

## Research Article

# A Revision of the Selenocosmiine Tarantula Genus *Phlogiellus* Pocock 1897 (Araneae: Theraphosidae), with Description of 4 New Species

Steven C. Nunn,<sup>1</sup> Rick C. West,<sup>2</sup> and Volker Von Wirth<sup>3</sup>

<sup>1</sup>27 Jeanne Drive, Victoria Point, QLD 4165, Australia

<sup>2</sup>6365 Willowpark Way, Sooke, BC, Canada V9Z 1L9

<sup>3</sup>Eichendorffstraße 1, 73547 Lorch, Germany

Correspondence should be addressed to Steven C. Nunn; [cnu84149@bigpond.net.au](mailto:cnu84149@bigpond.net.au)

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The tarantula genus *Phlogiellus* (Pocock 1897) is revised. The genus is diagnosed against all other selenocosmiine genera for the first time along with a new generic description. The tribe Yamiini (Kishida 1920) is diagnosed against all other selenocosmiine tribes. All *Phlogiellus* species are diagnosed from all congeners; all species are mapped. Complete dichotomous keys for both sexes of all species are included. Where appropriate, intraspecific variation is discussed. Four new species are described: *P. bogadeki* sp. nov. from Hong Kong, *P. johnreylazoi* sp. nov. from Palawan Island, Philippines, *P. moniqueverdezae* sp. nov. from Ranong, Thailand, and *P. pelidnus* sp. nov. from Sabah, Borneo. The type species *P. atriceps* (Pocock 1897) holotype male is redescribed and the male *P. baeri* (Simon 1877) is described in detail for the first time. The validity of *P. inermis* (Ausserer 1871) is confirmed. Relationships between all known selenocosmiine genera and *Phlogiellus* from the Philippines are discussed and several character traits are newly diagnosed. The tribe Phlogiellini (West et al. 2012) is a junior synonym of Yamiini (Kishida 1920). *Selenocosmia orophila* (Thorell 1897) from Myanmar, *Selenocosmia insulana* (Hirst 1909) from Djampea (= Jampea) Island, and *Selenocosmia obscura* (Hirst 1909) from Sarawak, Borneo, are transferred to *Phlogiellus*, altering the specific names to *Phlogiellus orophilus* (Thorell 1897) comb. nov., *Phlogiellus insulanus* (Hirst 1909) comb. nov., and *Phlogiellus obscurus* (Hirst 1909) comb. nov. *Phlogiellus subarmatus* (Thorell 1891) is transferred to *Chilobrachys* (Karsch 1891), becoming *Chilobrachys subarmatus* (Thorell 1891) comb. nov. *Phlogiellus kwebaburdeos* (Barrion-Dupo et al., 2014) is transferred to *Orphnaecus* (Simon 1892), becoming *Orphnaecus kwebaburdeos* (Barrion-Dupo et al., 2014) comb. nov. *Phlogiellus ornatus* (Thorell 1897) and *Phlogiellus nebulosus* (Rainbow 1899) are considered *species inquirenda*. *Phlogiellus baeri* (Simon 1877) is no longer considered *incertae sedis*; *Phlogiellus bicolor* (Strand 1911) and *Phlogiellus insularis* (Simon 1877) are considered *incertae sedis*.

## 1. Introduction

The genus *Phlogiellus* (Pocock 1897) presently comprises 16 species and belongs to the tribe Yamiini (Kishida 1920) within the subfamily Selenocosmiinae (Simon 1889) [1] of the mygalomorph family Theraphosidae. Members of the genus can be found in Myanmar, Thailand, Cambodia, Vietnam, Singapore, Indonesia, Taiwan, Hong Kong, Philippines, and other parts of the Southeast Asiatic region west of the

Wallace Line [2]. Several transfers and new descriptions herein provide the first record of this genus within their respective countries.

Pocock described *P. atriceps* (Pocock 1897) based on a mature male and female from the Bogor [formerly Buitenzorg] Botanical Gardens in Java [3]. Pocock considered that these specimens were unique amongst all known selenocosmiine genera in that the scopulae on tarsi I–IV were divided and a stridulating organ was present but somewhat reduced

[3]. While Pocock himself considered that these character traits associated with immature/juvenile selenocosmiine specimens [3], he found a mature male displaying these traits (along with a conspecific female), which led him to the discovery of this new genus [3].

Within the same paper, Pocock suggested that (but did not confirm) *P. atriceps* (Pocock 1897) may be synonymous with *I. inermis* (Ausserer 1871) and, further, that several of Simon's "group C" species [4, p. 136] within *Ischnocolus* (Ausserer 1871) belong to this new genus [3]. He did not, however, make any specific taxonomic changes within this work, except for descriptions of *Phlogiellus* and of *P. atriceps*, type species for *Phlogiellus* by original designation and monotypy [3].

In 1897, *Ischnocolus brevipes* (Thorell 1897a) was described from South Myanmar and promptly moved from *Ischnocolus* to *Phlogiellus* by the same author [5] later in that same year. Around the time Pocock described *Phlogiellus*, *P. aper* [6] from Jakarta [formerly Batavia], Java; *P. baeri* [7] from Manila, Philippines; *P. inermis* [8] from Indonesia; *P. insularis* [7] from Malamoy, Basilan, Philippines (= Malamawi Island, Basilan Province); *P. nebulosus* [9] from Santa Cruz, Archipelago, Solomon Islands; *P. ornatus* [10] from Myanmar; and *P. subarmatus* [11] from Nicobar Island were all originally described in *Ischnocolus* (Ausserer 1871). Three years later, Pocock [12] himself incorrectly listed *P. inermis* (Ausserer 1871) as the type for the genus during a large revision of Indian mygalomorph fauna, followed by Simon [13] and Strand [14], yet no official synonymy ever occurred, and *P. atriceps*, regardless, would have remained the type species by original designation and monotypy (Pocock [3], *contra* Pocock [12], Simon [13], and Strand [14]).

Additionally, Pocock [12] transferred *I. subarmatus* (Thorell 1897) to *Phlogiellus* and Simon [13] transferred *I. inermis* (Ausserer 1871), as well as his *Ischnocolus* "group C" [4, 15], to *Phlogiellus*. Both transfers were published as citing only and, outside of a revision of any sort, left several species with questionable taxonomic placement within *Phlogiellus* [13]. Raven discussed an issue relating to this problem: "Simon's work shared a weakness of many taxonomic reviews of that period, namely an inattention to an examination of types. Usually, only the specimens in the authors own collections were studied, and genera were assumed to be adequately described in the literature" [16].

Hirst [17] considered *Phlogiellus* a junior synonym of *Selenocosmia*, based on his discussion that many *Selenocosmia* and *Chilobrachys* possess both a third claw on leg IV and divided scopulae on tarsi III and IV, two of Pocock's character traits used when he first described *Phlogiellus* [17]. He also described two new species, *Selenocosmia insulana* (Hirst 1909) from Djampea Island and *Selenocosmia obscura* (Hirst 1909) from Borneo. Hirst then described a new subgenus, *Neochilobrachys* (Hirst 1909), defining it as a *Chilobrachys* (Karsch 1891) with an elementary stridulating organ and divided tarsal scopulae, naming the type species as Thorell's *P. subarmatus* [11] and, further, declared *P. subarmatus* a senior synonym of *P. inermis* [8], with this shifting *P. inermis* into his new subgroup [17]. Strand [18] ignored the finding of Hirst [17] and considered *Phlogiellus* valid, subsequently describing

*Phlogiellus bicolor* (Strand 1911), based upon a juvenile male (that Strand presumed to be a female) from Kuele (= Koil) Island, Sepik Province, Papua New Guinea. Being a juvenile, the type displayed traits that would artificially place it within *Phlogiellus* by Strand. Kishida [19] described *Yamia watasei* (Kishida 1920) from Lanyu (= Orchid) Island, Taiwan (a mature selenocosmiine female lacking a stridulating organ), and, due to the taxonomic difficulties he had in placing this species, created the tribe Yamieae (= Yamiini) (Kishida 1920). Giltay [20] described *Selenocosmia subinermis* (Giltay 1934) primarily from Bokor, Cambodia, and Vietnam, keyed *Selenocosmia insulana* and *Selenocosmia obscura* [20], and, further, described *Neochilobrachys mutus* [21] from Mauo (= Bunglasan) River, Samar Island, Philippines, a spider in which he diagnosed an absent maxillary lyra combined with divided tarsal scopula [21]. Abraham [22] erroneously listed *Neochilobrachys inermis* as "*Selenocosmia inermis*" and, based upon specimens within his own collection, concluded "*Selenocosmia inermis*" as being present on Singapore Island [22]. Petrunkevitch listed both *Neochilobrachys* and *Phlogiellus* as valid genera, interestingly, correctly citing *P. atriceps* as the type species for *Phlogiellus* [23].

Roewer followed Petrunkevitch's resurrection of *Phlogiellus* [24]. While Roewer [25] listed *Phlogiellus*, Brignoli [26] did not. Additionally, he transferred *Selenocosmia subinermis* (Giltay 1934) to *Phlogiellus* [25]. Curiously, Bonnet [27] synonymized both *Neochilobrachys inermis* [8] and *P. subarmatus* [8] with *P. atriceps* (Pocock 1897) and transferred both *Phlogiellus subarmatus* and *Phlogiellus subinermis* [20] back to *Selenocosmia* [27]; however, this was published without any supporting evidence for his transfers and thus largely overlooked by all who followed.

Raven [16] placed *Neochilobrachys* into junior synonymy of *Phlogiellus* because the type species *P. subarmatus* showed no defining generic characters and was clearly synonymous [16] (note that, within the same work, Raven also cited *Phlogiellus* when defining anterior-posterior gradations and significance in Mygalomorphae; see [16, p. 12]).

Barrion and Litsinger [28] described the new genus and species *Baccallbrapo bundokalbo* (Barrion and Litsinger) 1995 from Siniloan, Luzon Island, Philippines. They diagnosed the new genus by the absence of any stridulating organ and presence of undivided tarsal scopulae on legs I in the male and I-IV in the female [28].

Huber et al. [29] considered *Yamia* (Kishida 1920) a *nomen dubium*, also followed by Zhu et al. [30].

Raven [31] synonymized *Baccallbrapo* into *Phlogiellus* based on the fact that none of the characters Barrion and Litsinger [28] used to define *Baccallbrapo* were adequate enough to support generic recognition. Raven et al. ([32]: interactive key system) later indicated that *Phlogiellus* may be present in Australia. Shortly after, Haupt and Schmidt [33] resurrected the genus *Yamia* (Kishida 1920), described the neotype male of *Yamia watasei* (Kishida 1920) based on Kishida's accurate type locality (the original types were destroyed during WWII), considered both *P. baeri* [7] and *P. insularis* [7] *incertae sedis*, and placed other known altrate species *P. mutus* [21] and *Baccallbrapo bundokalbo* (Barrion and Litsinger 1995) into generic synonymy [33].

Raven [34] discussed Haupt and Schmidt's resurrection of the genus *Yamia*: "*The placement of taxa which lack a maxillary lyra (e.g., Yamia; see [33]) within the Selenocosmiinae only presents a phylogenetic problem if the alyrate taxa are considered the sister group of all of the other lyrate species. However, if the lyra has been secondarily lost in Yamia then that species may be better placed in Phlogiellus*" [34]. Additionally, Haupt and Schmidt incorrectly listed Simon as having synonymized both *I. insularis* (Simon 1877) and *I. baeri* (Simon 1877) into *Phlogiellus* "*in 1897, p. 955*" [33]; however, the authors have noted that page 955 of Simon's paper was published in 1903 and not 1897. Bonnet [27] listed *Phlogiellus baeri* [7] but failed to list *Phlogiellus insularis* [7]. However, Platnick [35], following Roewer [25], listed both *P. baeri* [7] and *P. insularis* [7]. In 2008, Zhu and Zhang revised Chinese theraphosid material, including the new description of *Selenocosmia xinpingsi* (Zhu and Zhang 2008) and a description of *Yamia watasei* nontype material. They further rejected Raven's hypothesis that *Yamia* may be a junior synonym of *Phlogiellus* [34] based on several characters they considered of strong generic value [36].

In 2012, West et al. performed cladistics on the subfamily Selenocosmiinae for the first time and resurrected the tribe, Yamiini (Kishida 1920) (they incorrectly declared a new name for this tribe, Phlogiellini [2]; however, the tribal name Yamiini takes precedence (Raven, pers. comm.), which comprised the genera *Phlogiellus* (Pocock 1897) and sister genus *Orphnaecus* (Simon 1892), locating several shared synapomorphies between the two genera. They also determined several synapomorphies without homoplasy that supported the validity of both *Phlogiellus* and *Orphnaecus*, characters of which have greatly aided in concisely diagnosing and describing both genera and the transfer of several species [2]. The *Phlogiellus* clade obtained was strongly supported, being the second strongest branch of all, only behind *Poecilotheria* (Simon 1885) [2]. *Selenocosmia xinpingsi* (Zhu and Zhang 2008) was tested as a terminal taxon in the cladistics and subsequently transferred to *Phlogiellus*, based upon multiple synapomorphies without homoplasy [2]. We further rely on these same inferred synapomorphies to support further species transfers herein. They also determined via the same empirical evidence that *Yamia* is indeed a junior synonym of *Phlogiellus*, in agreement with Raven's initial suggestion (Raven [34] and West et al. [2], *contra*. Haupt and Schmidt [33] and Zhu and Zhang [36]). In 2014, *Phlogiellus kwebaburdeos* [37] was described from Polillo Island, Quezon Province, in the Philippines.

Apart from a generic level subfamily key on Indian fauna [12], subfamily key to generic level [13], subfamily revision and key (to generic level only, Raven [16]), several reviews [25, 27, 35, 38, 39], systematic analyses and biogeographical account [2], and the above transfers [2, 5, 10, 12, 13, 16, 17, 27, 31, 33], most works devoted to *Phlogiellus* (and further most Selenocosmiinae) are mere citations and of little informative value, with individual species descriptions relied upon for taxonomic diagnosis. This is partly to do with the possibility that several described *Phlogiellus* species may be juveniles from other selenocosmiine genera, partly to do with the large spread of type material in various museums worldwide, and is partly due to previous character selection (see Raven [34,

pp. 16-17] "*on tarsal scopula division*" and see Character Discussion, herein).

Prior to the work of West et al. [2], both *Orphnaecus* and *Phlogiellus* were extremely problematic in their definition and diagnoses; for example, characters used previously for these taxa seemed largely plesiomorphic in nature or extremely variable among congeners examined (eye morphology, divided tarsal scopulae, and entire to reduced to completely absent maxillary lyra) or applicable to juveniles of other genera (this paper). Members of *Phlogiellus* are typically small (with the exception of several species) and lack easily identifiable traits seen in other selenocosmiine genera, resulting in the need to define new characters for the genus. Herein, we propose several new characters to solve this problem, along with those presented and tested by West et al., 2012.

The tribe Yamiini (Kishida 1920) is newly diagnosed against all other selenocosmiine tribes. The genus *Phlogiellus* is newly diagnosed against all other selenocosmiine genera. All species are keyed (both sexes) for the first time. All *Phlogiellus* species are diagnosed against all congeners. Moreover, relationships of *Phlogiellus* types from extreme ends of their range are discussed, as well as the close relationship shared with the predominant Philippine genus and sister group (*namely*, West et al. [2]) *Orphnaecus* (Simon 1892). The work of West et al., 2012, has formed a solid basis to accurately, for the first time, diagnose most selenocosmiine tribes and genera, including both Yamiini and *Phlogiellus*, based upon tested synapomorphies [2], along with discoveries of extreme morphological congeners newly described herein (e.g., *Phlogiellus johnreylazoi* sp. nov.). The synonymy of *Yamia* into *Phlogiellus* [2] is further discussed and remains supported. The type species *Phlogiellus atriceps* (Pocock 1897) is redescribed. The synonymy between *Phlogiellus atriceps* (Pocock 1897) and *Phlogiellus inermis* [8] remains rejected; both species are considered valid. *Phlogiellus bogadeki* sp. nov. from Hong Kong; *Phlogiellus johnreylazoi* sp. nov. from Palawan Island, Philippines; *Phlogiellus moniqueverdezae* sp. nov. from Ranong, Thailand; and *Phlogiellus pelidnus* sp. nov. from Sabah, Borneo, are newly described. *Selenocosmia orophila* [5, 10] from Myanmar, *Selenocosmia insulana* (Hirst 1909) from Djampea (= Jampea) Island, and *Selenocosmia obscura* (Hirst 1909) from Sarawak, Borneo, are transferred to *Phlogiellus*, altering the specific names to *Phlogiellus orophilus* [5, 10] comb. nov., *Phlogiellus insulanus* [17] comb. nov., and *Phlogiellus obscurus* [17] comb. nov. *Phlogiellus kwebaburdeos* [37] is transferred to *Orphnaecus* (Simon 1892), altering the specific name to *Orphnaecus kwebaburdeos* [40] comb. nov. *Phlogiellus ornatus* [5, 10] and *Phlogiellus nebulosus* [9] are considered *species inquirenda*. *Phlogiellus baeri* [7] is no longer considered *incertae sedis* (*contra*. Haupt and Schmidt [33]), and *Phlogiellus bicolor* [18] and *Phlogiellus insularis* [7] are considered *incertae sedis*, altering the species count of *Phlogiellus* to 17. The new inclusion of *P. insulanus* (formerly *Selenocosmia insulana* (Hirst 1909)) interestingly extends *Phlogiellus* range to both sides of the Wallace Line [41], adding to the enigmatic fauna of the immediate Sulawesi region. The male palpal organ of lyrate *Phlogiellus* species and its distinct similarities to the alyrate species *P. watasei* [19],

*P. moniqueverdezae* sp. nov., and the *Orphnaecus* palpal organ are discussed, as well as the significance of tarsal scopulae division in selenocosmiine genera. Until this time, a reasonable diagnosis or description for *Phlogiellus* has not existed; the group has been somewhat of a taxonomic dumping ground for small indistinguishable selenocosmiines, resulting in many misplaced species. This paper aims to resolve all taxonomic uncertainties surrounding this genus, with concise and complete diagnoses for the tribe Yamiini, the genus *Phlogiellus*, and all described congeners being clearly diagnosed and keyed from all others for the first time.

## 2. Materials and Methods

Taxonomic description follows Raven [34], West et al. [42], and West and Nunn [43]. Characters of phylogenetic significance follow West et al., 2012. All measurements are given in millimeters (mm) and were made to the nearest 0.01 mm using a squared eyepiece and digital dial callipers. Macro images were made by mounting a Nikon CP8800 to the phototube of a WILD Heerbrugg M8 and Wild Heerbrugg M3Z PLAN with trinocular head stereozoom microscope via Scopetronix Maxview TM system, with external cold light illumination and a Novex RZ Range trinocular microscope with C-Mount adapter for a Nikon Coolpix 4500 digital camera, with external LED cold ring light. Leg and pedipalp measurements were taken from their dorsal aspect on the left side of all specimens; coxae and trochantera were measured from their ventral aspect on the same side. Eyes of new species were measured dorsally in cross section at the longest and widest points with interdistances between all eyes provided. Claws are not included in measurements of tarsi. Total body length measurements include chelicerae. Sternal sigilla measurements do not include labiosternal sigilla. Spermathecae were dissected from females and cleared in heated lactic acid for a few minutes, following Von Wirth [44]. Leg formula is given in order of size from largest to smallest in both length and width proximally from a lateral prospective. Leg relation factor [RF~] followed von Wirth and Striffler [45], and is calculated by multiplying the length of leg I by 100 and then dividing by the length of leg IV (values equal to 100: equal sized legs I and IV; above 100: longer leg I; below 100: longer leg IV). Trichobothrial terminology follows Raven [34] and Guadanucci [46]. Scopula extents are given as distal extents, that is, 2/3 means for distal two-thirds and refer to the ventral extent. Methodology for scopula divisions follows Guadanucci [47]. Embolus terminology follows Bertani [48], with several new keels identified. DIVA-GIS Version 5.4.0.1 was utilized for construction of the geographic map (Figure 44). All newly designated type material is housed at the Queensland Museum.

Materials from the following institutions were cited, were examined, or had images of type material supplied to the authors: AM, Australia Museum, Sydney; IMK, Indian Museum of Kolkata; IRMS, Information and Records Management Society of Great Britain, Macclesfield; IRR, International Rice Research Institute, Manila; MHBU, Museum of Hebei University, Baoding, China; MNHN, Muséum

National d'Histoire Naturelle, Paris; NHM, Natural History Museum of London; NHMW, Naturhistorisches Museum, Vienna; NHTG, Museum of Natural History, Taiwan; NMW, Naturhistorisches Museum, Wien; NRM, Swedish Museum of Natural History, Stockholm; QM, Queensland Museum, Brisbane; RBINS, Royal Belgian Institute of Natural Sciences; SMF, Senckenberg Museum, Frankfurt am Main; ZMH, Zoologisches Museum Hamburg, Hamburg; ZMUC, Zoological Museum, University of Copenhagen, Copenhagen; ZMUT, Tokyo Imperial University, Science College Museum, Tokyo; ZSIC, Zoological Survey of India, Kolkata; ZSM, Zoologische Staatssammlung, Munich.

## Nomenclature

*Phlogiellus bogadeki* sp. nov. LSID: <http://zoobank.org/urn:lsid:zoobank.org:act:89F24C4A-461E-4B6B-B7A7-50BFFF6427D9>

*Phlogiellus johnreylazoi* sp. nov. LSID: <http://zoobank.org/urn:lsid:zoobank.org:act:239F9B08-C3B4-4A0A-A553-F6515F3896FA>

*Phlogiellus moniqueverdezae* sp. nov. LSID: <http://zoobank.org/urn:lsid:zoobank.org:act:E6725FE4-7E5C-4C6D-A56B-093C71DC79C7>

*Phlogiellus pelidnus* sp. nov. LSID: <http://zoobank.org/urn:lsid:zoobank.org:act:07A5D89D-4AA1-4461-9D3C-3D6FA4ABE434>

The new names contained in this paper are available under the International Code of Zoological Nomenclature. This work and the nomenclatural acts it contains have been registered in ZooBank. ZooBank Life Science Identifier (LSID) for this publication is <http://zoobank.org/urn:lsid:zoobank.org:pub:F3921708-FDCD-4BEF-899A-A03FE436BDED>.

## Material

*Note.* Under this listing, the authors have either examined material directly (listed as “-examined”) or viewed material via images, illustrations, and/or pers. comm. In those cases, where types have been viewed via images or illustrations, the name of the provider is given and cited as “(pers. comm.)”. In those cases, where types have been examined upon the author’s specific request, the name of the examiner is given and cited as “(pers. comm.)-examined.” In cases where both images and illustrations of the same material may have been sent by various authors, providers’ names are given, respectively. Coordinates and data in square brackets are traced with Google Earth and were added subsequently and, thus, are not part of the original data.

*Type Material.* *Lyrognathus robustus* (Smith 1988) [49], holotype female, 1988.2.6, Cameron Highlands [4°30'0" S, 101°30'0" E], Malaysia (unknown collector and date), NHM-examined.

*Orphnaecus dichromata* [50], holotype female, 37099–84, Sorong [0°52' S, 131°15' E], Irian Jaya, New Guinea, SMF-examined.

*Orphnaecus pellitus* (Simon 1892), syntype male and syntype female, AR4678, Calapnitan Caves [= Kulapnitan Caves, 13°45'N, 122°58'E], Camarines Sur Province, Luzon Island, Philippines, MNHN-examined.

*Orphnaecus philippinus* [51, 52], holotype female, 39202-84, Mambucal [= Mambukal, 10°24'42"N, 123°7'54"E] Mount Kanlaon, Negros Island, Philippines, SMF-examined.

*Phlogiellus aper* [6], syntype male, 1897.11.1.6-7, Batavia [= Jakarta, 6°12'S, 106°48'E], Java, MNHN-examined.

*Phlogiellus atriceps* (Pocock 1897), holotype male and 1 paratype female, 1897.11.1.6-7, Buitenzorg [= Bogor, 6°35'51"S, 106°47'54"E] Botanical Gardens, Java, NHM-images (R. Raven, pers. comm.)-examined.

*Phlogiellus baeri* [7], holotype female, AR 46711146, Manila [14°35'N, 120°58'E], Luzon Island, Philippines, MNHN-images (R. Raven, pers. comm.).

*Phlogiellus bicolor* [18], holotype juvenile male, 3767, Kuele Island [= Koil Island, 3°21'S, 144°12'E], East Sepik Province, Papua New Guinea, SMF-examined.

*Phlogiellus inermis* [8], lectotype male, 167 (Sumatra), paralectotype female, 168 (Java), NMW-examined.

*Phlogiellus insulanus* [17], holotype male, 96.5.25.37, Djampea [= Jampea, 7°4'60"S, 120°42'0"E] Island, South Sulawesi Province, Indonesia, NHM-images (R. Raven, D. Court pers. comm.)-examined.

*Phlogiellus insularis* [7], holotype juvenile, AR4579, Malamoy, Basilan [= Malamawi, 6°43'55"N, 121°57'56"E] Island, Basilan Province, Philippines, MNHN-images (F. Vol, pers. comm.)-examined.

*Phlogiellus obscurus* [17], holotype male, 1894.9.19.3-7, Sarawak, East Malaysia, NHM-images (D. Court, pers. comm.)-examined.

*Phlogiellus orophilus* [5, 10], holotype female, 27, Carin Cheba or Bia-pò [= Karen Mountains, 19°16'N, 96°35'E], Toungoo District, Karen State, Myanmar, NRM-examined.

*Phlogiellus watasei* [19], neotype male, 20080088, Yongchin Farm, Yeyin Village, Lanyu (= Orchid) Island (22°30'N, 121°31'E), Taiwan, ZSM-examined.

*Other Materials.* *Orphnaecus dichromata* [50], female, S88497, Irian Jaya, New Guinea, QM-examined.

*Orphnaecus pellitus* (Simon 1892), 1 female, S83791, Sorsogon Province (12°50'N, 123°55'E), Luzon Island, Philippines, QM-examined.

*Orphnaecus philippinus* [51, 52], 1 female, S83833, Sipalay (9°45'N, 122°26'E), Negros Island, Philippines, QM-examined.

*Orphnaecus* species (A), 2 females and 4 males in multijars, S83782, S83783, Bagacay (12°20'N, 123°40'E), Mobo, Masbate Island, Philippines, QM-examined.

*Phlogiellus atriceps* (Pocock 1897), 1 female, 1 male, 18987.16.1-5, West Java, NHM-images (D. Court, pers. comm.)-examined; 1 male, Bogor Botanical Gardens, Java, col. S. Pariwono, Sept. 1989-images examined.

*Phlogiellus baeri* [7], 1 female, S83748, Mt. Arayat (15°12'N, 120°45'E), Pampanga, Luzon Island, Philippines, QM-examined; 1 female, S88058, Malabon City, Metro Manila, Luzon Island, Philippines, QM-examined; 1 female, S88063, 3 males, S88064, S88065, and S88066, Mt. Natib (=

Mt. Orani, 14°43'12"N, 120°24'0"E), Bataan, Luzon Island, Philippines, QM-examined; 2 females S83760 and S83761; 2 males S74071 and S83931, Antipolo City (14°34'28.47"N, 121°10'50.64"W), elevation 658', Rizal Province, Luzon Island, Philippines, QM-examined.

*Phlogiellus inermis* (Ausserer [8]: det Kulczynski), male, 98.17.16.1, Java, NHM-images (D. Court, pers. comm.)-examined; 1 male, S83766, Kent Ridge (1°17'1.53"N, 103°47'25.98"E), Singapore, QM-examined; 1 male, S83765, MacRitchie Reservoir, (1°20'37"N, 103°49'52"E), Singapore, QM-examined; 2 females S83768 (multijar), Malcolm Road Garden (1°19'25"N, 103°49'55"E), Singapore, QM-examined; 1 female, S88767, Kent Ridge, Singapore, QM-examined.

*Phlogiellus obscurus* [17], males QM S83832 and S61763, Kota Belud, Kinabalu, Sabah, East Malaysia, S88356, Crocker Range, Sabah, East Malaysia, and S88359, Sepilok, Sabah, East Malaysia; females, S61762, Kota Kinabalu, Sabah, East Malaysia, and S88479, Sepilok, Sabah, East Malaysia, QM-examined.

*Phlogiellus subarmatus* [11], 1 male and 3 females, 09-10-7-32-34, Nicobar Islands, NHM-images, illustrations (Z. Mirza, A. Smith, pers. comm.).

*Phlogiellus watasei* (Kishida 1920), 1 male, S83757, Lanyu (= Orchid) Island (22°30'N, 121°31'E), Taiwan, QM-examined; 1 female, 20080089, Yongchin Farm, Yeyin Village, Lanyu (= Orchid) Island (22°30'N, 121°31'E), Taiwan, ZSM-examined.

*Phlogiellus xiping* [36], 1 male, S83763, 2 females, S83930 (multijar), Tai Po Kau Reserve (22°25'26"N, 114°10'50"E), New Territories, Hong Kong, QM-examined.

### 3. Taxonomy

#### *Selenocosmiinae* Simon 1889 [1]

*Selenocosmiini* (Simon 1889) [1]: 204 (sub-Selenocosmiinae); Simon 1892: 147 (sub-Selenocosmiinae); Pocock 1895a: 168 (sub-Selenocosmiinae); Raven 1985: 118; West et al., 2012: 14.

*Phlogiini* (Simon 1892): 144 (sub-Phlogiinae); Simon 1903: 953 (synonymized).

*Poecilotheriini* (Simon 1889) [1]: 204 (sub-Poecilotheriinae); Simon 1892: 144 (sub-Poecilotheriinae); Schmidt 1995: 1-2 (subfamilial elevation); Raven, 2005: 16; West et al., 2008: 38; West et al., 2012: 14 (replaced into synonymy of *Selenocosmiinae*).

*Chilobranchini*: West et al. 2012: 13.

*Yamiini* (Kishida 1920): 304; West et al., 2012: 13 (sub-*Phlogiellini*).

*Diagnosis* (Following Raven [34] and West et al. [2]). Maxilla with stridulation organ formed by an oval patch of modified setae (often bacillate) on prolateral face sometimes reduced to absent, originating medially (not ventrally from the oral fringe), opposing modified setae (strikers) in multiple rows on the retrolateral cheliceral surface: while maxillary lyra was reduced or absent in some genera, cheliceral strikers always remained; posterior sternal sigilla were largely removed from sternal margins (Figure 2(b)); many labial cuspules (>160,

except *Poecilotheria* >50) (West et al. [2, Figure 4]) and leg spines were only found distally on metatarsi; tibial apophyses on leg I in mature males were absent.

#### *Yamiini* (Kishida 1920)

*Yamiini* (Kishida 1920): 304 (sub-Yamieae).

Phlogiellini (West et al., 2012): 13, 30, 32, 33, and 37. New synonymy.

Genera: *Orphnaecus* (Simon 1892) and *Phlogiellus* (Pocock 1897).

**Diagnosis** (Following and Altered from West et al. [2]). It differs from all other selenocosmiine tribes by the male embolus being very robust basally in combination with strong single retrolateral keel with strong basal lobe; embolus emerges anteriorly from tegulum (Figures 3(e), 7(e), 17(f), 23(a)–23(c), 29(a)–29(c), 33(c), and 42(e) and see West et al. [2, 24, Figures 35 and 35a]).

**Note.** For morphology of the male bulb in other tribes and genera as proposed by West et al., 2012, please see within that paper, [2, p. 25] (*Poecilotheria* (Simon) [53, Figure 28a]) = *Poecilotheriini* (Simon 1889) [1], (*Chilobrachys* (Karsch) [54, Figure 31a], *Haplocosmia* (Schmidt and von Wirth) [55, Figure 32]) = *Chilobrachini*, West et al., 2012, p. 26 (*Lyrognathus* (Pocock) [56, Figures 37a and 38a], *Pseudocnemis*, West et al. [2, Figure 39], *Coremiocnemis* (Simon) [4, 15, Figure 41], *Selenocosmia* (Ausserer) [8, Figure 44a]) = *Selenocosmiini* (Simon 1889) [1], and see diagnoses of those tribes, [2, p. 13, 14].

*Phlogiellus* (Pocock 1897). *Phlogiellus*, Pocock 1897: 596, pl. 25, 1900: 202, Simon 1903: 955, f. 1108, Hirst 1907 and 1909: 384, Strand 1911: 202, Abraham 1924: 1113, Giltay 1934: 2, Roewer 1938: 6, f. 1-2, Bonnet 1958 [57]: 3600, Raven 1985: 118, 2000: 570, 24 h: 2005: 15, Smith 1986: 121, f, Haupt and Schmidt 2004: 202, f. 9, West et al., 2012: 13, 32, 33, pl. 30, Platnick 2016. Type species by original designation and monotypy, *Phlogiellus atriceps* (Pocock 1897).

*Neochilobrachys*, Hirst 1909: 388, Petrunkevitch 1928: 84, Roewer 1942: 264, Bonnet 1958 [57]: 3600, Raven 1985: 156 (synonymy), Haupt and Schmidt 2004: 27. Type species *Ischnocolus subarmatus* (Thorell 1871).

**Material.** Holotype: *Phlogiellus subarmatus* [11], female, Nicobar Island. Types in NRM and ZSIC. Nontypes used by Hirst [17]: *Phlogiellus subarmatus* [11], 1 male, 3 females, Nicobar Island. Specimens in NHM. Synonymized by Raven, 1985.

*Yamia*, Kishida 1920: 32, Bonnet 1959, Brignoli 1983, Huber, Sann and Schmidt 1996, Haupt and Schmidt 2004: 27, Raven 2005: 16, Zhu and Tso 2005 [58]: 13, West et al. 2012: 33 (synonymy). Type species, *Y. watasei* (Kishida 1920).

**Material.** Holotype: *Yamia watasei* (Kishida 1920), female, Lanyu (= Orchid) Island, Taiwan 1920: Holotype at ZMUT destroyed during WWII. Neotype: *Yamia watasei* (Kishida 1920), male, Yongchin Farm, Yeyin Village, Lanyu (= Orchid) Island, Taiwan 2000, col. J. Haupt. Neotype in ZSM. Synonymized by West et al., 2012.

*Baccallbrapo*, Barrion and Litsinger 1995: 21, Platnick 1998: 153, Raven 2000: 570 (synonymy), Haupt and Schmidt 2004: 27. Type species *B. bundokalbo* (Barrion and Litsinger 1995).

**Material.** Holotype: *Baccallbrapo bundokalbo* (Barrion and Litsinger 1995), male, Philippines, Laguna Province, Siniloan, Magsaysay Village, 16 January 1985, col. A. T. Barrion and M. Perez. Paratypes: 4 females, 11 immatures, Philippines, as per type locality, November 1984–February 1985, col. A. T. Barrion and M. Perez; 2 females, Quezon Province, Real, Llavac Village, Philippines, col. R. Apostol, 16 January 1985. All types in IRRI. Synonymized by Raven, 2000.

**Etymology.** *Phlogiellus* is part Latin and part Greek. The first part is the Greek word φλόξ φλογός, meaning “flame, blaze,” possibly referring to the overall orangy-brown coloration of many of the *Phlogiellus* species. The second part is the Latin diminutive suffix -ellus with a connecting vowel -i-.

**Diagnosis.** It differs from all other genera in the number of labial cuspules (ca. 160–320) (Figures 2(c), 6(c), 8(d), 11(d), 16(b), 19(c), 21(c), 26(c), 28(c), 32(b), 35(d), 39(c), and 41(c)); *Poecilotheria* possess well under 160; all other genera possess ca. 350–700 (namely, West et al. [2]). It differs from all other selenocosmiine genera in possessing a very deep, procurved fovea that is narrower than the width of the ocular tubercle (except *P. orophilus* comb. nov., which, while possessing a very deep procurved foveal groove, is wider than the ocular tubercle and is, herein, considered an autapomorphy for this species, Figure 35(c)) (Figures 6(a), 8(a), 10, 11(a), 16(a), 19(a), 21(a), 26(a), 28(a), 32(a), 39(a), and 41(a)), in combination with very dense setae bordering the carapace entirely (Figures 6(a), 8(f), 8(g), 11(a), 15(a), 19(a), 21(a), 26(a), 28(a), 32(a), 39(a), and 41(a)). It also differs from other selenocosmiine genera in the large ovular form of labiosternal suture sigillae in both sexes (see Character Discussion) (Figures 2(b), 6(e), 11(c), 16(b), 19(e), 21(d), 26(c), 28(c), 32(b), 35(d), 39(c), and 41(d)). It differs from all other Selenocosmiinae genera, except sister genus *Orphnaecus* (namely, West et al. [2]), in possessing a strongly keeled and stout embolus with a prominent basally projecting lobe (= synapomorphies without homoplasy of *Yamiini* (Kishida 1920), as determined by West et al. [2], herein; see Figures 3(e), 3(f), 7(e)–7(g), 17(g), 23(c), 29(a), 29(c), 33(e), 42(d), and 42(e)). However, *Phlogiellus* differs from *Orphnaecus* in the presence of proximally thin and elongated ectal chelicerate strikers, pallid in color (strikers are jet black with very stout bases in all *Orphnaecus* species; see West et al. [2, 29, Figure 51b]) (and see Character Discussion) (Figures 3(c), 7(c), 8(d), 12(c), 17(c), 20(c), 22(b), 27(c), 33(a), 36(a), 40(c), and 42(c)), scopulate brush of setae absent on dorsal palpal patella in males (present in all male *Orphnaecus*, see West et al. [2, p. 8, char. 43]), lyrate morphology (bacillae distally pointed, if present, except in *P. baeri*, Figure 6(d), lyra, if present, not reniform in shape as in most *Orphnaecus*, see West et al. [2, 29, Figure 51a]) (Figures 3(d), 6(d), 12(d), 16(d), 20(e), 22(a), 33(b), 36(c), 40(d), and 41(e)), spermathecal morphology, apically swollen in *Phlogiellus* (Figures 13(c), 26(d), 37(a), and 39(d)), and

basally swollen or tombstone morphology in *Orphnaecus*. Note that apical bud emerges anteriorly from main spermathecal lobes in *P. baeri* [7], Figure 8(b), unique spermathecae lacking distal swelling in *P. johnreylazoi* sp. nov., Figure 19(d), and spermathecae taper gradually in *P. watasei* (for *Orphnaecus* spermathecal morphology, see West et al. [2, 25, Figures 35b and 36]).

*Note.* West et al., 2012, determined the similar length of the PLS to metatarsus IV to be a synapomorphy without homoplasy for *Phlogiellus*; however, during the course of new species descriptions herein, that trait is no longer without homoplasy and thus is removed from our diagnosis.

*Description.* *Phlogiellus* is a small to medium-sized selenocosmiine theraphosid with a very deep fovea that is narrower than the width of the ocular tubercle (Figures 6(a), 8(a), 10, 11(a), 16(a), 19(a), 21(a), 26(a), 28(a), 32(a), 39(a), and 41(a)), very dense setae bordering the carapace entirely (Figures 6(a), 8(f), 8(g), 11(a), 15(a), 19(a), 21(a), 26(a), 28(a), 32(a), 39(a), and 41(a)), low number of labial cuspules compared to all other selenocosmiine genera (ca. 160–320) (Figures 2(c), 6(c), 8(d), 11(d), 16(b), 19(c), 21(c), 26(c), 28(c), 32(b), 35(d), 39(c), and 41(c)), unilobular spermathecal receptacles with (*P. baeri*, Figure 8(b)) or without anteriorly emerging apical buds [female] (all other species, Figures 13(c), 19(d), 26(d), 37(a), and 39(d)), maxillary lyra large (Figures 20(e), 22(a), 33(b), 36(c), 40(d), and 41(e)) to reduced/rudimentary (Figures 3(d), 6(d), 8(e), 12(d), and 16(d)) to absent (Figures 27(d) and 28(e)) in combination with thin and elongated ectal chelicerate strikers [female and male], needleform in morphology, pallid (Figures 3(c), 7(c), 8(d), 12(c), 17(c), 20(c), 22(b), 27(c), 33(a), 36(a), 40(c), and 42(c)), keeled and stout embolus with a basally projecting lobe [male] (Figures 3(e), 3(f), 7(e)–7(g), 17(g), 23(c), 29(a), 29(c), 33(e), 42(d), and 42(e)), tarsi IV divided by several rows of setae (except female *P. bundokalbo*), transversely cracked tarsi IV (all males and some females), and armed (except *P. bogadeki* sp. nov., *P. johnreylazoi* sp. nov., and *P. orophilus* comb. nov.) paired claws with a third claw on leg IV [female and male], two species with third claw on leg III also (*P. baeri*, *P. bogadeki* sp. nov.), and distinct ectochelicerate tumescence in males (Figures 7(c), 22(b), 22(c), 32(c), 33(a), 42(a), and 42(c) and see Character Discussion) and some females (*P. johnreylazoi* sp. nov., *P. pelidnus* sp. nov., Figures 20(a), 20(c), 40(a), and 40(c)). Tarsal trichobothriae: clavates in a wide field dorsally on tarsi I–IV; >30, in the distal 2/3 separated by the short epitrichobothrial field which runs for the entire tarsal length and merges distally with the clavates and proximally with the long filiform field. Long filiform field (>8) in proximal 0.3 dorsolaterally in roughly 2 rows. Shorter filiform distally intermixed with clavates and epitrichobothriae, unorganised.

*Type Species:* *Phlogiellus atriceps* (Pocock 1897)

*Distribution.* Southeast Asia (Figure 44).

Species included the following:

*P. aper* [6].

*P. atriceps* (Pocock 1897).

*P. baeri* [7], which is no longer considered *incertae sedis*.

*P. bogadeki* sp. nov.

*P. brevipes* [5, 10].

*P. bundokalbo* [28].

*P. inermis* [8].

*P. insulanus* [17], comb. nov.

*P. johnreylazoi* sp. nov.

*P. moniqueverdezae* sp. nov.

*P. mutus* [21].

*P. obscurus* [17], comb. nov.

*P. orophilus* [5, 10], comb. nov.

*P. pelidnus* sp. nov.

*P. subinermis* [20].

*P. watasei* [19].

*P. xinping* [36]

Species transferred to other genera include the following:

*P. subarmatus* [11], transferred to *Chilobrachys* to give *C. subarmatus* comb. nov.

*P. kwebaburdeos* [37], transferred to *Orphnaecus* to give *O. kwebaburdeos* comb. nov.

Species considered *incertae sedis* include the following:

*P. bicolor* [18]: 202, Kuele (= Koil) Island, Sepik Province, Papua New Guinea. Type immature.

*P. insularis* [7]: 91, Malamoy, Basilan (= Malamawi) Island, Basilan Province, Philippines. Type immature.

Species considered *species inquirenda* include the following:

*Phlogiellus ornatus* [5, 10]: 173, Myanmar. Most likely referable to *Ischnocolinae* (namely, Thorell [5, 10], Pocock [12], and Guadanucci [59]).

*Phlogiellus nebulosus* [9]: 305, Solomon Islands. Most likely referable to *Barychelidae* (namely, Raven, pers. comm., West et al. [2]).

Species considered *nomina dubia* include the following:

*A. mindanao* (Walckenaer [60]: 370, Mindanao, Philippines, originally in *Mygale*) Roewer 1955: 1596; Bonnet 1957 [61]: 2994; Platnick 2008. Type deposit unknown.

*Identification Key for Adult Males of Phlogiellus* (Pocock 1897)

*Note.* *P. bogadeki* sp. nov., *P. mutus* [21], and *P. orophilus* [5, 10] comb. nov. are known only from females.

(1) Maxillary lyra present (Figure 3(d)), 2.

- (i) Maxillary lyra absent (Figure 27(d)), 10.
- (2) Paired claws on leg IV with *ca.* 6 teeth (Figure 41(f)), *P. pelidnus* sp. nov.
  - (i) Paired claws on leg IV with < 4 teeth, 3.
- (3) All tarsal scopula divided, 4.
  - (i) Some (not all) tarsal scopula divided, 7.
- (4) Largest lyrate bacillae blunt tipped (Figure 6(d)), *P. baeri* [7].
  - (i) Largest lyrate bacillae sharp tipped (Figure 3(d)), 5.
- (5) Embolus without strong distal curve (Giltay [20, p. 3, Figure 1A]), *P. subinermis* [20].
  - (i) Embolus with strong distal curve (Giltay [20, p. 3, Figure 1B]), 6.
- (6) Tarsus IV straight (Figure 4(d)); lyrate bacillae count >120 (Figure 3(d)), *P. atriceps* (Pocock 1897).
  - (i) Tarsus IV bent medially; lyrate bacillae count >160, *P. inermis* [8].
- (7) Leg I tibia with ventral scopulate fringe (Figure 15(c)), *P. insulanus* [17] comb. nov.
  - (i) Leg I tibia without ventral scopulate fringe, 8.
- (8) Embolus incrassate, *ca.* 1/2 as thick distally compared to basally (Figures 23(a)–23(c)), *P. johnreylazoi* sp. nov.
  - (i) Embolus only < 1/4 as thick distally compared to basally (Figure 3(f)), 9.
- (9) Intercheliceral face with stout thorns (Zhu and Zhang [36, p. 438, Figure 8H]), *P. xinping* (Zhu and Zhang [36]).
  - (i) Intercheliceral face without stout thorns (Figure 32(d)), *P. obscurus* [17] comb. nov.
- (10) Metatarsus IV with 2 distal spines (Pocock [12, p. 184]), *P. brevipes* [5, 10].
  - (i) Metatarsus IV with more than 3 distal spines, 11.
- (11) Distal tibiae and entire metatarsi I and II covered in bright white setae (Figure 25(b)), *P. moniqueverdezae* sp. nov.
  - (i) Legs I and II uniform in color, lacking bright white setae, 12.
- (12) Foveal groove almost straight (Barrion and Litsinger [28, p. 22, Figure 5a]), *P. bundokalbo* [28].

- (i) Foveal groove procurved (Figure 8(g)), 13.

- (13) Scopula on tarsus III divided, *P. aper* [6].

- (i) Scopula on tarsus III not divided (Haupt and Schmidt [33, p. 200]), *P. watasei* [19].

#### Key for Adult Females of *Phlogiellus* (Pocock 1897)

Note. *P. aper* [6], *P. insulanus* [17] comb. nov., and *P. obscurus* [17] comb. nov. are only known from males.

- (1) Maxillary lyra present (Figure 3(d)), 2.
  - (i) Maxillary lyra absent (Figure 27(d)), 10.
- (2) Reduced third claw present on leg III, 3.
  - (i) Reduced third claw absent on leg III, 4.
- (3) Spermathecae with apical buds (Figure 8(b)), *P. baeri* [7].
  - (i) Spermathecae without apical buds (Figure 13(c)), *P. bogadeki* sp. nov.
- (4) All tarsal scopula divided, 5.
  - (i) Some (not all) tarsal scopula divided, 7.
- (5) Apical segment of posterior lateral spinneret two times the length of medial segment (Giltay [20, p. 4]), *P. subinermis* [20].
  - (i) Apical segment of posterior lateral spinneret one and a half times the length of medial segment, 6.
- (6) Bacillae on maxillary lyra *ca.* 7 in number, *P. inermis* [8].
  - (i) Bacillae on maxillary lyra *ca.* 120 in number (Figure 3(d)), *P. atriceps* (Pocock 1897).
- (7) Foveal groove wider than ocular tubercle (Figure 35(c)), *P. orophilus* [5, 10] comb. nov.
  - (i) Foveal groove narrower than ocular tubercle (Figure 8(a)), 8.
- (8) Spermathecae with inner/medial pointed ends (Figure 19(d)), *P. johnreylazoi* sp. nov.
  - (i) Spermathecae without inner/medial pointed ends (Figure 26(d)), 9.
- (9) Intercheliceral thorns present (Zhu and Zhang [36, p. 438, Figure 8H]), *P. xinping* [36].
  - (i) Intercheliceral thorns absent (Figure 40(b)), *P. pelidnus* sp. nov.

- (10) Metatarsus IV with only 2 distal spines (Pocock [12, p. 184]), *P. brevipes* [5, 10].
- (i) Metatarsus IV with more than 3 distal spines, 11.
- (11) All tarsal scopula undivided (Barrion and Litsinger [28, p. 21]), *P. bundokalbo* [28].
- (i) Tarsal scopula I, I and II, or I, II, and III divided, 12.
- (12) Spermathecae tapering distally (Haupt and Schmidt [33, p. 201, Figure 7]), *P. watasei* [19].
- (i) Spermathecae not tapering distally (Figure 26(d)), 13.
- (13) Tarsal scopula on leg II undivided (Haupt and Schmidt [33, p. 202]), *P. mutus* [21].
- (i) Tarsal scopula on leg II divided, *P. moniqueverdezae* sp. nov.

*Phlogiellus aper* [6]. *Ischnocolus aper*, Simon 1891: 308; 1892a: 136; *Phlogiellus aper*, Simon 1903: 955 (transfer); Roewer 1942: 264 (sub-*P. asper*).

*Types.* *Ischnocolus aper*, Simon 1891, syntypes, 1897.11.1.6–7, Batavia [= Jakarta, 6°12'S, 106°48'E], Java, MNHN.

*Diagnosis.* It differs from *P. atriceps*, *P. baeri*, *P. bogadeki* sp. nov., *P. inermis*, *P. insulanus* comb. nov., *P. johnreylazoi* sp. nov., *P. obscurus* comb. nov., *P. orophilus* comb. nov., *P. pelidnus* sp. nov., *P. subinermis*, and *P. xinping* in lacking any maxillary lyra. It differs from *P. moniqueverdezae* sp. nov. in lacking white setae apically on both tibiae and metatarsi I and II in males. It differs from *P. brevipes* in possessing more than 2 spines on the posterior metatarsi (only 2 known in *P. brevipes*). It differs from *P. bundokalbo* in having a strongly procurved foveal groove (mildly procurved, almost straight in *P. bundokalbo*). It differs from *P. watasei* in possessing divided scopula on tarsus III (undivided in *P. watasei*) in males.

*Note.* It cannot be readily diagnosed from *P. mutus*, as the only known material for *P. mutus* is female, while the only known *P. aper* material is male (both are alyrate).

*Phlogiellus atriceps* (Pocock 1897) Figures 1–4(d) and 44. *Phlogiellus atriceps*, Pocock, 1897: 596, pl. 25, f. 1, *P. atriceps*, Schmidt, 2003 [62]: 239, f. 767–769, *P. atriceps*, Huber, 2005 [63]: 2, and *P. atriceps*, West et al., 2012: 25, f. 33.

*Types.* Holotype male and paratype female 1897.11.1.6–7, Buitenzorg [= Bogor, 6°35'51"S, 106°47'54"E] Botanical Gardens, Java, NHM-images (R. Raven, pers. comm.)-examined.

*Etymology.* Latinized Greek meaning “with black head,” -atri- is a prefix meaning “black,” and -ceps- is a suffix meaning



FIGURE 1: *Phlogiellus atriceps* (Pocock 1897) nontype male habitus, in life, from garden shed in Bogor Botanical Gardens, Java. Photo: R. West.

“head” that Pocock [3, p 596] refers to as “the carapace black beneath.”

*Diagnosis.* It differs from *P. baeri* in possessing lyrate bacillae with distal spines (bacillae distally blunt in *P. baeri*). It differs from *P. insulanus* comb. nov., *P. johnreylazoi* sp. nov., *P. obscurus* comb. nov., *P. orophilus* comb. nov., *P. pelidnus* sp. nov., and *P. xinping* in that the tarsal scopulae of all legs are divided (in the above species, tarsal scopulae are undivided on either leg I, legs I and II, or legs I, II, and III). It differs from *P. aper*, *P. brevipes*, *P. bundokalbo*, *P. moniqueverdezae* sp. nov., *P. mutus*, and *P. watasei* in possessing a maxillary lyra. It differs from *P. subinermis* in possessing the apical segment of the posterior lateral spinnerets being only 1.5 times as long as the medial segment (in *P. subinermis* the apical PLS segment is nearly twice as long as the medial one). It also differs further from *P. subinermis* in possessing embolus that is distally curved strongly (embolus distally almost straight in *P. subinermis*) in males. It differs from *P. inermis* males in possessing 9 cheliceral teeth (10 in *P. inermis*), less dense patch of lyrate bacillae (>120 in *P. atriceps*, >160 in *P. inermis*), longer leg IV, 25.5, compared to leg I, 23.5 (similar length in *P. inermis*: IV, 23.7, compared to I, 23.3), and narrower sternum (1.3x wider in *P. inermis*), with tarsus IV being straight (bent in *P. inermis*). It differs from *P. bogadeki* sp. nov. in possessing armed paired claws on leg IV (unarmed paired claws on leg IV in *P. bogadeki* sp. nov.).

*Description.* Holotype male BM 1897.11.1.6 (Figure 2(a)) with body length: 17.

*Carapace.* Length 8, width 6.5. Fovea procurved, deep, not as wide as OT.

*Eyes.* Anterior row transverse, posterior row slightly recurved, almost straight. Eyes: ALE, AME, PLE, and PME.

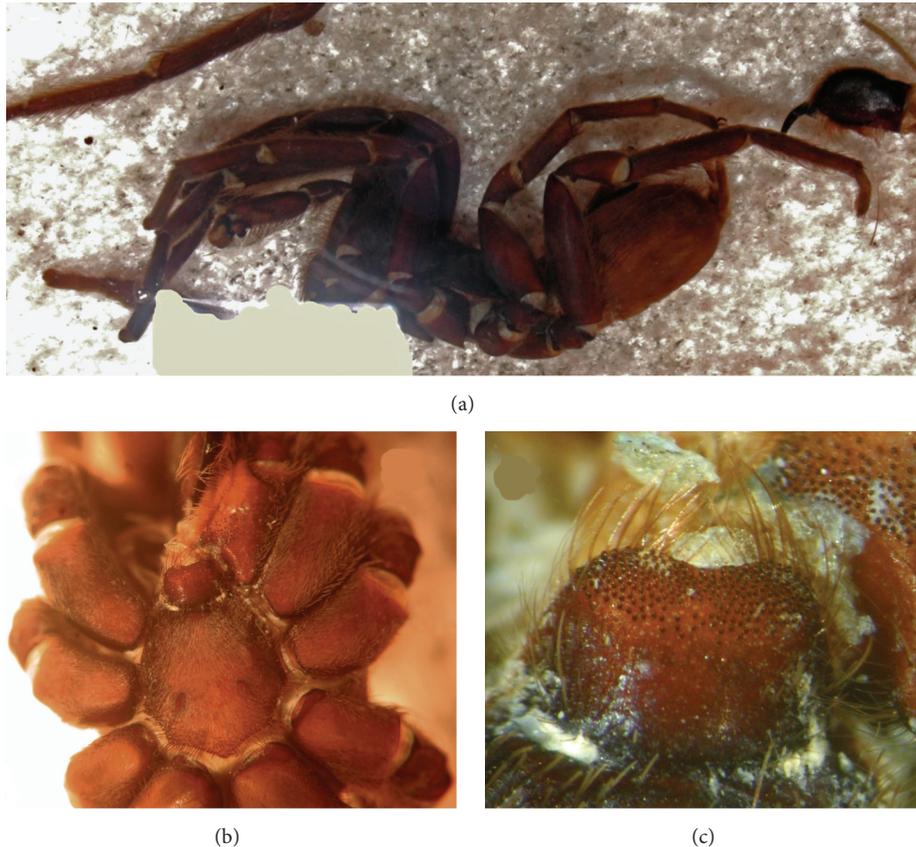


FIGURE 2: *Phlogiellus atriceps* (Pocock 1897) holotype male NHM 1897.11.1.6–7. (a) Habitus, lateral view. (b) Sternum, labium, maxilla, and coxae, ventral view. (c) Labium and labiosternal sigillae, ventral view. Photos: Dr. R. Raven.

*Chelicerae* (Figures 3(a)–3(c)). Ectal lyrate region, a series of strikers (>45) in >5 horizontal rows (Figure 3(c)). Longest strikers on lowest rows. Each striker needleform, with some filiform ends (Figure 3(c)). Teeth 9 >30 basomesals. Intercheliceral pegs absent. Ectochelelateral tumescence distinct (see Character Discussion), dorsal to retrolateral strikers (Figure 3(c)).

*Maxillae* (Figure 3(d)). Prolaterally planoconvex, anterior lobe well pronounced, many cuspules (>85) on inner basoventral surface. Lyra (Figure 3(d)): small group of bacilliform rods (>120) in ovoid patch on prolateral face, lowest row with >16 bacillae, longest rods medially in lowest rows. Rods paddle-shaped, medium to long shafts. At widest point, lyrate patch >6 rows deep, smallest rods dorsally. Posterior end of patch bluntly truncate, anterior end slightly pointed distad/rounded. Dorsal to suture >9 small elongated spines on anterior margin in unorganised rows.

*Labium* (Figure 2(c)). 1/3 wider than long. Many small cuspules (>220) along anterior 1/3 surface.

*Sternum* (Figure 2(b)). Slightly longer than wide. Slightly wider posteriorly than anteriorly, with thin even cover of short setae, interspersed with longer darker setae. Spines lacking along sternal border, although strong setae present

on posterior border. Posteriorly between left-right coxa IV, sternal border mildly acuminate, lateral sternal points not acuminate. Sternal sigilla: 3 pairs (not including labiosternal sigilla), posterior medium size, ovoid morphology, 2.5 lengths apart, 1.0–1.5 of their length from sternal margin. Median pair 1/3 size of posterior, similar form, border sternal margin. Anterior pair somewhat obscured, border sternal margin. Labiosternal sigilla large, larger than PSS.

*Legs* (Figures 4(a)–4(d)). Formula; length IV, I, II, III; width I, IV, III, II. Leg RF~92.15. Leg lengths: palp: 12.5. I: 23.5. II: 20. III: 17.5 IV: 25.5. Tar. III and IV transversely cracked, shows mild weakening medially, with pallid transverse region (Figures 4(c) and 4(d)).

*Scopulae*. Met. and tar. I-II undivided, met. and tar. III and IV divided by 3-4 rows of strong setae. Met. I, II: entire, III: 4/5, IV: 2/3 (Figures 4(b) and 4(c)).

*Coxae*. Some small black thorns prolaterodorsally, no thorns retrolaterally on I–IV. Coxae easily seen dorsally. I longest, about 1.2 times length of II. IV widest, just longer than III, basally rectangular with defined corners. Small ventral thorns prolaterally on III–IV (small setae only on I–II). I–III ventrally with many long thick blunt setae proximally, pallid. No short black setae. IV with mixture of long thick blunt setae entirely

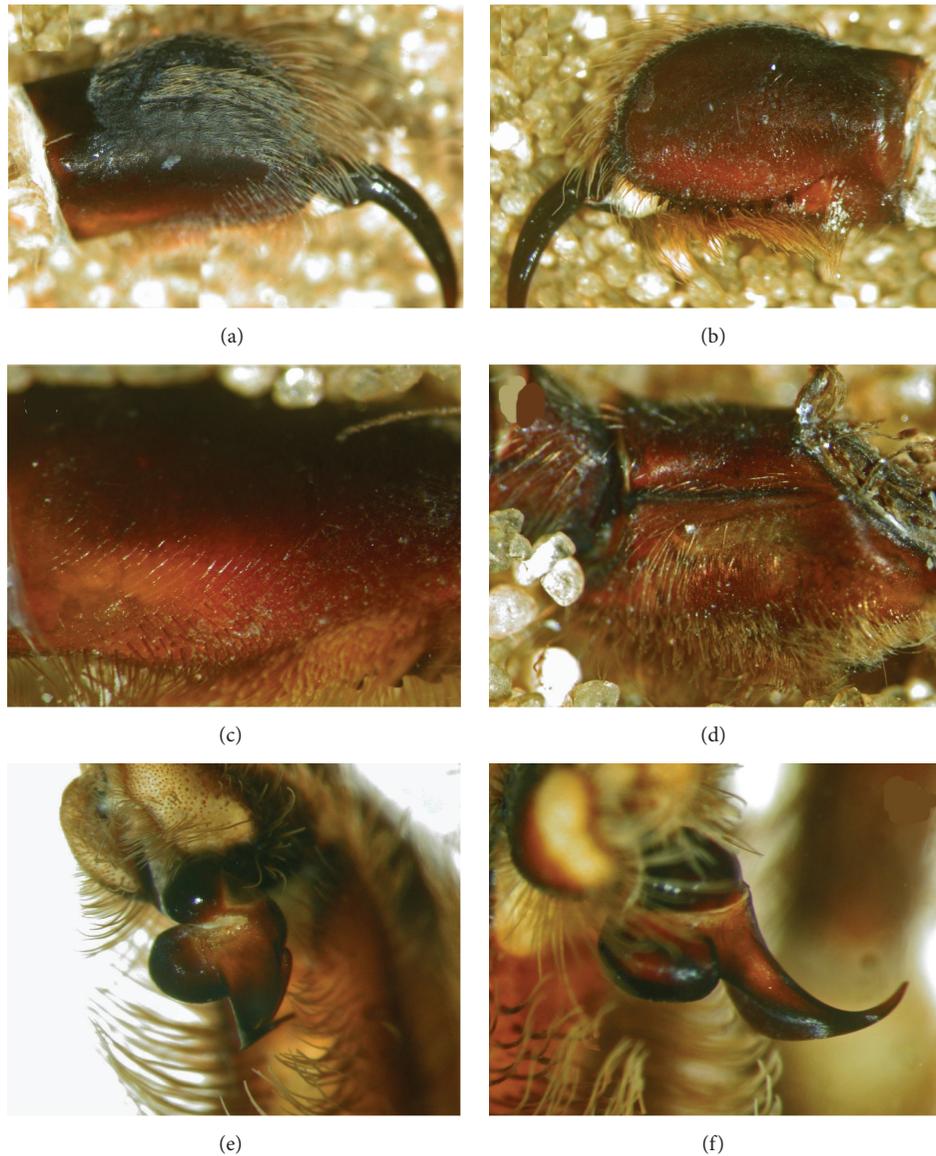


FIGURE 3: *Phlogiellus atriceps* (Pocock 1897) holotype male NHM 1897.11.1.6–7. (a) Right chelicera, prolateral view. (b) Right chelicera, retrolateral view. (c) Right chelicera, ectal view showing strikers and ectochelicerai tumescence. (d) Right maxilla, prolateral view. (e) Left embolus, anterior view. (f) Left embolus, prolateral view. Photos: Dr. R. Raven.

with mix of longer setae most concentrated along retrolateral ledge, pallid intermixed with shorter thin pallid setae. Ventral I–IV gently sloping anteriorly.

*Trichobothria*. On all tarsi basal filiform field slightly wider than clavate field, merges evenly. Clavates on tar. I in distal 2/3, long filiform only in basal 1/2, shorter filiform intermixed with clavates distally. Clavate extent on II–IV compared to I, in distal 2/3. Shorter filiform for length. Short epitrichobothrial field on I shorter than clavates, increasing in length proximally. Tarsal organ is not evident on legs I–IV under stereoscope.

*Spines*. Met. I lacking any spination, met. II with 1 DV and 1 DPV, met. III with 1 DV, 1 DPV, and 1 DD, and met. IV with 1 DV, 1 DPV, 1 DRV, and 1 DD.

*Claws*. Paired claws on all legs and palpal claw armed with *ca.* 2 teeth. Reduced third claw on leg IV.

*Abdomen*. 6 long. Ovular, elongated, yellow brown, covered with mat of fine short pale setae with sparse cover of longer pale yellowish setae (type specimen in alcohol). Longer hairs concentrate ventrally toward spinnerets and point distad. Strongly darker anterior to booklung-epigynum areas.

*Genitalia* (Figures 3(e) and 3(f)). Tibia incrassate, tapering distally. Cymbium bipartite, tegulum large. Stout embolus slightly tapers distally, very little flaring, proximally emerges anterior to tegulum. Relative length of palpal tibia about 2.6 times the length of embolus. Longitudinal keel present, strong, distinct, along entire length of embolus, twisted through 90° prolaterally distally (Figures 3(e) and 3(f)).



FIGURE 4: *Phlogiellus atriceps* (Pocock 1897) holotype male NHM 1897.11.1.6–7. (a) Right leg IV, prolateral view. (b) Right metatarsus IV, ventral view. (c) Right tarsus IV, ventral view. (d) Right tarsus IV, prolateral view. (e) Spinnerets, ventral view. Photos: Dr. R. Raven.



FIGURE 5: *Phlogiellus baeri* [7]. (a) Female QM S88058, habitus, in life, from Malabon City, Metro Manila, Luzon Island, Philippines. (b) Male QM S74071, habitus, in life, Antipolo City, Rizal Province, Luzon Island, Philippines. Photos: R. West.

*Color (in Life, Figure 1).* Chelicerae, legs I–III and palp black with a dark bluish violet pubescence, carapace and femora darker, abdomen and leg IV slightly lighter, all darker ventrally.

*Distribution and Natural History.* It is known only from the type locale (Figure 44). Nothing is known about the distribution and natural history of this species. A mature male was

found in a garden shed at the Botanical Gardens, Bogor, Java, in the month of September (S. Pariwono, pers. comm.).

*Phlogiellus baeri* [7] (Figures 5(a)–8(e), 9(a), 9(b), and 44). *Ischnocolus baeri*, Simon, 1877: 91, *Phlogiellus baeri*, Simon, 1903: 955 “Group C,” synonymy [64], Roewer, 1942: 264, Haupt and Schmidt, 2004: 202, f. 9 (*incertae sedis*), *P. baeri*, West et al., 2012: 4, 10, 12, 25, 30–32, f. 34, 53, tb. 1, 2.

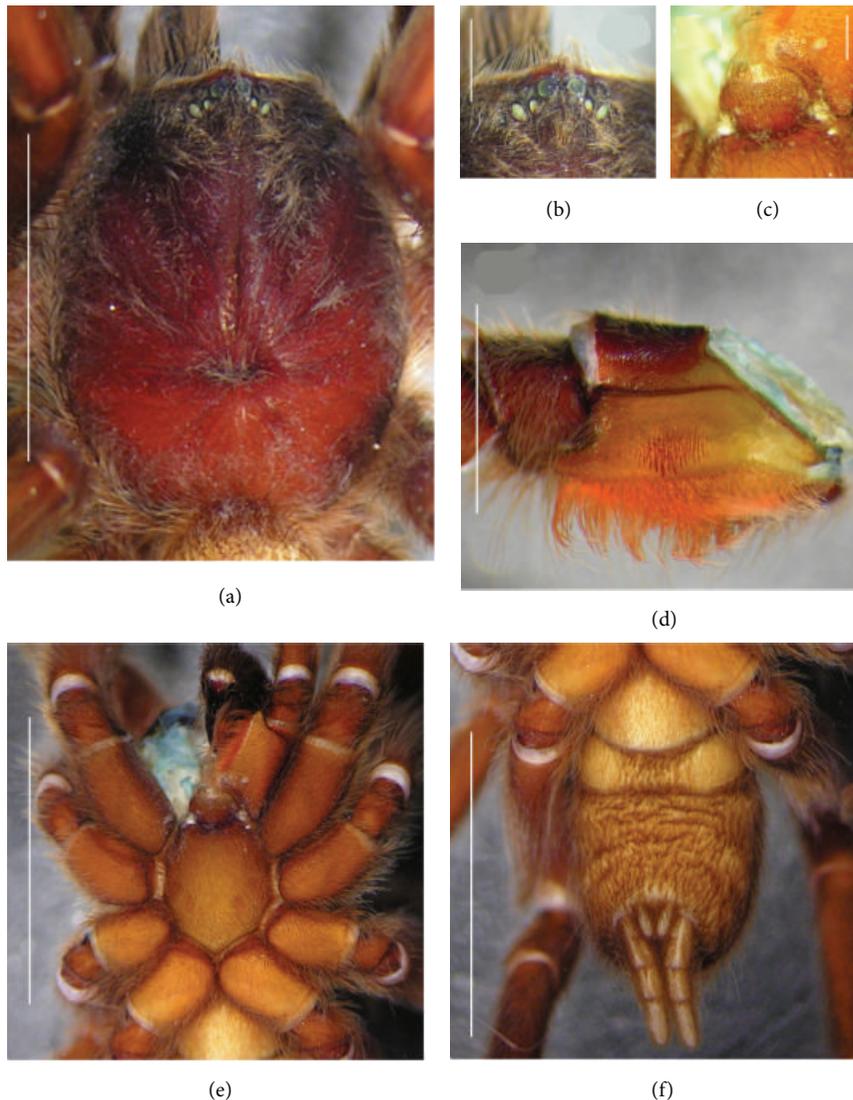


FIGURE 6: *Phlogiellus baeri* [7] male QM S74071. (a) Carapace, dorsal view. (b) Eyes, dorsal view. (c) Labium and labiosternal sigillae, ventral view. (d) Right maxilla, prolateral view. (e) Sternum, labium, maxilla, and coxae, ventral view. (f) Abdomen, ventral view. Scale bar = 10 mm for (e) and (f); 5 mm for (a); 2 mm for (d); 1 mm for (b) and (c). Photos: S. Nunn.

*Types.* *Ischnocolus baeri* (Simon 1877), holotype female (died during moult), AR46711146, Manila, Philippines, MNHN.

*Etymology.* Specific name is a patronymic adjective given to G. A. Baer by E. Simon in 1877.

*Diagnosis.* It differs from all other *Phlogiellus* species in possessing spermathecae in females being unilobular with apical buds (apical buds lacking in all other described species). It differs from *P. aper* in possessing a maxillary lyra in males (absent in *P. aper*). It differs from *P. insulanus* comb. nov. in lacking a dense scopulate brush of setae on the entire ventral surface of tibia I in males (*P. insulanus* displays a dense scopulate brush of setae on the ventral surface of tibia I, Figures 15(a)–15(c)). It differs from *P. obscurus* comb.

nov. males in lacking pallid bands distally on all leg segments (pallid bands distinct in *P. obscurus* comb. nov., Figure 31(a)).

*Description.* Male QM S74071. Body length: 18.65.

*Carapace* (Figure 6(a)). Length 7.89, width 6.45 (width across anterior edge, 3.67). Fovea 0.89 wide, procurved, deep, not as wide as OT. Distance from anterior carapace to fovea, 5.34. Carapace with 3 discernible hair types (C1 to C3): type C1 long, needleform, pallid, border carapace entirely, most concentrated posteriorly: type C2 short, thin straight, pallid, forming basis of carapace cover, very sparse: type C3 emerges from what looks to be bothrial collars, largely spiniform, pallid, aligned in uniform arrangement: (>5) along anterior

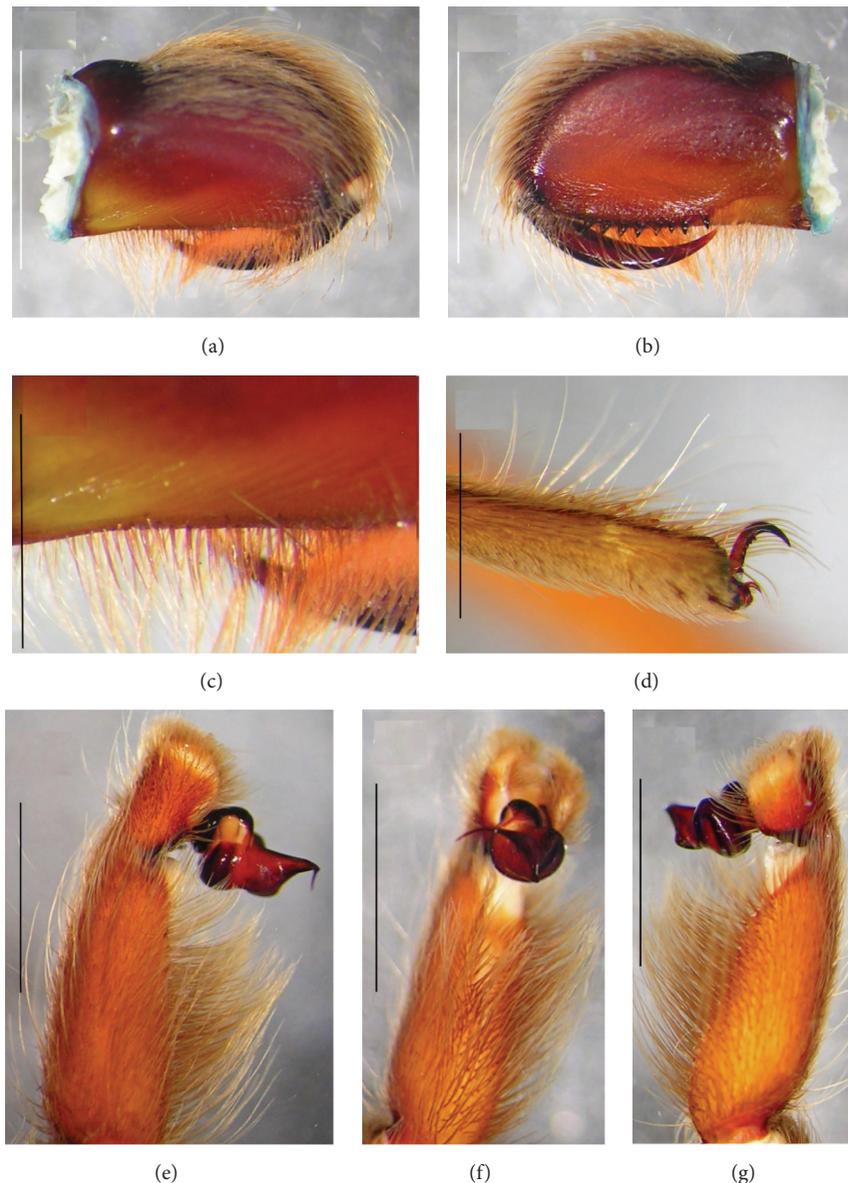


FIGURE 7: *Phlogiellus baeri* [7] male QM S74071. (a) Right chelicera, retrolateral view. (b) Right chelicera, prolateral view. (c) Right chelicera, retrolateral view showing strikers and ectal cheliceral tumescence. (d) Right tarsus and claw of leg IV, prolateral view. (e) Right palpal tibia, tarsus, and bulb, retrolateral view. (f) Right palpal tibia, tarsus, and bulb, ventral view. (g) Right palpal tibia, tarsus, and bulb, prolateral view. Scale bar = 5 mm for (a) and (b); 2 mm for (c), (d), and (e)–(g). Photos: S. Nunn.

edge of each radial groove, (>4) along anterior edge of each thoracic groove, (>11) along anterior edge of each caput groove and a line of >2 along medial caput ridge (between OT and fovea). >4 more behind each side of the OT, nearest median caput row.

*Eyes* (Figure 6(b)). Ocular tubercle; length 0.98, width 1.36. Anterior row slightly procurved. Posterior row slightly recurved. Eyes: AME 0.33/0.31, ALE 0.55/0.48, PLE 0.37/0.176, PME 0.27/0.21. Interocular distances: AME-AME 0.153, AME-ALE 0.098, AME-PME 0.162, ALE-ALE 0.73, ALE-PME 0.19, PME-PME 0.55, PME-PLE 0.04, PLE-PLE 0.83, ALE-PLE 0.16. OT hair types: 3 to 4 C3's directly posterior to

AME's and PME's. OT entirely covered in short weak, pallid setae (C3), with no uniform direction/random point.

*Chelicerae* (Figures 7(a)–7(c)). Length 6.98, width at base of each lobe 3.34 (bases widest point, dorsally). Ectal lyrate region (Figure 7(c)): a series of strikers (>30), in >3 horizontal rows (rows unordered). Strongest/longest strikers on lowest rows. Each striker needleform, lacking filiform ends. Teeth 8 larger, >18 smaller basomesal. Intercheliceral pegs absent, setae (>15 larger: 0.26–0.52 long, >5 smaller) in elongated cluster on basodorsal surface (Figure 7(b)). Retrolateral face basomedially lacking any spination. Ectochelelceral tumescence distinct, dorsal to retrolateral strikers (Figure 7(c)).

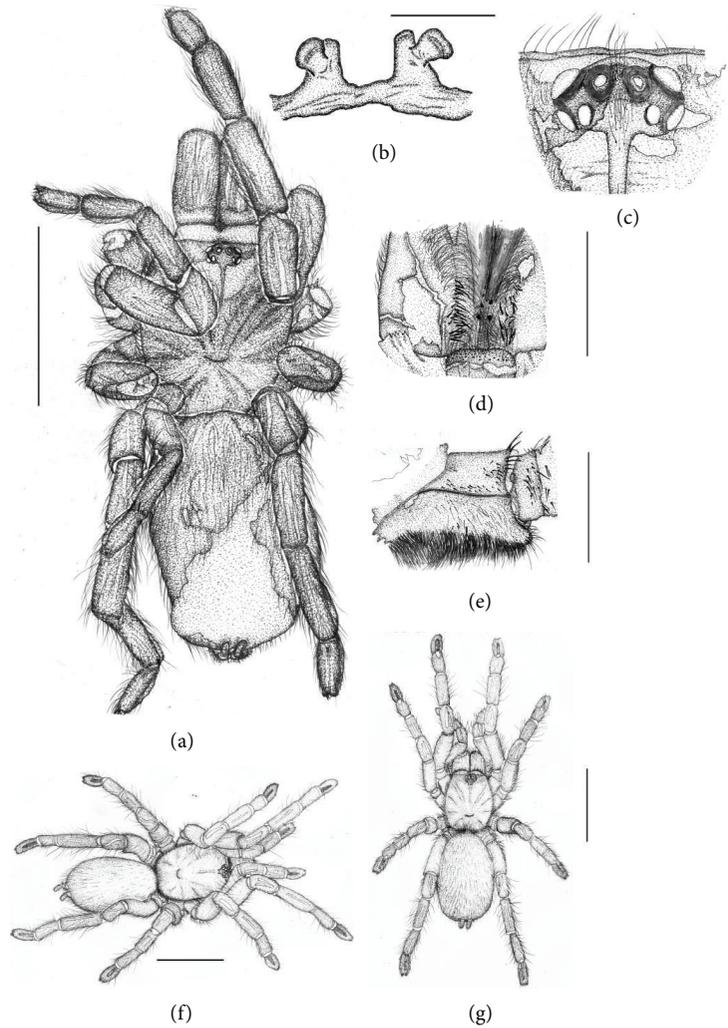
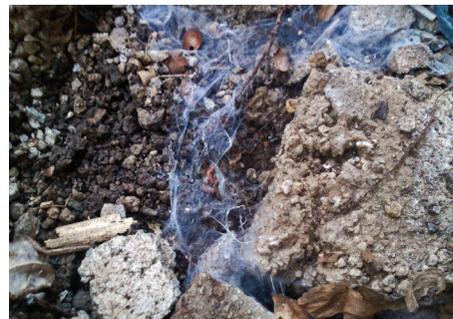


FIGURE 8: (a)–(e) *Phlogiellus baeri* [7] holotype female MNHN AR 46711146. (a) Habitus, from Manila, Luzon Island, Philippines, dorsal view. (b) Spermathecae, dorsal view. (c) Eyes, dorsal view. (d) Chelicerae, ventral view showing strikers. (e) Left maxilla, prolateral view. (f) *Phlogiellus xinping* [36] nontype female QM S83930, habitus, from Tai Po Kau Reserve, New Territories, Hong Kong, dorsal view. (g) *Phlogiellus watasei* [19] nontype female, habitus, from Lanyu Island, Taiwan, dorsal view. Scale bar = 5 mm for (a), (f), and (g); 1 mm for (b)–(e). Illustrations: S. Nunn.



(a)



(b)

FIGURE 9: *Phlogiellus baeri* [7]. (a) Biotope, Mt. Natib, Bataan Province, Luzon Island, Philippines. (b) Burrow structure as seen under an upturned rock, Antipolo City, Rizal Province, Luzon Island, Philippines. Photos: (a) B. Santos and (b) J. R. Lazo.



FIGURE 10: *Phlogiellus bogadeki* sp. nov. holotype female QM S83762 habitus, in life, from Sha Tin Village, New Territories, Hong Kong. Photo: R. West.

**Maxillae** (Figure 6(d)). Prolaterally planoconvex, anterior lobe well pronounced, many cuspules (>45) on inner basoventral surface. Lyra (Figure 6(d)): bacilliform rods >39 form sparse, ovoid patch prolaterally (1.31 long, 0.68 high), lowest row with >9 bacillae, longest rods in centre of lowest row. Rods paddle-shaped, pointed distad, long shafts (length including paddles up to 0.45), largest with distal blades. At widest point, lyrate patch 5 rows deep, smallest rods dorsally. Patch ovoid in shape. Immediately above maxillary suture > 11 small spines (Figure 6(d)) on anterior margin of maxillae, 2 rows, unordered.

**Labium** (Figure 6(c)). Length 1.34, width 2.04, many small cuspules (>160) along anterior 1/3 surface. Two hair types on labium (L1, L2), L1: long, reasonably dark spiniform in shape, curving distally toward anterior, most concentrated along lateral borders. Setae longest along anterior edge. L2: short dark spiniform, similar morphology to L1, but half size.

**Sternum** (Figure 6(e)). Length 5.74, width 5.23. Slightly wider posteriorly than anteriorly, with 3 discernible hair types (S1 to S3): type S1 longest, thickest, darker basally, becoming pallid distally, entire but sparse over sternum: type S2 elongate spiniform, entirely pallid, border sternum, most concentrated posteriorly: type S3 short thin, pallid, forming basis of sternal mat. Posteriorly between left and right cox. IV, sternal border weakly acuminate, lateral sternal points also weakly acuminate. Sternal sigilla (Figure 6(e)): 3 pairs (not including labiosternal sigilla), posterior medium in size; right length 0.49, width 0.35, left length 0.51, width 0.34, ovoid, 1.89 apart, 0.65–0.67 from sternal margin. Median pair 1/2 size of posterior, similar in form, border sternal margin. Anterior pair quarter size of posterior, somewhat obscured, border sternal margin. Labiosternal sigilla large, as big as PSS, 0.45 apart.

**Leg Setation.** All longer leg setation curves distad, lengths of exemplar longer tibial setae: palp 1.2, I 1.12, II 0.74, III 1.16, IV 1.78. Tibia and metatarsi setal counts almost equal from I to IV. All femora covered in sparse short setae that form the setal mat, with many long distally curving and pallid, most concentrated ventrally.

**Legs.** Formula (length); IV, I, II, III: (width) I, IV, II, III. Leg RF~105.35. Leg lengths (fem., pat., tib., met., tar., total): palp:

3.34, 2.85, 3.25, 0.00, 1.12, 10.56. I: 6.81, 4.04, 5.78, 4.1, 2.71, 23.44. II: 5.23, 3.15, 4.02, 3.88, 2.35, 18.63. III: 3.93, 2.83, 2.95, 3.97, 1.77, 15.45. IV: 6.12, 3.15, 5.12, 5.45, 2.41, 22.25. Leg mid-widths (fem., pat., tib., met., tar., total): palp: 1.31, 1.34, 1.32, –, 0.79, 4.76. I: 1.24, 1.32, 1.43, 1.02, 0.72, 5.73. II: 1.34, 1.29, 1.29, 0.75, 0.69, 5.36. III: 1.79, 1.21, 1.13, 0.74, 0.64, 5.51. IV: 1.34, 1.23, 0.98, 0.68, 0.63, 4.86. Tar. I–IV with transverse weakening.

**Scopula.** Tar. I–II divided by 3 rows of long, straight spiniform setae, tar. III and tar. IV divided by 4 rows of long, straight spiniform setae (Figure 7(d)). Met. I and II: entire, but sparse, II: 2/3 (sparse), IV: 1/2 (very sparse, divided), IV: 1/4, divided.

**Coxae** (Figure 6(e)). Many small black thorns prolaterodorsally, no thorns retrolaterally on I–III. Coxae easily seen dorsally. I longest, ca. 1.2 times length of II. IV widest, basally rectangular with rounded corners. Coxae with small thorns prolaterally on I–IV. I–III ventrally with many long thick blunt setae proximally, pallid in color. IV with mixture of long thick blunt setae entirely, pallid, intermixed with shorter thin pallid setae. Ventral I–IV gently sloping anteriorly. Retrolateral setation: I–III with median narrow light brush, grading to spiniform setae dorsally. IV with distodorsal brush, setae long, spiniform. I–IV retrolaterally lack ventral ledge. Ventral measurements for coxae: palp-length 2.95, width 1.45; I–2.87, 1.53; II 2.36, 1.82; III–1.87, 1.29; IV–3.04, 1.95.

**Trochantera.** Palp-length 1.15, width 1.25; I– 1.14, 1.34; II– 1.34, 0.95; III– 1.63, 1.65; IV– 1.96, 1.84.

**Trichobothria.** Tarsi: on all tarsi basal filiform field slightly wider than clavate field, merges evenly. Clavates on tar. I in distal 2/3 (>15), long filiform only in basal half, shorter filiform intermixed with clavates distally. Clavate extent on tar. II–IV compared to I, in distal 2/3. Shorter filiform for length. Short epitrichobothrial field on tar. I shorter than clavates, uniform height for length. Tarsal organ absent on legs I–IV under stereoscope (up to 50x). Metatarsi: trichobothrial field not detected. Tibia: tib. I prolaterally and proximally with short, possibly clavate trichobothria (>7) with patch 0.23 long, 0.15 wide, clearly pallid: >4 filiform detected in straight line proximally to clavate patch. Tib. IV prolaterally and proximally with short clavates (>24) in ovoid patch: >5 filiform detected in semicircular pattern ventrally to clavate patch.

**Spines.** (right) met. I with 1DV, met. II with 1DV, met. III with 1DV, 2DPV, 1DRV, 1DPD, and 1DD, and met. IV with 1DV, 1DPV, 1DRV, 1DPD, and 1DD.

**Claws.** Paired claws on legs I–III and palpal claw unarmed, paired claw IV with 2 teeth. Reduced third claw present on legs III and IV.

**Abdomen** (Figure 6(f)). 8.78 long, ovular, elongated, with 2 discernible hair types (A1 to A2): dorsally with 2 hair types: type A1 long, dark, but distally pallid: type A2 forms dense mat of abdomen, mid-length, spiniform. Longest hairs (A1) more concentrated posteriorly toward spinnerets, point

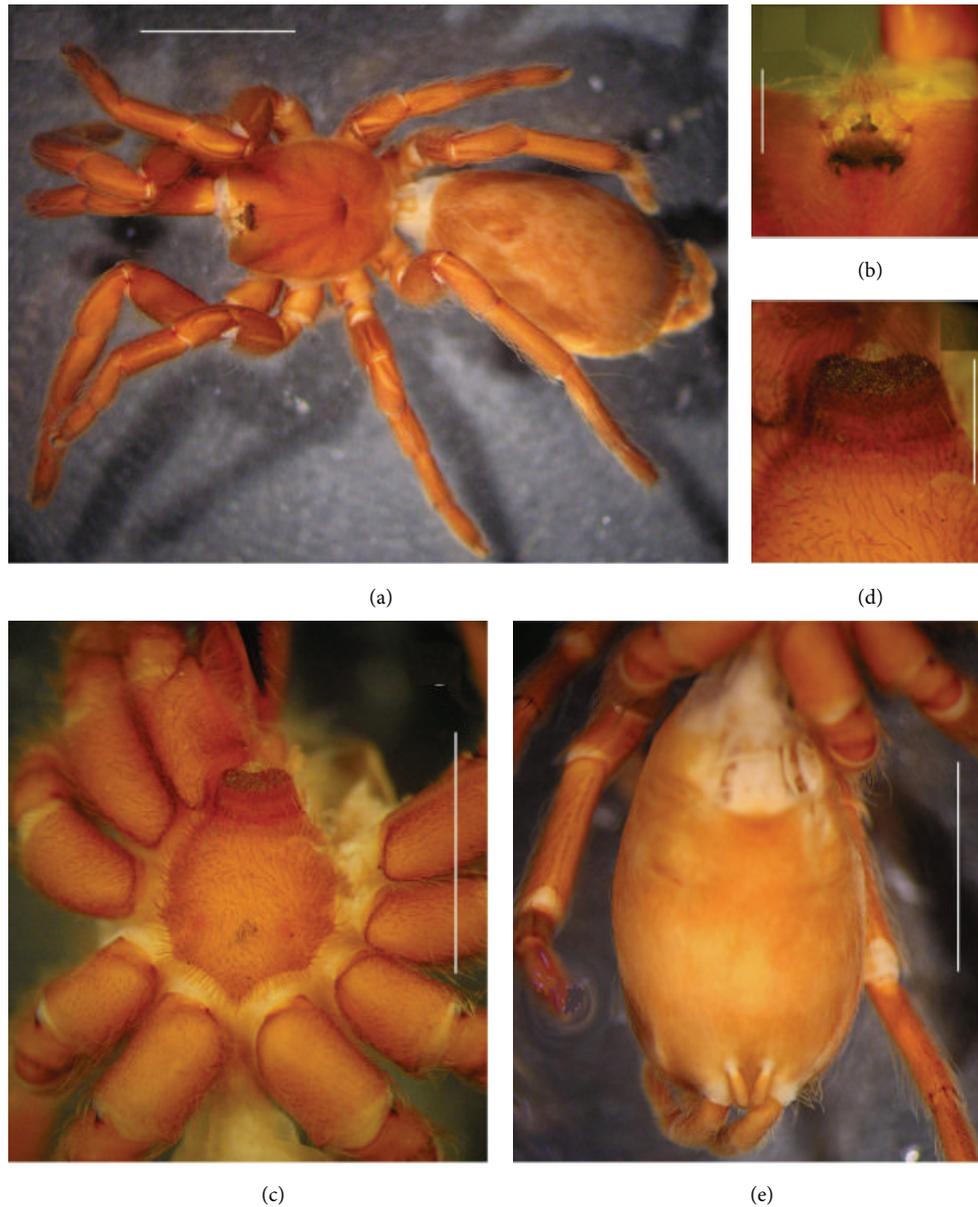


FIGURE 11: *Phlogiellus bogadeki* sp. nov. holotype female QM S83762. (a) Habitus, dorsal view. (b) Eyes, dorsal view. (c) Sternum, labium, maxilla, and coxae, ventral view. (d) Labium and labiosternal sigillae, ventral view. (e) Abdomen, ventral view. Scale bar = 5 mm for (a), (c), and (e); 1 mm for (b) and (d). Photos: S. Nunn.

distad. Ventral hair types similar to dorsal, although more dense entirely.

**Genitalia.** Palp (Figures 7(e)–7(g)): tibia mildly incrassate, tapering distally. Cymbium bipartite, tegulum large. Lanceolate embolus slightly tapers distally, very little flaring, proximally emerges anterior to tegulum. Relative length of palpal tibia about three times length of embolus. Longitudinal keel present, but reduced, not distinct (embolus not terete), along entire length of embolus, twisted through 90° prolaterally distally (Figure 7(e)).

**Spinnerets.** PMS: length 0.74, width (medially) 0.42. PLS: section lengths; basal 1.76, medial 1.34, apical 1.89. PLS

section widths (medially); basal 0.72, medial 0.69, apical 0.68. Spinnerets with 2 discernible hair types (SP1, SP2): SP1 very short and distally blunt, pallid, covers both pairs ventrally, second form (SP2), very similar but up to two times longer, dorsally on all segments.

Color (in life, Figure 5(b)) after and mid-molt; chelicerae, carapace, and abdomen dorsally chocolate brown with slightly paler setation and mild violet hue, coxae and trochantera slightly paler: darker ventrally. Legs I–IV chocolate brown with mild violet hue.

**Distribution and Natural History:** (Figures 9(a), 9(b), and 44). *Phlogiellus baeri* [4, 15] has been found from Mt. Natib (= Mt. Orani), Bataan, across fringe regions of Malabon City,

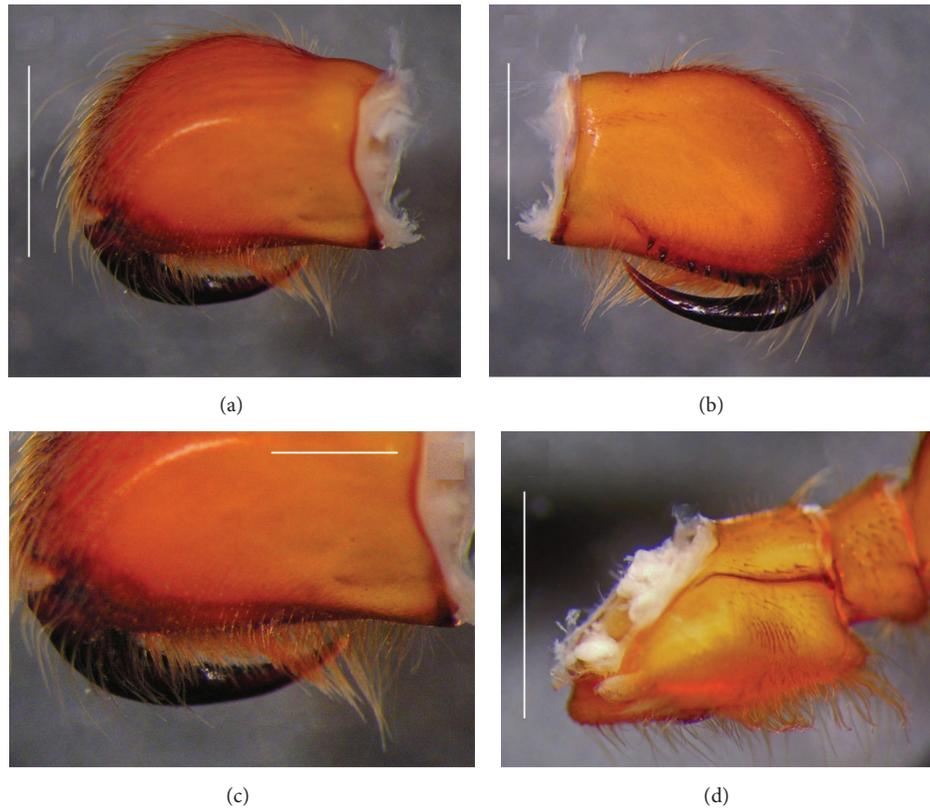


FIGURE 12: *Phlogiellus bogadeki* sp. nov. holotype female QM S83762. (a) Left chelicera, retrolateral view. (b) Left chelicera, prolateral view. (c) Left chelicera, retrolateral view showing strikers. (d) Left maxilla, prolateral view. Scale bar = 2 mm for (a), (b), and (d); 1 mm for (c). Photos: S. Nunn.

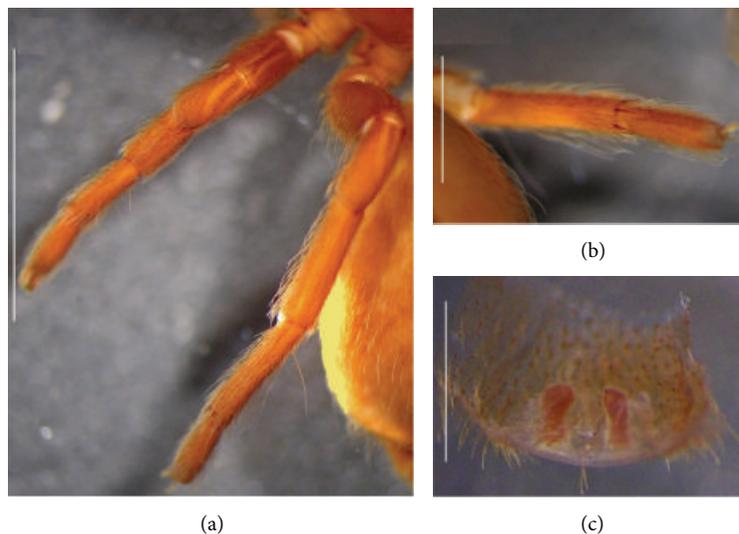


FIGURE 13: *Phlogiellus bogadeki* sp. nov. holotype female QM S83762. (a) Left legs III and IV, dorsal view. (b) Left tarsus and metatarsus IV, ventral view. (c) Spermathecae, dorsal view. Scale bar = 5 mm for (a); 2 mm for (b); 1 mm for (c). Photos: S. Nunn.

Metro Manila, eastward to Antipolo City, Rizal, Luzon Island, Philippines (Figure 44). Elevations for collected specimens ranged from 45 to 1000 meters (Figure 9(a)). As with *Phlogiellus inermis* [8] in Singapore (R. West, J. Koh, pers. comm.), *P. baeri* [4, 15] are common in lightly webbed burrows up to

20 cm in the ground or in loosely made silken retreats under larger rocks and piled debris or in leaf litter along fringes of crop fields and cleared land or in overgrown and semiforested property lots and gardens (Figure 9(b)), in both rural and urban habitats (J. R. Lazo, B. Santos, pers. comm.).

*Note.* Haupt and Schmidt declared this species *incertae sedis* due to the assumption that the female was possibly immature and that males are unknown (Haupt and Schmidt [33, p. 203]). West et al., 2012, subjected this species to cladistic analyses; however, they did not make any nomenclatural changes at the time [2]. We have examined 11 mature females and males herein (5 females, S83748, Pampanga, Luzon Island, S88058, Metro Manila, Luzon Island, S88063, Mt. Natib (= Mt. Orani), Bataan, Luzon Island, S83760, S83761, Antipolo City, elevation 658', Rizal Province, Luzon Island; 5 males, S88064, S88065, S88066, Mt. Natib (= Mt. Orani, Bataan, Luzon Island, S74071, S83931, Antipolo City, elevation 658', Rizal Province, Luzon Island, all held in the QM) and viewed the holotype female (AR46711146, Manila, Philippines, MNHN) and can state that, without question, the morphology of the holotype is typical to all females examined herein. The holotype is not juvenile; the male is now described and, as such, is no longer considered *incertae sedis*. The type *P. baeri* possesses maxillary lyra in combination with thin and elongated, pallid ectal chelicerate strikers, has fully developed spermathecae and fits well within and only within *Phlogiellus*. At first glance, this species seems enigmatic in that the mature female shows a reduction of lyrate bacillae (2 bacillae noted in all examined females of this species, as well as the type, Figure 8(e)), while the males described, as well as all conspecific males examined herein, retain a fully developed lyra (Figure 6(d)). This sexual dimorphism is somewhat unique amongst all known Selenocosmiinae. However, there exists another example of the same sexual dimorphism known to the authors. Congener *P. inermis* type series comprise a male and female; the same sexually dimorphic reduction in lyrate bacillae count in the mature female, compared to the fully lyrate male, is noted herein. The purpose for this reduction in the female lyra currently eludes the authors. When Haupt and Schmidt [33] considered that *P. baeri* [7] may belong to their newly resurrected genus *Yamia*, based upon the loss of maxillary lyra in the female type (even though the type clearly displays 2 lyrate bacillae), they had not examined conspecific males or other females [33]. In all females the authors examined herein, 2 bacillae were present, so this reduction is indeed stable; the holotype and nontype males described herein are considered exemplar representatives of this species, and similar sexual dimorphism, although somewhat interesting, is not precedent within the genus as it also exists in the *P. inermis* type material.

*Phlogiellus bogadeki* sp. nov. (Figures 10–14 and 44).

*Types.* Holotype female QM S83762; 2 paratype females QM S96598, S96599, Sha Tin Village [22°23'12.9"N, 114°12'32.14"E], New Territories, Hong Kong, col. Father Anthony Bogadek, Aug. 12, 1982, QM-examined.

*Etymology.* Specific name is a patronymic adjective in honour of Reverend Father Anthony Bogadek, retired teacher from the St. Louis School, Hong Kong, who brought this species to the author's attention in 1982.



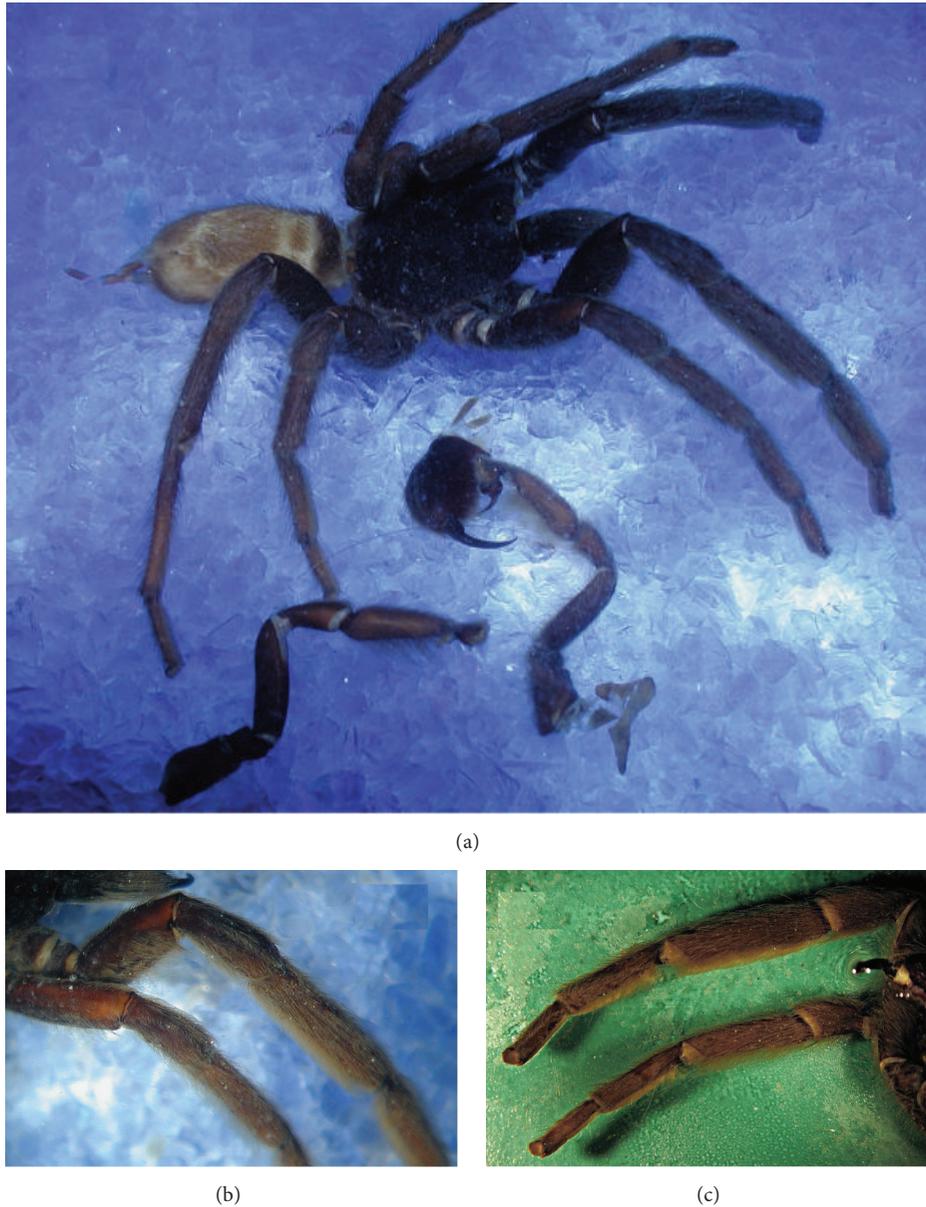
FIGURE 14: *Phlogiellus bogadeki* sp. nov., biotope, secondary broadleaf forest, Sha Tin Village, New Territories, Hong Kong. Photo: Dr. M. Lau.

*Diagnosis.* It differs from *P. watasei* [19] in possessing a full maxillary lyra and differs from *P. xinping* [36] in lacking intercheliceral thorns. It differs from all other *Phlogiellus* species in possessing very thin cheliceral strikers (all others, except *P. watasei* [19] and *P. xinping* [36], possess strikers 1/3 thicker). It differs from all other *Phlogiellus* species, except *P. orophilus* comb. nov. and *P. johnreylazoi* sp. nov., in possessing unarmed paired claws on leg IV; however, it further differs from both *P. orophilus* comb. nov. and *P. johnreylazoi* sp. nov. in possessing divided scopulae on all tarsi (anterior tarsal scopula undivided in *P. orophilus* comb. nov. and *P. johnreylazoi* sp. nov.).

*Description.* Holotype female QM S83762. Body length: 17.67.

*Carapace* (Figure 11(a)). Length 5.37, width 4.91 (width across anterior edge 2.81). Fovea 0.97 wide procurved, deep, not as wide as OT. Distance from anterior carapace to fovea, 4.1. Carapace with 3 discernible hair types (C1 to C3): type C1 long, needleform, pallid, border carapace entirely, most concentrated posteriorly; type C2 short, thin straight, pallid, forming basis of carapace mat, very sparse; type C3 emerges from what looks to be bothrial collars, largely spiniform, pallid, aligned in uniform arrangement (>5) along anterior edge of each radial groove, (>4) along anterior edge of each thoracic groove, (>11) along anterior edge of each caput groove and a line of >2 along medial caput ridge (between OT and fovea), >4 more behind each side of the OT, nearest median caput row.

*Eyes* (Figure 11(b)). Ocular tubercle; length 0.92, width 1.16. Anterior row slightly procurved. Posterior row slightly recurved. Eyes: AME 0.31/0.29, ALE 0.49/0.38, PLE 0.315/0.165, PME 0.24/0.21. Interocular distances: AME-AME 0.163, AME-ALE 0.078, AME-PME 0.122, ALE-ALE 0.69, ALE-PME 0.17, PME-PME 0.457, PME-PLE 0.03, PLE-PLE 0.72, ALE-PLE 0.13. OT hair types: 4 to 5 C3's directly posterior to AME's and PME's. OT entirely covered in short weak, pallid setae (C3), with no uniform direction/random point.



(a)

(b)

(c)

FIGURE 15: *Phlogiellus insulanus* [17] comb. nov., holotype male NHM 96.5.25.37. (a) Habitus, dorsal view. (b) Right tibia I, dorsal view. (c) Right tibia I, prolateral view showing scopulate fringe of setae ventrally. Photos: (a) and (b), R. Raven; (c), D. Court.

*Chelicerae* (Figures 12(a)–12(c)). Length 3.65, width at base of each lobe 1.34 (bases widest point, dorsally). Ectal lyrate region (Figure 12(c)): a series of strikers (>40), in >4 horizontal rows (rows unordered). Strongest/longest strikers on lowest rows. Each striker needleform, lacking filiform ends. Teeth 9 larger, >18 basomesals. Intercheliceral pegs absent, spines (>15 larger: 0.26–0.52 long, >5 smaller) in elongated cluster on basodorsal surface (Figure 12(b)). Retrolateral face basomedially lacking any spination.

*Maxillae* (Figure 12(d)). Prolaterally planoconvex, anterior lobe well pronounced, many cuspules (>40) on inner basoventral surface. Lyra (Figure 12(d)): many bacilliform rods >22 form sparse, ovoid patch prolaterally (0.41 long, 0.35

high), lowest row with >7 bacillae, longest rods in centre of lowest row. Rods paddle-shaped, pointed distad, long shafts (length including paddles up to 0.2), largest with distal blades. At widest point, lyrate patch 3 rows deep, smallest rods dorsally. Patch ovoid in shape. Immediately above maxillary suture > 9 small spines (Figure 12(d)) on anterior margin of maxillae, 2 rows, unordered.

*Labium* (Figure 11(d)). Length 0.68, width 1.49, many small cuspules (>200) along anterior 1/3 surface. Two hair types on labium (L1, L2), L1: long, reasonably dark spiniform in shape, curving distally toward anterior, most concentrated along lateral borders. Setae longest along anterior edge. L2: short dark spiniform, similar morphology to L1, but half size.

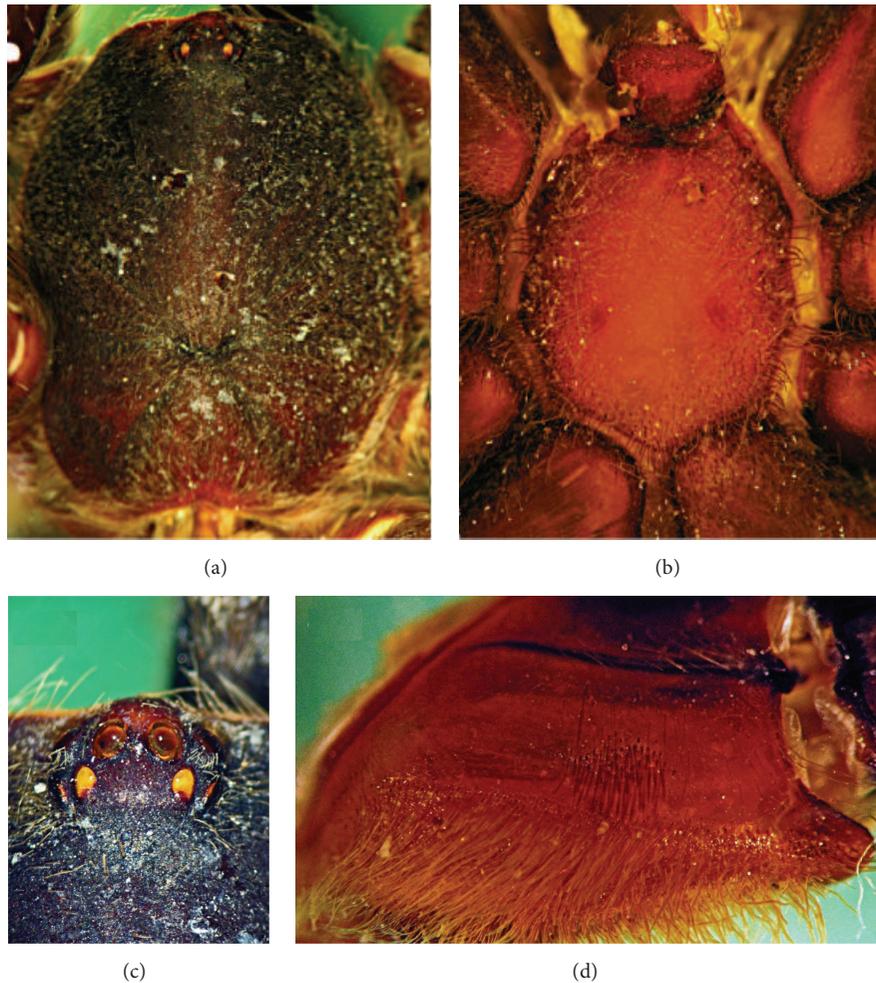


FIGURE 16: *Phlogiellus insulanus* [17] comb. nov., holotype male NHM 96.5.25.37. (a) Carapace, dorsal view. (b) Sternum, labium, and labiosternal sigillae, ventral view. (c) Eyes, dorsal view. (d) Left maxilla, prolateral view. Photos: D. Court.

**Sternum** (Figure 11(c)). Length 3.87, width 2.7. Slightly wider posteriorly than anteriorly, with 3 discernible hair types (S1 to S3): type S1 longest, thickest, darker basally, becoming pallid distally, entire but sparse over sternum: type S2 elongate spiniform, entirely pallid, border sternum, most concentrated posteriorly: type S3 short thin, pallid, forming basis of sternal mat. Posteriorly between left and right coxa IV, sternal border weakly acuminate; lateral sternal points also weakly acuminate. Sternal sigilla (Figure 11(c)): 3 pairs (not including labiosternal sigilla), posterior medium in size; right length 0.41, width 0.35, left length 0.415, width 0.34, ovoid, 1.23 apart, 0.35–0.41 from sternal margin. Median pair 1/2 size of posterior, similar in form, border sternal margin. Anterior pair quarter size of posterior, somewhat obscured, border sternal margin. Labiosternal sigilla large, as big as PSS, 0.65 apart.

**Leg Setation.** All longer leg setation curves distad, lengths of exemplar longer tibial setae: palp 1.2, I 1.12, II 0.74, III 1.16, and IV 1.78. Tibia and metatarsi setal counts almost equal from I to IV. All femora covered in sparse short setae that form the setal mat, with many long distally curving and pallid in color, most concentrated ventrally, forming a brush.

**Legs.** Formula (length); IV, I, II, III: (width) I, II, IV, III. Leg RF~88.83. Leg lengths (fem., pat., tib., met., tar., total): palp: 3.15, 2.12, 2.00, 0.00, 1.87, 9.14. I: 3.98, 2.96, 3.22, 2.15, 1.78, 14.09. II: 3.89, 2.66, 2.34, 1.66, 1.66, 12.21. III: 2.82, 1.82, 1.67, 2.23, 1.57, 10.11. IV: 4.67, 2.47, 3.29, 3.45, 1.98, 15.86. Leg mid-widths (fem., pat., tib., met., tar., total): palp: 1.08, 0.93, 0.85, –, 0.79, 3.65. I: 1.14, 1.18, 1.12, 0.75, 0.72, 4.91. II: 1.12, 1.21, 0.84, 0.82, 0.67, 4.66. III: 1.34, 1.01, 0.87, 0.68, 0.64, 4.54. IV: 1.27, 1.15, 0.91, 0.59, 0.64, 4.57. Tar. III and IV lacking transverse weakening.

**Scopula.** Tar. I–II divided by 3 rows of long, straight spiniform setae, and tar. III and IV divided by 4 rows of long, straight spiniform setae (Figure 13(b)). Met. I and II: entire, but sparse, III: 2/3 (sparse), IV: 1/2 (very sparse). Tar. IV without wider incassate retrolateral scopulate field than seen prolaterally.

**Coxae** (Figure 12(d)). Many small black thorns prolaterodorsally, no thorns retrolaterally on I–III. Coxae easily seen dorsally. I longest, ca. 1.2 times length of II. IV widest, basally rectangular with rounded corners. Coxae with small thorns prolaterally on I–IV. I–III ventrally with many long thick

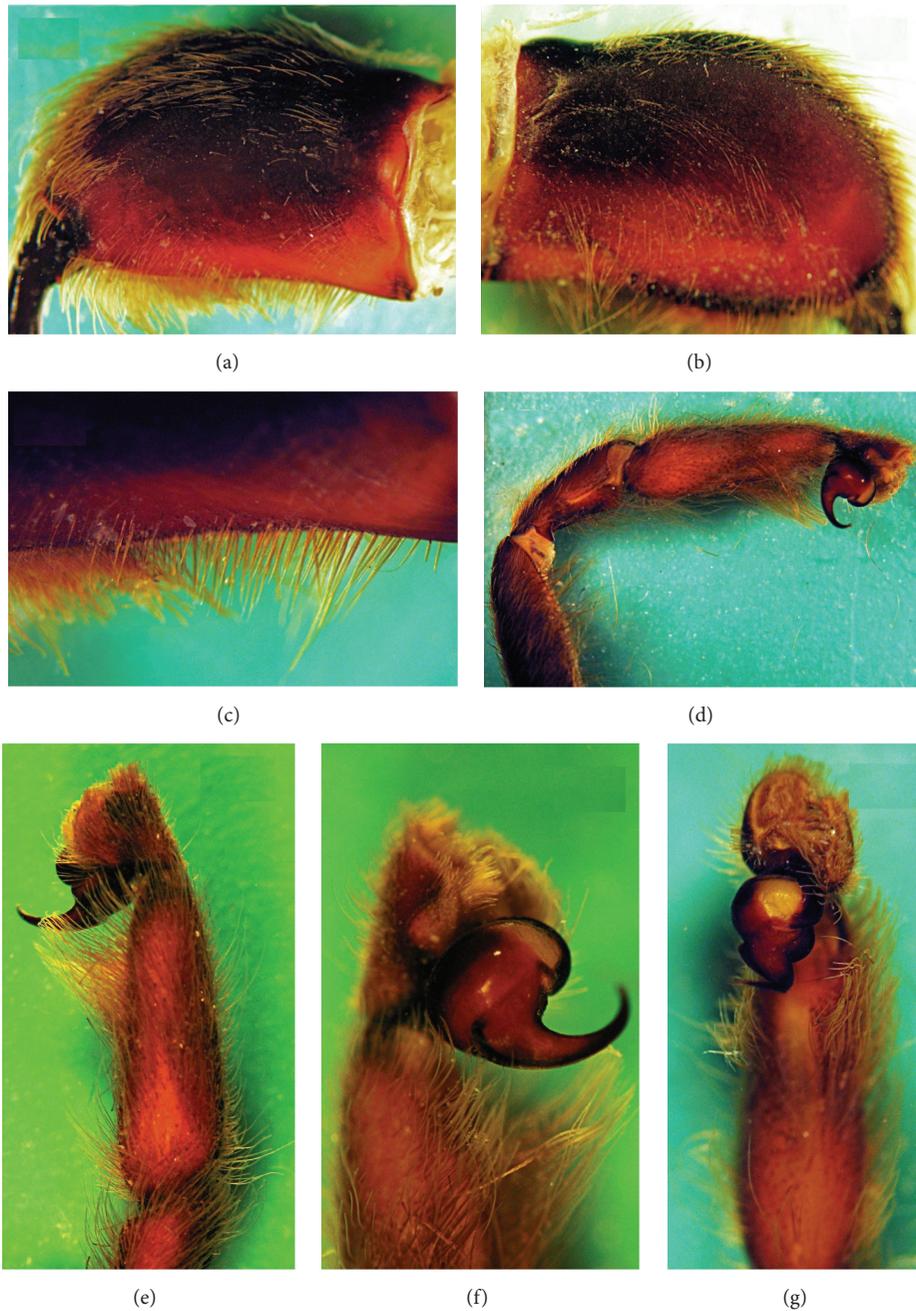


FIGURE 17: *Phlogiellus insulanus* [17] comb. nov., holotype male NHM 96.5.25.37. (a) Left chelicera, retrolateral view. (b) Left chelicera, prolateral view. (c) Left chelicera, retrolateral view showing strikers and ectocheliceral tumescence. (d) Left palp, prolateral view. (e) Left palpal tibia, tarsus, and bulb, retrolateral view. (f) Left palpal tibia, tarsus, and bulb, prolateral view. (g) Left palpal tibia, tarsus, and bulb, ventral view. Photos: D. Court.

blunt setae proximally, pallid in color. IV with mixture of long thick blunt setae entirely, pallid intermixed with shorter thin pallid setae. Ventral I–IV gently sloping anteriorly. Retrolateral setation: I–III with median narrow light brush, grading to spiniform setae dorsally. IV with distodorsal brush, setae long, spiniform. I–IV retrolaterally lack ventral ledge. Ventral measurements for coxae: palp-length 2.25, width 1.35; I– 2.37, 1.31; II– 2.06, 1.51; III– 1.82, 1.23; IV– 2.25, 1.35.

*Trochantera*. Palp-length 0.75, width 1.05; I, 0.84, 1.16; II, 0.94, 0.85; III, 1.12, 1.13; IV, 1.26, 1.29.

*Trichobothria*. Tarsi: on all tarsi basal filiform field slightly wider than clavate field, merges evenly. Clavates on tar. I in distal 2/3 (>15), long filiform only in basal half, shorter filiform intermixed with clavates distally. Clavate extent on tar. II–IV compared to I, in distal 2/3. Shorter filiform for length.

Short epitrichobothrial field on tar. I shorter than clavates, uniform height for length. Tarsal organ absent on legs I–IV under stereoscope (up to 50x). Metatarsi: trichobothrial field not detected. Tibia: tib. I prolaterally and proximally with short, possibly clavate trichobothria (>7) with patch 0.23 long, 0.15 wide, clearly pallid: >4 filiform detected in straight line proximally to clavate patch. Tib. IV prolaterally and proximally with short clavates (>24) in ovoid patch: >5 filiform detected in semicircular pattern ventrally to clavate patch.

*Spines.* (right) met. I with 1DV, met. II with 1DV, met. III with 1DV, 2DPV, 1DRV, 1DPD, and 1DD, and met. IV with 1DV, 1DPV, 1DRV, 1DPD, and 1DD.

*Claws.* Paired claws on all legs and palpal claw unarmed. Reduced third claw present on legs III and IV.

*Abdomen* (Figure 11(e)). 10.15 long, ovular, elongated, with 2 discernible hair types (A1 to A2): dorsally with 2 hair types: type A1, long, dark, but distally pallid: type A2 forms dense mat of abdomen, mid-length, spiniform. Longest hairs (A1) more concentrated posteriorly toward spinnerets, point distad. Ventral hair types similar to dorsal, although more dense entirely.

*Genitalia.* Epigastric fold 1.4. Spermathecae (Figure 13(c)): unilobed but not fused, separated by 0.23 (width including spermatheca 0.81), lobe length (right) 0.42, each lobe with apical rounded ends, distally swollen: lobe apical widths 0.21 (right): sclerotization constant/entire length of lobe. Epigastric fold extends ca. 2x length of spermathecal lobes.

*Spinnerets.* PMS: length 0.69, width (medially) 0.32. PLS: section lengths; basal 1.44, medial 1.26, apical 1.71. PLS section widths (medially); basal 0.68, medial 0.66, apical 0.66. Spinnerets with 2 discernible hair types (SP1, SP2): SP1 very short and distally blunt pallid, covers both pairs ventrally, second form (SP2), very similar but up to two times longer, dorsally on all segments.

Color (in life, Figure 10) after and mid-molt; chelicerae, carapace, and abdomen dorsally chocolate brown with slightly paler setation and mild violet hue, coxae and trochantera slightly paler; darker ventrally. Legs I–IV chocolate brown with mild violet hue.

*Distribution and Natural History.* It is known only from the type locale (Figure 44). Nothing is known about the distribution and very little is known about the natural history of this species. The fossorial retreat of the female consists of a loose labyrinth of silken tubes found under large rocks or in ground crevices on embankments along roads or trails (A. Bogadek, pers. comm.). General habitat is subtropical secondary evergreen forest, mainly made up of broadleaf vegetation, on sloped rocky and leaf-littered ground (Figure 14). The male is unknown.

*Phlogiellus brevipes* [5, 10]. *Ischnocolus brevipes*, Thorell, 1897a: 170; *Phlogiellus brevipes*, Thorell, 1897b: (transfer);

*Ischnocolus brevipes*, Pocock 1900: 183; *Neochilobrachys brevipes*, Roewer, 1942: 264 (transfer); *Phlogiellus brevipes*, Raven, 1985: 156 (synonymy).

*Types.* *Ischnocolus brevipes*, Thorell, 1897, syntype males and females, Tenasserim region [= Tanintharyi], Myanmar, NRM.

*Diagnosis.* It differs from *P. atriceps*, *P. baeri*, *P. bogadeki* sp. nov., *P. inermis*, *P. insulanus* comb. nov., *P. johnreylazoi* sp. nov., *P. obscurus* comb. nov., *P. orophilus* comb. nov., *P. pelidnus* sp. nov., *P. subinermis*, and *P. xinpings* in lacking any maxillary lyra. It differs from all other *Phlogiellus* species in only possessing two distal metatarsal spines ventrally (all other alyrate species record at least 4 or more distal spines on metatarsi distally, particularly on posterior legs).

*Note.* Pocock [12] appears to have missed Thorell's transfer to *Phlogiellus*, which would be unusual for Pocock, leading the authors to this conclusion.

*Phlogiellus bundokalbo* [28]. *Baccallbrapo bundokalbo*, Barrion and Litsinger, 1995: 22, f. 5a–q; *Phlogiellus bundokalbo*, Raven, 2000: 570 (synonymy); *Yamia bundokalbo*, Haupt and Schmidt, 2004: 202 (transfer); Jocqué and Dippenaar-Schoeman, 2006: 252, f. 103j; Schmidt, 2003 [62]: 244, f. 793–794; Schmidt, 2010 [65]: 44, f. 5.3; Zhu and Zhang 2008: 444; *Phlogiellus bundokalbo*, West et al., 2012: 33 (synonymy).

*Types.* *Baccallbrapo bundokalbo* (Barrion and Litsinger 1995), holotype male, 6 paratype females, 11 immatures, Laguna Prov., Sinaloan and Quezon Prov., Real, Luzon Island, Philippines, IRRI.

*Diagnosis.* It differs from *P. atriceps*, *P. baeri*, *P. bogadeki* sp. nov., *P. inermis*, *P. insulanus* comb. nov., *P. johnreylazoi* sp. nov., *P. obscurus* comb. nov., *P. orophilus* comb. nov., *P. pelidnus* sp. nov., *P. subinermis*, and *P. xinpings* in lacking any maxillary lyra. It differs from *P. brevipes*, *P. moniqueverdezae* sp. nov., *P. mutus*, and *P. watasei* in possessing undivided tarsal scopula on all legs in females. It differs from *P. aper* in possessing an almost straight foveal groove (strongly procurved in *P. aper*) in males.

*Phlogiellus inermis* [8]. *Ischnocolus inermis*, Ausserer, 1871: 188; *Phlogiellus inermis*, Simon, 1903: 955 (transfer); Strand, 1907: 79; *Selenocosmia inermis*, Hirst 1909: 384 (transfer); Abraham, 1924, p. 1113; Giltay, 1934: 2, f. 1b; *Phlogiellus inermis*, Roewer, 1938: 5 (transfer).

*Type.* *Ischnocolus inermis*, Ausserer, 1871, lectotype male, 167, Sumatra, paralectotype female, 168, Bogor, Java, NMW (new designation from syntype status).

*Diagnosis.* It differs from *P. baeri* in possessing lyrate bacillae with distal spines (bacillae distally blunt in *P. baeri*) and in female spermathecal lobes lacking apical buds (apical buds present in *P. baeri*). It differs from *P. insulanus* comb. nov., *P. johnreylazoi* sp. nov., *P. obscurus* comb. nov., *P. orophilus* comb. nov., *P. pelidnus* sp. nov., and *P. xinpings* in that the tarsal scopulae of all legs are divided (in the above species, tarsal

scopulae are undivided on either leg I, legs I and II, or legs I, II, and III). It differs from *P. aper*, *P. brevipes*, *P. bundokalbo*, *P. moniqueverdezae* sp. nov., *P. mutus*, and *P. watasei* in possessing a maxillary lyra. It differs from *P. subinermis* in possessing the apical segment of the posterior lateral spinnerets being only 1.5 times as long as the medial segment (in *P. subinermis* the apical PLS segment is nearly twice as long as the medial one). It also differs further from *P. subinermis* in possessing an embolus that is distally curved strongly (embolus distally almost straight in *P. subinermis*) in males. It differs from *P. atriceps* males in possessing 10 cheliceral teeth (9 in *P. atriceps*), more dense patch of lyrate bacillae (>160 in *P. inermis*, >120 in *P. atriceps*) in males, similar length of legs I and IV, being IV, 23.7, compared to leg I, 23.3 (longer leg IV in *P. atriceps*: IV, 25.5, compared to I, 23.5), and wider sternum (1.3x wider than in *P. atriceps*) in males, with tarsus IV being bent (not bent in *P. atriceps*) in males. It differs from *P. atriceps* females in the greatly reduced number of lyrate bacillae (ca. 7 cf. >120 in *P. atriceps*). It differs from *P. bogadeki* sp. nov. females in possessing armed paired claws on leg IV (unarmed in *P. bogadeki* sp. nov.).

*Note.* It is significant that the paralectotype female *P. inermis* possesses a well developed spermatheca, which proves she is mature. The lyrate count of bacillae on the prolateral maxillary surface is 7-8, greatly reduced in comparison to the conspecific male lectotype, which possesses >140 bacillae. The same sexual dimorphism is noted in *P. baeri* herein (a severe reduction of bacillae in mature females, compared to males).

Even though Pocock listed *P. inermis* as a possible synonym of *P. atriceps* “?” (Pocock [3, p. 596]), because he was clearly doubtful, under principles of the provisions on types (ICZN [66] Art. 67.2.5), *P. inermis* could not be considered a name bearing synonym of *P. atriceps* within Pocock’s original paper and thus considered synonymized or not thereafter; *P. inermis* was never valid as the “type species,” *contra*. Pocock, 1900, Simon, 1903, and Strand, 1907.

*Phlogiellus insulanus* [17] *comb. nov.* (Figures 15(a)–17(g) and 44). *Selenocosmia insulana*, Hirst, 1909: 385, pl. 24, f. 5; Giltay, 1934: 2.

*Type.* *Selenocosmia insulana* [17], holotype male, 96.5.25.37, Djampea [= Jampea] Island, South Sulawesi Province, Indonesia, NHM.

*Diagnosis.* It differs from all other *Phlogiellus* species in possessing a dense scopulate brush of setae on the entire ventral surface of tibia I (Figures 15(a)–15(c))

The type *Selenocosmia insulana* (Hirst 1909) (Figures 15(a)–17(g) and 44) from Djampea (= Jampea) Island in Indonesia is a mature male and displays male palpal bulb morphology synapomorphic to the tribe Yamiini (heavily keeled and stout embolus with basal lobe, Figures 17(e)–17(g); West et al. [2, p. 25, Figures 34, 35a]), divided tarsal scopulae on legs III and IV, weakly developed lyra consisting of ca. 80 bacillae, ovoid in shape (Figure 16(d)), needleform strikers (Figures 17(a)–17(c)), deep and procurved foveal groove smaller in width than the OT (Figure 16(a)), and a reduced



(a)



(b)

FIGURE 18: (a) *Phlogiellus johnreylazoi* sp. nov. holotype female QM S91276 habitus, in life, from Brooke’s Point, Palawan Island, Philippines. (b) *Phlogiellus johnreylazoi* sp. nov. paratype male QM S96629 habitus, in life, from Brooke’s Point, Palawan Island, Philippines. Photos: R. West.

third claw on leg IV, all characters of which, in combination, are diagnostic to *Phlogiellus* herein (and see West et al. [2]). Due to the presence of these character traits in the above species, *Selenocosmia insulana* (Hirst 1909) is, herein, transferred to *Phlogiellus* as *P. insulanus* [17] *comb. nov.*

*Phlogiellus johnreylazoi* sp. nov. (Figures 18(a)–24 and 44)

*Types.* Holotype female QM S91276; male paratypes QM S88309, S96629, S96630, S96631; paratype females QM S91272, Brooke’s Point [8°47’0’’N, 117°50’0’’E], Palawan Island, Philippines, col. J. Arimas Sept. 2008; S91266, S91321, Brooke’s Point [8°47’0’’N, 117°50’0’’E], Palawan Island, Philippines, col. M. Scheller April 2011, QM-examined.

*Etymology.* Specific name is a patronymic adjective in honour of Mr. John Rey Lazo of Antipolo City, Rizal Province, Luzon Island, Philippines, who has provided a large number of theraphosid spiders and data from Rizal and various other locales throughout the Philippines.

*Diagnosis.* It differs from all other *Phlogiellus* species in having spermatheca being unilobular with distinct medial points in females. It differs from all other male *Phlogiellus* species in possessing a highly incrassate embolus, entirely, the most distal region being almost 1/2 the width of the embolus basally (in all other known *Phlogiellus* males, the

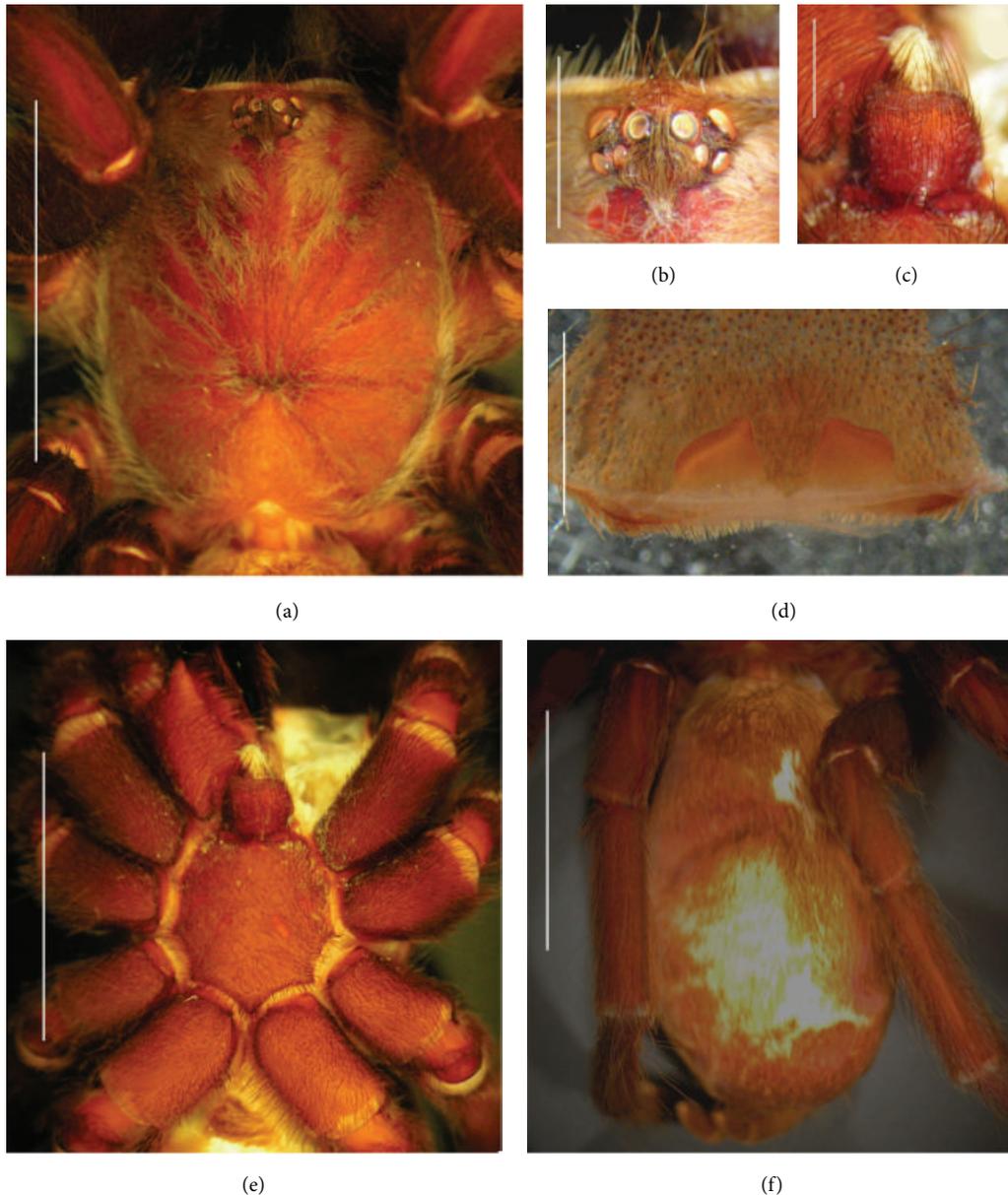


FIGURE 19: *Phlogiellus johnreylazoi* sp. nov. holotype female QM S91276. (a) Carapace, dorsal view. (b) Eyes, dorsal view. (c) Labium and labiosternal sigillae, ventral view. (d) Spermathecae, dorsal view. (e) Sternum, labium, maxilla, and coxae, ventral view. (f) Abdomen, dorsal view. Scale bar = 10 mm for (a), (e), and (f); 2 mm for (b), (c), and (d). Photos: S. Nunn.

embolus tapers moreso, always terminating  $<1/4$  the width of the embolus basally).

*Description.* Holotype female QM S91276. Body length: 43.34.

*Carapace* (Figure 19(a)). Length 16.83, width 13.29 (width across anterior edge 9.07). Fovea 3.12 wide, procurved, deep, not as wide as OT. Distance from anterior carapace to fovea, 11.05. Carapace with 3 discernible hair types (C1 to C3): type C1 long, needleform, pallid, border carapace entirely, most concentrated medially; type C2 short, thin straight, pallid, forming basis of carapace mat, some of longer form bordering carapace, intermixed with C1's; type C3 emerges from what looks to be bothrial collars, largely spiniform, pallid, aligned

in uniform arrangement: ( $>5$ ) along anterior edge of each radial groove, ( $>5$ ) along anterior edge of each thoracic groove, ( $>6$ ) along anterior edge of each caput groove and a line of  $>5$  along medial caput ridge (between OT and fovea).  $>9$  more behind each side of the OT, nearest median caput row.

*Eyes* (Figure 19(b)). Ocular tubercle; length 1.45, width 3.19. Anterior row straight. Posterior row slightly recurved. Eyes: AME 0.41/0.4, ALE 0.68/0.39, PLE 0.42/0.31, PME 0.31/0.24. Interocular distances: AME-AME 0.23, AME-ALE 0.17, AME-PME 0.13, ALE-ALE 1.26, ALE-PME 0.26, PME-PME 1.17, PME-PLE 0.06, PLE-PLE 1.59, ALE-PLE 0.12. OT hair types: 14 to 18 C3's directly posterior to AME's and PME's. OT

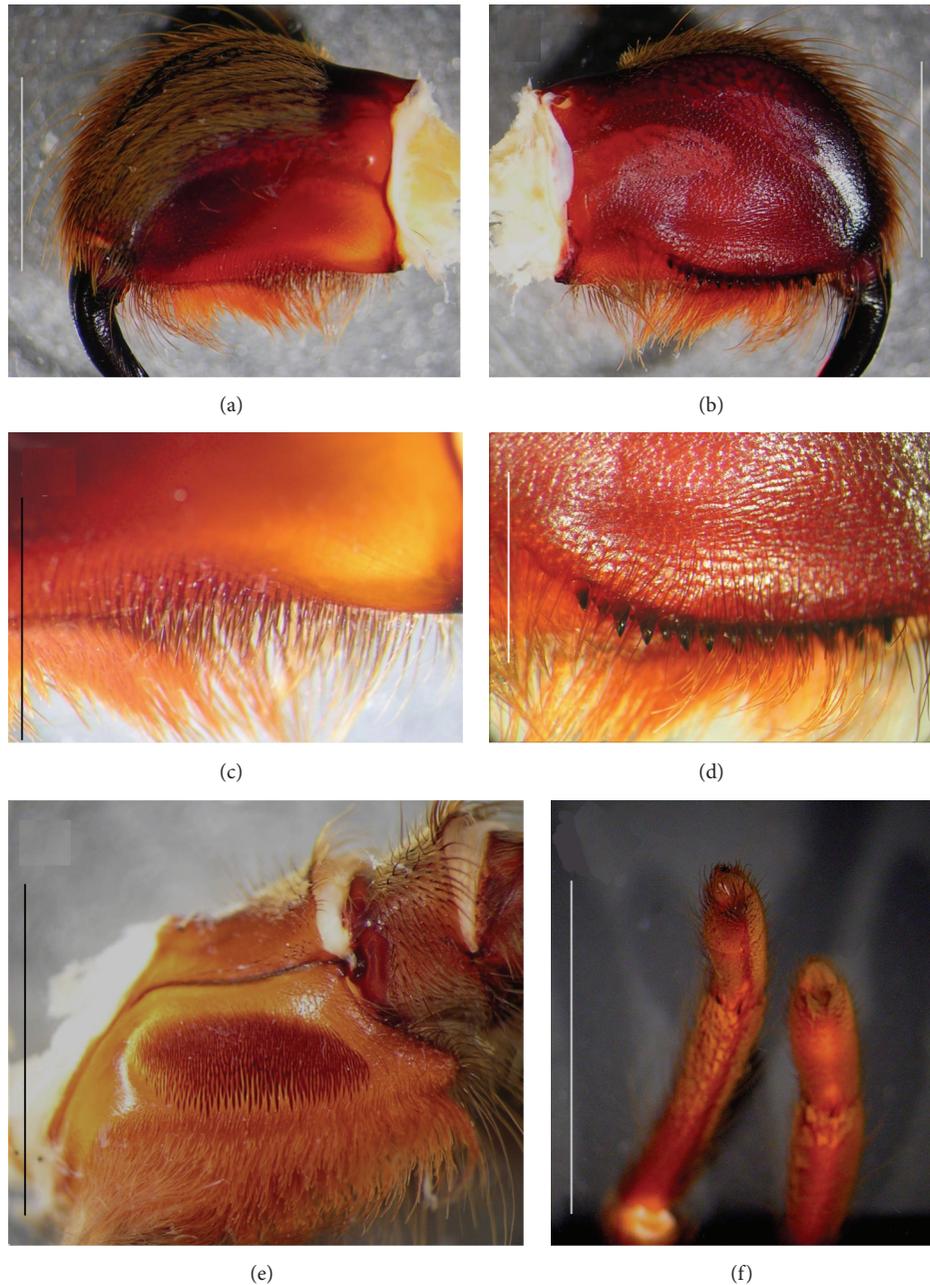


FIGURE 20: *Phlogiellus johnreylazoi* sp. nov. holotype female QM S91276. (a) Left chelicera, retrolateral view. (b) Left chelicera, prolateral view. (c) Left chelicera, retrolateral view showing strikers. (d) Left chelicera, prolateral view showing primary teeth. (e) Left maxilla, prolateral view. (f) Right tarsi and metatarsi III and IV, ventral view. Scale bar = 10 mm for (f); 5 mm for (e); 2 mm for (a)–(d). Photos: S. Nunn.

entirely covered in short weak, pallid setae (C3), with uniform pointing medially of OT.

*Chelicerae* (Figures 20(a)–20(d)). Length 9.71, width at base of each lobe 3.98 (bases widest point, dorsally). Ectal lyrate region (Figure 20(c)): a series of strikers (>75), in >5 horizontal rows (rows unordered). Strongest/longest strikers on lowest rows. Each striker needleform, lacking filiform ends. Teeth 13 larger (Figure 20(d)), >88 basomesals. Intercheliceral pegs absent, spiniform setae (>38 larger: 0.28–0.84 long, >18

smaller) in elongated cluster on basodorsal surface (Figure 20(b)). Retrolateral face basomedially lacking any spination.

*Maxillae* (Figure 20(e)). Prolaterally planoconvex, anterior lobe well pronounced, many cuspules (>115) on inner basoventral surface. Lyra (Figure 20(e)): many bacilliform rods >180 form ovoid patch prolaterally (3.56 long, 1.35 high), lowest row with >24 bacillae, longest rods in centre of lowest row. Rods paddle-shaped, pointed distad, long shafts (length

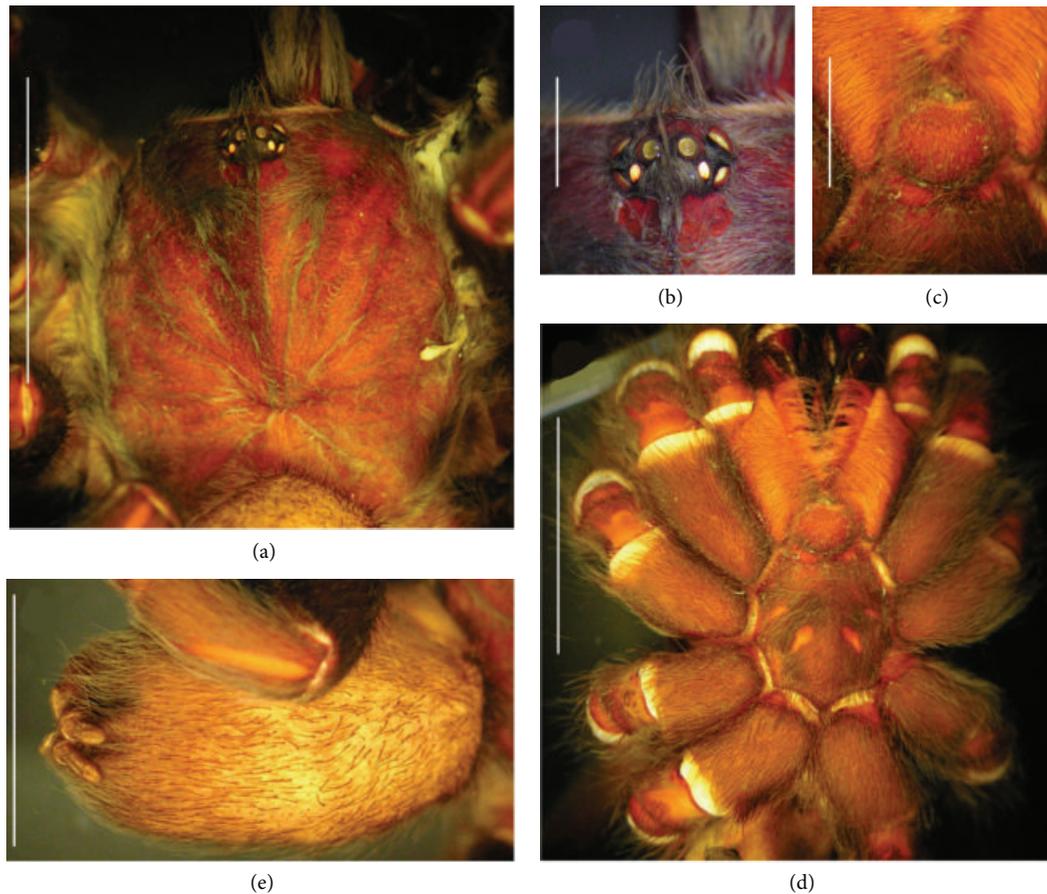


FIGURE 21: *Phlogiellus johnreylazoi* sp. nov. paratype male QM S96629. (a) Carapace, dorsal view. (b) Eyes, dorsal view. (c) Labium and labiosternal sigillae, ventral view. (d) Sternum, labium, maxilla, and coxae, ventral view. (e) Abdomen, dorsal view. Scale bar = 10 mm for (a), (d), and (e); 2 mm for (b) and (c). Photos: S. Nunn.

including paddles up to 0.43), lacking distal blades. At widest point, lyrate patch 9 rows deep, smallest rods dorsally. Patch ovoid in shape. Immediately above maxillary suture > 15 small spines, anterior to >16 stiff setae (Figure 20(e)) on anterior-posterior margin of maxillae, 2 rows, unordered.

**Labium** (Figure 19(c)). Length 2.93, width 3.12, many small cuspules (>200) along anterior 1/3 surface. Two hair types on labium (L1, L2), L1: long, reasonably dark spiniform in shape, curving distally toward anterior, most concentrated along lateral borders. Setae longest along anterior edge. L2: short dark spiniform, similar morphology to L1, but half size.

**Sternum** (Figure 19(e)). Length 7.51, width 7.05. Slightly wider posteriorly than anteriorly, with 3 discernible hair types (S1 to S3): type S1 longest, thickest, dark entirely, entire but sparse over sternum: type S2 elongate spiniform, entirely pallid, border sternum, most concentrated posteriorly: type S3 short thin, pallid, forming basis of sternal mat. Posteriorly between left and right cox. IV, sternal border weakly acuminate; lateral sternal points also weakly acuminate. Sternal sigilla (Figure 19(e)): 3 pairs (not including labiosternal sigilla), posterior medium in size; right length 1.15, width 0.45, left length 1.15, width 0.31, ovoid, 1.83 apart, 1.65–1.83 from sternal margin. Median pair 2/3 size of posterior, similar in form,

0.68 from sternal margin. Anterior pair quarter size of posterior, somewhat obscured, border sternal margin. Labiosternal sigilla large, slightly larger than PSS, 0.96 apart.

**Leg Setation.** All longer leg setation curves distad, lengths of exemplar longer tibial setae: palp 1.87, I 1.96, II 1.76, III 1.69, IV 2.14. Tibia and metatarsi setal counts almost equal from I to IV. All femora covered in sparse short setae that form the setal mat, with many long distally curving and pallid in color, most concentrated ventrally.

**Legs.** Formula (length); IV, I, II, III: (width) I, II, III, IV. Leg RF~99.43. Leg lengths (fem., pat., tib., met., tar., total): palp: 9.74, 5.31, 6.28, 0.00, 5.99, 27.32. I: 13.09, 8.38, 10.03, 8.71, 5.56, 45.77. II: 10.95, 7.11, 8.4, 7.58, 5.11, 39.15. III: 9.39, 5.91, 6.08, 7.52, 4.45, 33.35. IV: 12.61, 6.53, 9.97, 11.83, 5.09, 46.03. Leg mid-widths (fem., pat., tib., met., tar., total): palp: 2.31, 2.79, 2.27, –, 2.3, 9.67. I: 2.61, 3.04, 2.86, 2.34, 2.34, 13.19. II: 2.83, 2.81, 2.39, 2.38, 2.27, 12.68. III: 3.18, 3.08, 2.33, 2.21, 1.81, 12.61. IV: 2.57, 2.7, 2.35, 1.72, 1.82, 11.16. Tar. IV with transverse weakening.

**Scopula.** Tar. I, II, and III parted but not divided by any setae, IV divided by 2 rows of long, straight spiniform setae (Figure 20(f)). Met. I and II: entire, dense, III: 2/3 (dense), IV: 2/3 (dense). Tar. IV without wider/incrassate retrolateral

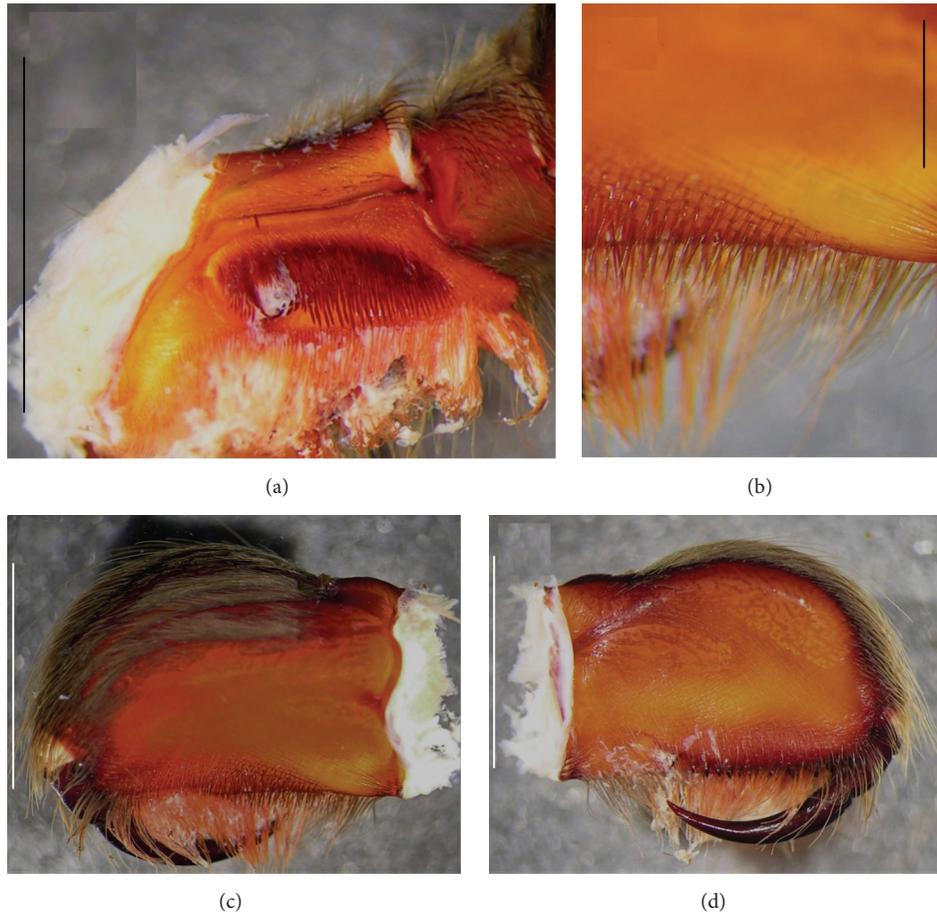


FIGURE 22: *Phlogiellus johnreylazoi* sp. nov. paratype male QM S96629. (a) Left maxilla, prolateral view. (b) Left cheliceral strikers, retrolateral view. (c) Left chelicera, retrolateral view showing strikers and ectocheliceral tumescence. (d) Left chelicera, prolateral view. Scale bar = 5 mm for (a), (c), and (d); 2 mm for (b). Photos: S. Nunn.

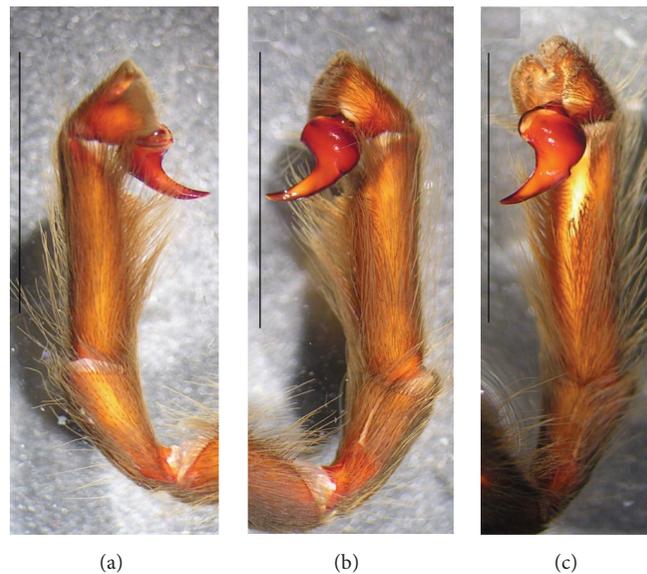


FIGURE 23: *Phlogiellus johnreylazoi* sp. nov. paratype male QM S96629. (a) Left palpal patella, tibia, tarsus, and bulb, prolateral view. (b) Left palpal patella, tibia, tarsus, and bulb, retrolateral view. (c) Left palpal patella, tibia, tarsus, and bulb, ventral view. Scale bar = 10 mm for (a)–(c). Photos: S. Nunn.



FIGURE 24: *Phlogiellus johnreylazoi* sp. nov., biotope, tropical deciduous forest, Brooke's Point region, Palawan, Philippines. Photo: L. Cuesta.



(a)



(b)

FIGURE 25: (a) *Phlogiellus moniqueverdezae* sp. nov. holotype female QM S88067 habitus, in life, from Ranong, Ranong Province, Thailand. (b) *Phlogiellus moniqueverdezae* sp. nov. male QM S88480 habitus, in life, from Ranong, Ranong Province, Thailand. Photos: R. West.

scopulate field than seen prolaterally. Coxae (Figure 19(e)): many small black thorns prolaterodorsally, no thorns retrolaterally on I–III. Coxae easily seen dorsally. I longest, *ca.* 1.2 times length of II. IV widest, basally rectangular with rounded corners. Coxae with small thorns prolaterally on I–IV. I–III ventrally with many long thick blunt setae proximally, pallid in color. IV with mixture of long thick blunt setae entirely, pallid intermixed with shorter thin pallid setae. Ventral I–IV gently sloping anteriorly. Retrolateral setation: I–III with median narrow light brush, grading to

spiniform setae dorsally. IV lacking any spines or setae. I–IV retrolaterally lack ventral ledge. Ventral measurements for coxae: palp-length 6.92, width 3.6; I, 7.1, 3.8; II, 5.81, 3.55; III, 5.16, 3.91; IV, 5.81, 4.09.

*Trochantera*. Palp-length 2.4, width 2.87; I, 2.98, 3.33; II, 3.11, 3.2; III, 2.17, 3.44; IV, 3.42, 3.76.

*Trichobothria*. Tarsi: on all tarsi basal filiform field slightly wider than clavate field, merges evenly. Clavates on tar. I in distal 2/3 (>15), long filiform only in basal half, shorter filiform intermixed with clavates distally. Clavate extent on tar. II–IV compared to I, in distal 2/3. Shorter filiform for length. Short epitrichobothrial field on tar. I shorter than clavates, uniform height for length. Tar. I patch 1.95 long, 0.38 wide. Tarsal organ absent on legs I–IV under stereoscope (up to 50x). Metatarsi: trichobothrial field not detected. Tibia: tib. I prolaterally and proximally with short, possibly clavate trichobothria (>21) with patch 0.45 long, 0.36 wide, clearly pallid: >7 filiform detected in straight line proximally to clavate patch. Tib. IV prolaterally and proximally with short clavates (>9) in ovoid patch: >5 filiform detected in semicircular pattern ventrally to clavate patch.

*Spines*. (Right) met. I lacking any spines, met. II with 1 DV (short spine), met. III with 1 DPV, 1 DRV, 1 P, 1 R, and 2 DD (one twice the size of the other), and met. IV with 1 DPV, 1 DRV, 1 P, 1 R, and 2 DD (one twice the size of the other).

*Claws*. Paired claws on legs I–III and palpal claw unarmed, paired claw IV unarmed. Large third claw present on leg IV.

*Abdomen* (Figure 19(f)). 23.61 long, ovular, elongated, with 2 discernible hair types (A1 to A2): dorsally with 2 hair types: type A1 long, dark, but distally pallid: type A2 forms dense mat of abdomen, mid-length, spiniform. Longest hairs (A1) more concentrated posteriorly toward spinnerets, point distad. Ventral hair types similar to dorsal, although more dense entirely.

*Genitalia*. Epigastric fold 4.91. Spermathecae (Figure 19(d)): unilobed but not fused, separated by 0.68 (width including spermatheca 2.91), lobe length (right) 0.96, each lobe almost tombstone shaped, but with medial pointed ends: sclerotization constant/almost entire length of lobe (bases are lacking heavy sclerotization). Epigastric fold extends *ca.* 3x length of spermathecal lobes.

*Spinnerets*. PMS: length 2.26, width (medially) 0.92. PLS: section lengths; basal 3.81, medial 2.68, apical 3.86. PLS section widths (medially); basal 1.51, medial 1.5, apical 1.13. Spinnerets with 2 discernible hair types (SP1, SP2): SP1 very short and distally blunt pallid, covers both pairs ventrally, second form (SP2), very similar but up to two times longer, dorsally on all segments.

Color (in life, Figure 18(a)) after and mid-molt; chelicerae, legs and palp dark bluish black, carapace and femora darker, abdomen dorsum with bluish violet pubescence, darker ventrally.

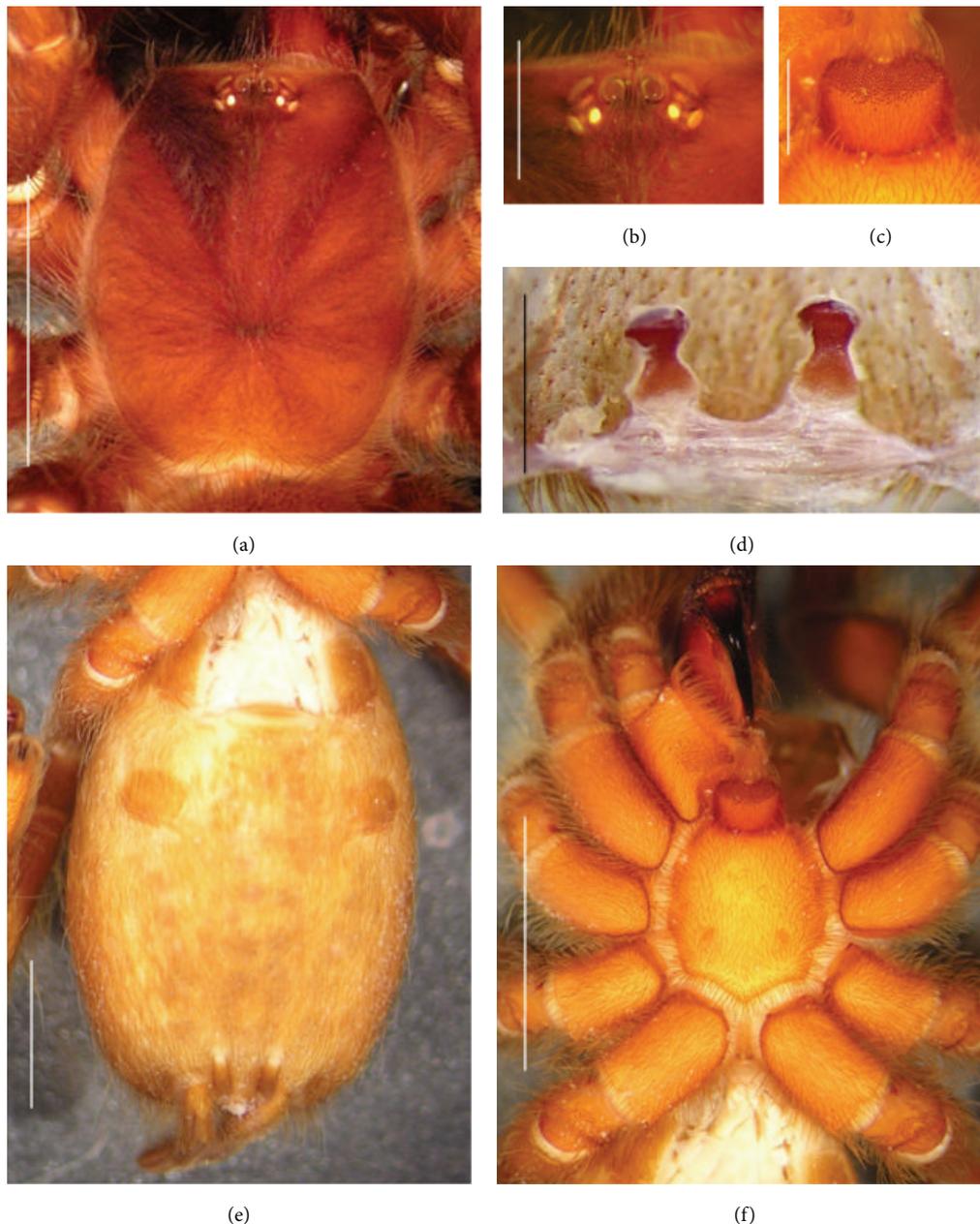


FIGURE 26: *Phlogiellus moniqueverdezae* sp. nov. holotype female QM S88067. (a) Carapace, dorsal view. (b) Eyes, dorsal view. (c) Labium and labiosternal sigillae, ventral view. (d) Spermathecae, dorsal view. (e) Abdomen, ventral view. (f) Sternum, labium, maxilla, and coxae, ventral view. Scale bar = 5 mm for (a), (e), and (f); 2 mm for (b); 1 mm for (c) and (d). Photos: S. Nunn.

Paratype male QM S96629, as in female except: body length: 37.3.

*Carapace* (Figure 21(a)). Length 16.2, and width 14.71 (width across anterior edge 9.29). Fovea 3.49 wide, weakly procurved, deep, narrower than OT. Distance from anterior carapace to fovea, 11.28. Carapace hair types as in female, except that type C2 setae are *ca.* 3-4 times longer and wavy, not straight. Type C2 setae also more numerous than in females. Eyes (Figure 21(b)): ocular tubercle; length 2.19, width 3.51.

*Chelicerae* (Figures 22(b)–22(d)). Length 8.53, width at base of each lobe 3.63 (at bases widest point, dorsally). Ectal lyrate region a series of strikers (Figure 22(b)) as in females. Cheliceral teeth, 9, >25 basomesals. Ectocheleceral tumescence distinct, dorsal to retrolateral strikers (Figure 22(c)).

*Maxillae* (Figure 22(a)). Prolaterally planoconvex, anterior lobe well pronounced, many cusps (>153) on inner basoventral surface. Lyra (Figure 22(a)): lacking any bacilli-form rods, however modified spiniform setae replace bacillae and form sparse, ovoid patch prolaterally covers most of the

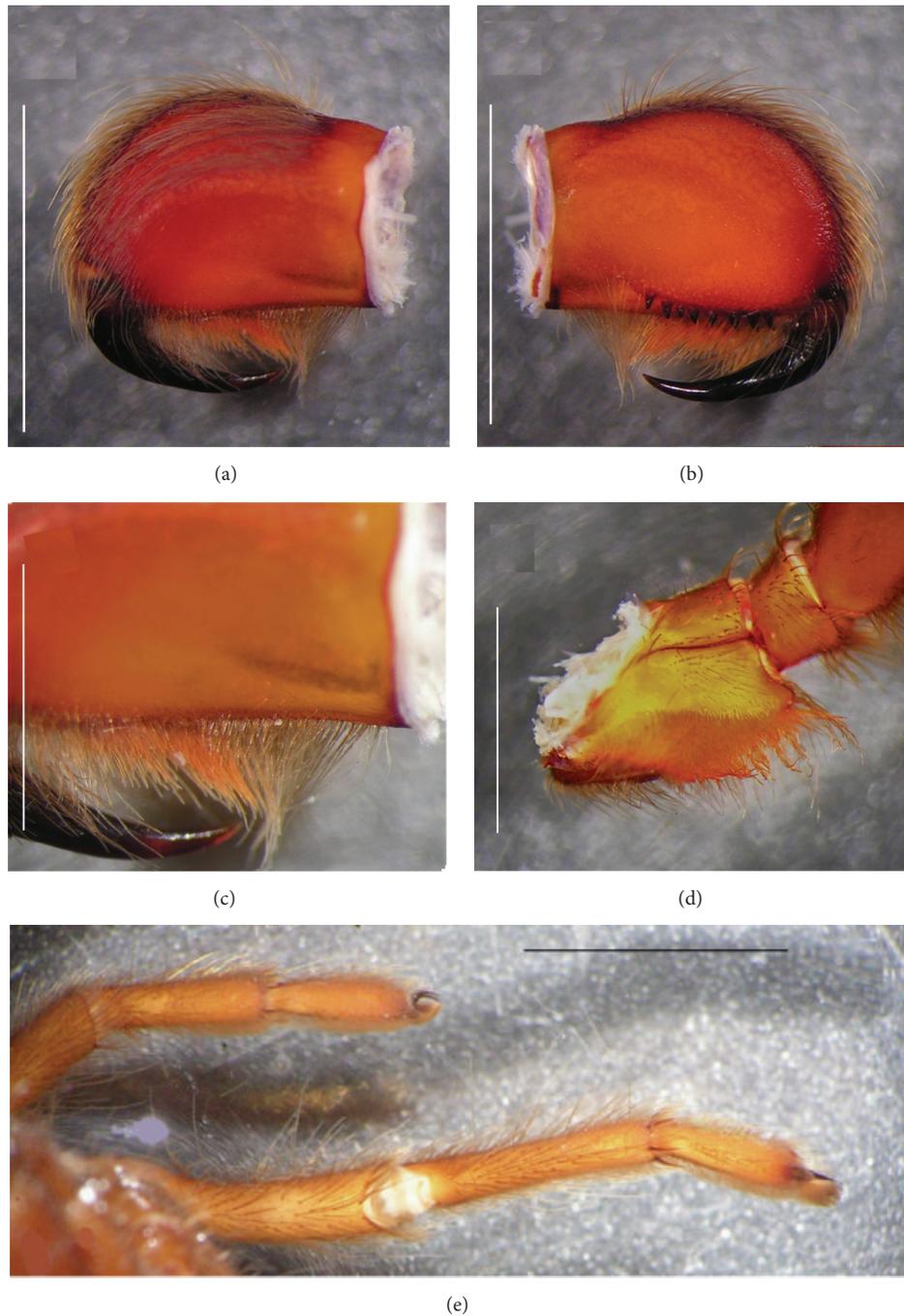


FIGURE 27: *Phlogiellus moniqueverdezae* sp. nov. holotype female QM S88067. (a) Left chelicera, retrolateral view. (b) Left chelicera, prolateral view. (c) Left chelicera, retrolateral view showing strikers. (d) Left maxillae, prolateral view. (e) Left metatarsi and tarsi III and IV, ventral view. Scale bar = 5 mm for (a) and (e); 2 mm for (b); 1 mm for (c) and (d). Photos: S. Nunn.

prolateral region ventral to suture. Immediately above maxillary suture > 11 small spines (Figure 22(a)) on anterior margin of maxillae, 2 rows, unordered, much more setae-like than spiniform.

*Labium* (Figure 21(c)). Length 2.35, width 2.71. Many small cuspules (>200) along anterior 1/4 surface.

*Sternum* (Figure 21(d)). Length 7.52, width 6.83, saddleform. Sigilla: as in female.

*Legs*. Formula (length); IV, I, II, III: (width); I, III, II, IV. Leg RF~97.69. Leg lengths (fem., pat., tib., met., tar., total): palp: 9.74, 5.88, 7.73, 0.00, 2.86, 26.21. I: 15.27, 8.99, 12.43, 10.31, 6.09, 53.09. II: 12.57, 7.4, 10.06, 9.13, 6.14, 45.3. III: 10.73, 6.45, 7.53,

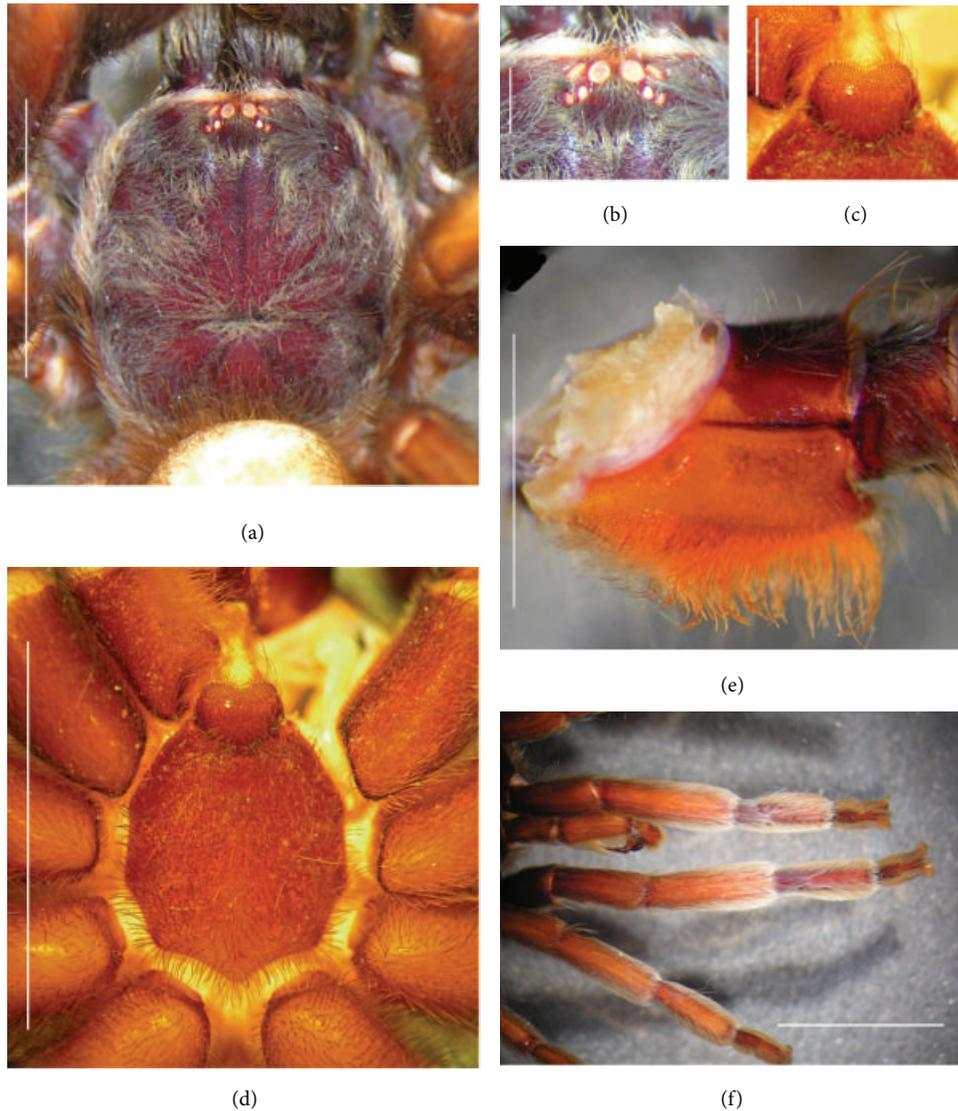


FIGURE 28: *Phlogiellus moniqueverdezae* sp. nov. paratype male QM S88480. (a) Carapace, dorsal view. (b) Eyes, dorsal view. (c) Labium and labiosternal sigillae, ventral view. (d) Sternum, labium, and maxilla, ventral view. (e) Left maxilla, prolateral view. (f) Anterior legs, dorsal view showing pallid tibial and metatarsal setae. Scale bar = 5 mm for (a), (d), and (f); 2 mm for (e); 1 mm for (b) and (c). Photos: S. Nunn.

10.11, 4.38, 39.2. IV: 14.47, 6.92, 11.84, 14.29, 6.82, 54.34. Leg widths (fem., pat., tib., met., tar., total): palp: 2.57, 2.28, 2.13, 0.00, 2.42, 9.4. I: 3.49, 3.1, 2.88, 2.02, 1.68, 13.17. II: 3.01, 3.0, 2.48, 1.67, 1.51, 11.67. III: 3.53, 2.97, 2.38, 1.63, 1.6, 12.11. IV: 3.21, 2.78, 2.43, 1.19, 1.61, 11.22. Leg setae most dense along all ventral femora and also distal 2/3 tib. and all met. I and II.

*Ventral Measurements for Coxae.* Palp-length 6.63, width 3.84; I, 7.21, 3.89; II, 5.66, 3.9; III, 5.59, 3.56; IV, 5.79, 4.04. Trochantera: Palp-length 2.39, width 2.74; I, 3.77, 3.86; II, 3.06, 3.5; III, 2.9, 3.59; IV, 3.57, 3.5.

*Abdomen (Figure 21(e)).* Length 17.37.

*Genitalia.* Palp (Figures 23(a)–23(c)): tibia incrassate, tapering distally. Cymbium bipartite, tegulum large. Stout embolus

slightly tapers distally, very little flaring, proximally emerges anterior to tegulum. Relative length of palpal tibia about 2.6 times length of embolus. Longitudinal keel present, strong, distinct, along entire length of embolus, twisted through 90° prolaterally distally (Figure 23(b)). Embolus entirely incrassate, more so than any other *Phlogiellus* species.

*Spinnerets.* PMS: length 2.07, width (medially) 0.62. PLS: section lengths; basal 2.84, medial 2.27, apical 3.57. PLS section widths (medially); basal 1.22, medial 1.02, apical 0.67. A unique third type of setae found (S3), type S3 twice as strong as other spinneret setae forms (S1, S2), confined to distal segment of PLS.

*Color (in Life, Figure 18(b)).* Chelicerae, carapace, patella to tarsi, and dorsum of trochantera all a medium blue-grey,

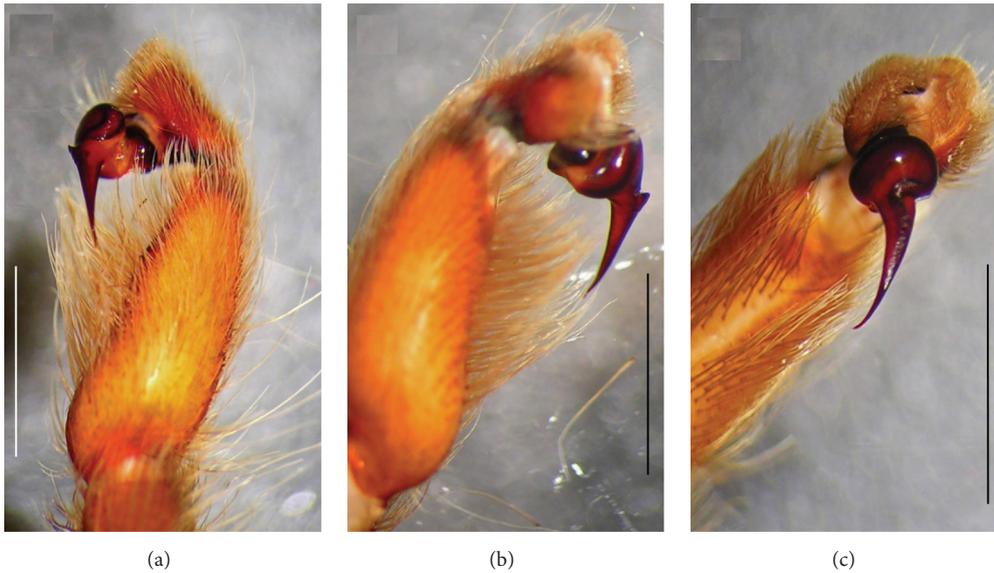


FIGURE 29: *Phlogiellus moniqueverdezae* sp. nov. paratype male QM S88480. (a) Left palpal tibia, tarsus, and bulb, prolateral view. (b) Left palpal tibia, tarsus, and bulb, prolateral view. (c) Left palpal tibia, tarsus, and bulb, ventral view. Scale bar = 2 mm for (a)–(c). Photos: S. Nunn.

carapace fringe lighter blue grey, all femora black with deep blue reflective pubescence, abdomen medium brown. All darker ventrally.

**Distribution and Natural History.** It is known only from the type locale (Figure 44). The habitat consists of tropical broadleaf forest with sloped ground and scattered rocks, fallen trees, and leaf litter (Figure 24). The natural history of this species is unknown. Mature males were found in September.

**Note.** We consider this species to be one of the more extreme variants within *Phlogiellus*. It is large and has a full lyra (Figures 20(e) and 22(a)), strong scopula (Figure 20(f)), and unique spermathecae (Figure 19(d)). However, these are not traits that remove this species from *Phlogiellus*; this species clearly fits both the tribal and generic diagnoses. The most significant character that would bring taxonomic placement of this species into question, the spermathecae, is most likely an autapomorphic condition for females which aligns to the very thick embolus (Figures 23(a)–23(c)) in this species and also an autapomorphy (and thus diagnostic) for males of this species. While the embolus is very thick, general morphology of the male bulb still corresponds perfectly to the generic description. The spermathecal morphology is not that unusual when looking at the genus as a whole. *P. baeri* possesses unique apical buds on the spermathecal lobes (Figure 8(b)); no other species is known to possess any buds, supporting our hypothesis that spermathecal variation within the genus is not so unique to question generic placement.

*Phlogiellus moniqueverdezae* sp. nov. (Figures 25(a)–30 and 44)

**Types.** Holotype female QM S88067; paratype females QM S88471, S88466; paratype males QM S88046, S88477, S88480,

S88045, Ranong [ $9^{\circ}58'2''N$ ,  $98^{\circ}38'2''E$ ], Ranong Province, Thailand, provided by Martin Gamache, QM-examined.

**Etymology.** Specific name is a matronymic adjective in honour of Ms. Monique Verdez, Lievin, France, for her support and aided contribution of selenocosmiine material for the author's research.

**Diagnosis.** It differs from *P. aper* [6], *P. mutus* [21], *P. bundokalbo* [28], and *P. watasei* [19] in possessing bright white setae covering distal tibiae I and II and entirely covering metatarsi I and II in males. It differs from all other *Phlogiellus* species in lacking any maxillary lyra.

**Description.** Holotype female QM S88067. Body length: 27.13.

**Carapace (Figure 26(a)).** Length 8.91, width 8.95 (width across anterior edge 4.32). Fovea 1.32 wide, procurved, deep, not as wide as OT. Distance from anterior carapace to fovea, 5.72. Carapace with 3 discernible hair types (C1 to C3): type C1 long, needleform, pallid, border carapace entirely, most concentrated posteriorly: type C2 short, thin straight, pallid, forming basis of carapace mat, very dense, most concentrated along carapace border: type C3 emerges from what looks to be bothrial collars, largely spiniform, pallid, aligned in uniform arrangement: (>5) along anterior edge of each radial groove, (>3) along anterior edge of each thoracic groove, (>13) along anterior edge of each caput groove and a line of >5 along medial caput ridge (between OT and fovea). >10 more behind each side of the OT, nearest median caput row.

**Eyes (Figure 26(b)).** Ocular tubercle; length 1.25, width 1.81. Anterior row straight. Posterior row slightly recurved. Eyes: AME 0.36/0.37, ALE 0.48/0.38, PLE 0.325/0.17, PME 0.28/0.21. Interocular distances: AME-AME 0.211, AME-ALE



FIGURE 30: *Phlogiellus moniqueverdezae* sp. nov. biotope, secondary broadleaf forest, Ranong Province, Thailand. Photo: Dr. I. Watkinson.



(a)



(b)

FIGURE 31: *Phlogiellus obscurus* [17] comb. nov. (a) Nontype male habitus, in life, from Kota Kinabalu, Sabah, East Malaysia. (b) Nontype female habitus, in life, from Kota Kinabalu, Sabah, East Malaysia. Photos: F. Cleton.

0.65, AME-PME 0.13, ALE-ALE 1.02, ALE-PME 0.185, PME-PME 0.91, PME-PLA 0.06, PLA-PLA 1.135, ALE-PLA 0.18. OT hair types: 14 to 18 C3's directly posterior to AME's and PME's. OT entirely covered in short weak, pallid setae (C3), with no uniform direction/random point.

*Chelicerae* (Figures 27(a)–27(c)). Length 5.98, width at base of each lobe 2.25 (bases widest point, dorsally). Ectal lyrate region (Figure 27(c)): a series of strikers (>19), in >4 horizontal rows (rows unordered). Strongest/longest strikers on

lowest rows. Each striker needleform, lacking filiform ends. Teeth 8 larger, >27 basomesals. Intercheliceral pegs absent, spiniform setae (>34 larger: 0.21–0.73 long, >23 smaller) in elongated cluster on basodorsal surface (Figure 27(b)). Retrolateral face basomedially lacking any spination.

*Maxillae* (Figure 27(d)). Prolaterally planoconvex, anterior lobe well pronounced, many cuspules (>180) on inner basoventral surface. Lyra (Figure 27(d)): completely absent. Immediately above maxillary suture > 12 small spines (Figure 27(d)) on anterior margin of maxillae, 2 rows, unordered.

*Labium* (Figure 26(c)). Length 1.3, width 1.49, many small cuspules (>300) along anterior 1/3 surface. Two hair types on labium (L1, L2), L1: long, reasonably dark spiniform in shape, curving distally toward anterior, most concentrated along lateral borders. Setae longest along anterior edge. L2: short dark spiniform, similar morphology to L1, but half size.

*Sternum* (Figure 26(f)). Length 4.25, width 3.59. Slightly wider posteriorly than anteriorly, with 3 discernible hair types (S1 to S3): type S1 longest, thickest, darker basally, becoming pallid distally, entire but sparse over sternum: type S2 elongate spiniform, entirely pallid, border sternum, most concentrated posteriorly: type S3 short thin, pallid, forming basis of sternal mat. Posteriorly between left and right cox. IV, sternal border weakly acuminate; lateral sternal points also weakly acuminate. Sternal sigilla (Figure 26(f)): 3 pairs (not including labiosternal sigilla), posterior medium in size; right length 0.41, width 0.25, left length 0.415, width 0.31, ovoid, 1.83 apart, 0.5–0.53 from sternal margin. Median pair 2/3 size of posterior, similar in form, border sternal margin. Anterior pair quarter size of posterior, somewhat obscured, border sternal margin. Labiosternal sigilla large, slightly larger than PSS, 0.55 apart.

*Leg Setation*. All longer leg setation curves distad, lengths of exemplar longer tibial setae: palp 1.9, I 1.86, II 1.83, III 1.76, IV 2.24. Tibia and metatarsi setal counts almost equal from I to IV. All femora covered in sparse short setae that form the setal mat, with many long distally curving and pallid in color, most concentrated ventrally.

*Legs*. Formula (length); IV, I, II, III: (width) I, IV, II, III. Leg RF~90.86. Leg lengths (fem., pat., tib., met., tar., total): palp: 4.59, 2.89, 2.63, 0.00, 3.72, 13.83. I: 5.79, 3.89, 4.97, 3.88, 2.35, 20.88. II: 5.63, 3.5, 3.88, 3.32, 2.38, 18.71. III: 4.67, 2.87, 2.9, 3.31, 2.51, 16.26. IV: 5.88, 3.4, 5.34, 5.89, 2.47, 22.98. Leg mid-widths (fem., pat., tib., met., tar., total): palp: 1.31, 1.41, 1.45, –, 1.32, 5.28. I: 1.62, 1.75, 1.65, 1.04, 0.93, 6.99. II: 1.45, 1.53, 1.33, 1.0, 0.87, 6.18. III: 1.68, 1.5, 1.35, 0.89, 0.73, 6.15. IV: 1.65, 1.8, 1.52, 0.81, 0.71, 6.49. Tar. III and IV lacking transverse weakening.

*Scopula*. Tar. I parted but not divided by any setae, II divided by 1 row of long, straight spiniform setae, tar III divided by 3 rows of long, straight spiniform setae, and tar. IV divided by 4 rows of long, straight spiniform setae (Figure 27(e)). Met. I and II: entire, dense, III: 2/3 (sparse), IV: 1/2 (very sparse).

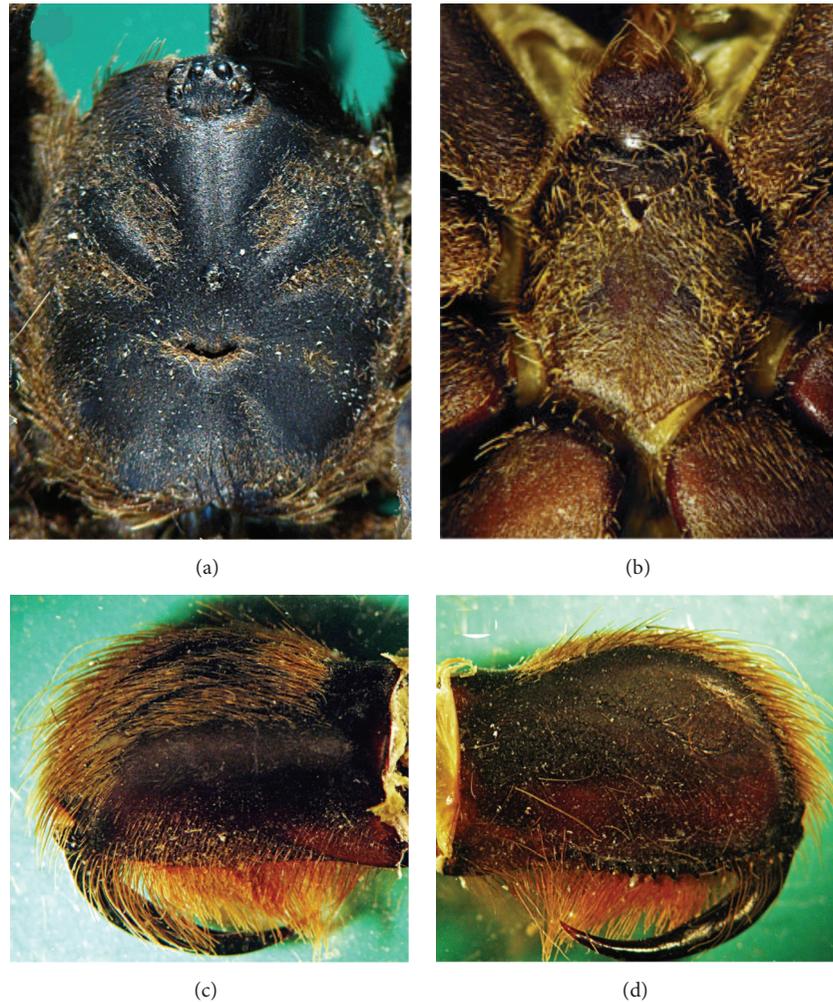


FIGURE 32: *Phlogiellus obscurus* [17] comb. nov., holotype male, NHM 1894.9.19.3–7. (a) Carapace, dorsal view. (b) Sternum, labium, and labiosternal sigillae, ventral view. (c) Left chelicera, retrolateral view. (d) Left chelicera, prolateral view. Photos: D. Court.

Tar. IV without wider/incrassate retrolateral scopulate field than seen prolaterally.

*Coxae* (Figure 26(f)). Many small black thorns prolaterodorsally, no thorns retrolaterally on I–III. Coxae easily seen dorsally. I longest, *ca.* 1.2 times length of II. IV widest, basally rectangular with rounded corners. Coxae with small thorns prolaterally on I–IV. I–III ventrally with many long thick blunt setae proximally, pallid in color. IV with mixture of long thick blunt setae entirely, pallid intermixed with shorter thin pallid setae. Ventral I–IV gently sloping anteriorly. Retrolateral setation: I–III with median narrow light brush, grading to spiniform setae dorsally. IV lacking any spines or setae. I–IV retrolaterally lack ventral ledge. Ventral measurements for coxae: palp-length 2.75, width 1.68; I, 3.67, 1.74; II, 2.93, 1.74; III, 2.66, 1.87; IV, 3.25, 2.03.

*Trochantera*. Palp-length 1.45, width 1.32; I, 1.85, 1.7; II, 1.57, 1.43; III, 1.5, 1.69; IV, 1.88, 1.69.

*Trichobothria*. Tarsi: on all tarsi basal filiform field slightly wider than clavate field, merges evenly. Clavates on tar. I in distal 2/3 (>15), long filiform only in basal half, shorter filiform intermixed with clavates distally. Clavate extent on tar. II–IV compared to I, in distal 2/3. Shorter filiform for length. Short epitrichobothrial field on tar. I shorter than clavates, uniform height for length. Tar. I patch 1.8 long, 0.35 wide. Tarsal organ absent on legs I–IV under stereoscope (up to 50x). Metatarsi: trichobothrial field not detected. Tibia: tib. I prolaterally and proximally with short, possibly clavate trichobothria (>24) with patch 0.41 long, 0.35 wide, clearly pallid: >7 filiform detected in straight line proximally to clavate patch. Tib. IV prolaterally and proximally with short clavates (>9) in ovoid patch: >4 filiform detected in semicircular pattern ventrally to clavate patch.

*Spines*. (Right) met. I with 1DV, met. II with 1DV, 1DPV, and 1DPV, met. III with 1DV, 2DPV, 1DRV, and 1DD,

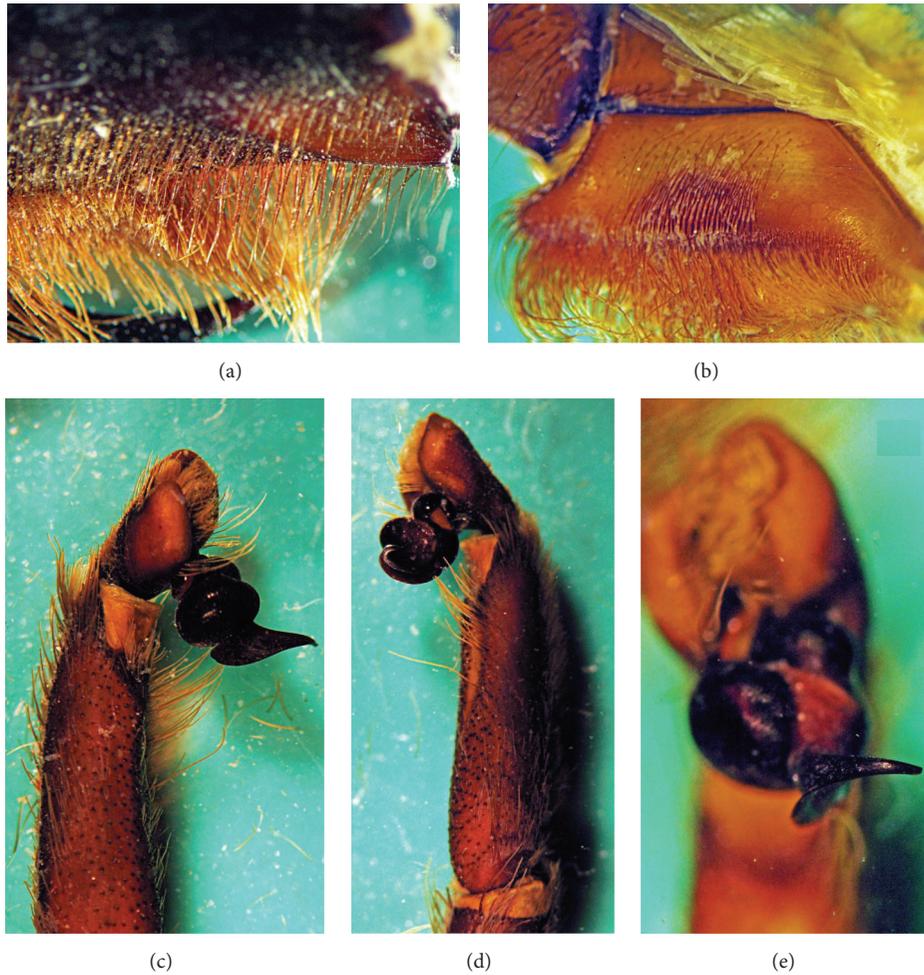


FIGURE 33: *Phlogiellus obscurus* [17] comb. nov., holotype male, NHM 1894.9.19.3–7. (a) Left chelicera, retrolateral view showing strikers and ectocheliceral tumescence. (b) Right maxilla, prolateral view. (c) Left bulb, prolateral view. (d) Left bulb, retrolateral view. (e) Left bulb, ventral view. Photos: D. Court.

and met. IV with 1 DV, 1 DPV, 1 DRV, 1 DPD, and 1 DD.

**Claws.** Paired claws on legs I–III and palpal claw unarmed, paired claw IV armed with 2 small teeth. Large third claw present on leg IV.

**Abdomen** (Figure 26(e)). 17.25 long, ovular, elongated, with 2 discernible hair types (A1 to A2): dorsally with 2 hair types: type A1 long, dark, but distally pallid; type A2 forms dense mat of abdomen, mid-length, spiniform. Longest hairs (A1) more concentrated posteriorly toward spinnerets, point distad. Ventral hair types similar to dorsal, although more dense entirely.

**Genitalia.** Epigastric fold 2.14. Spermathecae (Figure 26(d)): unilobed but not fused, separated by 0.51 (width including spermatheca 1.38), lobe length (right) 0.73, each lobe with apical rounded ends, distally swollen: lobe apical width 0.42 (right); sclerotization constant/entire length of lobe. Epigastric fold extends *ca.* 2x length of spermathecal lobes.

**Spinnerets.** PMS: length 1.45, width (medially) 0.43. PLS: section lengths; basal 2.05, medial 1.6, apical 1.78. PLS section widths (medially); basal 1.12, medial 0.81, apical 0.8. Spinnerets with 2 discernible hair types (SP1, SP2): SP1 very short and distally blunt pallid, covers both pairs ventrally, second form (SP2), very similar but up to two times longer, dorsally on all segments.

Color (in life, Figure 25(a)) after and mid-molt; chelicerae, carapace, and abdomen dorsally chocolate brown with slightly paler setation and mild violet hue; coxae and trochantera slightly paler; darker ventrally. Legs I–IV chocolate brown with mild violet hue.

Paratype male QM S88480, as in female except: body length: 24.06.

**Carapace** (Figure 28(a)). Length 7.65, and width 6.98 (width across anterior edge 4.82). Fovea 1.69 wide, weakly procurved, deep, narrower than OT. Distance from anterior carapace to fovea, 5.25. Carapace hair types as in female, except that type C2 setae are *ca.* 3–4 times longer and wavy, not straight.

Type C2 setae also more numerous than in females. Eyes (Figure 28(b)): ocular tubercle; length 1.28, width 1.78.

*Chelicerae*. Length 3.25, width at base of each lobe 1.43 (at bases widest point, dorsally). Ectal lyrate region a series of strikers as in females. Cheliceral teeth, 9, >25 basomesals. Ectochelelceral tumescence distinct, dorsal to retrolateral strikers.

*Maxillae* (Figure 28(e)). Prolaterally planoconvex, anterior lobe well pronounced, many cuspules (>153) on inner basoventral surface. Lyra (Figure 28(e)): lacking any bacilli-form rods, however, modified spiniform setae replace bacillae and form sparse, ovoid patch prolaterally covers most of the prolateral region ventral to suture. Immediately above maxillary suture > 11 small spines (Figure 28(e)) on anterior margin of maxillae, 2 rows, unordered, much more setae-like than spiniform.

*Labium* (Figure 28(c)). Length 0.98, width 1.46. Many small cuspules (>200) along anterior 1/4 surface.

*Sternum* (Figure 28(d)). Length 3.85, width 3.52, saddleform. Sigilla: as in female.

*Legs*. Formula (length); IV, I, II, III: (width); I, III, II, IV. Leg RF~98.01. Leg lengths (fem., pat., tib., met., tar., total): palp: 4.05, 2.63, 3.74, 0.00, 1.78, 12.2. I: 7.47, 4.45, 5.79, 4.67, 3.3, 25.68. II: 6.49, 3.78, 5.21, 4.25, 2.56, 22.29. III: 5.28, 2.56, 3.76, 4.67, 2.65, 18.92. IV: 7.29, 3.5, 6.15, 6.34, 2.92, 26.2. Leg widths (fem., pat., tib., met., tar., total): palp: 1.55, 1.70, 1.86, 0.00, 1.58, 6.69. I: 1.73, 1.71, 1.46, 1.01, 0.96, 6.87. II: 1.69, 1.45, 1.2, 0.89, 0.67, 5.9. III: 2.07, 1.5, 1.25, 0.7, 0.65, 6.17. IV: 1.53, 1.48, 1.2, 0.85, 0.76, 5.82. Leg setae most dense along all ventral femora and also distal 2/3 tib. and all met. I and II.

*Ventral Measurements for Coxae*. Palp-length 2.65, width 1.52; I, 3.49, 1.88; II, 2.86, 1.78; III, 2.52, 1.73; IV, 2.92, 1.81. Trochantera: palp-length 1.34, width 1.23; I, 1.8, 1.77; II, 1.62, 1.6; III, 1.58, 1.63; IV, 1.82, 1.85.

*Abdomen*. Length 11.62.

*Genitalia: Palp* (Figures 29(a)–29(c)). Tibia incrassate, tapering distally. Cymbium bipartite, tegulum large. Stout embolus slightly tapers distally, very little flaring, proximally emerges anterior to tegulum. Relative length of palpal tibia about 2.6 times length of embolus. Longitudinal keel present, strong, distinct, along entire length of embolus, twisted through 90° prolaterally distally (Figures 29(a)–29(c)).

*Spinnerets*. PMS: length 0.98, width (medially) 0.29. PLS: section lengths; basal 2.65, medial 1.36, apical 1.91. PLS section widths (medially); basal 0.65, medial 0.56, apical 0.55. A unique third type of setae found (S3), type S3 twice as strong as other spinneret setae forms (S1, S2), confined to distal segment of PLS.

*Color (in Life, Figure 25(b))*. Carapace and legs dark blue/grey (darker than female). Coxae and trochantera palest dorsally

with a subtle pinkish color. Metatarsi (entire) and distal 2/3 tibia I and II with bold white/cream setation, strongly contrasting to rest of body (Figures 25(b) and 28(f)). Abdomen dark blue/grey. Posterior leg segments (III and IV) display mild distal pale lateral banding.

*Distribution and Natural History*. It is known only from the type locale (Figure 44). Nothing is known about the natural history of this species or the construction of the retreat. General habitat of the region consists of broadleaf secondary forest, grasses, and short vegetation on sloped rocky ground (Figure 30). Males matured in captivity between the months of March and May.

*Phlogiellus mutus* [21]. *Neochilobrachys mutus*, Giltay, 1935: 5; *Phlogiellus mutus*, Raven, 1985: 156 (synonymy); *Yamia muta*, Haupt and Schmidt, 2004: 202, f. 8 (transferred from *Phlogiellus*); Schmidt, 2010 [65]: 44, f. 5.4; West et al., 2012: 33 (synonymy).

*Types*. *Selenocosmia muta*, Giltay, 1935, 2 syntypes (1 juvenile, the other a mature female), Mauo River, Samar Island, Philippines, RBINS.

*Diagnosis*. It differs from *P. atriceps*, *P. baeri*, *P. bogadeki* sp. nov., *P. inermis*, *P. insulanus* comb. nov., *P. johnreylazoi* sp. nov., *P. obscurus* comb. nov., *P. orophilus* comb. nov., *P. pelidnus* sp. nov., *P. subinermis*, and *P. xinping* in lacking any maxillary lyra. It differs from *P. bundokalbo* in possessing spermathecal lobes that turn distally inward (lobes turn distally outward in *P. bundokalbo*) and in having posterior tarsal scopula divided (undivided on tarsi I–IV in *P. bundokalbo*) in females. It differs from *P. brevipes* in possessing more than 2 spines on the posterior metatarsi (only 2 known in *P. brevipes*). It differs from *P. moniqueverdezae* sp. nov. in possessing undivided tarsal scopula on leg II (tarsal scopula divided on leg II in *P. moniqueverdezae* sp. nov.) in females. It differs from *P. watasei* in possessing spermathecae that distally swell (lobes distally taper in *P. watasei*) in females.

*Note*. It cannot be diagnosed readily from *P. aper*, as the only known material for *P. aper* is male, while the only known *P. mutus* material is female.

When Haupt and Schmidt transferred this species to *Yamia*, under “Materials and Methods” they referenced Giltay’s original description as “1835” [33]; however, this is an error; the paper was published in 1935, not 1835.

*Phlogiellus obscurus* [17] comb. nov. (Figures 31(a)–34(c) and 44). *Selenocosmia obscura*, Hirst, 1909: 385, pl. 24, f. 6; Giltay, 1934: 2.

*Type*. *Selenocosmia obscura*, Hirst, 1909, holotype male, 1894.9.19.3–7, Sarawak, East Malaysia, NHM.

*Diagnosis*. It differs from all other *Phlogiellus* species in possessing pallid bands distally on all leg segments (Figures 31(a) and 31(b)).

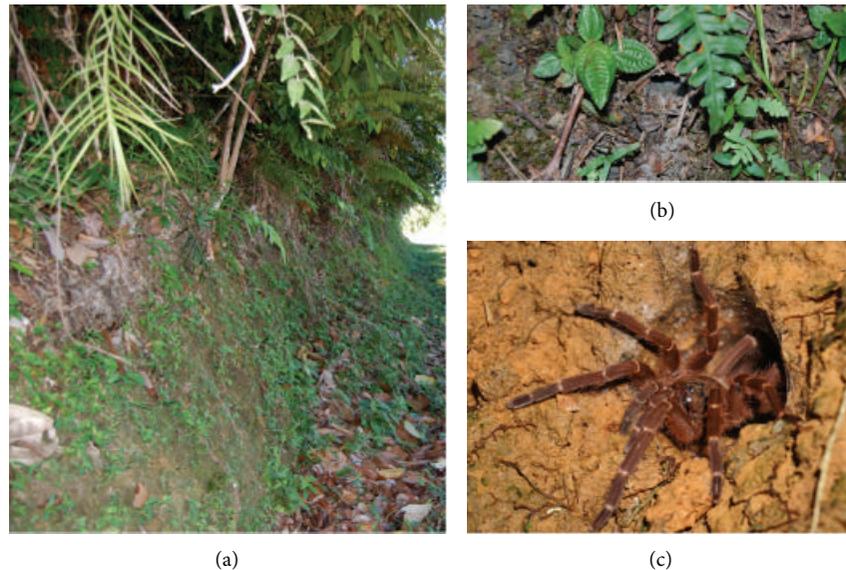


FIGURE 34: *Phlogiellus obscurus* [17] comb. nov. habitat. (a) Biotope, roadside embankment, tropical deciduous forest, Danum Valley, Sabah, Borneo. (b) Burrow entrance amongst ferns and short vegetation. (c) Burrow entrance with spider in hunting pose. Photos: (a) and (b), J-M. Verdez; (c), A. Mommerency.

The type *Selenocosmia obscura* (Hirst 1909) from Sarawak, Borneo (Figures 32(a)–33(e) and 44), is a mature male and displays male palpal bulb morphology synapomorphic to the tribe Yamiini (heavily keeled and stout embolus with basal lobe, Figures 33(c)–33(e)), divided tarsal scopulae on legs III and IV, weakly developed lyra consisting of ca. 120 bacillae, ovoid in shape (Figure 33(b)), needleform strikers (Figure 33(a)), deep and procurved foveal groove smaller in width than the OT (Figure 32(a)), and a reduced third claw on leg IV, all characters of which, in combination, are diagnostic to *Phlogiellus* herein (and see West et al. [2]). Due to the presence of these character traits in the above species, *Selenocosmia obscura* (Hirst 1909) is, herein, transferred to *Phlogiellus* as *P. obscurus* [17] comb. nov.

*Phlogiellus orophilus* [5, 10] comb. nov. (Figures 35(a)–37(c) and 44). *Phlogius orophilus*, Thorell, 1897: 175; *Selenocosmia orophila*, Simon, 1903: 955 (synonymy); Pocock, 1900: 201, NRM.

*Type.* *Phlogius orophilus*, Thorell, 1897: 175; *Selenocosmia orophila* holotype female, Pocock, 1900, 27, Bia-pò, Myanmar: 201.

*Diagnosis.* It differs from all other *Phlogiellus* species in possessing a foveal groove considerably wider than the ocular tubercle (compare Figure 35(b) to Figure 35(c)); it differs from all other *Phlogiellus* species, except *P. bogadeki* sp. nov. and *P. johnreylazoi* sp. nov., in possessing unarmed paired claws on leg IV (Figure 37(c)); however, it differs from *P. bogadeki* sp. nov. in possessing undivided scopulae on tarsi I and II (all tarsal scopula divided in *P. bogadeki* sp. nov.) and differs from *P. johnreylazoi* sp. nov. in possessing undivided scopula on tarsus II (tarsal scopula divided on leg II in *P. johnreylazoi* sp. nov.).

The type *Selenocosmia orophila* [5, 10] (Figures 35(a)–37(c)) from Bia-pò, Myanmar, shows taxonomic characters that in a classical way might place this animal into *Selenocosmia*. The lyra is quite well developed (Figure 33(c)) which, in past times, would have immediately removed this species from *Phlogiellus* (namely, Pocock [56]). However, upon examination of the type material, it is apparent the type is a mature female with spermathecae: contra. Platnick, 2016 (Figure 37(a)), which is morphologically very similar to many *Phlogiellus*, including *P. atriceps* (Pocock 1897).

The type lacks any characters that in a contemporary way (namely, West et al. [2]) would place it within *Selenocosmia*, but to which it fits the generic definition, herein, and following the findings of West et al. [2], of *Phlogiellus* perfectly. Cheliceral strikers are in needle form and pallid (Figure 36(a)), a key synapomorphy for *Phlogiellus* (namely, West et al. [2]). Any argument that a well developed lyra would place this species out of *Phlogiellus* is as irrelevant as the argument that alyrate species should have their own genus (e.g., “*Yamia*,” namely, Raven [34], West et al. [2], and herein). There are several species that exist within this genus which have even more defined maxillary lyra (e.g., *P. johnreylazoi* sp. nov. (Figure 20(e)), *P. pelidnus* sp. nov. (Figure 40(d)), and others with similar sized lyra (e.g., *P. xinping* (Zhu and Zhang [36, p. 438, Figure 8G])) and all fall well within the generic diagnosis and description of *Phlogiellus*. Therefore, we transfer *Selenocosmia orophila* [5, 10] to *Phlogiellus*, altering the specific name to *Phlogiellus orophilus* [5, 10] comb. nov.

*Phlogiellus pelidnus* sp. nov. (Figures 38–44)

*Types.* Holotype female QM S88904; paratype female QMS88305; paratype males QM S88304, S91240, S88357,



(a)

(b)

(c)

(d)

FIGURE 35: *Phlogiellus orophilus* [5, 10] comb. nov., holotype female, NRM 27. (a) Habitus, dorsal view. (b) Eyes, dorsal view. (c) Foveal groove, dorsal view. (d) Sternum, labium, labiosternal sigillae, ventral view. Scale bar = 10 mm for Figure 26(a); 2 mm for Figure 27(b); 2 mm for (b)–(d). Photos: V. von Wirth.

S88358, S88308, and S88307; Gunung Alab [5°49'41"N, 116°20'28.11"E], Tuaran, Sabah, Borneo, QM-examined.

**Etymology.** A Greek word *πελιδνός* latinized to become a Latin masculine adjective, meaning “blue-black” for the color in life.

**Diagnosis.** It differs from all other *Phlogiellus* species in possessing 6 teeth on paired tarsal claw IV (only 0–3 maximum noted in all other species, if present) (Figure 41(f)); it further differs in females having a greatly pronounced dorsal curvature of chelicerae (more than two-thirds the length of chelicerae, Figures 40(a) and 40(b)) in females and in males having a greatly pronounced ectocheliceral tumescence (Figure 42(c), and see Character Discussion), being much more pronounced than any other species.

**Description.** Holotype female QM S88904. Body length: 46.37.

**Carapace** (Figure 39(a)). Length 15.82, width 13.65 (width across anterior edge 8.81). Fovea 3.04 wide, procurved, deep, not as wide as OT. Distance from anterior carapace to fovea, 11.48. Carapace with 3 discernible hair types (C1 to C3): type C1 long, needleform, pallid, border carapace entirely, most concentrated posteriorly: type C2 short, thin straight, pallid, forming basis of carapace mat: type C3 emerges from what looks to be bothrial collars, largely spiniform, pallid, aligned in uniform arrangement: (>5) along anterior edge of each radial groove, (>3) along anterior edge of each thoracic groove, (>10) along anterior edge of each caput groove and a line of >4 along medial caput ridge (between OT and fovea). >8 more behind each side of the OT, nearest median caput row.

**Eyes** (Figure 39(b)). Ocular tubercle; length 1.95, width 2.82. Anterior row slightly procurved. Posterior row straight. Eyes: AME 0.61/0.6, ALE 0.61/0.51, PLE 0.49/0.23, PME 0.44/

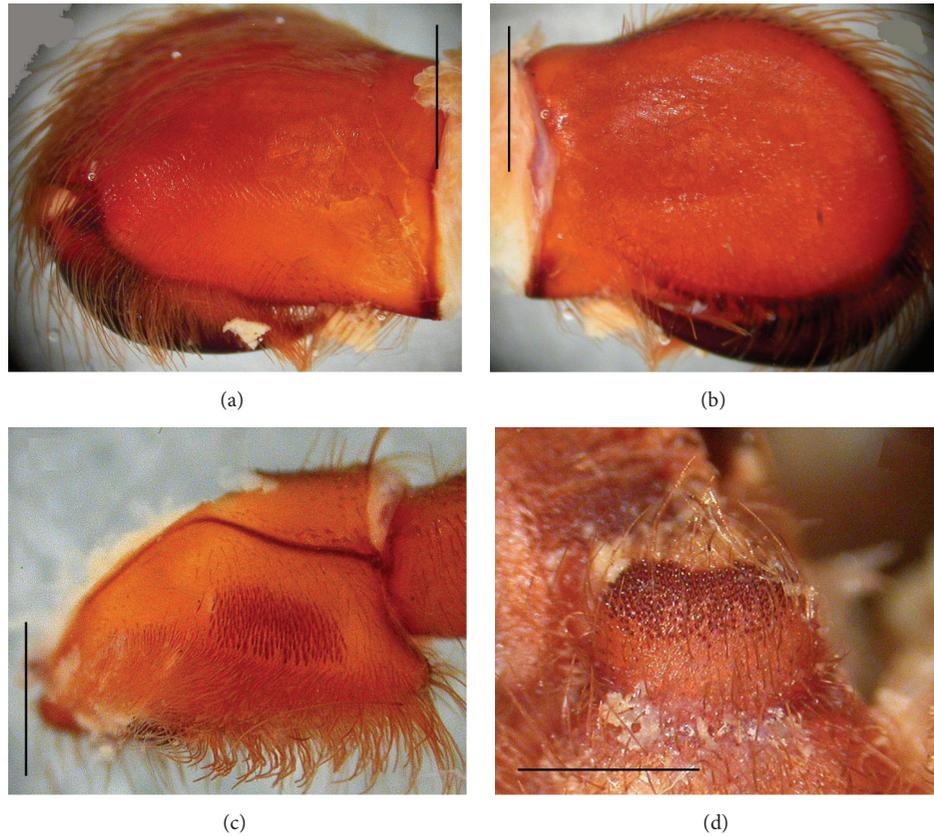


FIGURE 36: *Phlogiellus orophilus* [5, 10] comb. nov., holotype female, NRM 27. (a) Left chelicera, retrolateral view. (b) Left chelicera, prolateral view. (c) Left maxilla, prolateral view showing lyræ. (d) Labium and labiosternal sigillae, ventral view. Scale bar = 2 mm for (a)–(d). Photos: V. von Wirth.

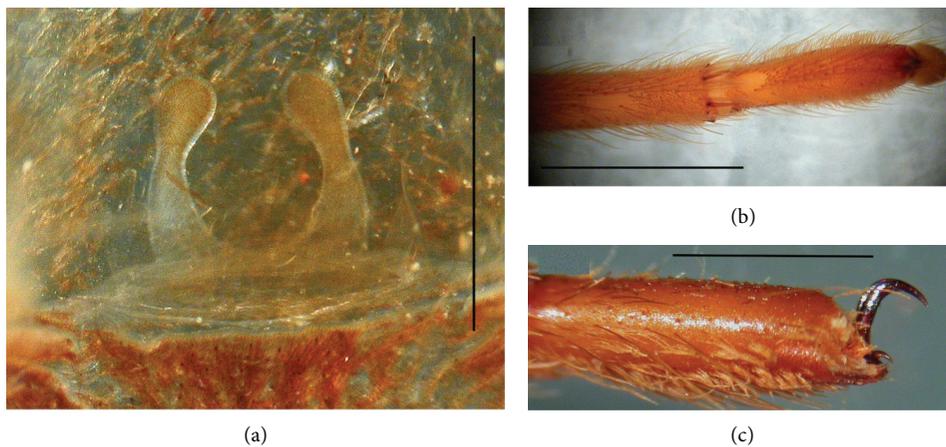


FIGURE 37: *Phlogiellus orophilus* [5, 10] comb. nov., holotype female, NRM 27. (a) Spermathecae, dorsal view. (b) Metatarsus and tarsus IV, ventral view. (c) Tarsus IV and claw IV, retrolateral view. Scale bar = 2 mm for (a) and (b); 1 mm for (c). Photos: V. von Wirth.

0.225. Interocular distances: AME-AME 0.34, AME-ALE 0.27, AME-PME 0.156, ALE-ALE 1.81, ALE-PME 0.465, PME-PME 1.34, PME-PLA 0.22, PLA-PLA 1.71, ALE-PLA 0.32. OT hair types: 14 to 15 C3's directly posterior to AME's and PME's. OT entirely covered in short weak, pallid setae (C3), with no uniform direction/random point.

*Chelicerae* (Figures 40(a)–40(c)). Length 8.64, width at base of each lobe 4.16 (bases widest point, dorsally). Ectal lyræ region (Figure 40(c)): a series of strikers (>50), in >5-6 horizontal rows (rows unordered). Strongest/longest strikers on lowest rows. Each striker needleform, lacking filiform ends. Teeth 14 larger, >68 basomesals. Intercheliceral pegs absent,



FIGURE 38: *Phlogiellus pelidnus* sp. nov., holotype female QM S88904 habitus, in life, from Gunung Alab, Tuaran, Sabah, Borneo. Photo: J-M. Verdez.

spiniform setae (>15 larger: 0.26–0.52 long, >5 smaller) in elongated cluster on basodorsal surface (Figure 40(b)). Retrolateral face basomedially lacking any spination. Ectoche-liceral tumescence present, not as distinct as in male (Figures 40(a) and 40(c)).

*Maxillae* (Figure 40(d)). Prolaterally planoconvex, anterior lobe well pronounced, many cuspules (>125) on inner basoventral surface. Lyra (Figure 40(d)): many bacilliform rods >235 form sparse, ovoid patch prolaterally (3.35 long, 1.13 high), lowest row with >27 bacillae, longest rods in centre of lowest row. Rods paddle-shaped, pointed distad, long shafts (length including paddles up to 0.39), lacking distal blades. At widest point, lyrate patch 10 rows deep, smallest rods dorsally. Patch ovoid in shape. Immediately above maxillary suture >35 small spines (Figure 40(d)) on anterior margin of maxillae, 2 rows, unordered.

*Labium* (Figure 39(c)). Length 2.34, width 2.76, many small cuspules (>320) along anterior 1/4 surface. Two hair types on labium (L1, L2), L1: long, reasonably dark spiniform in shape, curving distally toward anterior, most concentrated along lateral borders. Setae longest along anterior edge. L2: short dark spiniform, similar morphology to L1, but half size.

*Sternum* (Figure 39(a)). Length 7.53, width 6.38. Slightly wider posteriorly than anteriorly, with 3 discernible hair types (S1 to S3): type S1 longest, thickest, darker basally, becoming pallid distally, entire but sparse over sternum: type S2 elongate spiniform, entirely pallid, border sternum, most concentrated posteriorly: type S3 short thin, pallid, forming basis of sternal mat. Posteriorly between left and right cox. IV, sternal border weakly acuminate; lateral sternal points also weakly acuminate. Sternal sigilla (Figure 39(a)): 3 pairs (not including labiosternal sigilla), posterior medium in size; right length 1.08, width 0.45, left length 1.07, width 0.44, ovoid, 1.53 apart, 0.63–0.67 from sternal margin. Median pair 1/2 size of posterior, similar in form, almost border sternal margin. Anterior pair 1/4 of posterior, somewhat obscured, almost border sternal margin. Labiosternal sigilla large, as big as PSS, 0.31 apart.

*Leg Setation*. All longer leg setation curves distad, lengths of exemplar longer tibial setae: palp 1.45, I 1.36, II 1.25, III 1.36, IV

1.75. Tibia and metatarsi setal counts almost equal from I to IV. All femora covered in sparse short setae that form the setal mat, with many long distally curving, pallid in color, most concentrated ventrally.

*Legs*. Formula (length); IV, I, II, III: (width) I, II, IV, III. Leg RF~96.64. Leg lengths (fem., pat., tib., met., tar., total): palp: 9.02, 5.59, 6.52, 0.00, 5.69, 26.82. I: 11.03, 7.72, 9.51, 8.23, 5.31, 41.96. II: 10.52, 7.04, 7.42, 7.69, 4.56, 37.23. III: 8.41, 5.81, 7.32, 7.36, 4.26, 33.16. IV: 11.61, 6.7, 9.88, 10.79, 4.44, 43.42. Leg mid-widths (fem., pat., tib., met., tar., total): palp: 2.85, 2.62, 2.67, –, 2.21, 10.35. I: 2.88, 3.15, 2.76, 2.19, 2.11, 13.09. II: 2.92, 2.75, 2.41, 2.25, 1.94, 12.27. III: 2.91, 2.83, 2.58, 1.75, 1.83, 11.9. IV: 2.93, 2.67, 2.31, 1.75, 1.88, 11.54. Tar. IV displaying transverse weakening.

*Scopula*. Tar. I–III undivided, tar. IV divided by 4 rows of long, straight spiniform setae (Figure 40(e)). Met. I and II: entire, III: 3/4, IV: 1/2 (very sparse), IV: 1/4. Tar. IV without wider/incrassate retrolateral scopulate field than seen prolaterally.

*Coxae* (Figure 39(e)). Many small black thorns prolaterodorsally, no thorns retrolaterally on I–III. Coxae easily seen dorsally. I longest, ca. 1.2 times length of II. IV widest, basally rectangular with rounded corners. Coxae with small thorns prolaterally on I–IV. I–III ventrally with many long thick blunt setae proximally, pallid in color. IV with mixture of long thick blunt setae entirely, pallid intermixed with shorter thin pallid setae. Ventral I–IV gently sloping anteriorly. Retrolateral setation: I–III with median narrow light brush, grading to spiniform setae dorsally. IV with distodorsal brush, setae long, spiniform. I–IV retrolaterally lack ventral ledge. Ventral measurements for coxae: palp-length 7.01, width 3.63; I, 7.08, 3.74; II, 5.77, 3.47; III, 4.92, 3.23; IV, 5.75, 3.81.

*Trochantera*. Palp-length 2.64, width 2.67; I, 3.79, 3.22; II, 3.54, 3.34; III, 2.72, 3.0; IV, 3.84, 3.25.

*Trichobothria*. Tarsi: on all tarsi basal filiform field slightly wider than clavate field, merges evenly. Clavates on tar. I in distal 2/3 (>26), long filiform only in basal half, shorter filiform intermixed with clavates distally. Clavate extent on tar. II–IV compared to I, in distal 2/3. Shorter filiform for length. Short epitrichobothrial field on tar. I shorter than clavates, uniform height for length. Tarsal organ present on leg I, conical, small, absent on legs II–IV under stereoscope (up to 50x). Metatarsi: trichobothrial field not detected. Tibia: tib. I prolaterally and proximally with short, possibly clavate trichobothria (>7) with patch 0.23 long, 0.15 wide, clearly pallid: >4 filiform detected in straight line proximally to clavate patch. Tib. IV prolaterally and proximally with short clavates (>24) in ovoid patch: >5 filiform detected in semicircular pattern ventrally to clavate patch.

*Spines*. (Right) met. I lacking any spines, met. II with 1 reduced DV, met. III with 1 DV, 2 DPV, 1 DRV, and 1 DD, and met. IV with 1 DV, 1 DPV, 1 DRV, 1 DPD, 1 DRD, and 1 DD.

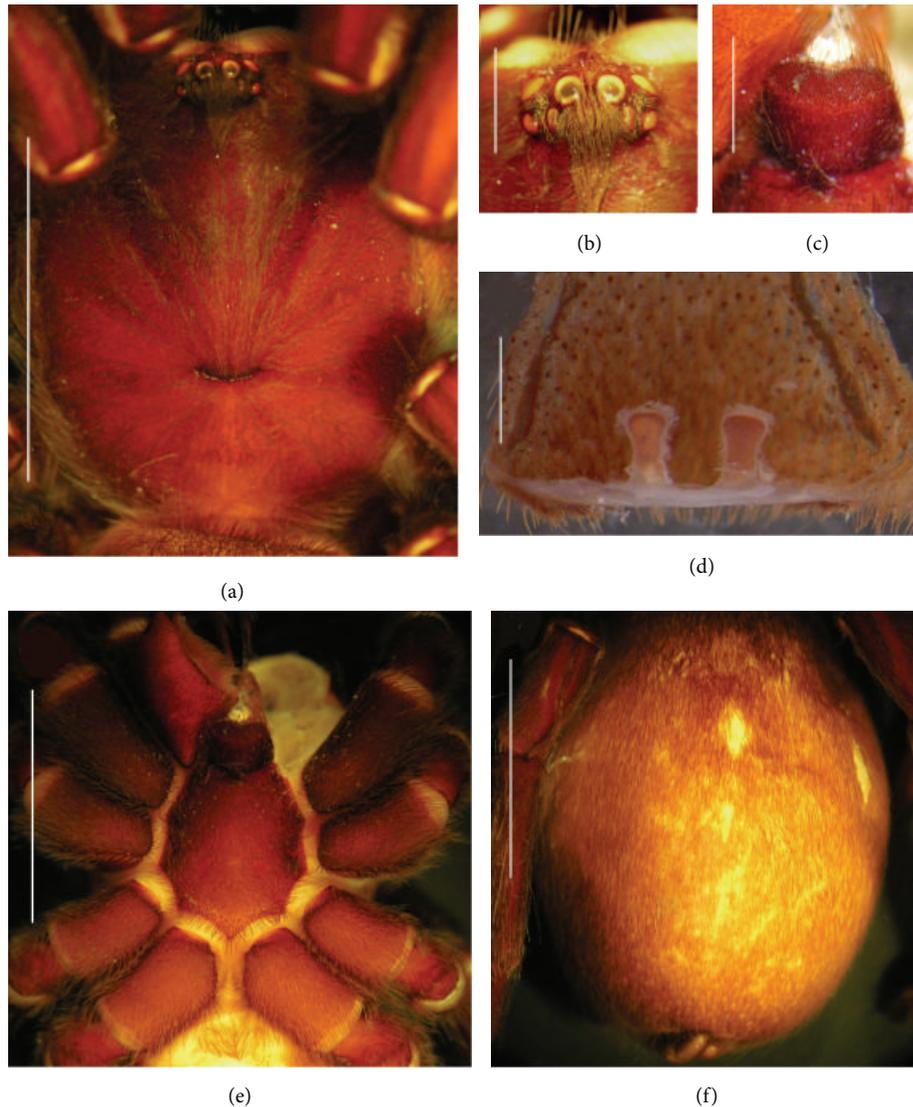


FIGURE 39: *Phlogiellus pelidnus* sp. nov. holotype female QM S88904. (a) Carapace, dorsal view. (b) Eyes, dorsal view. (c) Labium and labiosternal sigillae, ventral view. (d) Spermathecae, dorsal view. (e) Sternum, labium, maxilla, and coxae, ventral view. (f) Abdomen, dorsal view. Scale bar = 10 mm for (a), (e), and (f); 2 mm for (b) and (c); 1 mm for (d). Photos: S. Nunn.

**Claws.** Paired claws on palpal claw unarmed, paired claws legs I and II with 3 teeth, leg III with 5 teeth, and leg IV with 6 teeth (same as male, see Figure 41(f)). Reduced third claw present on leg IV.

**Abdomen (Figure 39(f)).** 22.47 long, ovular, elongated, with 2 discernible hair types (A1 to A2): dorsally with 2 hair types: type A1 long, dark, but distally pallid; type A2 forms dense mat of abdomen, mid-length, spiniform. Longest hairs (A1) more concentrated posteriorly toward spinnerets, point distad. Ventral hair types similar to dorsal, although more dense entirely.

**Genitalia.** Epigastric fold 2.36. Spermathecae (Figure 39(d)): unilobed but not fused, separated by 0.59 (width including spermatheca 1.81), lobe length (right) 0.86, each lobe

with apical rounded ends, distally swollen: lobe apical widths 0.53 (right): sclerotization constant/entire length of lobe. Epigastric fold extends *ca.* 2x length of spermathecal lobes.

**Spinnerets.** PMS: length 2.08, width (medially) 0.96. PLS: section lengths; basal 3.04, medial 2.81, apical 2.82. PLS section widths (medially); basal 1.59, medial 1.24, apical 0.95. Spinnerets with 2 discernible hair types (SP1, SP2): SP1 very short and distally blunt pallid, covers both pairs ventrally, second form (SP2), very similar but up to two times longer, dorsally on all segments.

Color (in life, Figure 38) before and mid-molt; chelicerae, legs, and palp pale bluish grey, carapace and femora darker, abdomen dorsum with bluish violet pubescence, darker ventrally.

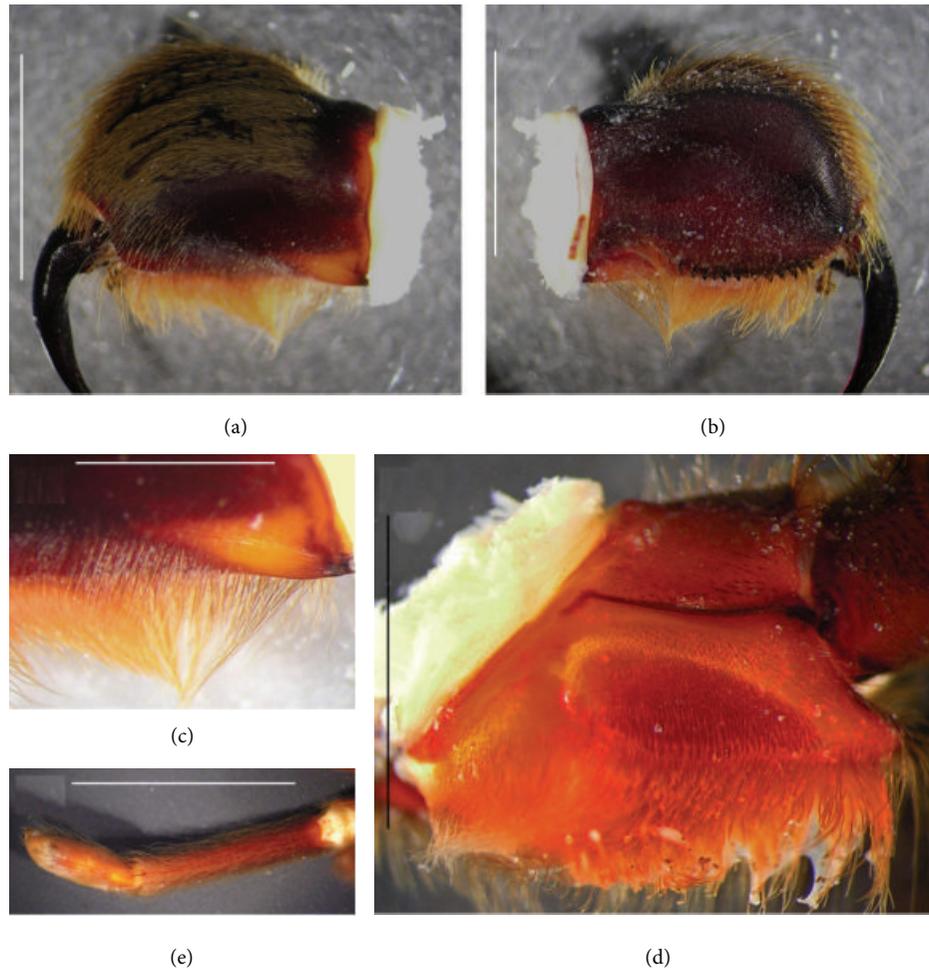


FIGURE 40: *Phlogiellus pelidnus* sp. nov. holotype female QM S88904. (a) Left chelicera, retrolateral view. (b) Left chelicera, prolateral view. (c) Left chelicera, retrolateral view showing strikers. (d) Left maxilla, prolateral view. (e) Right metatarsus and tarsus IV, ventral view. Scale bar = 10 mm for (e); 5 mm for (a), (b), and (d); 2 mm for (c). Photos: S. Nunn.

Paratype male QM S88304, as in female except: body length: 30.21.

*Carapace* (Figure 41(a)). Length 12.24, and width 10.83 (width across anterior edge 5.67). Fovea 1.82 wide, procurved, deep, narrower than OT. Distance from anterior carapace to fovea, 8.49. Carapace hair types as in female, except C2, are far more numerous and setae bordering carapace (C1) very dense.

*Eyes* (Figure 41(b)). Ocular tubercle; length 2.25, width 3.01.

*Chelicerae* (Figures 42(a)–42(c)). Length 5.07, width at base of each lobe 2.92 (at bases widest point, dorsally). Cheliceral teeth, 13, >18 basomesal teeth. Strikers and prolateral face as in female. Ectocheical tumescence distinct, dorsal to retrolateral strikers (Figure 42(c)).

*Maxillae* (Figure 41(e)). Prolaterally planoconvex, anterior lobe well pronounced, many cuspules (>264) on inner basoventral surface. Lyra (Figure 41(e)): many bacilliform rods >295 form sparse, ovoid patch prolaterally, lowest row

with >40 bacillae, longest rods in centre of lowest row. Rods paddle-shaped, pointed distad, long shafts (length including paddles up to 0.42), lacking distal blades. At widest point, lyrate patch 10 rows deep, smallest rods dorsally (most dorsal rods almost setiform). Patch ovoid in shape. Immediately above maxillary suture >35 small spines (Figure 41(e)) on anterior margin of maxillae, 2 rows, unordered (more spini-form than in female).

*Labium* (Figure 41(c)). Length 2.09, width 2.29. Many small cuspules (>294) along anterior 1/4 surface.

*Sternum* (Figure 41(d)). Length 6.08, width 5.29, saddle-form.

*Legs*. Formula (length); IV, I, II, III: (width); I, III, IV, II. Leg RF~97.99. Leg lengths (fem., pat., tib., met., tar., total): palp: 7.72, 4.72, 6.32, 0.00, 2.72, 21.48. I: 11.94, 7.35, 10.02, 9.49, 5.28, 44.08. II: 11.12, 6.75, 9.15, 9.16, 4.6, 40.78. III: 9.49, 5.65, 9.77, 8.88, 4.38, 38.17. IV: 12.16, 5.52, 10.61, 11.92, 4.77, 44.98. Leg widths (fem., pat., tib., met., tar., total): palp: 2.15, 2.13, 2.37, 0.00, 2.09, 8.74. I: 2.48, 2.52, 2.43, 1.65, 1.24, 10.32. II: 2.45, 2.3,

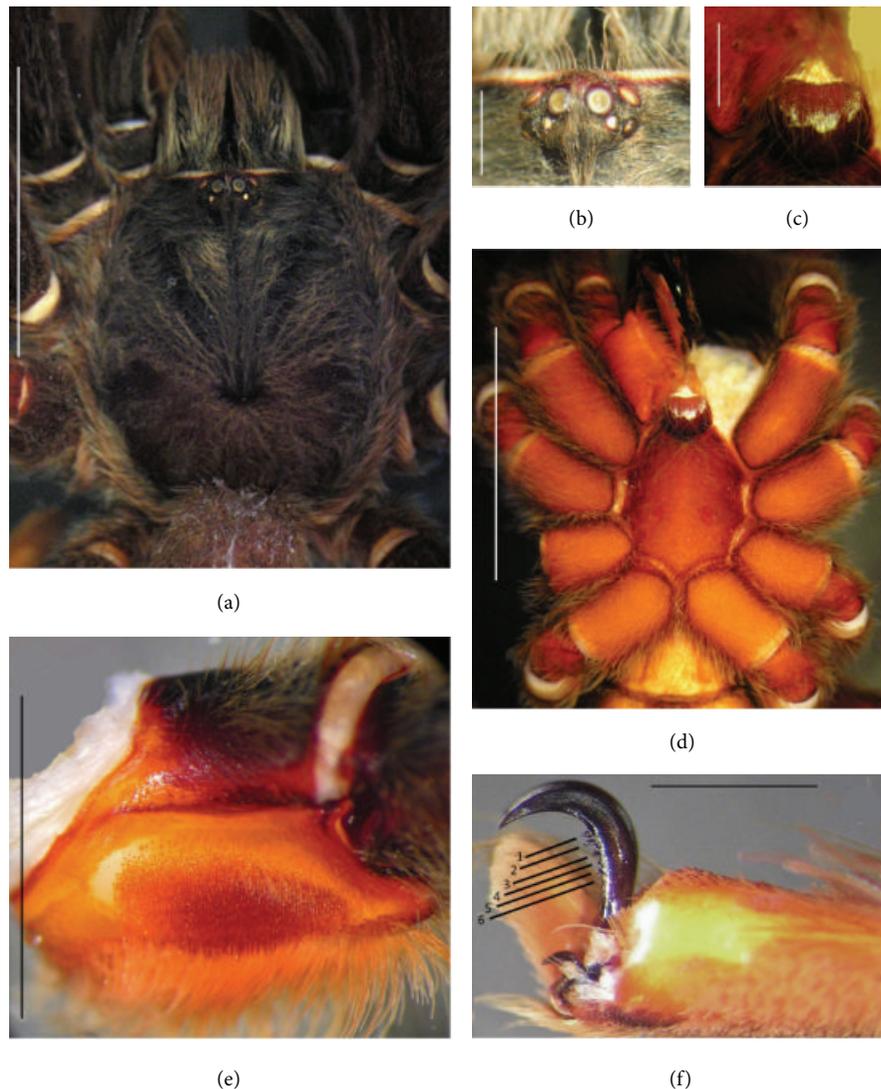


FIGURE 41: *Phlogiellus pelidnus* sp. nov. paratype male QM S88304. (a) Carapace, dorsal view. (b) Eyes, dorsal view. (c) Labium, labiosternal sigillae, dorsal view. (d) Sternum, labium, labiosternal sigillae, maxilla, and coxae, ventral view. (e) Left maxilla, prolateral view. (f) Left claw IV, showing 6 teeth on paired claw, prolateral view. Scale bar = 10 mm for (a); 5 mm for (d) and (e); 2 mm for (b) and (c); 1 mm for (f). Photos: S. Nunn.

1.96, 1.39, 1.16, 9.26. III: 3.13, 2.2, 2.08, 1.31, 1.3, 10.02. IV: 2.42, 2.26, 2.08, 1.37, 1.28, 9.41.

*Ventral Measurements for Coxae.* Palp-length 5.04, width 2.2; I, 6.42, 2.72; II, 4.84, 2.83; III, 4.45, 2.69; IV, 4.52, 2.91. Trochantera: palp-length 2.15, width 2.45; I, 3.15, 3.13; II, 2.91, 2.61; III, 1.91, 2.65; IV, 2.62, 2.8.

*Scopula.* As in female.

*Abdomen.* Length 14.15.

*Genitalia.* Palp (Figures 42(d) and 42(e)): tibia incrassate, tapering distally. Cymbium bipartite, tegulum large. Stout embolus slightly tapers distally, very little flaring, proximally emerges anterior to tegulum. Relative length of palpal tibia about 2.6 times length of embolus. Longitudinal keel present,

strong, distinct, along entire length of embolus, twisted through 90° prolaterally distally (Figures 42(d) and 42(e)).

*Spinnerets.* PMS: length 1.38, width (medially) 0.53. PLS: section lengths; basal 1.96, medial 1.74, apical 2.43. PLS section widths (medially); basal 1.05, medial 0.81, apical 0.65.

*Color (in Alcohol).* As in the female, except carapace and dorsal coxae with very pale setae, almost golden in color (Figure 41(a)).

*Distribution and Natural History.* It is known only from the type locale (Figure 44). Specimens were found at an elevation of 1940 meters in self-excavated burrows in firm clay soil embankments, amongst mosses and ferns (Figures 43(a)–43(c)). This region of the mountain is moist and often shrouded in fog. The entrance of the burrows is lined in silk

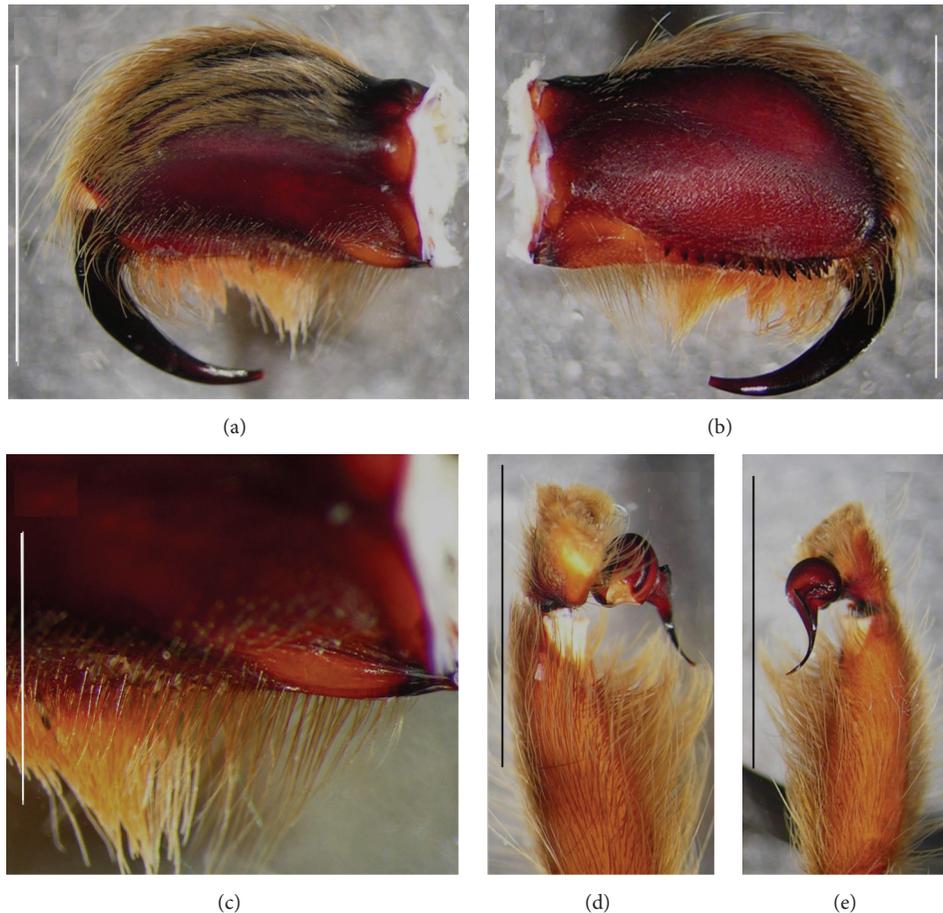


FIGURE 42: *Phlogiellus pelidnus* sp. nov. paratype male QM S88304. (a) Left chelicera, retrolateral view. (b) Left chelicera, prolateral view. (c) Left chelicera, retrolateral view showing strikers and ectocheliceral tumescence. (d) Left bulb, prolateral view. (e) Left bulb, retrolateral view. Scale bar = 5 mm for (a), (b), (d), and (e); 2 mm for (c). Photos: S. Nunn.

but does not have a flared entry (Figure 43(c)). Males matured in captivity in February (J-M. Verdez, pers. comm.).

*Phlogiellus subinermis* [20]. *Selenocosmia subinermis*, Giltay, 1934: 4, f. 1A; *Phlogiellus subinermis*, Roewer, 1942: 265 (transfer); *Selenocosmia subinermis*, Bonnet, 1959: 3600 (transfer).

*Types.* *Selenocosmia subinermis*, Giltay, 1934, holotype male, Bokhor (= Bokor Mountain Range), Cambodia; paratype male, Poeloe Condore (= Poulo Condor Island), Vietnam; paratype female, Nahtrang (= Nha Trang City), Vietnam, RBINS.

*Diagnosis.* It differs from *P. baeri* in possessing spermathecae being unilobular without apical buds (apical buds present in *P. baeri*). It differs from *P. insulanus* comb. nov., *P. johnreylazoi* sp. nov., *P. obscurus* comb. nov., *P. orophilus* comb. nov., *P. pelidnus* sp. nov., and *P. xinping* in that the tarsal scopulae of all legs are divided (in the above species, tarsal scopulae are undivided on either leg I, legs I and II, or legs I, II, and III). It differs from *P. aper*, *P. brevipes*, *P. bundokalbo*, *P. moniqueverdezae* sp. nov., *P. mutus*, and *P. watasei* in possessing a maxillary lyra. It differs from *P. atriceps*, *P. bogadeki*

sp. nov., and *P. inermis* in possessing the apical segment of the posterior lateral spinnerets being almost twice as long as the medial segment (in *P. atriceps*, *P. bogadeki* sp. nov., and *P. inermis* the apical PLS segment is only 1.5 times as long as the medial). It also differs further from both *P. atriceps* and *P. inermis* in possessing an embolus that is almost straight distally (embolus distally curved strongly in *P. atriceps* and *P. inermis*) in males.

*Phlogiellus watasei* [19]. *Yamia watasei*, Kishida, 1920a: 305, f. 3; Haupt and Schmidt, 2004: 200, f. 107; Zhu and Tso, 2005 [58]: 13, f. 1A–I; Zhu and Zhang, 2008: 444, f. 9A–I; Schmidt, 2010 [65]: 44, f. 5.2; *Phlogielus watasei*, West Nunn and Hogg, 2012: 33 (synonymy).

*Type.* *Yamia watasei*, Kishida 1920, neotype male, 2000–VIII–07, Yongchin Farm, Yeyin village, Lanyu Island, Taiwan, ZSM.

*Diagnosis.* It differs from *P. atriceps*, *P. baeri*, *P. bogadeki* sp. nov., *P. inermis*, *P. insulanus* comb. nov., *P. johnreylazoi* sp. nov., *P. obscurus* comb. nov., *P. orophilus* comb. nov., *P. pelidnus* sp. nov., *P. subinermis*, and *P. xinping* in lacking any maxillary lyra. It differs from *P. brevipes* in possessing more than



FIGURE 43: *Phlogiellus pelidnus* sp. nov. (a) Biotope, tropical montane forest, Gunung Alab, Tuaran, Sabah, Borneo. (b) Sloped embankment showing burrow amongst mosses and ferns. (c). Close-up of burrow entrance. Photos: J-M. Verdez.

2 spines on the posterior metatarsi (only 2 known in *P. brevipes*). It differs from *P. bundokalbo* in having divided tarsal scopula on legs I–IV (all tarsal scopulae undivided in *P. bundokalbo*) in females. It differs from *P. moniqueverdezae* sp. nov. in lacking white setae on metatarsi and tibiae of legs I and II in males and distally tapering of spermathecal lobes in females. It differs from *P. mutus* in possessing spermathecae that distally taper (lobes distally swell in *P. mutus*) in females. It differs from *P. aper* in possessing undivided scopula on tarsus III (divided in *P. aper*) in males.

*Note.* When Haupt and Schmidt reinstated *Yamia* [33], under “Materials and Methods,” they nominated the neotype, deposited in the ZSM, and they also nominated a male and female “paratype,” deposited in the NHTG [33, p. 199–200]. Although curiously, under their description of the neotype, they list the NHTG material, also another female held in the ZSM, as “Additional material from neotype locality” [33, p. 200]. Following the articles of the ICZN, paratypes could

only exist in the case they were originally fixed by Kishida in 1920. As all original type material was destroyed during WWII [2, 33, 36], Haupt and Schmidt could only nominate a neotype, and there is no provision within the ICZN to allow any subsequent fixation of “paratype” material; thus, the material held in the NHTG holds no type status.

*Phlogiellus xinping* [36]. *Selenocosmia xinping*, Zhu and Zhang, 2008: 440, f. 8A–I; *Phlogiellus xinping*, West et al., 2012: 33 (transfer).

*Types.* *Selenocosmia xinping*, Zhu and Zhang, 2008, holotype male, Ar.T0035, 2 females, Ar.T0036, Ar.T0037, Hong Kong, MHBU.

*Diagnosis.* It differs from *P. aper*, *P. brevipes*, *P. bundokalbo*, *P. moniqueverdezae* sp. nov., *P. mutus*, and *P. watasei* in possessing a maxillary lyra [36, p. 438, Figure 8H]. It differs from all other *Phlogiellus* (including the sympatric *P. bogadeki* sp.

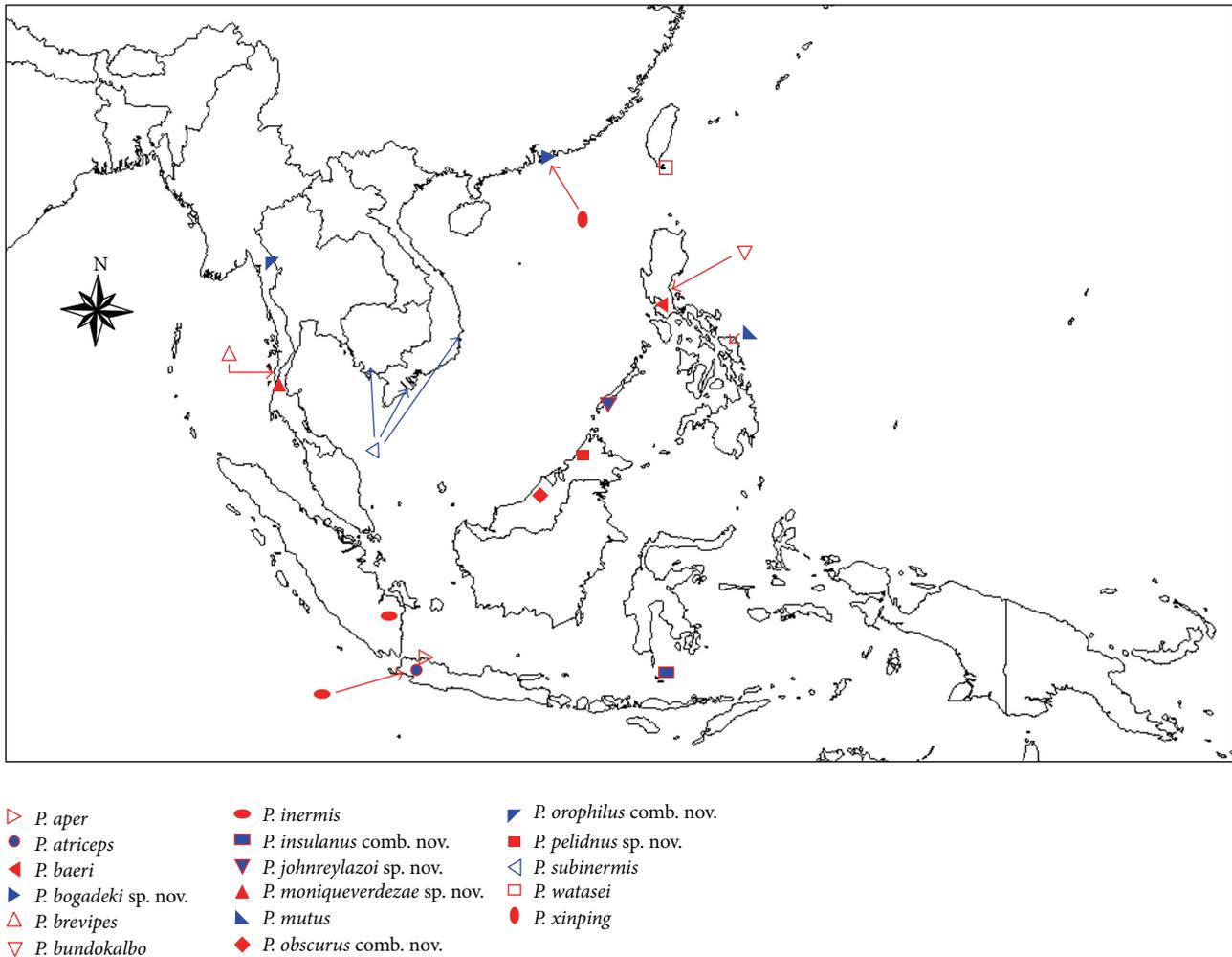


FIGURE 44: Map showing records of all valid *Phlogiellus* species, throughout Southeast Asia. Image: S. Nunn.

nov.) species in possessing intercheliceral thorns [36, p. 438, Figure 8H].

*Note.* See Character Discussion on “intercheliceral setae” herein, and also see “Taxonomic Concerns Resolved” herein.

*Remarks and Results.* The interesting lyrate sexual dimorphism found in *P. baeri* is further testament that *Yamia*, as a genus, is invalid and truly belongs within *Phlogiellus*, as synonymized by West et al. [2]. The only other selenocosiine species known to the authors that exhibits this shared sexual dimorphism is *P. inermis*. Additional support that “*Yamia*” is invalid can be found in the morphology of the cheliceral strikers of *P. watasei* [19] from Taiwan (an alyrate *Phlogiellus* species) and cheliceral strikers found in *P. xinping* [36] and *P. bogadeki* sp. nov. from Hong Kong (both lyrate *Phlogiellus* species). All three species share very thin cheliceral strikers (ca. 1/3 thinner than all other *Phlogiellus* species), a synapomorphy for the Chinese clade, and further evidence the “absence of a maxillary lyra” lacks any value as a character trait of generic significance in Selenocosiinae

(namely, West et al. [2]). The same can be said of alyrate *Phlogiellus* species in other regions. The types *P. aper* [6] from Java, *P. moniqueverdezae* sp. nov. from Thailand, and *P. bundokalbo* [28] and *P. mutus* [21] from the Philippines are also alyrate, yet they are clearly closer related to *P. atriceps* (Pocock 1897) and other lyrate *Phlogiellus* species than they are to the Chinese clade. If “*Yamia*” was indeed a valid genus based upon the absence of a maxillary stridulating organ (namely, Kishida [19], Haupt and Schmidt [33], and Zhu and Zhang [36]), then the above examples should not exist, yet they are clear evidence of the empiric (cladistic and biogeographical) findings of West et al. [2] and initial questions asked by Raven [34].

*Phlogiellus subarmatus* [11] was first described in *Ischnocolus* (Ausserer 1871) and was later transferred to *Chilobrachys* (Karsch 1891) by Hirst [17] and nominated as the type species for his new subgenus, *Neochilobrachys* [17]. Hirst made this transfer based on the similarities this species shares with *Chilobrachys*, yet he wanted to distinguish this species due to an elementary stridulating organ, being the “reduction” in count of bacillae being limited to 2–6 in number found on

the prolateral maxillary surface [17]. Petrunkevitch elevated *Neochilobrachys* to genus level but provided no reason for this [23]. Raven synonymized *Neochilobrachys* with *Phlogiellus* based on the fact the type species possessed no defining characters of generic significance [16]. The authors have considered these historic contributions to this species [11, 16, 17, 20, 21, 25] and viewed the *P. subarmatus* material held in the NHM that Hirst [17] first based his *Neochilobrachys* description on (this is the only collection that holds a male of this species). The topotypic material is clearly synonymous with Thorell's type material, all coming from Nicobar Island. It is quite clear this species belongs in *Chilobrachys*, as it possesses primary and secondary rows of strikers that are only seen in *Chilobrachys* (primary strikers thick and heavy/thorn-like, namely, West et al. [2], p. 4, char. 3; secondary strikers thorn-like, namely, West et al. [2], p. 4, char. 4) and within all members of that genus, making both primary and secondary striker conditions synapomorphies without homoplasy for *Chilobrachys* [2]. This is the key platform for treatment of this species herein. This species also displays a wishbone abdominal pattern in females, a pattern not known in *Phlogiellus* (this paper), but is seen in both *Chilobrachys fimbriatus* (Pocock 1899) [67] and *Chilobrachys hardwicki* [56] (the only other selenocosmiine genus that possesses an abdominal pattern is *Poecilotheria* (Simon) [53], a readily identifiable arboreal genus that this species clearly does not belong in). Additionally, the metatarsal and tarsal scopulate conditions, leg claws, eyes, and male bulb morphology all fall well within the alpha-taxonomy of *Chilobrachys* as outlined by Karsch, 1891, Pocock, 1900, Simon, 1903, and West et al., 2012. We, therefore, transfer *Phlogiellus subarmatus* [11] to *Chilobrachys* (Karsch 1891) as *Chilobrachys subarmatus* [11] comb. nov.

*Note.* It must be said that this species possesses somewhat unique lyrate bacillae, which are more thorn-shaped than clavate, as seen in other *Chilobrachys*. We consider this an autapomorphic condition for this species, but should it come to pass more *Chilobrachys* (or other misplaced species) readily fits this lyrate morphology and, further, shows similar significant morphology also aligned closely to *Chilobrachys subarmatus*; there could possibly be argument for revalidation of *Neochilobrachys*. But that would have to entail further rigorous cladistic analysis in these author's opinions, as *Chilobrachys* and sister genus *Haplocosmia* synapomorphies would have to also be tested, which might better place such a group (if others with similar lyrate morphology exist) as a species group (not a subgenus) within *Chilobrachys*.

*Phlogiellus kwebaburdeos* [37] was first described as a cave-dwelling tarantula from Burdeos on the island of Polillo in the Quezon Province, the Philippines. The authors defined this new species as possessing "three long and three short clavate paddle-shaped setae and >250 spiniform setae" [40, p. 5]. During the course of examination of *Phlogiellus* material listed herein, the authors did not note clavate bacillae present in any lyrate arrangement within the genus (except for male *P. baeri*, which lacks surrounding spiniform setae). Additionally, the color *in situ* is not similar to any known *Phlogiellus* species. Both traits are, however, clearly noted

within *Orphnaecus*, to which this species is better placed. Further, there are no other traits that would place this species in any other selenocosmiine genus, and to date *Orphnaecus* are largely confined to the Philippines, with many undescribed species found on numerous Philippine islands. We therefore transfer this species to *Orphnaecus* (Simon 1892), becoming *Orphnaecus kwebaburdeos* [40] comb. nov.

When Pocock first described *Phlogiellus* (Pocock 1897), he suggested that several of Simon's "group C" species [4, p. 136] within *Ischnocolus* (Ausserer 1871) may be better placed within *Phlogiellus* [3]. Following this suggestion, Simon transferred all of his "group C" *Ischnocolus* to *Phlogiellus* [13], without justifying the bulk transfer, leaving several species with questionable taxonomic placement. A perfect example of this is *Phlogiellus ornatus* [5, 10], a species first described under the ischnocoline genus *Ischnocolus* and further revised by Pocock in 1900 as an *Ischnocolus* species [12]. This is significant because it shows that Pocock himself did not consider *I. ornatus* as belonging to *Phlogiellus*, the genus he described in 1897 [3, 12]. Yet, Simon ignored Pocock's work [12] and rather chose to transfer all his "group C" including *I. ornatus* to *Phlogiellus* [13]. Had Simon covered Pocock's work [12], he would have discovered that this species possesses leg spines not seen in any Selenocosmiinae species (which are confined to distal leg segments, among several other key characters) but are commonly known within *Ischnocolus*, the genus to which it was originally assigned [5, 10] and revised [12]. The same treatment was given by Simon to the species *Phlogiellus nebulosus* [9], another species which Rainbow himself described as an *Ischnocolus* species with legs "armed with long thin spines" [9, p. 306]. Further, West et al. cited Raven's view that this species belongs in Barychelidae (Simon 1889) [2]. It is quite clear that both of these species do not belong in Selenocosmiinae, let alone within *Phlogiellus* (following the empirical findings of West et al. [2]). Therefore we, herein, consider *Phlogiellus ornatus* [5, 10] and *Phlogiellus nebulosus* [9] as *species inquirenda*.

The types *Phlogiellus bicolor* [18] from Kuele (= Koil) Island, Sepik Province, Papua New Guinea, and *Phlogiellus insularis* [7] from Malamoy, Basilan (= Malamawi) Island, Basilan Province, Philippines, display cracked and bent tarsi IV and undivided tarsal scopulae on legs III and IV in combination with a reduced ovoid lyrate organ on the prolateral maxillary face. However, this is a direct case of ontogenetic variables at play; the types have clavate trichobothrial patterns that rapidly reduce from tarsi I–IV and both are missing sexual organs; therefore, they are juvenile and cannot be accurately placed within any selenocosmiine genus. Therefore, both *Phlogiellus bicolor* [18] and *Phlogiellus insularis* [7] are considered *incertae sedis*.

#### 4. Character Discussion

*Chelicerate Strikers.* In all *Phlogiellus* species, the ectal lyrate region composes a series of long and thin strikers; each striker is lanceolate/needleform, with some filiform ends (although are clearly much stronger than the other chelicerate setae in the area, distinctly recognised as strikers) and pallid color.

The strikers are easily distinguishable from surrounding setae of the oral fringe (setae from the oral fringe do not taper, but strikers do) and are present in all *Phlogiellus* with a full stridulating organ, as well as *P. baeri* [7], a Philippine *Phlogiellus* that, according to Haupt and Schmidt [33], has secondarily lost the lyrate structure on the opposing prolateral maxillary face (however, it is shown within this paper that the type is mature, and other larger mature examples cited, herein, display a lyra identical to the type, 1-2 bacillae present, Figure 8(e)). That said, within this paper, it is shown that males of this species possess a reasonably well developed lyra in all examples examined herein. But considering true alyrate species such as *P. aper*, *P. brevipes*, *P. bundokalbo*, *P. moniqueverdezae* sp. nov., *P. mutus*, and *P. watasei*, cheliceral strikers are always retained. In other selenocosmiine genera, there may be a secondary loss of lyra on the maxillae, but strikers seem to remain in all alyrate specimens studied so far. This supports Raven's opinion on the loss of maxillary lyra in selenocosmiines [34, p. 16], as well as the empirical findings of West et al., 2012 [2, p. 33], confirming *Yamia* (Kishida 1920) as a junior synonym of *Phlogiellus*. Strikers differ from those of its sister group *Orphnaecus* in that they are quite pallid/not dark and much thinner basally/more lanceolate (in *Orphnaecus* the strikers are quite stout basally).

**Maxillae and Chelicerae.** All *Phlogiellus* species show a basal prominence on the ventral surface of the maxillae, covered in a cluster of strong and long setae found ventrally and diagonal to the maxillary lobe (strong setae endemic to the basal prominence); these setae are noticeably stout at the base, much longer than other setae in the surrounding area and tapering evenly to filiform ends. In *Phlogiellus baeri* [7] males examined herein, a series of ca. 14 small spines are found on the anterior prolateral margin of the maxillae, just dorsal to the maxillary suture. These spines are strong and robust and in a uniform angled arrangement that corresponds precisely to opposing retrolateral cheliceral grooves found dorsal to the cheliceral strikers. It is presumed these spines and grooves conform to movements of the appendages that create stridulation (i.e., lyra/striker), but whether or not they actually assist in any way is unknown. Regardless, as the spines above the maxillary suture are present in most, if not all selenocosmiines, further investigation of this trait within other members of the subfamily is warranted and may prove informative.

**Intercheliceral Pegs, Thorns, and Setae.** *Phlogiellus xinpings* possesses intercheliceral thorns [36, p. 438, Figure 8H]. In a classical way, this would have left *P. xinpings* out of consideration for the genus *Phlogiellus*. However, West and Nunn, 2010, determined that members of a selenocosmiine genus can house both species with or without intercheliceral pegs in their revision of *Lyrognathus* [43]. Indian *Lyrognathus* lack intercheliceral pegs but possess intercheliceral spiniform setae, while all others possess intercheliceral pegs [2, 43]. *Selenocosmia*, while still being problematic, also house congeners with both states and also varying counts in those species that possess intercheliceral pegs too. There is no consistency to this state to aid in diagnosing a selenocosmiine

genus. West et al., 2012, took examination of this character a step further and subjected the morphology of intercheliceral pegs to empirical testing via cladistics performed on the subfamily Selenocosmiinae. The resulting tree displayed measures of branch support and stability [2], utilizing a data matrix consisting of 46 characters (some multistate) and 39 exemplar taxa from 12 genera, resulting in the synonymy of *Yamia* with *Phlogiellus* [2, p. 30, f. 53]. Results found that individual morphology of intercheliceral pegs is informative and in this regard is interesting, because the intercheliceral setae found in *P. xinpings* are more thorn-like than peg-like (as is found in the tribe Selenocosmiini, to which *Selenocosmia* belong) and, thus, the presence of intercheliceral thorns in *P. xinpings* becomes an autapomorphy for that species, the morphology of which has nothing nearer to do with any Selenocosmiini (which display typical peg-like morphology, in those species that possess them). Additionally, intercheliceral pegs are also seen in the tarantula subfamily Selenogyrinae (Smith 1990) [68], so it is likely that the presence of intercheliceral pegs is not a derived trait within Selenocosmiinae but possibly a reversal in those selenocosmiine taxa that possess them. This leaves "presence/absence" of intercheliceral pegs within Selenocosmiinae as a generic character, being clearly problematic and largely uninformative. For more discussion on inconsistencies in using the "presence/absence" of intercheliceral pegs as a character and general treatment of intercheliceral pegs, see West and Nunn, 2010, p. 41, and West et al., 2012, p. 36.

**Ectochelelateral "Tumescence."** The presence of a softened pallid region, often setose but sometimes a-setose, found on the lower basal intercheliceral surfaces of some mygalomorph males was first discovered by Hirst [69] in the theraphosid genus *Metriopelma* (Becker 1878) [70] as well as in his new theraphosid genus *Euphrictus* (Hirst 1908), of which he presumed was stridulatory in function. The organ was later described in detail by Raven who presumed the structure to be glandular in purpose [16, p. 8]. Raven [16, p. 115] noted intercheliceral tumescence in the theraphosid genera *Heterothele* (Karsch 1879) [71], *Euphrictus* (Hirst 1908), and *Ischnocolus* (Ausserer 1871) among many other mygalomorph families [16, p. 8]. While Raven illustrated this organ (namely, Raven [16, p. 104, Figure 124]) in the mygalomorph genus *Neodiplothele* (Mello-Leitão 1917) [72], Guadanucci and Wendt first imaged this structure in the theraphosid genus *Ischnocolus* (namely, Guadanucci and Wendt [73, p. 4, Figure 2B]). During the course of examination of material, herein, the authors noted the presence of a swollen, a-setose, laterally ridged pallid region on the ectochelelateral surface (immediately dorsal to cheliceral strikers) of all *Phlogiellus* males described or revised and diagnosed herein, being overly prominent (and thus specifically diagnostic) in the species *P. pelidnus* sp. nov. (Figures 42(a) and 42(c)), and more significantly also present in the female of this species (Figures 40(a) and 40(c)) as well as in *P. johnreylazoi* sp. nov. females (Figures 20(a) and 20(c)). In the species *P. pelidnus* sp. nov., intercheliceral tumescence is present (Figure 42(b)) and it appears that ectochelelateral tumescence is a complex structure, most likely derived from intercheliceral tumescence. The

purpose of this structure is unknown to the authors, and while Raven [16] presumed this “organ” (interchelicerum tumescence) may be glandular in function, it must be said, in a later work, that Raven stated “*its function remains unknown*” [74, p. 301]. For now, the authors recognize that further research with this structure needs to be done in order to elucidate its function, particularly in light of the presence of ectochelicerum tumescence in some new female species. “Tumescence,” in the strictest sense, is a glandular organ largely found in male arthropods which is used for sexual behaviour and pheromonal recognition. As a point of interest, Guadanucci and Wendt discovered a pallid region on the prolateral ventral surface of both male and female maxillae in *Ischnocolus*, corresponding to the ectochelicerum surface [73, p. 3, Figure 2A]. The maxillary pallid region found by Guadanucci and Wendt [73] in both sexes may suggest a mechanical purpose rather than glandular one; this may be the case of ectochelicerum “tumescence” as well (being found in both sexes). Even if this is found to be the case, further research on “interchelicerum tumescence” would still need to be performed, as this structure remains present only within mygalomorph males, remaining distinct from ectochelicerum “tumescence” (despite one condition most likely being derived from the other).

**Labio-sternal Sigillae.** The labio-sternal sigillae are another pair of muscle attachment points located in the junction between the labium and sternum ventrally. They were first noted by Simon [7] during his voyage to the Philippines [7]. These sigillae attach to the anterior pair of *suspensor centralis* muscles [16, p. 20] and seem to be consistent within all *Phlogiellus* species studied herein. In all *Phlogiellus* addressed herein, the sigillae are very large and ovular in form, obviously separated from each other in distance by their own diameter.

**Note.** For a concise history of the taxonomic and phylogenetic use of labio-sternal sigillae within Mygalomorphae, see [16, p. 20].

**Male Embolus.** In all examined Selenocosmiinae mentioned herein, as well as *Phlogiellus*, the embolus emerges anteriorly from the tegulum. The embolus is entirely keeled within *Lyrognathus* [43, 75], *Phlogiellus*, and *Orphnaecus* [2]. In all three genera, the keel begins dorsally and then turns 90° prolaterally, continuing to turn ventrally and proximally on the embolus. In *Phlogiellus* and *Orphnaecus*, the keel emerges as a large basal projection ventrally. While such a projection is also present in *Lyrognathus*, it is far smaller in size, except in the spider *L. robustus* (Smith 1988) [49] (male nontype examined, West and Nunn [43]), in which the keel and lobe are absent. The proximal embolus is thin in *Lyrognathus*, whereas, in *Phlogiellus* and *Orphnaecus*, the proximal embolus is rather stout/incrassate-obconic. In *Lyrognathus*, the embolus is long, just under half the length of the palpal tibia. In both *Phlogiellus* and *Orphnaecus* the embolus is short, just under one-quarter to one-third the length of the palpal tibia. The emboli of the *Lyrognathus*, *Phlogiellus*, and *Orphnaecus* share several key and possibly derived characters, namely, the entire embolic prolateral keel and the ventrobasal projection,

also on the embolus. However, only *Phlogiellus* and *Orphnaecus* show the greatly enlarged ventrobasal projection, in combination with the entirely keeled proximally obconic embolus, a synapomorphy for the tribe Yamiini, as discovered by West et al., 2012, and thus is used, herein, to diagnose Yamiini.

**Female Spermathecae.** The morphology of selenocosmiine spermathecae varies from “fused” lobes (*Poecilotheria* (Simon 1885), *Haplocosmia* (Schmidt and von Wirth 1996), and some *Chilobrachys* (Karsch 1891), see West et al. [2]) to “unilobular” (most *Chilobrachys*, Northeast Indian members of *Lyrognathus* (Pocock 1895), *Orphnaecus*, *Phlogiellus*, some *Selenocosmia*, *Selenotholus* (Hogg 1902), and *Selenotypus* (Pocock 1895), see West et al., 2012) and “bilobular” (*Phlogiellus baeri* [4, 15], *Coremiocnemis* (Simon 1892), Southeast Asian *Lyrognathus*, and *Psednocnemis* West et al., 2012, and most *Selenocosmia*, see West et al., 2012) morphology. Within *Phlogiellus*, spermathecae vary from unilobular to a single species (*P. baeri*) possessing bilobular morphology. Bilobular spermathecae are also seen in other Selenocosmiinae as mentioned above; however, in those species excluding *Phlogiellus*, the secondary lobe emerges laterally from an equal base with the medial lobes. In *P. baeri* [7, Figures 31–35], the secondary lobe is different in morphology from the main lobe and emerges from a different region, anteriorly and apically from the main lobe (Figure 8(b)), which we term a “bud.” Therefore, the similarity of bilobular spermathecae between *P. baeri* [7] and other bilobed selenocosmiine is clearly artificial. This conclusion is empirically supported in West et al., 2012. The apical anterior emergence of a spermathecal bud from the main lobe is unique to *P. baeri* [7] and could be considered an autapomorphy for the species. In *P. johnreylazoi* sp. nov., the spermathecal lobes are also unique. Each lobe is very wide, with no distal flaring, but possesses medial pointed ends (Figure 19(d)). This, however, is possibly explained by the unique embolus morphology in the male (which is much wider/more robust than any other *Phlogiellus* species, Figures 23(a)–23(c)). Therefore, we consider this condition an autapomorphic trait, diagnostic to *P. johnreylazoi* sp. nov. It would seem more informative to diagnose the morphology of female selenocosmiine spermathecae in greater detail than has been done in the past, looking to the origin or emerging points of both the main and secondary lobes (if present) and covering in greater detail than before the morphology of each lobe (bilobular or unilobular). With the inevitable further study of the male selenocosmiine bulb in great detail, future examination of the accompanying female sexual morphology may yield additional informative results.

**Tarsal Scopulae Division.** The divided tarsal scopulae of theraphosids were first seriously considered by Ausserer [8], followed by Pocock [3, 12], Simon [13], Foelix and Chu-Wang [76], Raven [16, 31, 34], Roscoe and Walker [77], Prentice [78], Perez-Miles [79], and later by Guadanucci [47]. Raven [16] looked at mygalomorph tarsal scopulae in great detail and further discussed the division of tarsal scopulae in adult spiders and how ontogeny relates directly to morphology of both the entirety of the scopulae and division as well. Due to the plesiomorphic nature of tarsal scopulae division

and additional problematic issues following recapitulation theory (Haeckel's Law) and subsequent presence of juvenile/immature types (see Raven [16, p. 12] and Guadanucci [47]), applying tarsal scopulae division to a group of any selenocosmiines as an informative generic trait is not useless but clearly problematic, even though Pocock used tarsal scopulae division to diagnose *Phlogiellus* [3, p. 596] and further revise it [12, p. 187], followed by Simon [13, p. 955] and Strand [18, p. 183]. The issue does not seem to be one of character stability; Guadanucci [47] showed that tarsal scopulae division in adult theraphosids is informative and further, through cladistic analysis, determined that spider's size does not relate to the division of tarsal scopulae contrary to the thoughts of Perez-Miles [79]. The species *P. bundokalbo* (Barrion and Litsinger [28, p. 21]) is a good example of Guadanucci's findings. It is a relatively small *Phlogiellus* species, yet it possesses undivided tarsal scopula on legs I–IV in females (while much larger species like *P. johnreylazoi* sp. nov. possess divided tarsal scopula on leg IV). As such, the character is ignored in the generic diagnosis but included within the genus description herein under provision that the types are indeed adult, within specific diagnoses. Tarsal scopulae division, when used as a specific indicator on mature specimens, is clearly informative [34, 47] and, thus, is diagnosed without complication within species. The presence of undivided tarsal scopulae on leg IV is clearly informative among several selenocosmiine groups, *Lyrognathus* [43], some *Selenocosmia* (Nunn, West, and Court, in prep.), and some *Chilobrachys*. The presence of undivided tarsal scopulae on legs I–IV in the female *P. bundokalbo* is most likely an autapomorphic condition of the species, which should not put into question the stability of divided tarsal scopulae on posterior legs in *Phlogiellus*. Along with tarsal scopulae division, other similar trends on the legs are seen in *Phlogiellus*: the presence of a reduced third claw on legs IV (and in several species legs II and III) and transversely cracked tarsi IV (and often tarsi III) but not in all species. These trends were discussed in great detail by Raven which he termed anterior-posterior gradations (Raven [16, p. 12]).

*Trichobothriae*. Setae found on tarsi and metatarsi I–IV were seen to be consistent between all *Phlogiellus* species examined herein and others within the genus (Guadanucci *in press*, Raven, pers. comm.). Within *Phlogiellus*, the clavate trichobothriae are found in the distal 2/3 of all tarsi dorsally, in a relatively wide and noticeable field (>30) separated by the short epitrichobothrial field. Both proximally and distally the epitrichobothriae disperse (lengthening in size 1/5 on proximal tarsus), with the distal end merging evenly with the clavates and surrounding a domed tarsal organ. Raven presumed these epitrichobothriae to be chemosensory in function and showed the morphology of these setae in detail [34, p. 25. Figures 31–33]. The presence of full tarsal trichobothriae on legs I–IV can be used to validate the maturity of female *Phlogiellus* material, particularly small specimens (such as *P. bogadeki* sp. nov.).

*Taxonomic Concerns Resolved*. Several repetitive problems have surrounded *Phlogiellus* ever since its original description

[3]. The authors in most following works had not considered the genus as a monophyletic or natural group, had not examined types (most critically the type species, *P. atriceps*), and continued to follow Pocock's original description [3]. The latter is significant because Pocock, himself, used largely plesiomorphic traits (he made note of this himself in the original description, Pocock [3]), with his generic definition being little more than having historic value [3]. The problems have continued without changing either (*namely*, Raven [34] and West et al. [2]). A good example of such problems continuing during contemporary times can be found in Zhu and Zhang's revision of Chinese Theraphosidae [36]. While describing the species "*Selenocosmia xinping*," Zhu and Zhang diagnosed this species against *Selenocosmia arndsti* [50] and only that species, a spider from New Guinea [36]. Because the authors overlooked the type species *Selenocosmia javanensis* [80], they did not diagnose the species against other *Selenocosmia* (or *Selenocosmiinae*) found in closer geographical range and, further, ignored other genera with type species that are clearly closer related, as *Phlogiellus atriceps* most certainly (*namely*, West et al. [2], determined via empirical evidence) only serves to compound the taxonomic problems surrounding problematic genera such as *Phlogiellus* and *Selenocosmia* (Ausserer 1871). The characters utilized by West et al., 2012, in the cladistics performed on the subfamily serve as an extremely useful tool to newly diagnose most selenocosmiine species to genus level (outside of the Australo-Papuan region) and, particularly, to isolate *Phlogiellus* species from *Selenocosmia*, without questioning the two most problematic genera in *Selenocosmiinae* prior to the work of West et al., 2012. In fact, the *Phlogiellus* clade was tested as the second strongest branch within their cladistics, stronger than any other selenocosmiine genus, except for *Poecilotheria* [2]. Had Zhu and Zhang [36] been able to utilize West et al.'s cladistics [2], by morphology of the male bulb alone, they would have easily served to place *P. xinping*, firstly, within the tribe Yamiini and subsequently within *Phlogiellus* but more importantly would have shown that this species has nothing nearer to do with *Selenocosmia*. Zhu and Zhang also revised "*Yamia watasei*" (in which they maintained *Yamia* was a valid genus). Investigation into their own paper shows that both *P. xinping* and *P. watasei* possess almost identical bulbs [36, p. 438, Figures 8A–8C and p. 439, Figures 9G–9I, resp.], with characters utilized by West et al., 2012, to define the tribe Yamiini and subsequently sister genera *Orphnaecus* and *Phlogiellus*. The significance of male bulb morphology in mygalomorph systematics is greatly endorsed by Raven [16, p. 9, 10] and most others who have followed and performed larger systematic revisions on Mygalomorphae [81], theraphosid subfamilies, or subfamily genera (*namely*, Bertani [48], West et al. [42], and West et al. [2]). Further, investigation into the work of West and Nunn, 2010, and West et al., 2012, would have also shown that the presence or absence of intercheliceral pegs is uninformative on a generic level, a finding that has greatly assisted in understanding characters of generic value among species with intercheliceral pegs within this subfamily (see Character Discussion on intercheliceral pegs herein).

The authors strongly suggest an examination of any future potential *Phlogiellus* material, either for sex organs or for a congeneric clavate trichobothrial pattern that is uniform on tarsi I–IV which does not show a dramatic or rapid reduction posteriorly. This examination alone should eliminate many future erroneous placements of juvenile specimens into *Phlogiellus*. The work of West et al., 2012, should serve as the most useful platform to date (this paper for *Phlogiellus*) to identify and place future problematic selenocosmiine species (aside from Australo-Papuan material).

## Abbreviations

ALE:	Anterior lateral eyes
AME:	Anterior median eyes
D:	Dorsal
DL:	Distolateral
DV:	Distoventral
fem.:	Femur
met.:	Metatarsus
OT:	Ocular tubercle
P:	Prolateral
pat.:	Patella
PLE:	Posterior lateral eyes
PME:	Posterior median eyes
R:	Retrolateral
S:	Synonymy
tar.:	Tarsus
tib.:	Tibia
V:	Ventral.

## Competing Interests

The authors declare that there are no competing interests regarding the publication of this paper.

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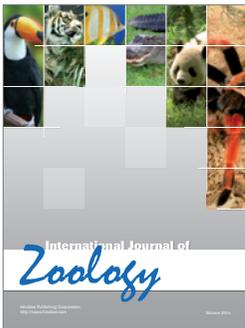
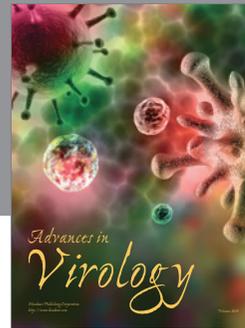
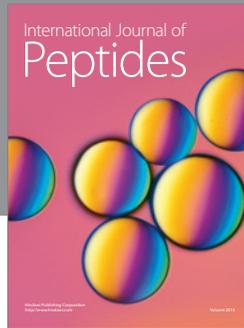
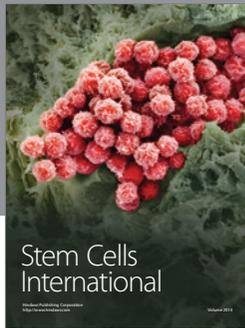
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