

A new spider species of the genus *Cocalus* C.L. Koch, 1846 (Araneae: Salticidae: Spartaeinae) from Western Ghats of India

Новый вид пауков из рода *Cocalus* C.L. Koch, 1846 (Araneae: Salticidae: Spartaeinae) из Западных Гат Индии

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КЛЮЧЕВЫЕ СЛОВА: Aranei, паук-скакунчик, описание, карта распространения, Керала, Уэйнадский заповедник.

ABSTRACT. A new species of the jumping spider genus *Cocalus* C.L. Koch, 1846 — *C. lacinia* sp.n. (♂♀) — is diagnosed and described from the Wayanad Wildlife Sanctuary, Western Ghats, Kerala, India. A detailed morphological description, diagnostic features and illustrations of the copulatory organs of both sexes are given. The current distribution of the genus in India is mapped as well.

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РЕЗЮМЕ. Диагностирован и описан новый вид пауков-скакунчиков из рода *Cocalus* C.L. Koch, 1846 из Уэйнадского заповедника, Западные Гаты, Керала, Индия: *C. lacinia* sp.n. (♂♀). Приведены детальное морфологическое описание, диагностические признаки и иллюстрации копулятивных органов обоих полов. Также прокартировано современное распространение рода в Индии.

Introduction

The Spartaeine genus *Cocalus* C.L. Koch, 1846 is a poorly studied salticid group confined to the Oriental and Australian Regions. The genus is characterized by the presence of an elevation in the posterior ocular quadrangle in both sexes and the sinuous finger-like projection resting on the male palpal retrolateral tibial apophysis [Wanless, 1981]. Currently, the genus consists of five valid species, of which the only one, *Cocalus murinus* Simon, 1899, has been reported from

the Indian subcontinent [Roy *et al.*, 2016; WSC, 2018]. In the present paper, we aim to describe and illustrate a new species, *Cocalus lacinia* sp.n. (♂♀), collected from the Wayanad Wildlife Sanctuary lying in Western Ghats in Kerala, one of the biodiversity hotspots of the world [Myers *et al.*, 2000]. The current geographic distribution of the genus in India is mapped as well.

Materials and methods

Field photos were taken with a Canon EOS 5D Mark-III using Canon EF 100 mm f/2.8 Macro USM Lens, Canon MP-E 65 mm 1–5x Macro Lens and Canon MT-24EX Macro Twin Lite Flash. Spiders were hand-collected, and the specimens were stored in 70% ethanol. A morphological examination was undertaken under a Leica M205 C stereomicroscope. The microphotographic images were taken by means of Leica DMC4500 digital camera attached to Leica M205 C stereomicroscope, with the software package Leica Application Suite (LAS), version 4.3.0. LAS montage facility. All measurements are in mm. Measurement data for palps and legs are as follows: total length [femur, patella, tibia, metatarsus (except palp), tarsus]. The studied specimens are deposited in the reference collection at the Centre for Animal Taxonomy and Ecology (CATE), Department of Zoology, Christ College (Autonomous), Irinjalakuda, Kerala, India.

Abbreviations used in the text and figure plates: ALE — anterior lateral eyes, AME — anterior median eyes, co — copulatory opening, do — dorsal, e — embolus, ec — extension of cymbium, fd — fertilization duct, pl — prolateral, PLE — posterior lateral eyes, PME — posterior median eyes, plv — prolateral ventral, rl — retrolateral, RTA — retrolateral tibial apophysis, rlv — retrolateral ventral, t — tegulum, v — ventral, VTA — ventral tibial apophysis, vto — ventral tibial outgrowth. The terminology follows Reiskind [1969]; that for leg spination follows the format by Bosselaers & Jocque [2000].



Figs 1–2. General appearance of *Cocalus lacinia* sp.n. from the Wayanad Wildlife Sanctuary, Kerala, India: 1 — holotype male, dorsal view; 2 — paratype female, dorsal view.

Рис. 1–2. Общий вид *Cocalus lacinia* sp.n. из Уэйнадского заповедника, Керала, Индия: 1 — самец голотип, сверху; 2 — самка паратип, сверху.

Description

Genus *Cocalus* C.L. Koch, 1846

Type species: *C. concolor* C.L. Koch, 1846

Cocalus lacinia sp.n.

Figs 1–19, Map.

TYPE. Holotype ♂ (CATE, 8402A) from the Wayanad Wildlife Sanctuary (11°45'27.6"N, 76°14'50.5"E), Kurichiad Range, Wayanad District, Kerala, India, 916 m a.s.l., 10.06.2015, P.P. Sudhin & K.S. Nafin.

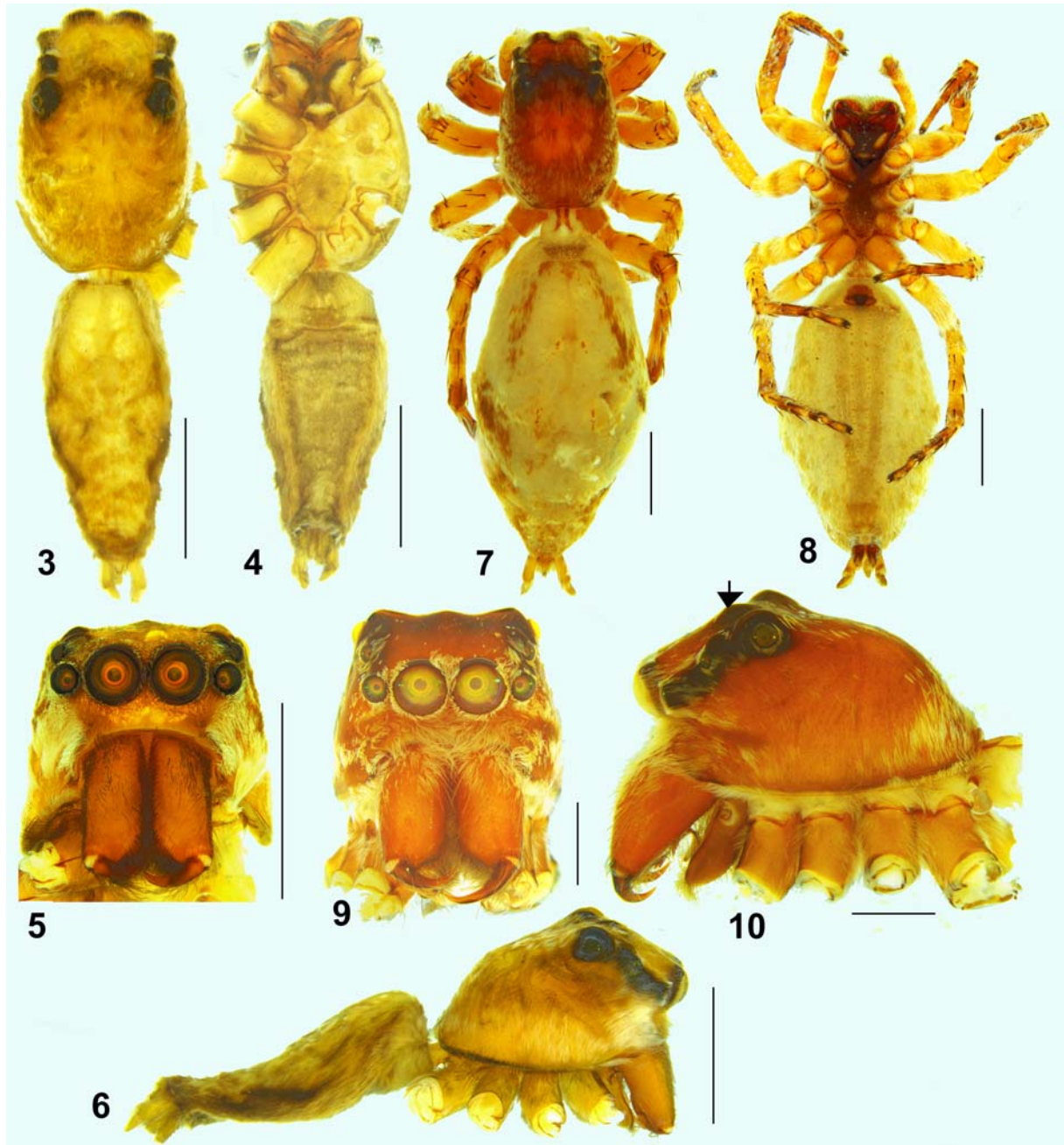
PARATYPE: INDIA: 1 ♀ (CATE, 8402B), the same locality (11°45'56.3"N, 76°14'57.9"E), 842 m a.s.l., 9.06.2015, P.P. Sudhin & K.S. Nafin.

ETYMOLOGY. The specific epithet is a noun in apposition originated from the Latin word *lacinia*, meaning a flap and referring to the presence of a flap-like structure on the basal tibia of the male palp.

DIAGNOSIS. The male of *C. lacinia* sp.n. is similar to that of *C. gibbosus* Wanless, 1981 from Australia (Queensland), but differs from it in the following combination of characters: the embolus is positioned almost vertically at the distal end of the tegulum (slightly shifted retrolaterally in *C. gibbosus*); the VTA thumb-shaped, with a sub-acute tip (more stout and truncate in *C. gibbosus*); the palpal tibia basally with a flap-like ventral outgrowth (which is absent from *C. gibbosus*). The female of *C. lacinia* sp.n. is closest to that of *C. menglaensis* Cao, Li et Żabka, 2016 from China (Yunnan), but can be distinguished by the following characters: the abdomen elongated and robust (slightly shorter and linear in *C. menglaensis*); the epigynal plate without prominent posterior projections (prominent, heavily sclerotized and rectangular in *C. menglaensis*); the copulatory openings are located posteriorly (slightly below the middle area in *C. menglaensis*); the spermathecae globular, with a posterior triangular extension (phaseoliform, without posterior triangular extension in *C. menglaensis*) (cf. figs 7, 8, 12, 14–16, 18–19 with figs 4C–D in Wanless [1981], fig. 4 in Davies & Żabka [1989], and figs 18 A–B, D–E in Cao *et al.* [2016]).

DISTRIBUTION. The type locality only (Map).

DESCRIPTION. MALE (holotype; Figs 1, 3–6, 11–13, 16–17). Measurements: body length 8.32. Carapace length 3.62, width (at the middle) 2.47, height at PLE 1.79. Abdomen length 4.41, width (at the middle) 1.81. Ocular area length 1.81, width 2.02. Eye diameters: AME 0.59, ALE 0.29, PME 0.16, PLE 0.31. Eye interdistances: AME–ALE 0.08, PME–PME 1.64, ALE–ALE 1.34, PME–PLE 0.47, PLE–PLE 1.64, ALE–PME 0.48. Clypeus height 0.32. Length of chelicera 1.01. Palp and leg measurements: palp 3.12 [0.84, 0.59, 0.52, 1.17], leg I 8.51 [2.14, 1.2, 2.28, 1.88, 1.01], II 9.49 [2.41, 1.09, 2.69, 2.29, 1.01], III 7 [1.96, 0.78, 1.76, 1.63, 0.87], IV 9.23 [2.48, 1.05, 2.24, 2.42, 1.04]. Leg formula: 2413. Spination. Palp: femur rl 1, do 2, pl 1; tarsus rl 1 pl 1; Legs: femur I–II rl 1 do 3 pl 2, III–IV rl 1 do 3 pl 2; patellae I–IV rl 1 pl 1; tibia I–II rl 3 rlv 3 do 3 pl 3 plv 3, III–IV rl 3 rlv 3 do 2 pl 3 plv 3; metatarsi I–II rl 3 rlv 2 do 1 pl 2 plv 1 v 1, III–IV rl 3 rlv 2 do 1 pl 3 plv 2 v 1; tarsi I–IV spineless. Carapace light yellowish brown, covered with white, brown and black setae, laterally with a white band extending from ALE to the rear end, narrowing towards it; carapace margins with a row of small black hairs (Figs 3, 6); eye field covered with chocolate white hairs; fovea light reddish brown, situated just behind PLEs (Fig. 3); clypeus low, vertical, covered with long white setae (Fig. 5); chelicerae light reddish brown, sub-vertical, frontal face with brown and white hairs (Fig. 5), pro- and retromargins with three teeth, fangs medium-sized, reddish brown; endites yellowish brown, with dull white inner tips and dark grey hairs on inner margin, margin of endites with narrow dark brown lines (Fig. 4). Labium light brown, scopulate, with a dull white tip. Sternum almost oval, yellowish brown, covered with brown and white hairs (Fig. 4). Pedicel light yellowish, with reddish-brown lateral stripes (Figs 3, 6). Abdomen pale yellow, ovoid, posteriorly narrowing, covered with black and white hairs, dorsally with irregular light brown transverse patches, laterally with continuous irregular black stripes (Figs 3, 6). Venter yellowish brown, covered with numerous brown hairs, its posterior tip with dense white hairs (Fig. 4). Spinnerets yellowish brown, covered with dark brown hairs. Legs yellow, covered with hairs, setae and spines, all trochanters with a row of prolateral and retrolateral black setae, tarsal claw with eleven teeth.



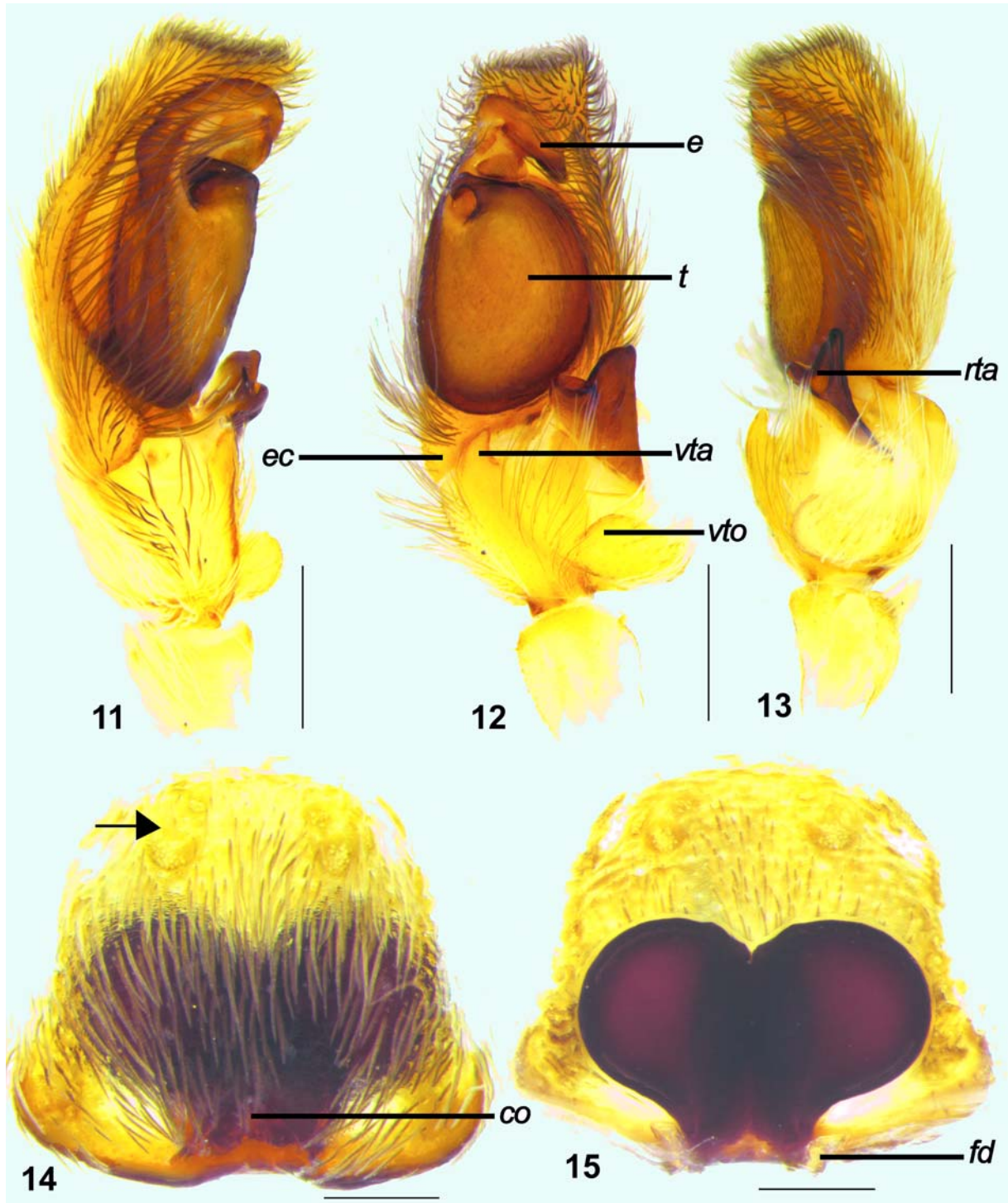
Figs 3–10. Somatic characters of *Cocalus lacinia* sp.n., holotype male (3–6) and paratype female (7–10): 3, 7 — body, dorsal view; 4, 8 — ditto, ventral view; 5, 9 — carapace, frontal view; 6 — body, lateral view; 10 — carapace, lateral view. Scale bar: (3–6, 7–8) 2 mm, (9–10) 1 mm.

Рис. 3–10. Соматические признаки *Cocalus lacinia* sp.n., самец-голотип (3–6) и самка-паратип (7–10): 3, 7 — тело, сверху; 4, 8 — то же, снизу; 5, 9 — головогрудь, спереди; 6 — тело, сбоку; 10 — головогрудь, сбоку. Масштаб: (3–6, 7–8) 2 мм (9–10) 1 мм.

Palp as shown in Figs 11–13, 16–17. Palp moderately long, pale yellowish, densely covered with hairs; tibia base with a flap-like ventral outgrowth, which is retrolaterally oriented (Figs 12, 16); VTA thumb like, wide at the base, with sub-acute tip (Figs 12, 16: vto); RTA dark reddish brown, with wide sinuous edge (Figs 12–13, 16–17: rta); cymbium broad, moderately long, distally truncate, with posterior triangular extension (Fig. 12: ec); tegulum ovoid, light brown with tegular furrow, retrolateral striae and dark

reddish brown peripheral seminal duct (Figs 12, 16); embolus robust, hook-shaped, with the pointed tip curving inwards, towards the alveolar cavity (Figs 12–13, 16–17: e).

FEMALE (paratype; Figs 2, 7–10, 14–15, 18–19): Measurements: body length 12.71. Carapace length 3.88, width (at the middle) 2.83, height at PLE 2.25. Abdomen length 8.34, width (at the middle) 4.01. Ocular area length 1.72, width 2.21. Eye diameters: AME 0.66, ALE 0.33, PME 0.22, PLE 0.32. Eye interdistances: AME–ALE 0.09, PME–

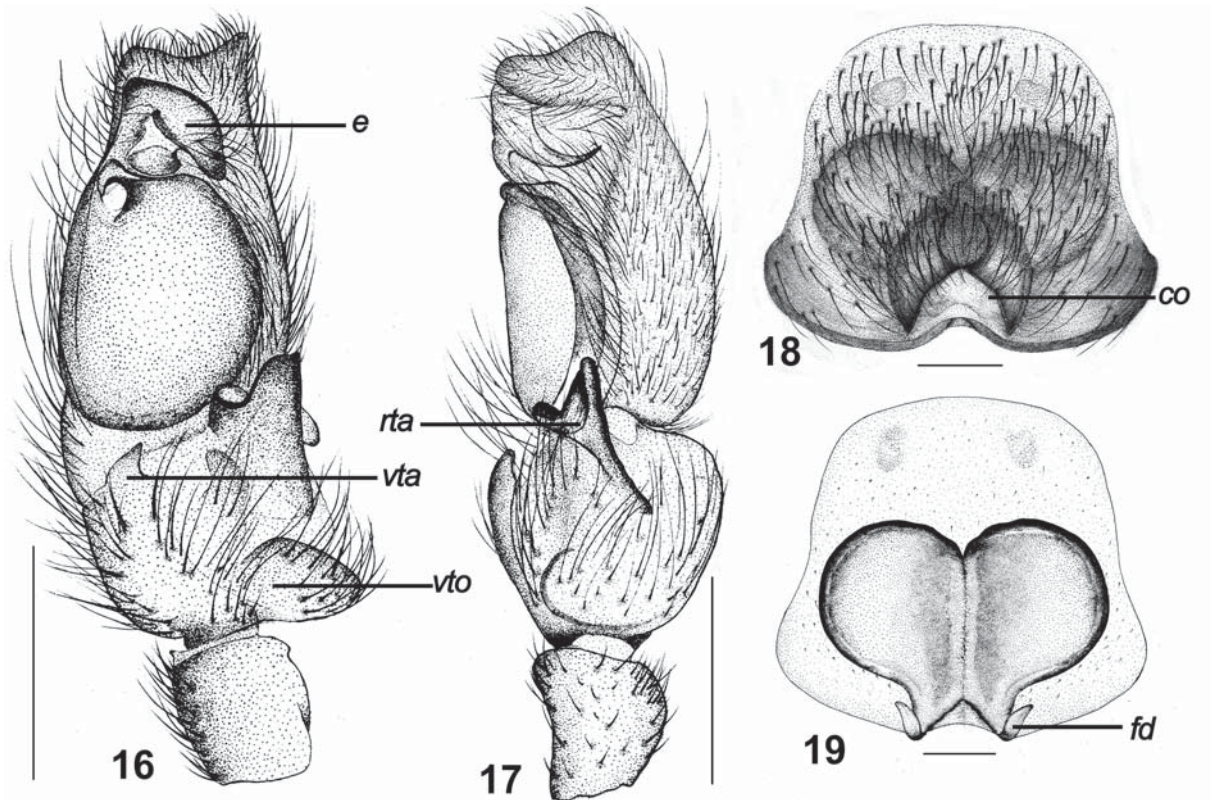


Figs 11–15. Copulatory organs of *Cocalus lacinia* sp.n. (holotype male and paratype female): 11 — male left palp, prolateral view; 12 — ditto, ventral view; 13 — ditto, retrolateral view; 14 — epigyne, ventral view; 15 — spermathecae, dorsal view. Scale bar: (11–13) 0.5 mm, (14–15) 0.2 mm.

Рис. 11–15. Копулятивные органы *Cocalus lacinia* sp.n. (самец-голотип и самка-паратип): 11 — левая пальпа самца, спереди-сбоку; 12 — то же, снизу; 13 — то же, сзади-сбоку; 14 — эпигина, снизу; 15 — сперматека, сверху. Масштаб: (11–13) 0,5 мм, (14–15) 0,2 мм.

PME 1.73, ALE–ALE 1.47, PME–PLE 0.32, PLE–PLE 1.88, ALE–PME 0.31. Clypeus height 0.35. Length of chelicera 1.51. Palp and leg measurements: palp 3.81 [1.08, 0.62, 0.77, 1.34], leg I 8.11 [2.28, 1.30, 2.18, 1.49, 0.86], II 7.73

[2.21, 1.21, 1.99, 1.44, 0.88], III 7 [2.21, 0.83, 1.88, 1.40, 0.68], IV 10.03 [2.72, 1.19, 2.43, 2.68, 1.01]. Leg formula: 4123. Spination. Palp: femur rl 1 do 2 pl 1, tibia rl 1, tarsus rl 2 rlv 1 pl 1 plv 1 v 1; Legs: femur I–II rl 3 do 3 pl 2, III–IV



Figs 16–19. Copulatory organs of *Cocalus lacinia* sp.n. (holotype male and paratype female): 16 — male left palp, ventral view; 17 — ditto, retrolateral view; 18 — epigyne, ventral view; 19 — spermathecae, dorsal view. Scale bar: (16–17) 0.5 mm, (18–19) 0.2 mm.

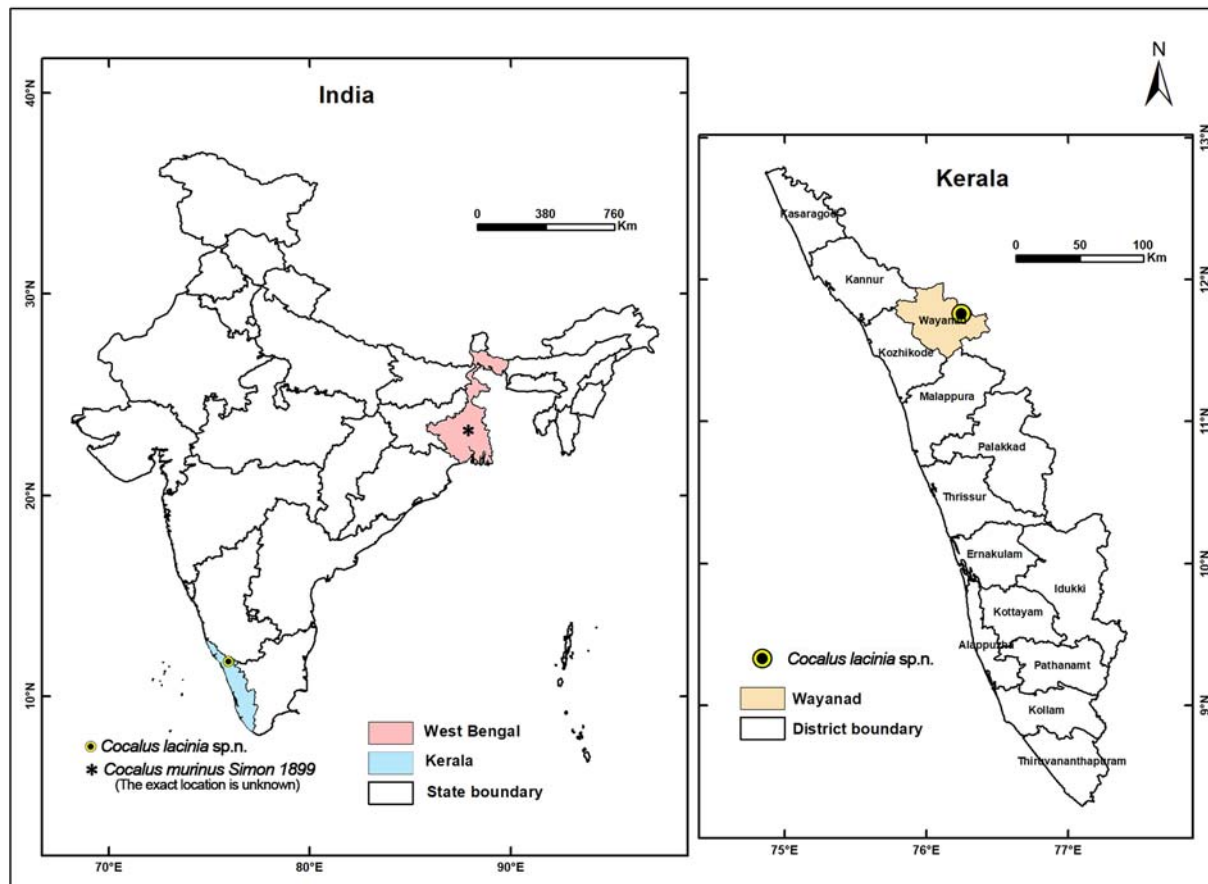
Рис. 16–19. Копулятивные органы *Cocalus lacinia* sp.n. (самец-голотип и самка-паратип): 16 — левая пальпа самца, снизу; 17 — то же, сзади-сбоку; 18 — эпигина, снизу; 19 — сперматека, сверху. Масштаб: (16–17) 0,5 мм, (18–19) 0,2 мм.

rl 2 do 2 pl 3; patellae I–IV rl 1 pl 1; tibia I–II rl 3 rlv 3 do 3 pl 3 plv 3, III–IV rl 3, rlv 3 do 2 pl 3 plv 3; metatarsi I–II rl 3 rlv 1 do 1 pl 3 plv 1, III–IV rl 2 rlv 2 do 1 pl 2 plv 2 v 1; tarsi I–IV spineless. In all respects as the male, except as follows: carapace light reddish brown, covered with white setae, more elongate and appressed in the ocular quadrangle, margin of carapace with narrow dark reddish brown lines, region around the posterior quadrangle with a wide inverted V-shaped black mottling (Fig. 7); posterior ocular quadrangle elevation more prominent (arrowed in Fig. 10); fovea distinct, longitudinal, dark reddish-brown (Fig. 7); clypeus light reddish brown, densely covered with white hairs (Fig. 9); chelicerae reddish brown, promargin with three teeth and retromargin with four teeth; labium dark brown, maxillae and sternum light brown (Fig. 8). Abdomen more elongated, slightly robust, pale yellow, covered with white and brown setae, dorsally with a median light brown longitudinal stripe terminating at the middle, laterally with continuous irregular similar coloured stripes (Fig. 7). Venter pale yellow, medially with three longitudinal light greyish brown stripes and four longitudinal light brown dot lines (Fig. 8). Anterior and median spinnerets light yellowish brown, posterior spinnerets light brown. Epigyne as shown in Figs 14–15, 18–19. Epigyne bell-shaped, golden-light brown, covered with long creamy hairs, posterior borderline with a median invagination (Figs 14, 18), anteriorly with a pair of kidney-shaped thickenings (arrowed in Fig. 14); copulatory openings at the lateral margins of the posterior triangular groove (Figs 14,

18: co); spermathecae massive, globular, dark reddish brown, compact, with posterior triangular extension (Figs 15, 19); insemination duct short, entering the spermathecae mid-ventrally; fertilization duct short, anterolaterally oriented, located at the posterior tip of the spermathecae (Figs 15, 19: fd).

HABITAT. The studied specimens were collected from the bark of *Tectona grandis* (Lamiaceae) in the Teak plantation of the Wayanad Wildlife Sanctuary, Kerala, India.

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Map. Collecting localities of the genus *Cocalus* C.L. Koch, 1846 in India.
Карта. Точки находок рода *Cocalus* C.L. Koch, 1846 в Индии.

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