

SIX NEW AND ONE NEWLY RECORDED SPECIES OF SALTICIDAE (ARACHNIDA: ARANEAE) FROM SINGAPORE AND MALAYSIA

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ABSTRACT. – Seven species belonging to five genera of Salticidae (*Artabrus*, *Bathippus*, *Epeus*, *Pancorius* and *Simaetha*) from Singapore and Malaysia are diagnosed, described and figured. Among them, six species are new to science and named: *Bathippus digitalis*, *B. pahang*, *B. rectus*, *Epeus furcatus*, *Pancorius kohi* and *Simaetha deelemanae*; the species *Artabrus erythrocephalus* (C. L. Koch, 1846) is newly recorded from Singapore.

KEY WORDS. – Araneae, Salticidae, spiders, new species, Singapore, Malaysia.

INTRODUCTION

Jumping spiders (Salticidae) are one of the few spider groups whose major mode of locomotion is, as the name implies, jumping. Salticids are the largest and most diverse family with nearly 5000 described species (Platnick, 2003). They are found on all continents except Antarctica and most oceanic islands. Their habitats range from rainforests to deserts and from 80 m below sea level in Death Valley to 6400 m above sea level on Mt. Qomolangma (Mt. Everest). Most species live in the tropical regions.

Singapore is a small state, but the tropical environment may support rich salticid diversity. Although the list of salticids of Singapore contains 45 genera and 72 species (Koh, 1989; Song et al., 2002), most of these taxa were described between the early part of 19th century and the early part of 20th century. Since then, almost no study of salticid fauna of Singapore has been conducted. Until 1980s, the descriptions of some new genera and new species, and the revisions of some previously described taxa from other South-east Asia countries were provided by Wanless (1983), Prószyński (1984, 1987), and Zabka (1985, 1988). Koh (1989) published a small book on common Singapore spiders including 24 salticid names of 20 genera, in which a brief introduction to each species, its habit and distribution, and color photos were presented. Most recently, a few salticid species have been subjected to behavioural studies (*Epeus flavobilineatus* (Doleschall): Jackson, 1988; *Phaeacius malayensis* Wanless: Jackson & Hallas, 1986; Li, 2000; *Thiania bhamoensis* Thorell: Li et al., 2002; *Thorelliola ensifera* (Thorell):

Jackson & Whitehouse, 1989). However, the salticid fauna of Singapore is relatively poorly known. The same is also applied to Malaysia. In the present study, we report on partial results of a taxonomic study which attempts to sort the spider collection in the Raffles Museum of Biodiversity Research, National University of Singapore, Singapore, to family and some families largely to species. Based on the specimens deposited in the Raffles Museum of Biodiversity Research (hereafter RMBR), a total of six new species and one new record of the family Salticidae from Singapore and Malaysia were described.

MATERIALS AND METHODS

All measurements given in this paper are in millimeters. The measurements of legs are as follow: total length (femur + patella plus tibia + metatarsus + tarsus). Dissected epigynes were digested in lactic acid for 10-30 min. or in 10% KOH for approximately 24 hrs at room temperature, rinsed in distilled water, stained in ethanol solution of chlorazol black E under control and mounted in glycerin. All specimens including types are deposited in the Zoological Reference Collection (ZRC) of the Raffles Museum of Biodiversity Research, National University of Singapore.

The abbreviations used are:

ALE – anterior lateral eyes, AME – anterior median eyes, PLE – posterior lateral eyes, PME – posterior median eyes.

TAXONOMY

Artabrus Simon, 1902

Artabrus Simon, 1902: 404.

Type species. – *Plexippus erythrocephalus* C. L. Koch, 1846, by subsequent designation.

Diagnosis. – This genus is similar to *Epeus* in body shape and eye pattern, but can be easily distinguished from the latter in genital structure: copulatory ducts short and parallel, not coiled in loops like that of *Epeus*; spermatheca inflated and elliptic; male palp simple, outgrowth of cymbium and auricular outgrowth of palpal bulb absent.

Remarks. – *Artabrus* is a small genus represented by only three species (Prószyński, 2002), distributed in Indonesia, Philippines and Gilbert Island. However, judging from the illustrations given by Prószyński (2002), *Artabrus jolensis* Simon, 1902, from Philippines and *A. planipudens* (Karsch, 1881) from Gilbert Island might belong to other genera.

Artabrus erythrocephalus (C. L. Koch, 1846),
new record
(Figs. 1A-E)

Plexippus erythrocephalus C. L. Koch, 1846: 102, TF.1164.

Artabrus erythrocephalus - Prószyński, 1984: 1; 1987: 2-3; Zabka & Nentwig, 2002: 466.

Material examined. – 1 female, 1 male (ZRC.ARA.49), Bukit Timah Nat. Res., Singapore, coll. D. H. Murphy, 28 Feb.1968.

Description. – **Male.** Total length 11.31. Cephalothorax 4.59 long, 3.78 wide; abdomen 5.72 long, 2.70 wide. Carapace (Fig. 1A) yellowish brown, eye area reddish brown, with white fine and short hairs, both sides of fovea white. Eye sizes: AME 0.94, ALE 0.48, PME 0.10, PLE 0.51. Anterior eye row 2.97 wide, posterior row 3.06 wide, eye area 1.85 long. Chelicera strong, dark red, with 2 promarginal teeth and 1 retromarginal tooth. Endite and labium yellowish brown. Sternum and legs yellow. Tibiae I and II each with 4 pairs of ventral spines, metatarsi I and II each with 2 pairs of ventral spines. Leg measurements: I 11.93

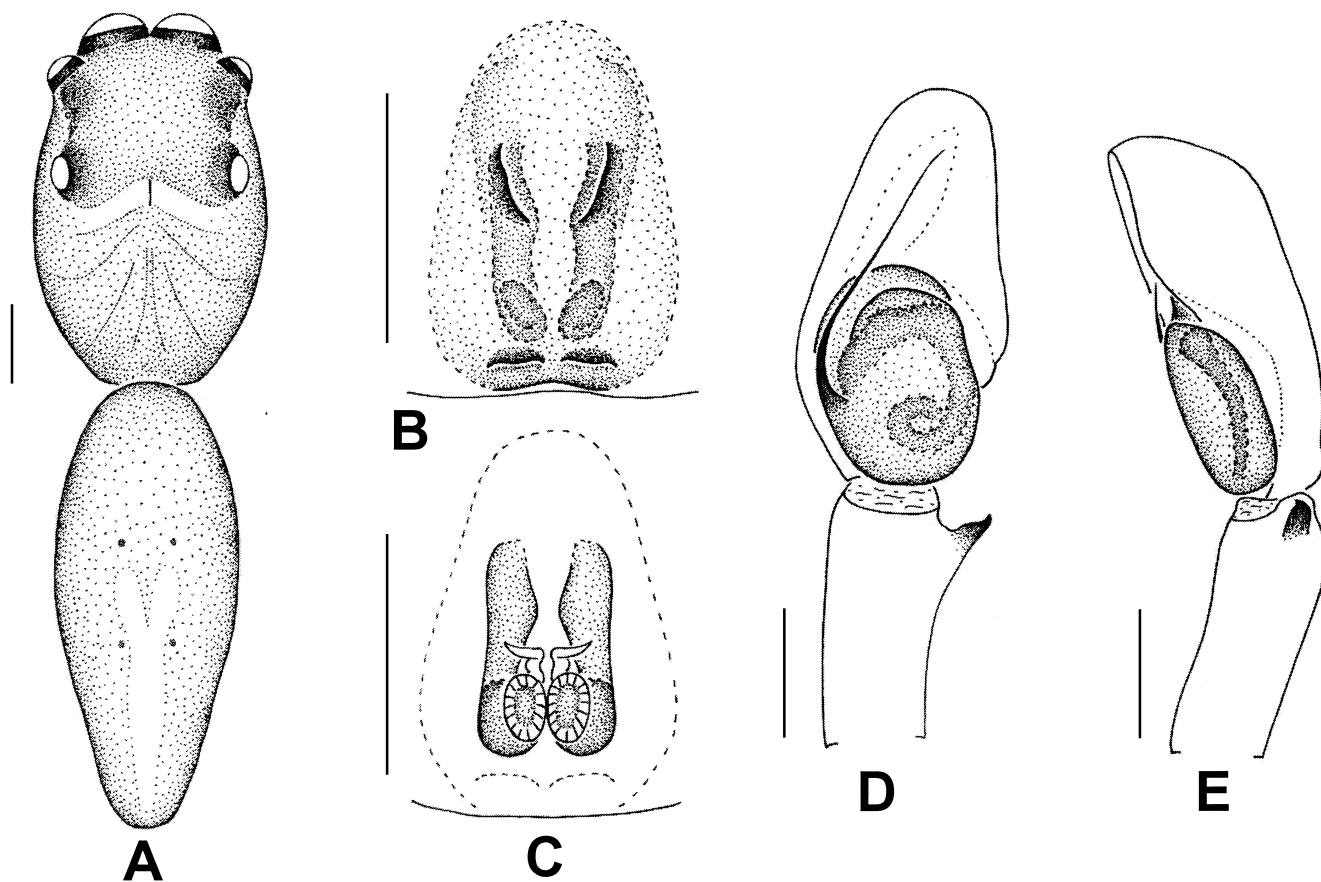


Fig. 1. *Artabrus erythrocephalus* (C. L. Koch, 1846). A. male; B. epigynum, ventral view; C. same, dorsal view; D. left palp, ventral view; E. same, lateral view. Scales: A = 1.0 mm, B - E = 0.5 mm.

(3.33+5.45+2.07+1.08); II 9.06 (2.79+4.01+1.49+0.77); III 10.00 (3.33+3.47+2.16+1.04); IV 9.50 (2.97+3.42+2.21+0.90). Leg formula: 1342. Dorsum of abdomen yellow, center of posterior half part light yellow, with two pairs of brown spots at middle; venter yellow, with two longitudinal brown bands behind genital groove. Embolus of palpal organ (Figs. 1D, E) slender and whip-like; tibial apophysis short.

Female. Total length 10.05. Cephalothorax 4.41 long, 3.51 wide; abdomen 5.67 long, 2.43 wide. Dorsum of abdomen with longitudinal brown stripes on both sides, other characters as those of the male. Leg measurements: I 8.97 (2.66+3.96+1.49+0.86); II 7.71 (2.52+3.11+1.22+0.86); III 9.27 (3.15+3.24+1.89+0.99); IV 8.96 (2.97+3.06+2.03+0.90). Leg formula: 3142. Anterior half of epigynum (Figs. 1B, C) with a trapezoid depression; spermatheca elliptic in shape.

Distribution. – Singapore, Indonesia (Java, Krakatau Island).

***Bathippus* Thorell, 1892**

Bathippus Thorell, 1892: 401.

Type species. – *Plexippus macrognathus* Thorell, 1881, by subsequent designation.

Diagnosis. – This genus is so similar to *Canama* that Prószyński (1987) suggested merging *Canama* with *Bathippus*. However, the studies by Davies & Zabka (1989) led to different conclusions, and indicated that they differed in the cheliceral and epigynal structure. Female epigynum of *Bathippus* with two depressions divided by a median ridge, spermatheca large and round, male chelicera lacking the bifurcated tooth on retromargin; whereas in *Canama*, female epigynum with only one large depression, spermatheca not distinctly inflated, and male chelicera with a bifurcated retromarginal tooth.

Remarks. – Up to now, 28 species have been recorded in the world (Prószyński, 2002), not including the 3 new species reported in this paper. Members of this genus are mainly distributed in the South-east Asia, Australia (Queensland) and New Caledonia.

***Bathippus digitalis*, new species**
(Figs. 2A-D)

Material examined. – Holotype – male (ZRC.ARA.50), Bukit Timah Nat. Res., Singapore, 17 Mar.1968.

Diagnosis. – The arrangement of cheliceral teeth resembles that of *Bathippus palabuanensis* Simon, 1902 (see Simon, 1902: 419; 1903: 726, f. 876-877), but differs from the latter

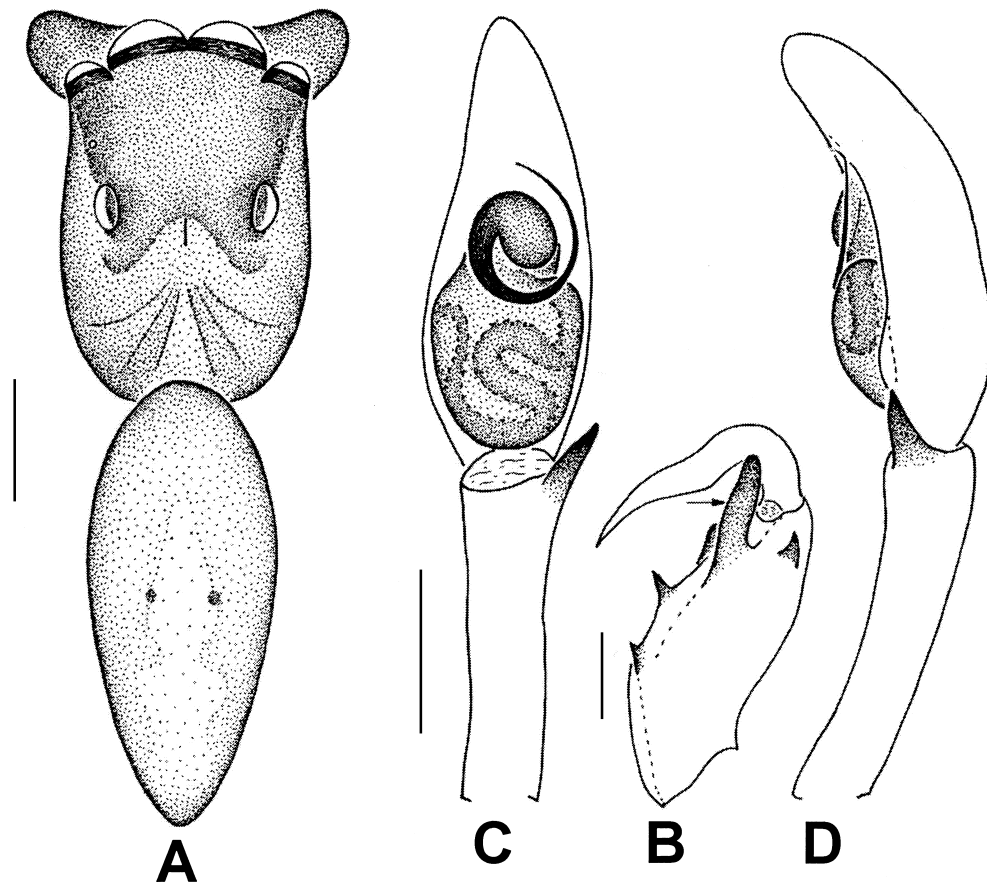


Fig. 2. *Bathippus digitalis*, new species, holotype (ZRC.ARA.50). A. male; B. left chelicera, ventral view (the black arrow refers to the large and finger-like retromarginal tooth); C. left palp, ventral view; D. same, lateral view. Scales: A, B = 1.0 mm, C, D = 0.5 mm.

in the femur I with ventral scopulae; the large tooth on retromargin finger-like, rather than dagger-like; the palpal organ of the new species is similar to that of *Bathippus molossus* (Thorell, 1881) (*Plexippus molossus* Thorell, 1881: 553, 708; *Bathippus molossus* - Prószyński, 1984: 8), but can be distinguished from the latter by the relatively longer embolus and the tibial apophysis which is not hook-like.

Description. – **Male.** Total length 7.20. Cephalothorax 3.33 long, 3.06 wide; abdomen 3.87 long, 1.85 wide. Carapace (Fig. 2A) orange yellow, eye area reddish brown. Eye sizes: AME 0.82, ALE 0.60, PME 0.07, PLE 0.51. Anterior eye row 2.61 wide, posterior row 2.43 wide, eye area 1.58 long. Chelicera (Fig. 2B) long, dark reddish brown, with 3 teeth on promargin and 1 large, finger-like tooth on retromargin, back surface of chelicera with a process near the fang. Endites and labium orange yellow, sternum yellow. Legs I and II orange yellow, III and IV lighter in color. Tibiae I and II each with 3 pairs of ventral spines, metatarsi I and II each with 2 pairs of ventral spines. Femur I and tibia I ventrally with dense scopulae. Leg measurements: I 9.05 (2.70+3.69+1.89+0.77); II 6.98 (2.16+2.70+1.35+0.77); III 9.64 (3.15+3.38+2.34+0.77); IV 7.35 (2.03+2.43+2.12+0.77). Leg formula: 3142. Dorsum of abdomen yellowish brown, centrally with a pair of small reddish brown spots; venter yellow. Embolus of palpal organ (Figs. 2C, D) slender, its basal part elliptic; end of tibial apophysis not hook-like.

Etymology. – The specific name refers to the large finger-like tooth on retromargin.

***Bathippus pahang*, new species**
(Figs. 3A-C)

Material examined. – Holotype – male (ZRC.ARA.51), Pahang, Rompin. Nr Sg. Kinchin, Base Camp, Malaysia, 13 Jun.1989.

Diagnosis. – The new species can easily be distinguished from others of this genus by the short tibia of the male palp, with its length only one third of that of cymbium, and the long and forked tibial apophysis.

Description. – **Male.** Total length 3.30. Cephalothorax 1.71 long, 1.53 wide; abdomen 1.62 long, 1.13 wide. Carapace (Fig. 3A) reddish brown, ALE, PME and PLE surrounded by black circles. Eye sizes: AME 0.51, ALE 0.29, PME 0.07, PLE 0.24. Anterior eye row 1.62 wide, posterior row 1.40 wide, eye area 0.95 long. Chelicera reddish brown, promargin with 2 teeth; retromargin with 1 tooth. Endite and labium reddish brown. Sternum smooth, yellowish brown. Coxa, trochanter, femur, tibia and the tip of metatarsus of leg I reddish brown; other segments yellowish brown, with brown rings. Tibia I with 3 pairs of ventral spines; metatarsi I and II each with 2 pairs of ventral spines. Leg measurements: I 3.83 (1.17+1.58+0.63+0.45); II 3.29 (1.08+1.13+0.63+0.45);

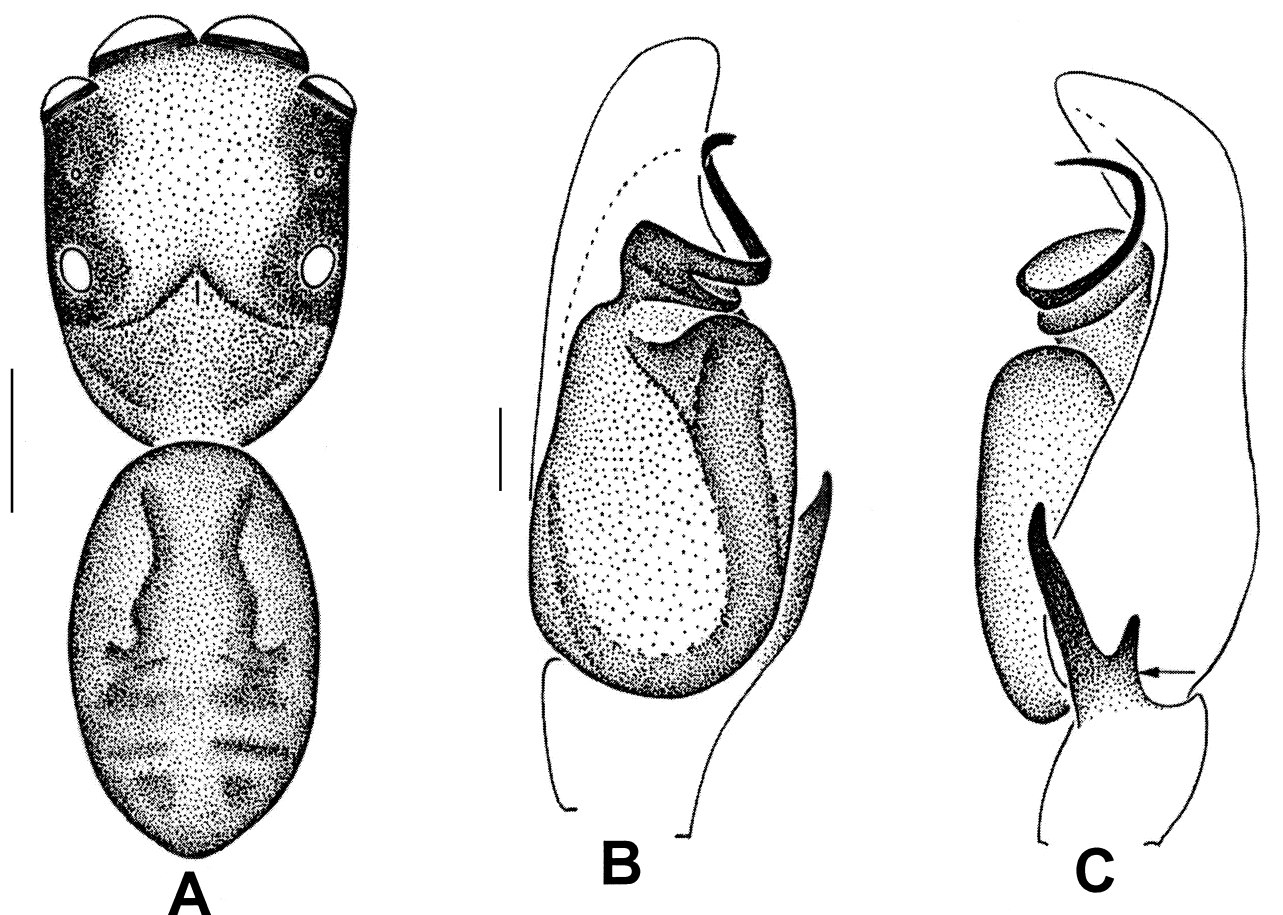


Fig. 3. *Bathippus pahang*, new species, holotype (ZRC.ARA.51). A. male; B. left palp, ventral view; C. same, lateral view (the black arrow refers to the forked tibial apophysis). Scales: A = 0.5 mm, B, C = 0.1 mm.

III 3.74 (1.26+1.08+0.90+0.50); IV 3.65 (1.17+1.17+0.86+0.45). Leg formula: 1342. Dorsum of abdomen yellow, with irregular brown markings; venter light brown. Embolus of palpal organ (Figs. 3B, C) coiled at the tip; tibial apophysis long and forked

Etymology. – The specific name is a noun in apposition taken from the type locality.

***Bathippus rectus*, new species**
(Figs. 4A-D)

Material examined. – Holotype – male (ZRC.ARA.52), Bukit Timah Nat. Res., Singapore, coll. D. Li, 24 Aug.1999.

Paratype – 1 male (ZRC.ARA.53), Bukit Timah Nat. Res., Singapore, coll. D. H. Murphy, 8 Jun.1967.

Diagnosis. – The arrangement of cheliceral teeth of the new species is similar to that of *Bathippus shelfordii* Peckham & Peckham, 1907 (Peckham & Peckham, 1907: 620; Zabka, 1988: 431, f. 22-28), but differs from the latter in the structure of palpal organ; the palpal organ of the new species resembles that of *Bathippus molossus* (Thorell, 1881) (*Plexippus molossus* Thorell, 1881: 553, 708; *Bathippus molossus* - Prószyński, 1984: 8), but differs from the latter in the

embolus relatively longer, coiled in more than one circle and tibial apophysis not hook-like.

Description. – **Males.** Total length 6.75 (paratype)-8.45. Length of holotype 8.45: cephalothorax 3.42 long, 2.79 wide; abdomen 5.09 long, 2.03 wide. Carapace (Fig. 4A) dark brown, the PME and PLE surrounded by black circle. Eye sizes: AME 0.87, ALE 0.49, PME 0.09, PLE 0.46. Anterior eye row 2.48 wide, posterior row 2.25 wide, eye area 1.62 long. Chelicera (Fig. 4B) long, orange yellow, with 3 promarginal teeth and 1 retromarginal tooth. Endite and labium orange yellow, sternum yellow. Legs: femora I, II and patellae I, II dark red, other segments orange yellow. Femur I dorsally and patella I dorsally and ventrally with dense scopulae. Tibiae I, II and metatarsi I, II each with 4 pairs of ventral spines. Leg measurements: I 13.28 (3.87+5.22+ 3.06+1.13); II 10.36 (3.20+3.69+2.34+1.13); III 15.04 (5.09+4.91+4.14+0.90); IV 10.09 (2.93+3.15+3.20+0.81). Leg formula: 3124. Dorsum of abdomen grayish brown (yellow in paratype), centrally with 2 pairs of small brown spots; venter grayish brown, with 4 rows of light yellow, longitudinal markings. Embolus of palpal organ (Figs. 4C, D) slender, coiled into more than one circle, its basal part swollen as a bulb; tibial apophysis finger-like, not curved.

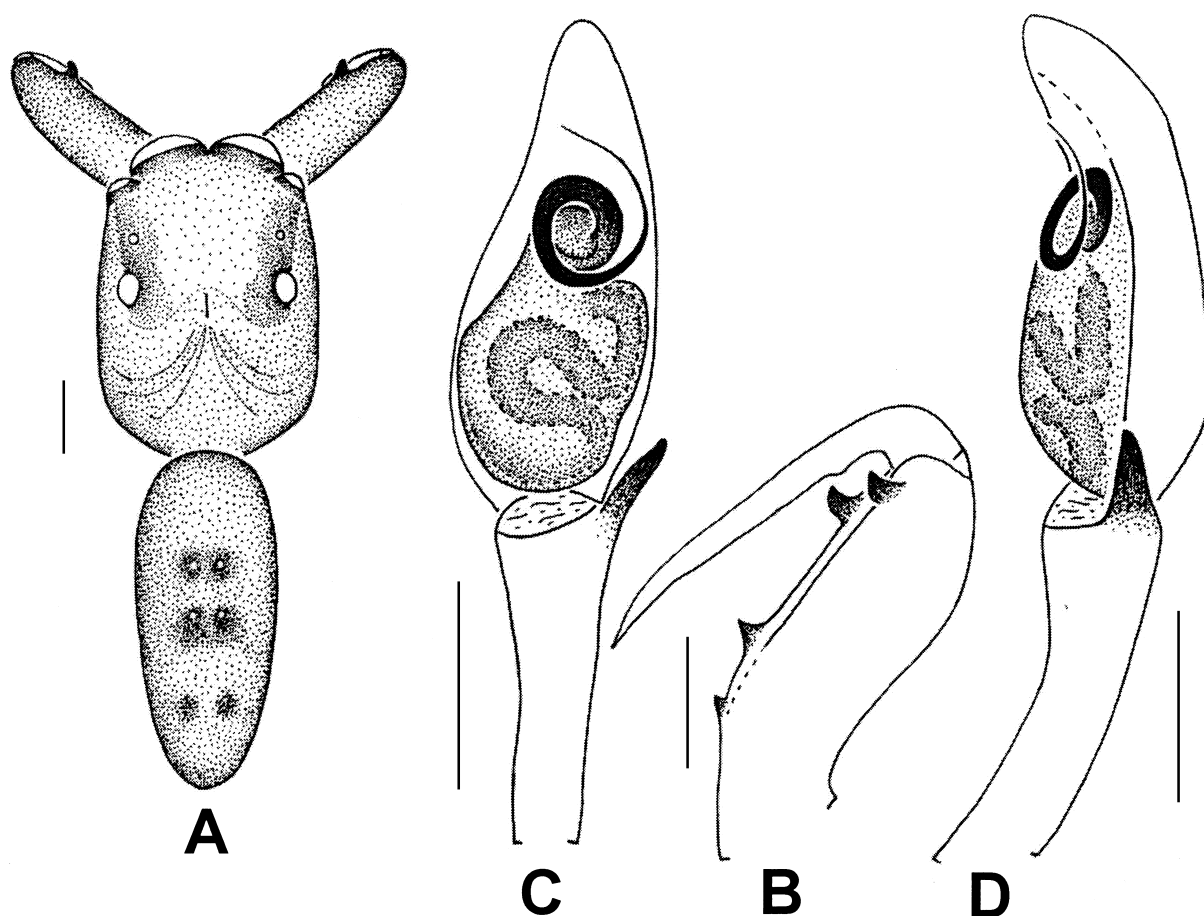


Fig. 4. *Bathippus rectus*, new species, holotype (ZRC.ARA.52). A. male; B. left chelicera, ventral view; C. left palp, ventral view; D. same, lateral view. Scales: A, B = 1.0 mm, C, D = 0.5 mm.

Etymology. – The specific name refers to the straight apophysis of palpal tibia.

***Epeus* Peckham & Peckham, 1886**

Epeus Peckham & Peckham, 1886: 271, 334.

Type species. – *Evenus tenera* Simon, 1877, by original designation; Zabka, 1985: 214; Peng et al., 1993: 48.

Diagnosis. – The genus is similar to *Plexippoides* in epigynum with a shallow depression, long copulatory duct forming several loops; palpal organ with outgrowth of cymbium and auricular outgrowth of palpal bulb. However, it differs from the latter in: cephalothorax distinctly tall, outgrowth of cymbium long and located at outside or front of the tibial apophysis, auricular outgrowth at central or back part of the palpal bulb.

Remarks. – Members of this genus are mainly distributed in South-east Asia. Up to now, 11 species have been recorded in the world (Platnick, 2003), not including the new species described in this paper.

***Epeus furcatus*, new species**
(Figs. 5A-C)

Material examined. – Holotype – male (ZRC.ARA.116), Bukit Timah Nat. Res., Singapore, 8 Jun.1967.

Paratype – 1 male (ZRC.ARA.116), same data as holotype, coll. D. H. Murphy.

Diagnosis. – The new species is similar to *Epeus tener* (Simon, 1877) (*Evenus tenera* Simon, 1877: 59, T. 3, F. 12; *Epeus tener* - Zabka, 1985: 216, f. 125-126) in the shape of palp, but differs from the latter in having the tibial apophysis of palp short, and outgrowth of cymbium forked.

Description. – **Males.** Total length 6.75 (paratype)-7.20. Length of holotype 7.20: cephalothorax 3.15 long, 2.61 wide; abdomen 4.05 long, 1.35 wide. Carapace (Fig. 5A) orange yellow, eye area silvery white. Eye sizes: AME 0.82, ALE 0.37, PME 0.07, PLE 0.36. Anterior eye row 2.16 wide, posterior row 2.03 wide, eye area 1.53 long. Chelicera reddish brown, with 2 promarginal teeth and 1 retromarginal tooth. Endites and labium reddish brown, sternum yellow

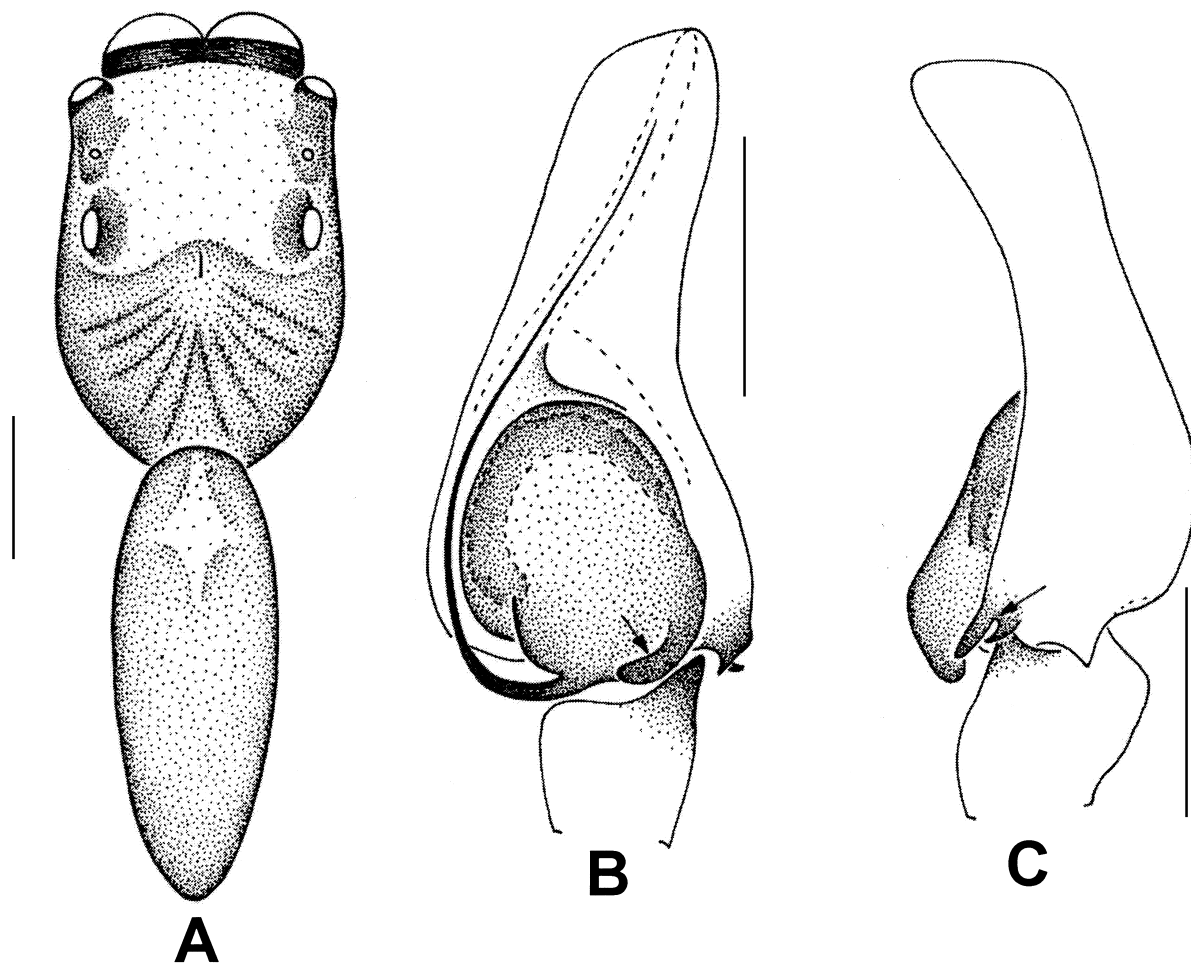


Fig. 5. *Epeus furcatus*, new species, holotype (ZRC.ARA.116). A. male; B. left palp, ventral view (the black arrow refers to the auricular outgrowth); C. same, lateral view (the black arrow refers to the outgrowth of cymbium). Scales: A = 1.0 mm, B, C = 0.5 mm.

and smooth. Legs I and II yellowish brown, III and IV light in color, yellow. Tibiae I and II each with 4 pairs of ventral spines, metatarsi I and II each with 2 pairs of ventral spines. Tibiae I, II and metatarsi I, II ventrally with dense scopulae. Leg measurements: I 10.14 (2.97+4.19+2.12+0.86); II 9.87 (3.29+3.74+1.98+0.86); III 10.13 (3.15+3.51+2.61+0.86); IV 8.38 (2.43+2.61+2.48+0.86). Leg formula: 1324. Dorsum of abdomen yellow, cardiac spot light yellow; venter yellow. Embolus of palpal organ (Figs. 5B, C) slender; outgrowth of cymbium forked; tibial apophysis short and thumb-like.

Etymology. – The specific name refers to the forked outgrowth of cymbium.

***Pancorius* Simon, 1902**

Pancorius Simon, 1902: 410.

Type species. – *Ergane dentichelis* Simon, 1899, by subsequent designation; Zabka, 1985: 422.

Diagnosis. – This genus is similar to *Hyllus*. Body big, thickset and densely haired. Male palpal organ simple; epigyne with 2 pockets, and internal structures with 2-3 chambers.

Remarks. – A total of 24 species from South and South-east Asia has been reported in the world (Prószyński, 2002).

***Pancorius kohi*, new species**
(Figs. 6A-C)

Material examined. – Holotype – female (ZRC.ARA.267), Labrador Park, Singapore, coll. H. K. Lua, 16 Jan.1991.

Paratype – 1 female (ZRC.ARA.268), Labrador Park, Singapore, 20 Apr.1991.

Diagnosis. – This new species can be easily distinguished by its epigynum having only one slit-like intromittent pore, internal structures with three chambers, of which the first one is small and round, and the third one large and triangular.

Description. – **Female.** Total length 5.90 (paratype)-6.70. Length of holotype 6.70: cephalothorax 3.42 long, 2.48 wide; abdomen 3.33 long, 2.43 wide. Carapace (Fig. 6A) reddish brown. Eye area 1.17 long. Eye sizes: AME 0.54, ALE 0.29, PME 0.07, PLE 0.27. Anterior eye row 1.94 wide, posterior row 1.80 wide, eye area 1.17 long. Chelicera reddish brown, each margin with 4 teeth. Endites and labium reddish brown. Sternum yellowish brown, covered with dense black setae.

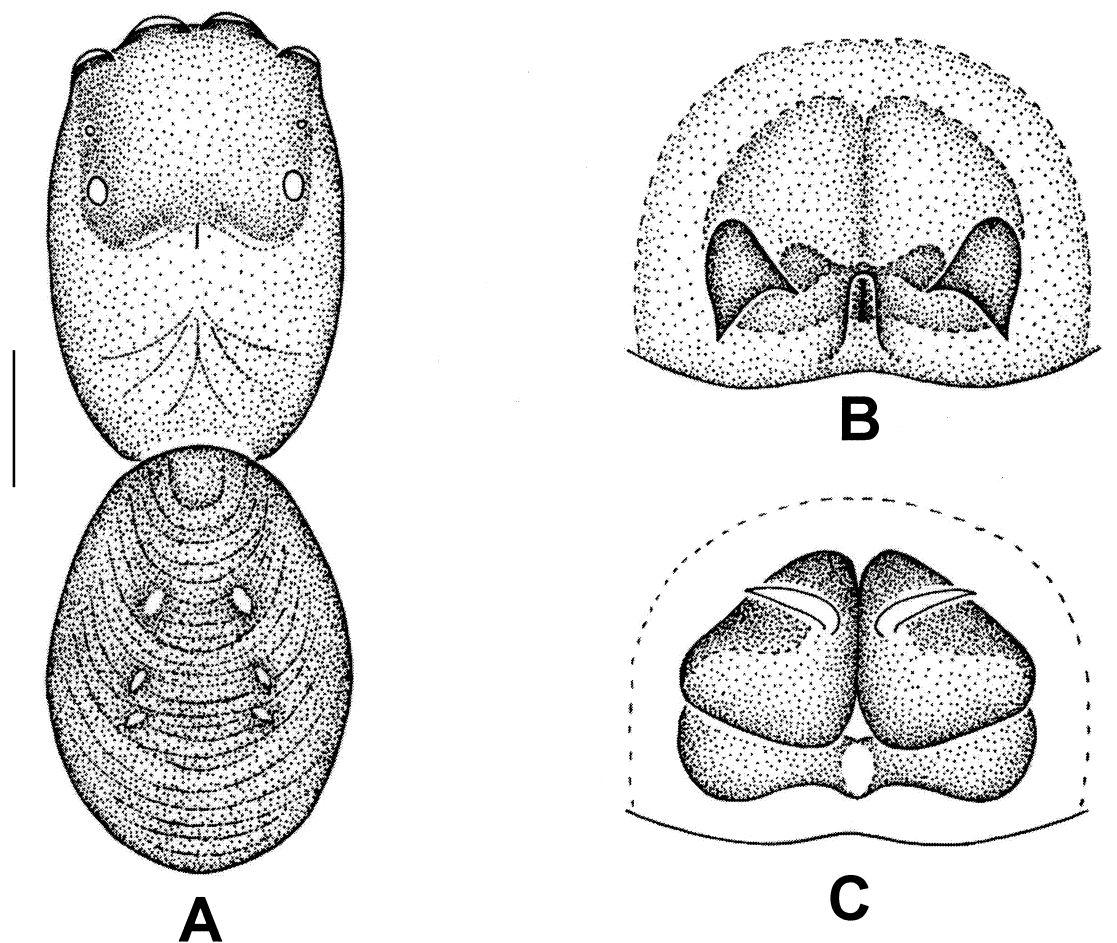


Fig. 6. *Pancorius kohi*, new species, holotype (ZRC.ARA.267). A. female; B. epigynum, ventral view; C. same, dorsal view. Scales: A = 1.0 mm, B, C = 0.1 mm.

Legs yellowish brown, covered with long and brown hairs. Metatarsi I and II each with 2 pairs of ventral spines. Leg measurements: I 5.63 (1.71+2.39+0.90+0.63); II 5.77 (1.80+2.39+0.90+0.68); III 6.48 (2.16+2.52+1.17+0.63); IV 6.76 (2.16+2.30+1.53+0.77). Leg formula: 4321. Dorsum of abdomen dark brown, covered densely with short brown hairs, with light brown markings, at middle provided with 3 pairs of yellowish brown spots; venter light brown. Epigynum (Figs. 6B, C) with two hoods, one slit-like intromittent pore located posteriorly at the middle of epigynum; internal structures with three chambers, the first one small and round, the third one large and triangular.

Etymology. – The specific name is a patronym in honor of Mr. J. K. H. Koh, who has made contributions to the study of spiders of Singapore.

Simaetha Thorell, 1881

Simaetha Thorell, 1881: 520.

Type species: *Simaetha thoracica* Thorell, 1881, by original designation; Zabka, 1994: 500.

Diagnosis. – Spiders of this genus resemble those of *Simaethula*, but can be distinguished from the latter by: PLEs about middle of carapace, PME not much farther from PLEs than from ALEs, sternum of male with conical prominence. This genus is also similar to *Stertinus*, but the difference

between them is still unclear for the type species of *Stertinus* lacking reliable diagnostic illustration and description.

Remarks. – A total of 20 species has been reported in the world (Prószyński, 2002), being distributed in Australia, Africa (Congo), South and South-east Asia.

Simaetha deelemanae, new species (Figs. 7A-E)

Material examined. – Holotype – male (ZRC.ARA.342), Bukit Timah Nat. Res., Singapore, coll. D. H. Murphy, 14 Sep.1967.

Diagnosis. – The new species resembles *Simaetha almadenensis* Zabka, 1994 (Zabka, 1994: 529, f. 19A-D), but differs from the latter by having (1) the embolus of palpal organ longer; (2) the tibial apophysis finger-like with its basal part narrow; (3) the tibia of the palp shorter than tarsus.

Description. – **Male.** Total length 4.37. Cephalothorax 2.25 long, 2.25 wide; abdomen 2.16 long, 1.89 wide. Carapace (Fig. 7A) dark reddish brown, with iridescent color. Eye sizes: AME 0.55, ALE 0.27, PME 0.10, PLE 0.25. Anterior eye row 1.71 wide, posterior row 2.16 wide, eye area 1.04 long. Chelicera strong, reddish brown, promargin with 3 large teeth and 4 small teeth (Fig. 7B); retromargin with 1 tooth and 1 forked fissidentate (Fig. 7C). Endite and labium reddish brown. Sternum with iridescent color. Legs yellowish brown. Coxae of legs with a notch at the base. Leg I stout, femur,

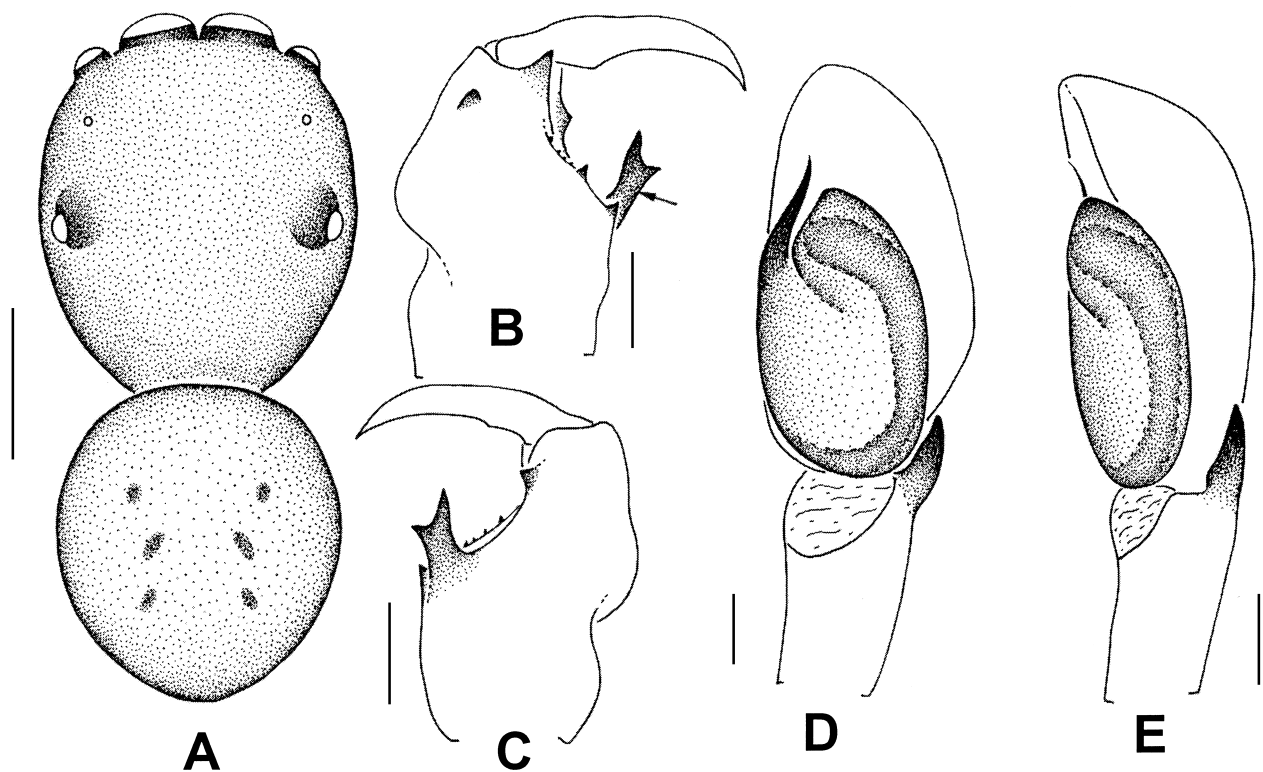


Fig. 7. *Simaetha deelemanae*, new species, holotype (ZRC.ARA.342). A. male; B. left chelicera, dorsal view (the black arrow refers to the retromarginal fissidentate); C. same, ventral view; D. left palp, ventral view; E. same, lateral view. Scales: A = 1.0 mm, B, C = 0.5 mm, D, E = 0.1 mm.

patella and tibia swollen; tibiae with scopulae ventrally and 2 pairs of stout spines; metatarsi with 2 pairs of stout ventral spines. Leg measurements: I 4.92 (1.44+2.03+0.86+0.59); II 3.96 (1.26+1.44+0.72+0.54); III 3.25 (1.13+1.17+0.54+0.41); IV 4.33 (1.53+1.58+0.81+0.41). Leg formula: 1423. Dorsum of abdomen reddish brown, with iridescent color, with 3 pairs of dark brown spots at middle; venter brown. Embolus of palpal organ (Figs. 7D, E) slender, tibial apophysis finger-like.

Etymology. – The specific name is a patronym in honor of Dr. Christa L. Deeleman-Reinhold, who has contributed to the study of the spiders from South-east Asia.

Remarks. – The new species is placed in the genus *Simaetha* for its resemblance with the species *Simaetha almadenensis* Zabka, 1994.

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