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A New Species of Wishbone Spider Genus *Damarchus* from Doi Inthanon National Park, Thailand (Mygalomorphae: Bemmeridae)

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ABSTRACT.– The wishbone spider genus *Damarchus*, belonging to the family Bemmeridae, encompasses four recognized genera: *Atmetochilus*, *Damarchus*, *Homostola*, and *Spiroctenus*. Current distribution records indicate that *Atmetochilus* and *Damarchus* are exclusively found in Asia. To date, ten species of *Damarchus* have been documented, with three species reported in Thailand. However, our field surveys conducted since 2015 have identified multiple undescribed species within the genus that remain unclassified. Through detailed morphological analyses, we describe a new species, *Damarchus sirindhornae* Kunsete & Warrit, sp. nov., discovered in Doi Inthanon National Park. This species is classified within the *workmani*-group but can be distinguished from other members of the group by the absence of spines on the male coupling spur and the absence of secondary receptacles on the female spermathecae.

KEYWORDS: Mygalomorphae, taxonomy, protected area

INTRODUCTION

The wishbone spider genus *Damarchus* Thorell, 1891 belongs to family Bemmeridae Simon, 1903 which consists of four genera: *Atmetochilus* Simon, 1887; *Damarchus* Thorell, 1891; *Homostola* Simon, 1892; and *Spiroctenus* Simon, 1889 (World Spider Catalog, 2025). *Damarchus* are known only from Asia. It can be distinguished from other genera through the integration of these characteristics including to short procurved fovea, rastellum consisting of weak spines, and pairs of posterior sternal sigilla not centrally confluent. *Damarchus* includes ten species that are known only from their respective type localities across India, Indonesia, Malaysia, Myanmar, Singapore, and Thailand (World Spider Catalog, 2025). Schwendinger and Hongpadharakiree (2023) divided *Damarchus* into two species groups including to *pylorus*-group which contains modified palpal organ (2 species: *D. pylorus* Schwendinger and Hongpadharakiree, 2023, and *D. lanna* Schwendinger and Hongpadharakiree, 2023) and *workmani*-group which contains simple palpal organ (4 species: *D. bifidus* Gravely, 1935, *D. cavernicola* Abraham, 1924, *D. dao* Schwendinger & Hongpadharakiree, 2023, and *D. workmani* Thorell, 1891) while another three species contain insufficient information including to *D. assamensis* Hirst, 1909, *D. montanus* (Thorell, 1890), and *D. oatesi* Thorell, 1895. However, *workmani*-group must includes *D. inazuma*, which has recently been formally described as a new species (Kunsete et al., 2025). In Thailand, four species have been documented, including *D. dao*, *D. inazuma*, *D. lanna*, and *D. pylorus*. Observations since 2015 indicate that *Damarchus* exhibits a broader distribution across various regions, ranging from sea level to high altitude habitats (Schwendinger and Hongpadharakiree, 2023). Additionally, we have identified at least 11 undescribed species of *Damarchus* in Thailand, underscoring the presence of numerous undocumented species within the region.

Doi Inthanon National Park is located in northern Thailand and is renowned for being the country's highest point, with an elevation of 2,565 m, commonly referred to as "The Roof of Thailand" (Srisuka et al., 2022). Within this area, one species of Bemmeridae has been reported: *D. lanna* (female paratype) (Schwendinger and Hongpadharakiree, 2023). The mountain encompasses a variety of vegetation along altitude from lowland to montane forests (Teejuntuk et al., 2002). This ecological diversity significantly influences the region's faunal diversity. We hypothesize that there are additional undescribed faunal species, particularly spiders, inhabiting this area. In this study, we describe a new species of the genus *Damarchus* based on morphological analyses conducted in Doi Inthanon National Park.

MATERIALS AND METHODS

All type materials were collected from Checkpoint Point 2, Doi Inthanon National Park, Tha Pha, Chom Thong, Thailand (18°31'33"N 98°29'58"E, elevation 1,686 m). The type materials were collected with permission from Department of National Parks, Wildlife and Plant Conservation under the project “Studies in

silk gene structures and silk toughness in spiders collected in Thailand": Permission No. 0907.4/17112. Measurements were conducted using a ZEISS Stemi DV4 stereomicroscope. The shape of the eye row was taken from the front edge of eye. All measurements are given in millimeters, including the total length (excluding chelicerae and spinnerets), the diameter and interdistance of all eyes, as well as the lengths of each leg segment and pedipalps, measured laterally (with the number of spines indicated following the segment abbreviation). Spinnerets were measured on the ventral side. The photographs were taken by using a Canon 7D digital camera attached to a ZEISS Stemi 508 stereomicroscope. Terminologies used here are adapted from Zonstein and Marusik (2014) and Kunsete et al. (2020). Abbreviations are as follows: **AME** = anterior median eye; **ALE** = anterior lateral eye; **PME** = posterior median eye; **PLE** = posterior lateral eye; **PLS** = posterior lateral spinneret; **PMS** = posterior median spinneret; **d** = dorsal; **p** = prolateral; **r** = retrolateral; **v** = ventral.

RESULTS

Taxonomy

Family Bemmeridae Simon, 1903

Genus *Damarchus* Thorell, 1891

***Damarchus sirindhornae* Kunsete & Warrit, sp. nov.**
https://zoobank.org/urn:lsid:zoobank.org:act:10FA85C5-5AAC-4B72-977F-05EA3F389F9F
(Figs 1–4)

Material examined.– male holotype ♂ (ITN–024), Thailand, Chiang Mai province, Checkpoint Point 2, Doi Inthanon National Park, Tha Pha, Chom Thong, Chiang Mai, (18°31'33"N 98°29'58"E, elevation 1,686 m), 14-VI-2019, coll. N. Warrit et al.; Female paratypes 3♀ (ITN–029; ITN–034; ITN–035), Thailand, Chiang Mai province, Checkpoint Point 2, Doi Inthanon National Park, Tha Pha, Chom Thong, Chiang Mai, (18°31'33"N 98°29'58"E, elevation 1,686 m), 14-VI-2019, coll. N. Warrit et al.

Type deposit.– All type materials are preserved at Natural History Museum, Department of Biology, Faculty of Science, Chulalongkorn University, Bangkok, Thailand.

Etymology.– The species is named to honor the celebration on the Auspicious Occasion of Her Royal Highness Princess Maha Chakri Sirindhorn's 6th Cycle Birthday Anniversary, April 2nd, 2025.

Common name.– Sirindhorn's wishbone spider (Thai: แมงมุมรังซ้อนสิรินธร)

Diagnosis.– The male of *D. sirindhornae* sp. nov. can be distinguished from those of *D. workmani* and *D. cavernicola* by the absence of spines at the base of the coupling spur on Leg I (Fig. 2D–F). It can be differentiated from those of *D. bifidus*, *D. dao* and *D. inazuma* by the presence of one straight adjacent spine at the tip of the coupling spur on leg I (Fig. 2D–F). Additionally, *D. sirindhornae* sp. nov. differs from *D. lanna* and *D. pylorus* through its elongated, curved embolus and the absence of a paraembolic apophysis (Fig. 1A–C). The female of *D. sirindhornae* sp. nov. is distinguished from those of *D. dao* by the lack of secondary receptacles on the spermathecae, and it is differentiated from those of *D. lanna* and *D. pylorus* by the development of spermathecae on stalks (Fig. 4A–C).

Holotype description (male).– Male (holotype): Body (Fig. 1) length 19.30.

Color in nature: Carapace, chelicerae, legs are covered with white layer material and dorsal abdomen gray and ventral abdomen, and spinnerets pale white.

Color in alcohol: Carapace, chelicerae and legs brown. Abdomen dorsally gray and ventral abdomen and spinnerets pale white.

Carapace (Fig. 1C): 9.26 long, 7.93 wide. Chelicerae 3.25 long. Eyes (Fig. 1D): tubercle with 2 rows with low mound, 4 eyes in each row; anterior row procurved; posterior row slightly recurved, almost straight. Eye size and interdistances: AME 0.45, AME–AME 0.18, ALE 0.45, ALE–ALE 1.83, PME 0.3, PME–PME 0.75, PLE 0.33, PLE–PLE 1.68, AME–ALE 0.15, AME–PME 0.12, AME–PLE 0.30, ALE–PME 0.09, ALE–PLE 0.06, PME–PLE 0.12. Eye to fovea 7.86. Fovea (Fig. 1C): strongly procurved to U-shaped. Three rows of setae on fovea. Rastellum of about 16 robust down-curved setae on anterior margin of chelicerae (weaker than female). Cheliceral furrow with 8 promarginal teeth in one row, mesobasal denticles present. Fang ventrally smooth without teeth. Stridulating strikers absent. Labium (Fig. 1E): 1.50 long, 0.80 wide, without cuspules. Maxillae (Fig. 1E): 3.15 long, 1.50 wide; serrula absent; cuspules absent. Sternum (Fig. 1F) 4.20 long, 3.85 wide, posterior and medial sternal sigilla large but not confluent, anterior sigilla small, oval, on upper margin.

Spination: No spines on leg tarsi. Leg I: metatarsus, v5. Tibial apophysis (Fig. 2D–F): leg I without small group of short velvet-like setae. Coupling spur present on Leg I ventral, stalk-shape with 1 curved long spine (3–4 times longer than wide) on wide digitiform or long triangular spines tip of the stalk (Fig. 2E). Leg II:

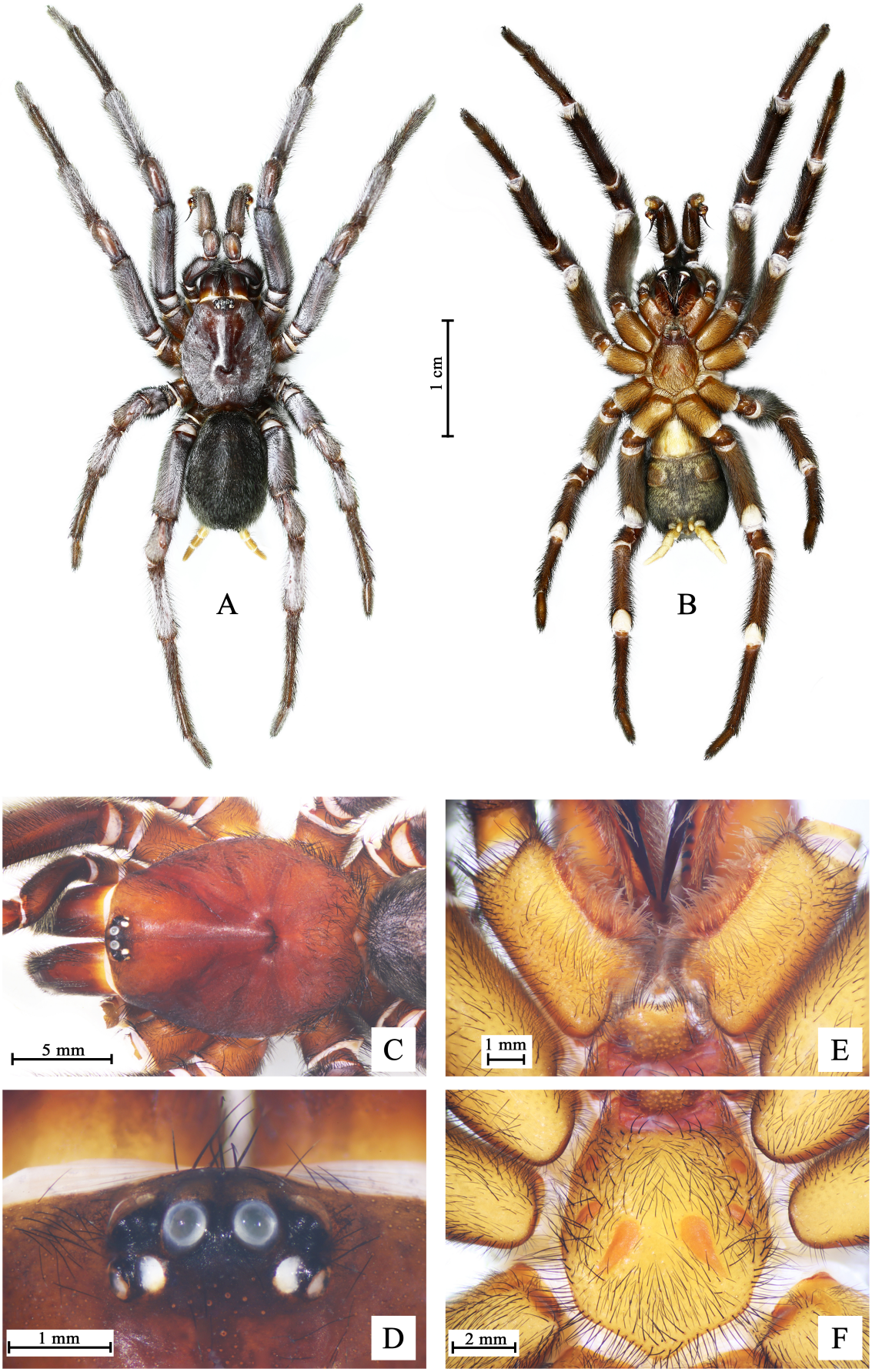

FIGURE 1. *Damarchus sirindhornae* Kunsete & Warrit, sp. nov., holotype (ITN–024), male **A** dorsal habitus **B** ventral habitus **C** carapace **D** eye tubercle **E** maxillae and labium **F** sternum. Scale bars: A–B = 1.00 cm; C = 5.00 mm; D–E = 1.00 mm; F = 2 mm.

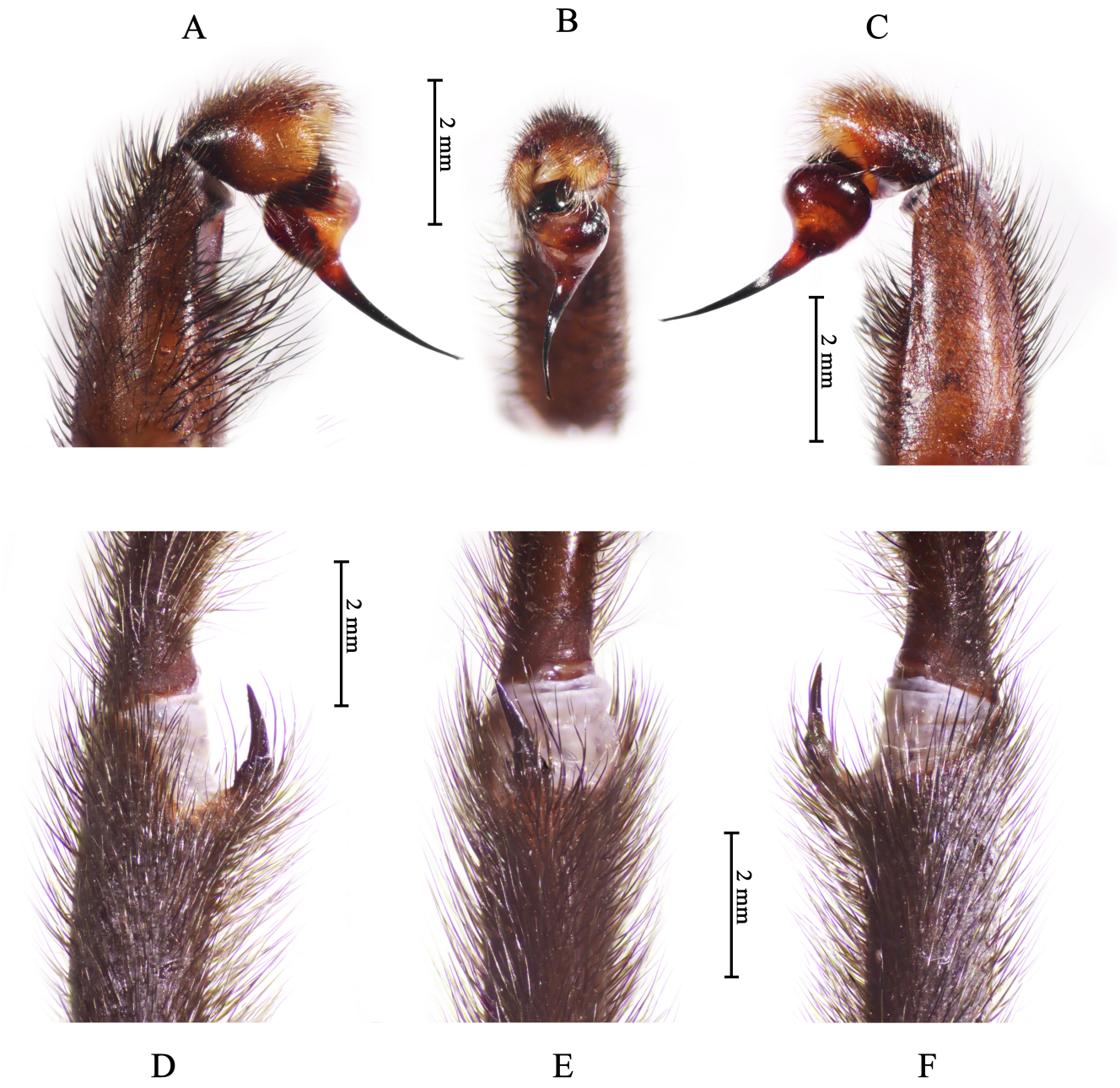

FIGURE 2. *Damarchus sirindhornae* Kunsete & Warrit, sp. nov., holotype, male, **A**–**C** left palpal organ, **D**–**F** tibial apophysis on left Leg I. **A, D** prolateral **B, E** ventral **C, F** retrolateral. Scale bars: A–F = 2.00 mm.

metatarsus scopulate, v3 p1. Leg III: patella, p3; tibia, v4 r1 p2; metatarsus, v3 p5 d6. Leg IV: tibia, v3 r1, metatarsus, v5 r2 p5 d2. No preening combs present on tibiae I–IV. Leg measurements (Table 1), formula: 1423.

Scopula: entire on tarsi I–IV, almost cover all on metatarsus II, III and half on metatarsi III, not divided, absent on cymbium, metatarsi IV, tibiae I–IV, patellae I–IV and femora I–IV.

Trichobothria: one zigzag row with 15–16 per row on tarsi I–IV, one row with 8–10 on metatarsi I–IV, no trichobothria on patellae or femora.

Claws: S-shaped row of teeth with 9, 6, 6, 9 teeth per row on all paired claws (Leg I–IV respectively).

Palp (Fig. 2A–C): Cymbium 1.60 long, 1.00 wide with long setae on tip and without spines. Bulb 0.92 spherical, narrow on tip, embolus 2.32 elongated, slightly curved and sharp at tip.

Spinnerets: PMS: 0.90 long, 0.20 diameter, PLS: 4.08 long, 0.40 diameter, length of basal, medial, and apical segments 1.50, 1.02, 1.56. Apical segment digitiform.

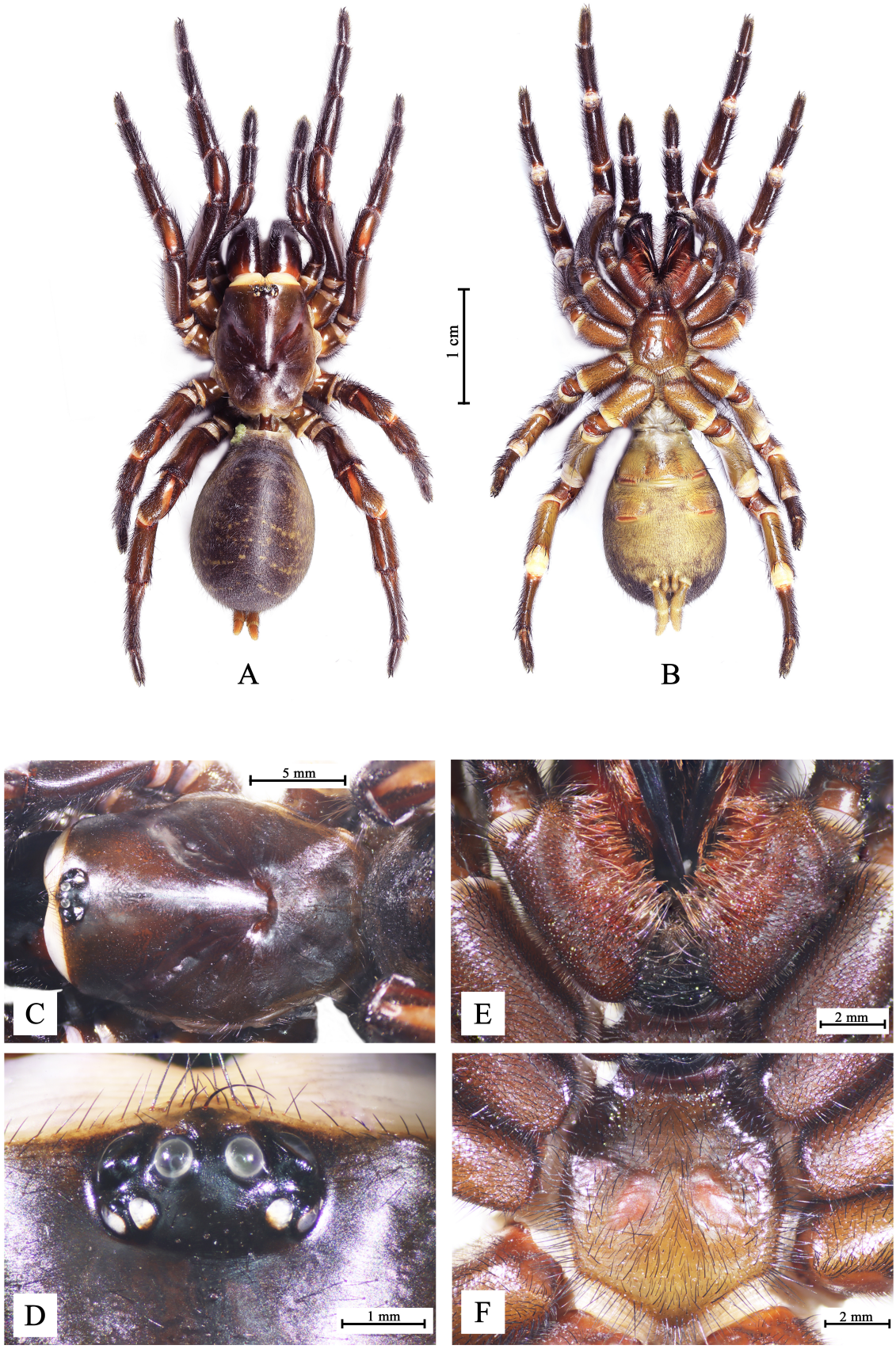

FIGURE 3. *Damarchus sirindhornae* Kunsete & Warrit, sp. nov., paratype (ITN–029), female **A** dorsal habitus **B** ventral habitus **C** carapace **D** eye tubercle **E** maxillae and labium **F** sternum. Scale bars: A–B = 1.00 cm; C = 5.00 mm; D = 1.00 mm; E–F = 2 mm.

TABLE 1. *Damarchus sirindhornae* sp. nov., Holotype male, length of pedipalp and leg segments (N=1).

Appendage	Femur	Patella	Tibia	Metatarsus	Tarsus	Total
Palp	4.10	2.40	3.60		1.60	11.70
Leg I	8.50	3.70	6.60	6.20	3.50	28.50
Leg II	6.50	3.70	5.70	5.50	3.00	24.40
Leg III	5.70	2.80	4.30	5.30	2.80	20.90
Leg IV	7.40	3.60	6.30	7.90	2.50	27.70

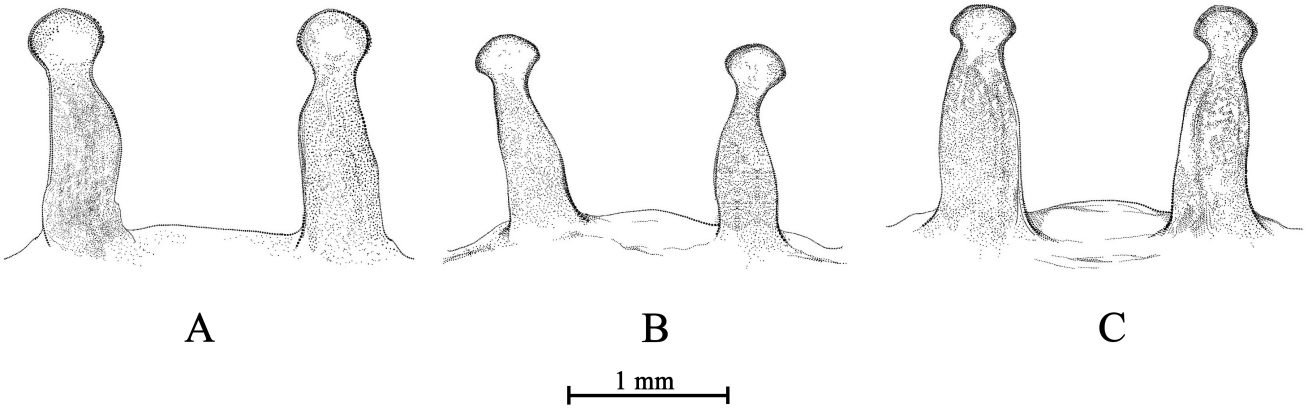

FIGURE 4. *Damarchus sirindhornae* Kunsete & Warrit, sp. nov. spermathecae, paratype, **A** ITN–029 **B** ITN–034 **C** ITN–035. Scale bars: A–C = 1.00 mm.

Paratype description (female).– measurements were taken and averaged from all paratypes (N=3). Illustrations are based on ITN–029 female (paratype): Body (Fig. 3) length 35.15±5.13.

Color in nature: Carapace, chelicerae, legs are dark brown and abdomen black. Abdomen covered by pale white spots and ventral abdomen and spinnerets pale white overall.

Color in alcohol: Carapace, chelicerae and legs brown. Abdomen dorsally pale gray and covered with pale yellow spots, ventral abdomen, and spinnerets pale yellow overall.

Carapace (Fig. 3C): 11.66±0.84 long, 8.96±0.67 wide. Chelicerae 4.83±0.73 long. Eyes (Fig. 3D): tubercle 2 rows with low mound, 4 eyes in each row; anterior row procurved; posterior row slightly recurved, almost straight. Eye size and interdistances: AME 0.37±0.04, AME–AME 0.21±0.03, ALE 0.53±0.08, ALE–ALE 1.96±0.05, PME 0.27±0.05, PME–PME 0.75±0.04, PLE 0.31±0.05, PLE–PLE 1.43±0.07, AME–ALE 0.15±0.06, AME–PME 0.20±0.02, AME–PLE 0.45±0.10, ALE–PME 0.21±0.06, ALE–PLE 0.21±0.11, PME–PLE 0.05±0.02. Eye to fovea 7.61±1.04. Fovea (Fig. 3C): strongly procurved to U-shaped. 3 rows of setae on fovea. Rastellum of about ca. 20 robust down–curved setae on anterior margin of chelicerae. Cheliceral furrow with 9 promarginal teeth in one row, mesobasal denticles present. Fang ventrally smooth without teeth. Stridulating strikers absent. Labium (Fig. 3E): 2.25± 0.01 long, 1.33±0.10 wide, without cuspules. Maxillae (Fig. 3E): 5.02±0.30 long, 2.25±0.13 wide; serrula absent; ca.36 tiny cuspules each on posterior lobe, absent on heel. Sternum (Fig. 3F) 5.41±0.47 long, 5.30±0.46 wide, posterior and medial sternal sigilla large, not centrally confluent, triangular. anterior sigilla small, oval, on upper margin.

Spination: Palp: patella p3, tibia p2 v1, tarsus p1 v2. Leg I: tibia v2 metatarsus v4. Leg II: tibia p1 v2, metatarsus p1 v2. Leg III: patella p2, tibia p3 r1 v2, metatarsus d5 p9 r2 v4. Leg IV: tibia r2, metatarsus d4 p7 r3 v3. Preening combs present on metatarsi III, IV (ventral). Legs (Table 2), formula: 4123.

Scopula: entire on tarsi of palp, Leg I–LIV, almost of metatarsi I, II., not divided. metatarsi III–IV.

Trichobothria: one zigzag row with 10–12 per row on tarsi I–IV, one row with 12–14 on metatarsi I–IV and two rows of 6–10 on tibiae II, III, IV; none on patellae or femora.

Claws: two rows of teeth with 3–4 teeth on outer claw and 1–3 teeth on inner claws.

Spinnerets: PMS: 1.85±0.47 long, 0.68±0.20 diameter, PLS: 6.44±1.59 long, 1.05±0.23 diameter, length of basal, medial, and apical segments 3.98±1.30, 1.16± 0.36, 1.30±0.89; apical segment digitiform.

TABLE 2. *Damarchus sirindhornae* sp. nov., paratype female, length of pedipalp and leg segments (N=3).

Appendage	Femur	Patella	Tibia	Metatarsus	Tarsus	Total
Palp	5.40±0.46 (5.00–5.90)	2.73±0.38 (2.30–3.00)	3.50±0.17 (3.30–3.60)		3.50±0.00 (3.50)	15.13±0.67 (14.70–15.90)
Leg I	6.87±0.64 (6.50–7.60)	4.87±0.32 (4.50–5.10)	5.40±0.40 (5.00–5.80)	4.73±0.40 (4.50–5.20)	2.97±0.15 (2.80–3.10)	24.83±0.61 (24.30–25.50)
Leg II	6.90±0.46 (6.50–7.40)	4.30±0.26 (4.00–4.50)	4.43±0.40 (4.20–4.90)	4.47±0.06 (4.40–4.50)	2.67±0.35 (2.30–3.00)	22.77±1.33 (21.90–24.30)
Leg III	5.63±0.32 (5.40–6.00)	3.63±0.49 (3.30–4.20)	3.10±0.17 (3.00–3.30)	3.90±0.36 (3.50–4.20)	2.60±0.40 (2.00–3.00)	18.87±1.35 (17.50–20.20)
Leg IV	8.50±0.70 (7.70–9.00)	4.60±0.72 (4.00–5.40)	5.40±0.69 (5.00–6.20)	7.27±0.32 (6.90–7.50)	3.17±0.15 (3.00–3.30)	28.93±1.78 (26.90–30.20)

Spermathecae: Divided into two lobes. Each lobe form almost straight and stalk which narrow near top. Head of spermathecae mushroom-like or semicircular. No secondary receptacles present (Fig. 4).

Variation. Variation presents on spermathecae in size and shape (Fig. 4).

Remark.– The nesting structure of *D. sirindhornae* sp. nov. features a collar-like entrance (Fig. 5) and a Y-shaped burrow with a sac-like branch shaft covered by a fine layer of silk, resembling that of *D. lanna* (Schwendinger and Hongpadharakiree, 2023, fig. 5C). The branch shaft has been observed at varying depths, extending from a short distance from the entrance to approximately 30 cm below ground level, near the bottom of the burrow. In certain burrows, the entrance was found to be closed due to the folding of its structure. However, it remains uncertain whether this closure is a deliberate behavior of the spider or the result of an external incident such as by raining.

DISCUSSION

Elevational range and habitat associations of *Damarchus sirindhornae* sp. nov.

Trapdoor spiders and other burrowing mygalomorphs select their habitats based on various factors, including soil texture, litter composition, vegetation, topography, and prey availability (Main, 1957; Marples and Marples, 1972; Bond and Coyle, 1995). These factors are critical for their survival, as soil texture influences burrow construction, while soil water retention affects humidity and the microenvironment within the burrow (Souza-Silva, Silva, and Brescovit, 2014). The population of *D. sirindhornae* sp. nov. was observed in association with *Conothele* sp. (Family Halonoproctidae Pocock, 1901) within a montane forest at an elevation of approximately 1,686 m. This location is situated within the montane forest zone (1,400–2,500 m elevation), where the dominant tree type transitions from dipterocarp to montane evergreen forest. In this zone, trees are high, which density increases with altitude, and the soil retains high moisture levels (Teejuntuk et al., 2002). Furthermore, as noted by Schwendinger and Hongpadharakiree (2023), *D. lanna* has been reported from a nearby location about 840 m from the *D. sirindhornae* sp. nov. population. The presence of at least three mygalomorph species in this area indicates that the environment provides optimal ecological conditions for their survival, particularly concerning soil moisture and texture.

Endemism and distribution patterns of *Damarchus* in Thailand

All species of *Damarchus* are considered endemic due to their restricted distributions, which can be attributed to their sedentary lifestyle, low vagility and live in strictly specific environment (Raven, 2010). In Thailand, certain species, such as *D. dao* and *D. pylorus*, have only been documented at their type localities, while others, such as *D. lanna*, exhibit a broader distribution (Schwendinger and Hongpadharakiree, 2023). Although overlapping distributions between Thai *Damarchus* species and other mygalomorph families, such as Halonoproctidae and Idiopidae Simon, 1889, have been observed (personal observation), instances of more than one *Damarchus* species coexisting in close proximity are rare. However, individuals of *D. lanna* have been recorded about 840 m from the *D. sirindhornae* sp. nov. population, albeit at a lower elevation of 1,200 m (Schwendinger and Hongpadharakiree, 2023), suggesting a potential close phylogenetic relationship between the two species. Despite this, *D. lanna* is classified within the *pylorus*-group, while *D. sirindhornae* sp. nov. is placed in the *workmani*-group based on its morphological characteristics, which include a simple, unmodified palpal organ lacking para-embolic apophysis, keel, or ribs, and a coupling spur bearing at least one apical megaspine (Schwendinger and Hongpadharakiree, 2023). The *pylorus* and *workmani*-groups exhibit distinctly different morphological traits, particularly in their

FIGURE 5. Collar-like nest entrance of *D. sirindhornae* Kunsete & Warrit, sp. nov., the entrance was constructed from clay, spider silk and surrounding materials.

palpal organs, indicating significant evolutionary divergence. Unfortunately, the phylogenetic relationships between these groups have yet to be studied, leaving this question unresolved.

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