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A new species of *Angaeus* from Malaysia with possible affinity to related genera within Stephanopinae (Araneae: Thomisidae)

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The crab spider genus *Angaeus* Thorell, 1881 currently contains 10 described species (Benjamin 2013; WSC 2017). All species of the genus are restricted to tropical Asia. The aim of this correspondence is to illustrate and describe a new species of the genus characterized by a number of features previously found in the genera *Angaeus, Borboropactus* Simon, 1884, *Epidius* Thorell, 1877 and *Geraesta* Simon, 1889. The most unusual feature is the elongated tibia of the male palp that was previously thought to be diagnostic of *Epidius* (Figs 1, 2, 8; character 1 in Benjamin 2011; Benjamin 2017). However, the new species lacks tibial macrosetae (Figs 1, 2, 8) and lacks a flexibly attached MA, both also being characteristics of *Epidius* (characters 2 and 18 in Benjamin 2011). Furthermore, this new species differs considerably in general appearance from all known species of *Epidius*.

Angaeus verrucosus **sp. nov.** shares the presence of a concave MA, epigynal teeth and an anterior eye region that projects beyond the clypeus with other species of *Angaeus, Borboropactus* and *Geraesta* (characters 17, 26, 55 in Benjamin 2011). All known species of *Angaeus* and *Geraesta* share the presence of cymbium trichobothria as found in *A. verrucosus* **sp. nov.** (Figs 2, 9, 10, Benjamin 2013, 2015). Furthermore, the general habitus including the markings of the opisthsoma are very characteristic of *Angaeus* and *Geraesta* (Figs 5, 6). Species of *Geraesta* differ from *A. verrucosus* **sp. nov.** in the presence of at least one serrated apical tibial apophysis in males, opisthosomal lobes and presence of a cololus in females (Benjamin 2015). *Angaeus* and *Borboropactus* females share a median epigynal septum (character 25, termed epigynal folds in Benjamin 2011) and the males share a hyaline conductor (character 14, also present in *Geraesta*, Benjamin 2011), both characters are absent in *A. verrucosus* **sp. nov.** However, the presence of a canoe-shaped tapetum (Homann 1934) and tarsal sensory pits, both diagnostic for *Borboropactus* (figs 24c, d in Benjamin 2011), are absent in *A. verrucosus* **sp. nov**. Thus, based on current knowledge of Stephanopinae crab spiders and to avoid describing monotypic genera, I consider this new species best placed in *Angaeus*.

This is the sixth contribution of a series based on collections of canopy-living spiders in SE-Asia made by Andreas Floren and coworkers and sorted by Christa Deeleman-Reinhold (Benjamin 2013, 2014, 2016, 2017, Benjamin & Clayton 2016).

The examined specimens were borrowed from the Rijksmuseum van Natuurlijke Histoire, Leiden (RMNH). Methodology follows Benjamin (2011). Specimens used for habitus illustrations were placed in 70% ethanol and photographed using a dissecting microscope (Zeiss Discovery V20) with top illumination and a magnification of up to 150x. Digital images were taken with a Zeiss AxioCam HRc camera. Images were edited using Zeiss AxioVision Rel. 4.8 software package. Left structures are depicted unless otherwise stated. Setae are usually not depicted in the final palp drawings. A Carl Zeiss Gemini FE-SEM housed at Zoological Research Museum Alexander Koenig (ZFMK) was used to study and photograph morphological features; relevant methodology is given in detail in Benjamin (2011). Coordinates are given only where known, in the format given in the labels. All measurements are given in millimeters. Morphological abbreviations: ALE anterior lateral eyes, AME anterior median eyes, C conductor, CO copulatory opening, E embolus, ET epigynal teeth, H epigynal hood, MA median apophysis, PLE posterior lateral eyes, PME posterior median eyes, S spermatheca, TO tarsal organ, Tr trichobothrium.

Family Thomisidae
Genus *Angaeus* Thorell, 1881
***Angaeus verrucosus* sp. nov. Figs 1–14**
Type material. Holotype: male from Malaysia, Borneo, West Sabah, Mt. Kinabalu National Park, Sorinsim, 6.15° N,

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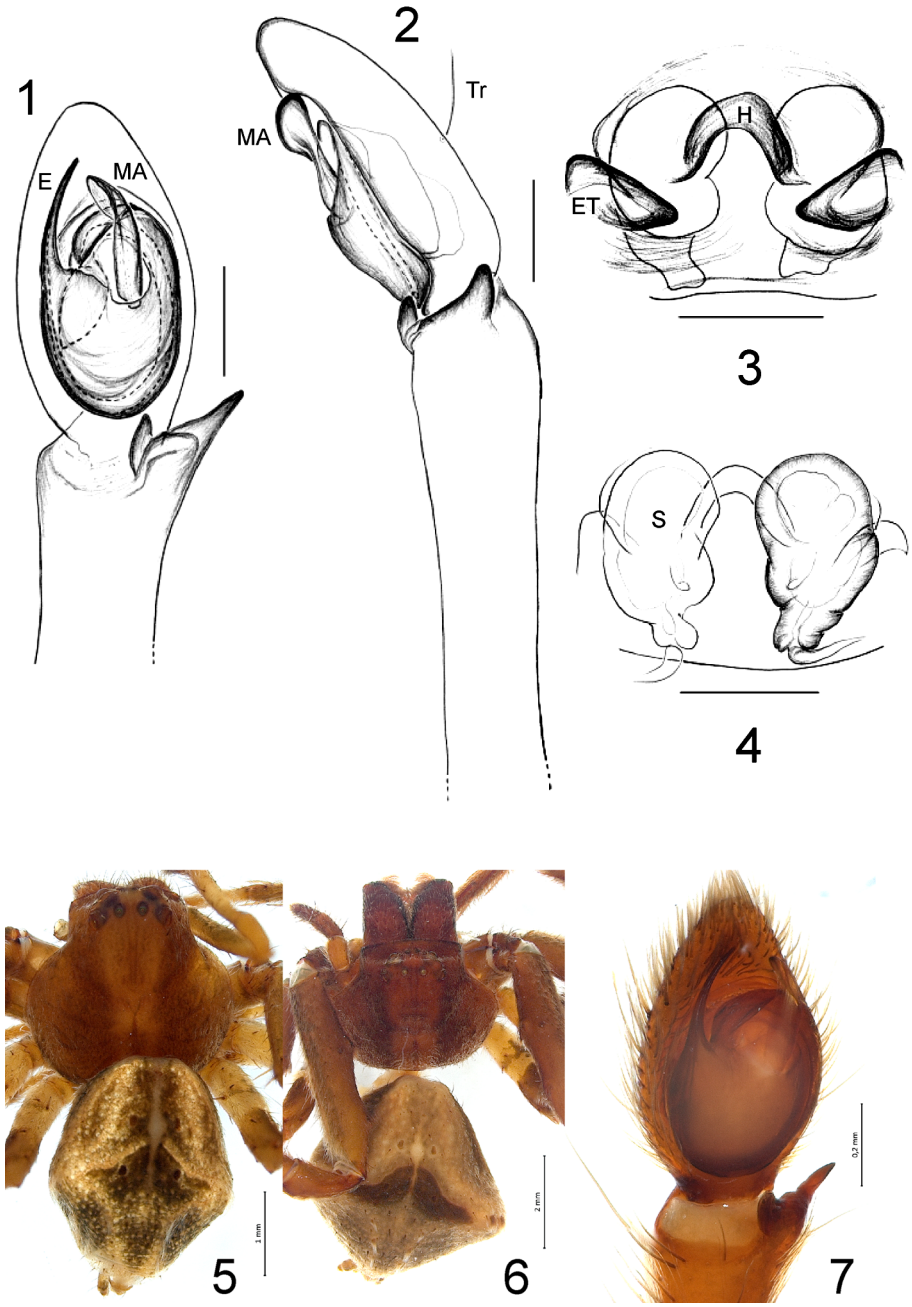
116.50° E, 40 year old secondary forest, 500–700 m, fogging canopy tree 6 *Vinex pinnata*, refog 1 after 8 days, 07 March 1997, leg. A. Floren, loc 60 (RMNH.ARA.15928).

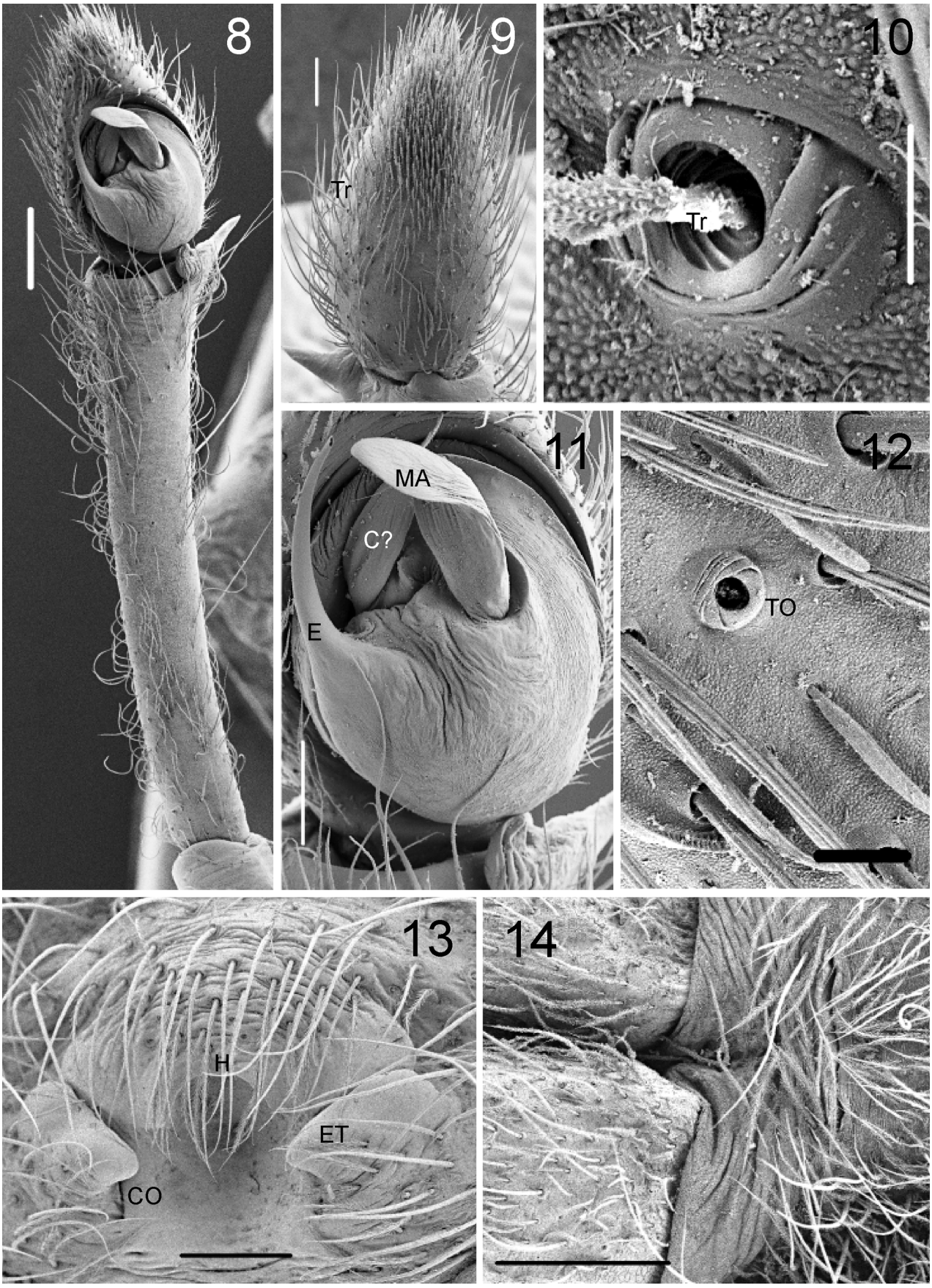
Other material examined. MALAYSIA: ***Borneo:*** West Sabah, Mt. Kinabalu National Park, 6.15° N, 116.50° E: 2 males, 1 female, several juveniles, , 5 year old secondary forest, 500–700 m, fogging canopy tree 1, *Melochia umbellata*, loc 19, 16 February1997, leg. A. Floren, (RMNH.ARA.17157); 1 male, 2 juveniles, fogging canopy tree 5, refogg 2 after 3 days, loc 27, 24 February 1997(RMNH.ARA.15909); 2 males, 1 female, several juveniles, fogging canopy tree 5, *Melochia umbellata*, refogg after 17 days, loc 29, 10 March 1997 (RMNH.ARA.17158); 2 males, 2 juveniles, fogging canopy tree 10, *Melochia umbellata*, refogg after 1 day, loc 34, 10 March 1997 (RMNH.ARA.17159); 1 male (fragments), fogging canopy, *Vinex pinnata*, loc 50, 26 February–12 March 1997 (RMNH.ARA.15925). All material leg. A. Floren.

Etymology. The species name refers to the red coloration of the holotype.

Diagnosis. Males of *A. verrucosus* **sp. nov.** can be diagnosed by the elongated tibia of the male palp in combination with the concave shape of the MA and the shape of RTA (Figs 1, 2, 7, 8, 11). Females can be separated by the shape of H and ET (Figs 3, 13).



FIGURES 1–7. *Angaeus verrucosus* **sp. nov.** (RMNH). 1–2, 7 left male palp (1, 7 ventral, 2 retrolateral); 3 epigynum, ventral; 4 vulva, dorsal; 5 female habitus, dorsal; 6 male habitus, dorsal. Scale bars = 0.2 mm (1–4, 7), 1.0 mm (5), 2.0 mm (6).



FIGURES 8–14. Scanning electron micrographs of *Angaeus verrucosus* **sp. nov.** (RMNH). 8–11 left male palp (8, 11 ventral; 9, 10 dorsal, showing the trichobothria of the cymbium); 12 tarsal organ, female, left leg I; 13 epigynum, ventral; 14 female prosoma, ventral. Scale bars = 10 µm (10), 20 µm (12), 100 µm (9, 11, 13), 200 µm (8, 14).

Description. Male: Total length: 6.3; prosoma length: 3.1, width: 2.9. Leg I: femur 5.0, patella 1.5, tibia 5.0, metatarsus 3.5, tarsus 1.5. Leg formula 1243. Leg I femur with mounds of fine setae (sometimes with a spine), claw tufts present and dense. Prosoma dark red brown, apex lighter. Posterior portions of prosoma rounded, anterior eye region projected beyond the clypeus. Eyes not on tubercles, ALE>PLE>PME>AME, both rows recurved, distance between PMEs larger that distance between AME. ALE project slightly forwards. Opisthosoma dark brown with white spots, apex with dark triangular markings. Shape of opisthosoma oval, center broadest, cololus absent (Fig 14). Palp: tibia elongated, cymbium and tegulum oval, cymbium with trichobothria. E tapering, short. MA present, leaf-like, C absent (Figs 1, 2, 7, 8–11). However, note the presence of a structure of unknown function adjunct to E that is highlighted "C?" in Fig 11.

Female: Total length: 11.0; prosoma length: 4.5, width: 4.5. Leg I: femur 5.5, patella 1.5, tibia 5.0, metatarsus 3.1, tarsus 1.5. In general similar to male. Females differ in less prominent white spots and prominent triangular marking on the grey dorsum of opisthosoma. Epigynum with hood and ET; S kidney shaped, CO laterally, below ET (Figs 3, 13).

Distribution. Malaysia, Mt. Kinabalu National Park.

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