order of decreasing size, e.g., 4, 1, 2, and 3. Urticating setae terminology follows that proposed by Cooke, Roth, and Miller [37] and Kaderka et al. [38]. All measurements are given in mm.

3. Results

Neostenotarsus Pribik & Weinmann, 2004

Stenotarsus Tesmoingt & Schmidt, 2002: 4. (preoccupied *nec Stenotarsus* Perty, 1832)

Stenotarsus: Schmidt (2003)

Neostenotarsus Pribik & Weinmann, 2004: 21. (replacement name).

Neostenotarsus: Schmidt (2015)

Type species: *Stenotarsus scissistylus* Tesmoingt & Schmidt, 2002.

Amended diagnosis: *Neostenotarsus* can be distinguished from most genera, except *Catanduba* Yamamoto, Lucas, and Brescovit, 2012; *Cyriocosmus* Simon, 1903; *Homoeomma* Ausserer, 1871; and *Plesiopelma* Pocock, 1901, by the presence of a protuberance on metatarsus I in the male. It can be distinguished from *Cyriocosmus* by the absence of a paraembolic apophysis on the palpal bulb (which is present in *Cyriocosmus*) and from *Catanduba*, *Homoeomma*, and *Plesiopelma* by its non-filiform embolus (filiform in *Catanduba*, *Homoeomma*, and *Plesiopelma*). *Neostenotarsus* can be further differentiated from all known Theraphosinae by the elongate apical keel terminating in a pronounced crest in the apical quarter (with the apical keel not terminating in a pronounced crest in the apical quarter in other known theraphosine genera for which males are known).

Distribution: Guyana (new record) and French Guiana

Remarks: The function of the baso-retrolateral protuberance on metatarsus I in several New-World theraphosid genera has yet to be explained. It is possible this structure may relate to the mating process (e.g., helping the male secure the female's fangs) and is used in conjunction with the tibial apophysis, but this needs to be confirmed through observations of mating behaviour.

Species included: *N. guianensis* and *N. scissistylus*

Neostenotarsus guianensis (Caporiacco, 1954);

Hapalopus guianensis Caporiacco, 1954: 49, figs. 1, 1a;

Neostenotarsus guianensis: Schmidt (2015): 15. (in part).

Type material: Holotype ♂*Hapalopus guianensis* (MNHN AR–4206), vallée de l'Oyapock, entre les fleuves Moutaquouère et Dégrad Galoupa, 1948, coll. Mission Aubert de la Rue, examined.

Diagnosis: *Neostenotarsus guianensis* can be distinguished from males of *N. scissistylus* stat. rev. by the absence of denticles on the prolateral keels (Figure 1B–E) (purportedly present in *N. scissistylus* stat. rev., cf. Tesmoingt & Schmidt [29] (p. 8, figs. 3, 4b, 5)), a wider apical third of the embolus (Figure 1B,C) (with the apical third being narrower in *N. scissistylus* stat. rev., cf. Tesmoingt & Schmidt [29] (p. 8, fig. 3)), the presence of a patch of bristles on the retrolateral face of the palpal tibia and of a baso-retrolateral protuberance on metatarsus I (Figures 1F and 2A–H) (absent [not mentioned] in *N. scissistylus* stat. rev., cf. Tesmoingt & Schmidt [29] (pp. 4–5)), and the megaspine of the RB that is longer and more medially situated (Figure 2A–E) (the megaspine is shorter and more apically situated in *N. scissistylus* stat. rev., cf. Tesmoingt & Schmidt [29] (p. 8, figs. 1–2)).

Redescription of holotype male (MNHN AR–4206): Total length including chelicerae—28.8. Carapace: length—12.0; width—10.1. Caput: slightly raised. Ocular tubercle: raised, length—2.5, and width—1.7. Eyes: ALE > AME, AME > PLE, PLE > PME; anterior eye row is procurved, and posterior row is slightly recurved. Clypeus: narrow; clypeal fringe—short. Fovea: deep, procurved. Chelicera: length—6.1; width—3.0. Abdomen: length—10.7; width—6.8. Maxilla with 80–90 cuspules covering approximately 84% of the proximal edge. Labium: length—2.0 and width—1.8, with 80–90 cuspules, most of which are separated by 0.5–1.0 times the width of a single cuspule. Labio-sternal mounds: joined. Sternum: length—5.4 and width—4.6, with three pairs of sigilla. Tarsi I–III are fully scopulate, and tarsus IV is divided by a band of setae. Metatarsal scopulae: uninterpretable, specimen abraded; unable to take accurate measurements of proper extent. Lengths of legs and palpal segments: see Table 1, legs 4, 1, 2, and 3. Spination: femur III d 0–0–1, IV d 0–0–1, tibia I v 0–1–2, II v 1–2–3, III d 2–0–2, v 1–1–3, IV d 0–2–2, v 1–2–3, palp v 0–1–1, metatarsus I v 0–0–1 (apical), II v 0–2–3 (apical), III d 1–2–1, v 2–2–4 (3 apical), IV d 1–3–2, v 1–3–3 (apical).

Tibia I with paired tibial apophysis, RB longer than PB, RB with two megaspines, and PB with one megaspine (Figure 2A–E). Femur III: slightly incrassate. Palpal tibia: retrolateral apophysis present at apex, tibia slightly incrassate, with a thick pad of bristle-like setae behind retrolateral apophysis (Figure 1F). Palpal cymbium: unmodified. Metatarsus I: slightly curved, baso-retrolateral protuberance present, area of metatarsus anterior of protuberance concave (Figure 2F–H), closing against the inside of RB and the apex of PB (Figure 2E). Posterior lateral spinnerets have three segments, basal 2.6, median 2.2, and digitiform apical 2.9. Posterior median spinnerets have one segment. Palpal bulb has developed TH; embolus thick and slightly tapered upwards; A, PI, and PS elongate and developed; PI and A with a crest in the apical quarter; PC present and wide throughout length (Figure 1B–E). Urticating setae: Type I present dorsally. Stridulation organ is absent. Colour: alcohol preserved brown, opisthosoma (depilated) dorsally black, with brown urticating setae (Figure 1), presence of undulating pattern on lateral faces of opisthosoma (see remarks).

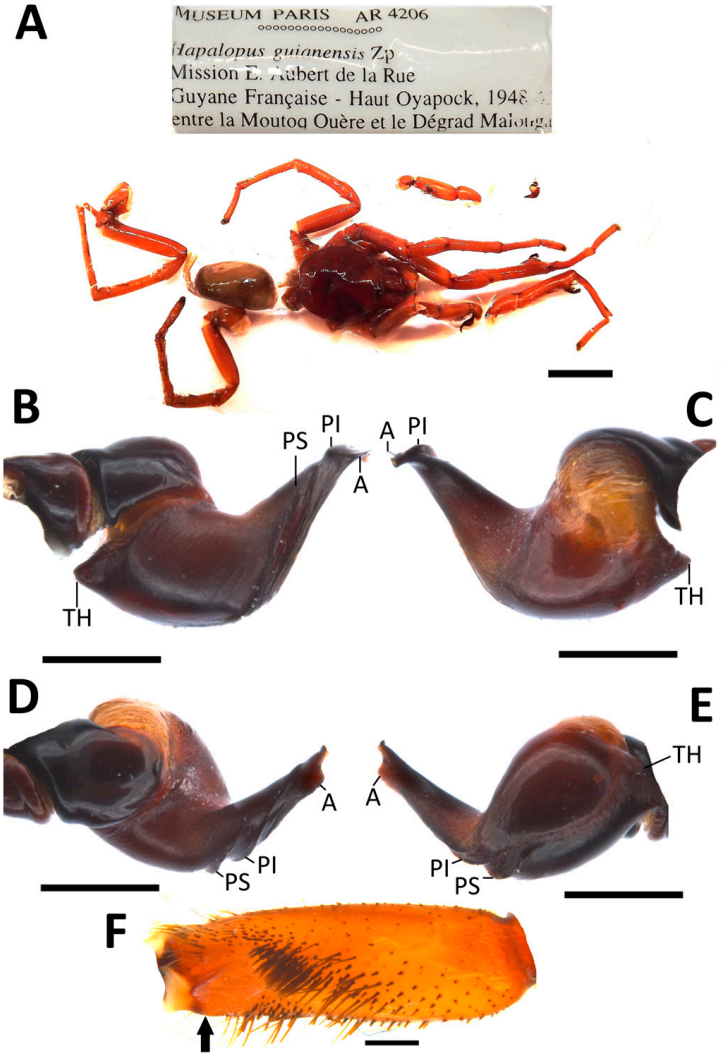

Figure 1. Holotype male *Neostenotarsus guianensis* (Caporiacco, 1954) (MNHN AR–4206): (**A**) habitus of specimen and labels, (**B**–**E**) palpal bulb (left hand side), (**B**) prolateral view, (**C**) retrolateral view, (**D**) dorsal view, (**E**) ventral view, and (**F**) palpal tibia, lateral view. Scale bars = 1 mm. Arrow denotes palpal tibial apophysis; a patch of bristles is viewable behind the apophysis. Photo credits: R. Gabriel.

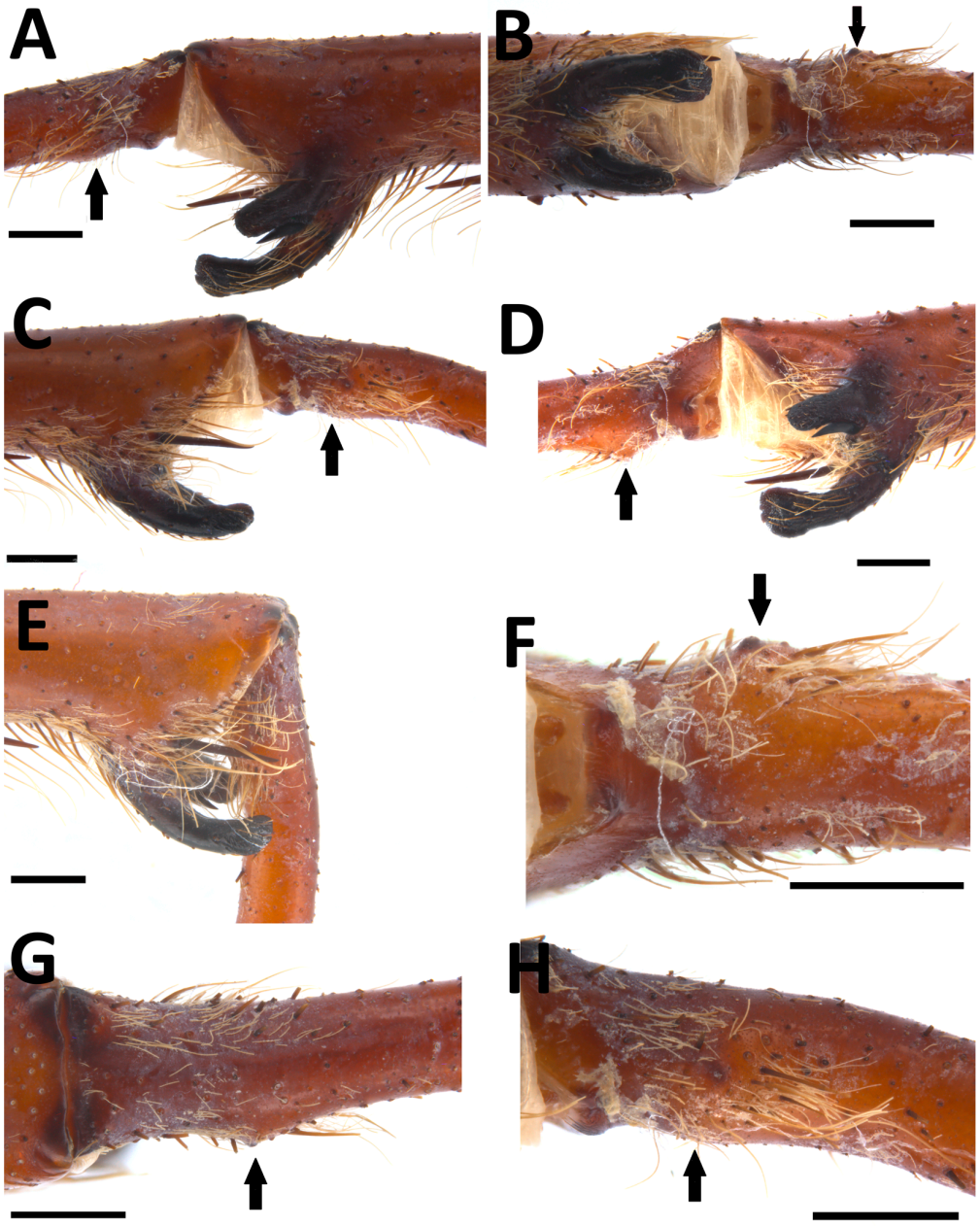

Figure 2. Holotype male *Neostenotarsus guianensis* (Caporiacco, 1954) (MNHN AR–4206), tibia and metatarsus of leg I (left hand side): (**A**) prolateral view; (**B**) ventral view; (**C**) retrolateral view; (**D**) prolatero-ventral view; (**E**) position of metatarsus against the tibial apophysis; (**F**) details of baso-retrolateral metatarsal protuberance, ventral view; (**G**) dorsal view; (**H**) retrolateral view. Scale bars = 1 mm. Arrows indicate positions of baso-retrolateral metatarsal protuberances. Photo credits: R. Gabriel.

Table 1. *Neostenotarsus guianensis* holotype male (MNHN AR–4206), podomere lengths.

	I	II	III	IV	Palp
Femur	10.5	10.7	9.5	11.9	6.0
Patella	5.9	5.1	4.9	4.9	4.1
Tibia	9.3	8.3	7.5	10.4	6.6
Metatarsus	8.7	8.2	9.9	13.9	–
Tarsus	6.7	6.0	5.1	6.3	2.2
Total	41.1	38.3	36.9	47.4	18.9

Female: Unknown.

Other material examined: 2 ♂♂(BMNH 1939.3.24.46–58), British Guyana, [coll.] C. A. Hudson.

Distribution: Guyana and French Guiana.

Remarks: The locality as written on the modern typed data label is not as that found in the original text by Caporiacco [28]. Therefore, in the type material section above, we have standardized the type locality according to the published phrasing.

Remarks: The opisthosomal pattern of the holotype male is very faint but can be observed by eye. As this specimen was fragile and the pattern is extremely faded, we opted to use photographs of the opisthosomas of conspecific males in BMNH, which are in much better condition (Figure 3A,B). These specimens are in a jar with specimens of *Holothele longipes* [18] and an unidentified female theraphosine with a singular spermathecal receptacle and an unpatterned abdomen, which we do not consider to be congeneric with *Neostenotarsus*.

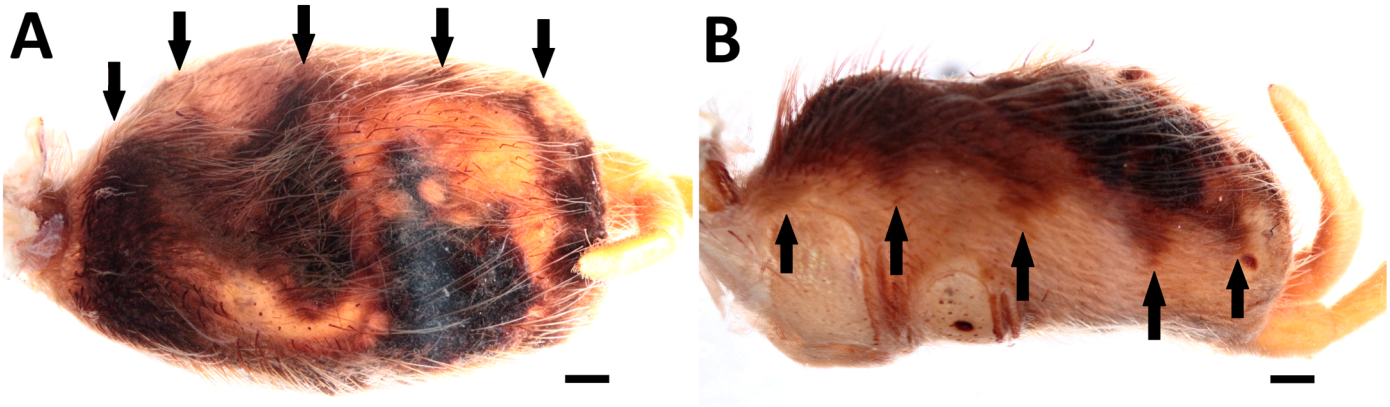

Figure 3. Non-type males of *Neostenotarsus guianensis* (Caporiacco, 1954) (BMNH 1939.3.24.46–58): (**A**) dorso-lateral view of opisthosoma, showing dorsal black colouration and edges of lateral pattern; (**B**) lateral view of opisthosoma, showing undulating pattern on lateral face. Scale bars = 1 mm. Arrows indicate undulating pattern on opisthosoma. Photo credits: D. Sherwood.

Neostenotarsus scissistylus (Tesmoingt & Schmidt, 2002) stat. rev.

Stenotarsus scissistylus Tesmoingt & Schmidt, 2002: 4, figs. 1–21.

Stenotarsus guianensis: Schmidt (2003): 188, figs. 497–499.

Neostenotarsus scissistylus: Pribik & Weinmann (2004): 21. (replacement name for genus)

Neostenotarsus guianensis: Schmidt (2015): 15. (misidentification)

Type material: Holotype ♂and unspecified number of ♀♀exuviae *Stenotarsus scissistylus*, Agoli, French Guiana, April 1997, coll. A. Braunshausen, whereabouts unknown, not located in MNHN.

Diagnosis: *Neostenotarsus scissistylus* stat. rev. can be distinguished from males of *N. guianensis by* the purported presence of denticles on the prolateral keels [29] (p. 8, figs. 3, 4b, 5) (absent in *N. guianensis*, cf. Figure 1B–E), a narrower apical third of the embolus [29] (p. 8, fig. 3) (with the apical third being wider in *N. guianensis*, cf. Figure 1B,C), the absence of patch of bristle-like setae on the retrolateral face of the palpal tibia and of a baso-retrolateral protuberance on metatarsus I—not mentioned by [29] (pp. 4–5) (present in *N. guianensis*, cf. Figures 1F and 2A–H), and a more apically situated megaspine on the RB [29] (p. 8, figs. 1–2) (with the megaspine being longer and more medially situated in *N. guianensis*, cf. Figure 2A–E).

Distribution: French Guiana (we could not locate the type locality "Agoli" on maps).

Remarks: Despite searching, we were unable to locate the type material of this species during recent visits over the last five years to MNHN, where Tesmoingt & Schmidt [29] stated they would later deposit the types. Other type material of other theraphosid species described by Marc Tesmoinigt are not deposited in the collections stated [16,39], so this

also may be the case with this taxon. As is apparently common with species described from the exuviae of live specimens from the pet trade, the physical specimens themselves are often never deposited in a museum either (see below). Nonetheless, there are several characters in the original description that are not in concordance with *N. guianensis*, namely, (1) purported denticles on the prolateral keels, (2) an apparent absence of a baso-retrolateral protuberance on metatarsus I (a character not mentioned as being present in the description), (3) the absence of a patch of bristle-like setae on the retrolateral face of the palpal tibia (also not mentioned as being present), (4) a shorter and more apically situated megaspine on the RB, and (5) a narrower apical third of the embolus. Furthermore, whilst differences in colouration on the abdomen were noted (mentioned as being darker patches of setae) by Tesmoingt & Schmidt [29], a comprehensive description of any apparent abdominal pattern was not given unambiguously, nor was an illustration showing this character provided. This may, however, simply be an artefact of the poor descriptive methodologies used by Tesmoingt & Schmidt [29], who published their description in a pet hobby magazine as opposed to an academic, peer-reviewed journal. Until the types or topotypes are located, this character state remains speculative in *N. scissistylus*. Therefore, only the original description can be used for comparison. We hereby remove *N. scissistylus* stat. rev. from synonymy with *N. guianensis* due to the apparent notable differences and tentatively consider it valid until such time as the types are located or future workers can collect topotypic material.

The female Is known (only from exuviae) but cannot be compared with *N. guianensis* as the female of the latter is unknown.

4. Discussion

Here, we clarify the taxonomy of *Neostenotarsus*, reviewing all known species, presenting the first photographs of the holotype of *N. guianensis*, and studying the palpal bulb in detail, according to modern standards first proposed by Bertani [34]. We show that pet trade material described as a second species by Tesmoingt & Schmidt [29] further confused the taxonomy of this group and that Schmidt [30] apparently placed one species into synonymy with another.

The use of exuviae for the original description of the female of *N. scissistylus* stat. rev. whilst itself being problematic (and already discussed in detail elsewhere [40]) also highlights another problem resulting from "pet hobby" descriptions: the subsequent non-deposition of the physical specimens that produced these exuviae in museums themselves. This appears to be almost always true of such descriptions [16,39]. The sole use of exuviae in descriptions of female theraphosids could be due to the financial value of live specimens (which may be sold on by hobbyists and/or not sent for description due to their monetary value). It is also possible such specimens die in captivity and are commonly attacked by phorid flies or other invertebrates [41], making them unsuitable for deposition. In any case, it is evident that descriptions using exuviae do not meet modern taxonomic standards.

A redescription of *N. scissistylus* stat. rev. and a formal description of the female of *N. guianensis* are required. However, the first records of the latter species from Guyana also showed it has a wider distribution range than previously thought, which we hope will provide future workers the opportunity to gather more material to further advance our knowledge of this group. In the meantime, the holotype of *N. guianensis* has been fully redescribed and is now readily identifiable for the first time in seven decades.

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