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A new species and new synonym in the genus *Colopsus* Simon, 1902 (Araneae: Salticidae: Plexippina) from India

Новый вид и новый синоним в роде *Colopsus* Simon, 1902 (Araneae: Salticidae: Plexippina) из Индии

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KEY WORDS: Aranei, description, Karnataka, Sri Lanka, taxonomy.

КЛЮЧЕВЫЕ СЛОВА: Aranei, описание, Карнатака, Шри-Ланка, таксономия.

ABSTRACT. A new jumping spider species, *Colopsus arkavathi* Caleb sp.n. (♂♀), is described from Karnataka, India. A new combination, *C. manu* (Caleb, Christudhas, Laltanpuii et Chitra, 2014) comb.n. (ex. *Hyllus*) is proposed; the latter species name is recognized as a senior synonym of *C. cinereus* Kanesharatnam et Benjamin, 2021 syn.n. A detailed description, illustrations, and a map showing the records of all the known Indian *Colopsus* congeners are provided.

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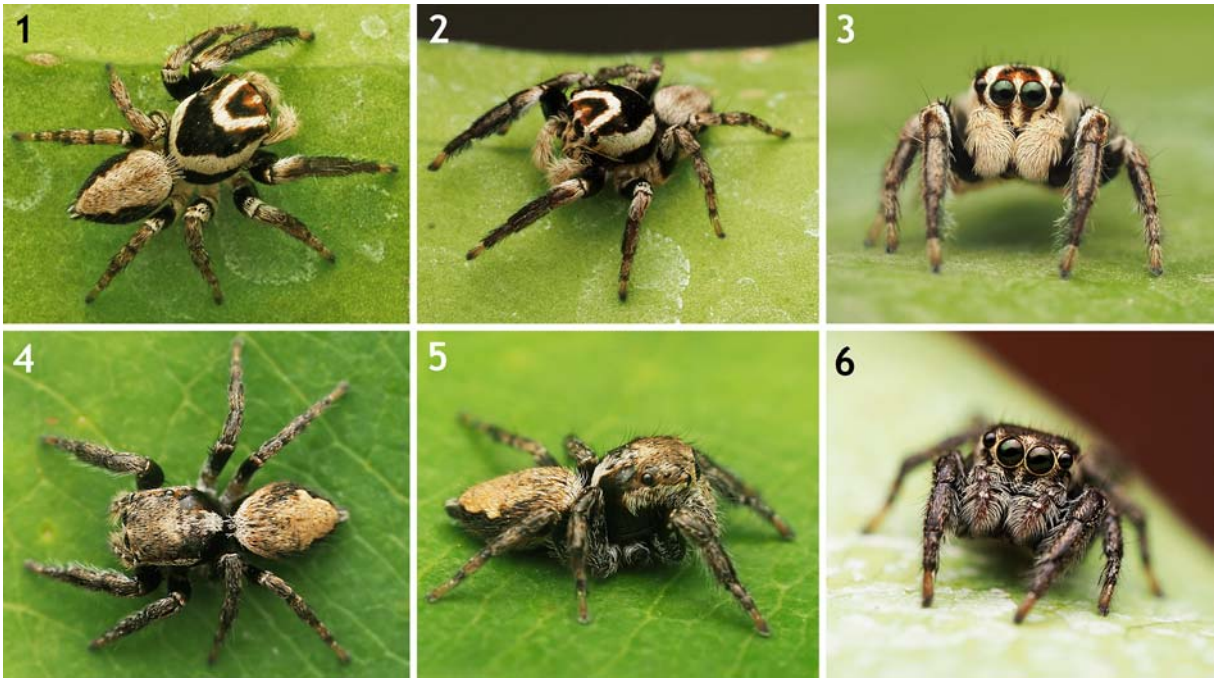
РЕЗЮМЕ. Описан новый вид пауков-скакунчиков, *Colopsus arkavathi* Caleb sp.n. (♂♀), из Карнатаки, Индия. Предложена новая комбинация, *C. manu* (Caleb, Christudhas, Laltanpuii et Chitra, 2014) comb.n. (ex. *Hyllus*); установлено, что это видовой название является старшим синонимом *C. cinereus* Kanesharatnam et Benjamin, 2021 syn.n. Даны детальное описание, иллюстрации и карта распространения всех известных видов *Colopsus* из Индии.

Introduction

The Oriental genus *Colopsus* Simon, 1902 of the plexippine jumping spiders currently includes six nominal species known from India, Sri Lanka, China and Vietnam [Kanesharatnam, Benjamin, 2021; Logunov, 2021a,b; Caleb, Sankaran, 2022; WSC, 2022]. The genus was earlier considered a synonym of *Evarcha* Simon, 1902 [Prószyński, 1984], but has recently been revalidated based on both morphological and molecular evidence [Kanesharatnam, Benjamin, 2021]. *Colopsus* was recorded from India with the discovery of *C. cinereus* Kanesharatnam et Benjamin, 2021 [Logunov, 2021a], which was originally described from Sri Lanka [Kanesharatnam, Benjamin, 2021]. While studying salticid specimens from Karnataka, we have found out that they are very similar both to *Hyllus manu* Caleb, Christudhas, Laltanpuii et Chitra, 2014 known from South India and to *C. cinereus* known from India and Sri Lanka. In order to establish the identity of the newly collected specimens and *C. cinereus*, the types of *H. manu* have been re-examined. Thus, the present paper aims: (1) to describe a new *Colopsus* species from Karnataka, India, (2) to provide new detailed digital images of *H. manu*, and (3) to synonymise the name *C. cinereus* with *H. manu*.

Materials and methods

Specimens were hand-collected and preserved in 70% ethanol. Images of live specimens were captured either with an Olympus OM-D E-M1 Mark II camera with 60 mm Zuiko macro lens, or a OnePlus 6T mobile phone attached with SKYVIK 25 mm macro lens or Apexel Professional 12x/24x. Morphological examination was carried out under a Leica SAPO stereomicroscope and photomicrographs were taken with a Leica MC190 HD camera and processed with the Leica Application Suite (LAS) version 4.13. Left male palps were detached and examined in detail and photo-



Figs 1–6. General appearance of *Colopsus arkavathi* sp.n., male (1–3) and female (4–6). 1, 4 — dorsal view; 2, 5 — dorso-lateral view; 3, 6 — front view.

Рис. 1–6. Общий вид *Colopsus arkavathi* sp.n., самец (1–3) и самка (4–6). 1, 4 — сверху; 2, 5 — сверху-сбоку; 3, 6 — спереди.

graphed. Temporary mounts of the epigyne were examined and studied under a Leica DM3000 LED compound microscope and photographed with a Leica MC190 HD camera. Leg measurements are given as follows: total length (femur, patella, tibia, metatarsus, tarsus). All measurements are in mm. The studied specimens are deposited in the Southern Regional Centre, Zoological Survey of India (ZSIC), Chennai, Tamil Nadu, India.

Abbreviations used in the text: AER — anterior eye row; ALE — anterior lateral eye; AME — anterior median eye; D — described; EFL — eye field length; PER — posterior eye row; PLE — posterior lateral eye; PME — posterior median eye; RTA — retrolateral tibial apophysis. A distributional map was produced using the online mapping software SimpleMappr [Shorthouse, 2010].

Taxonomy

Genus *Colopsus* Simon, 1902

Type species: *Colopsus cancellatus* Simon, 1902.

Colopsus arkavathi Caleb sp.n.

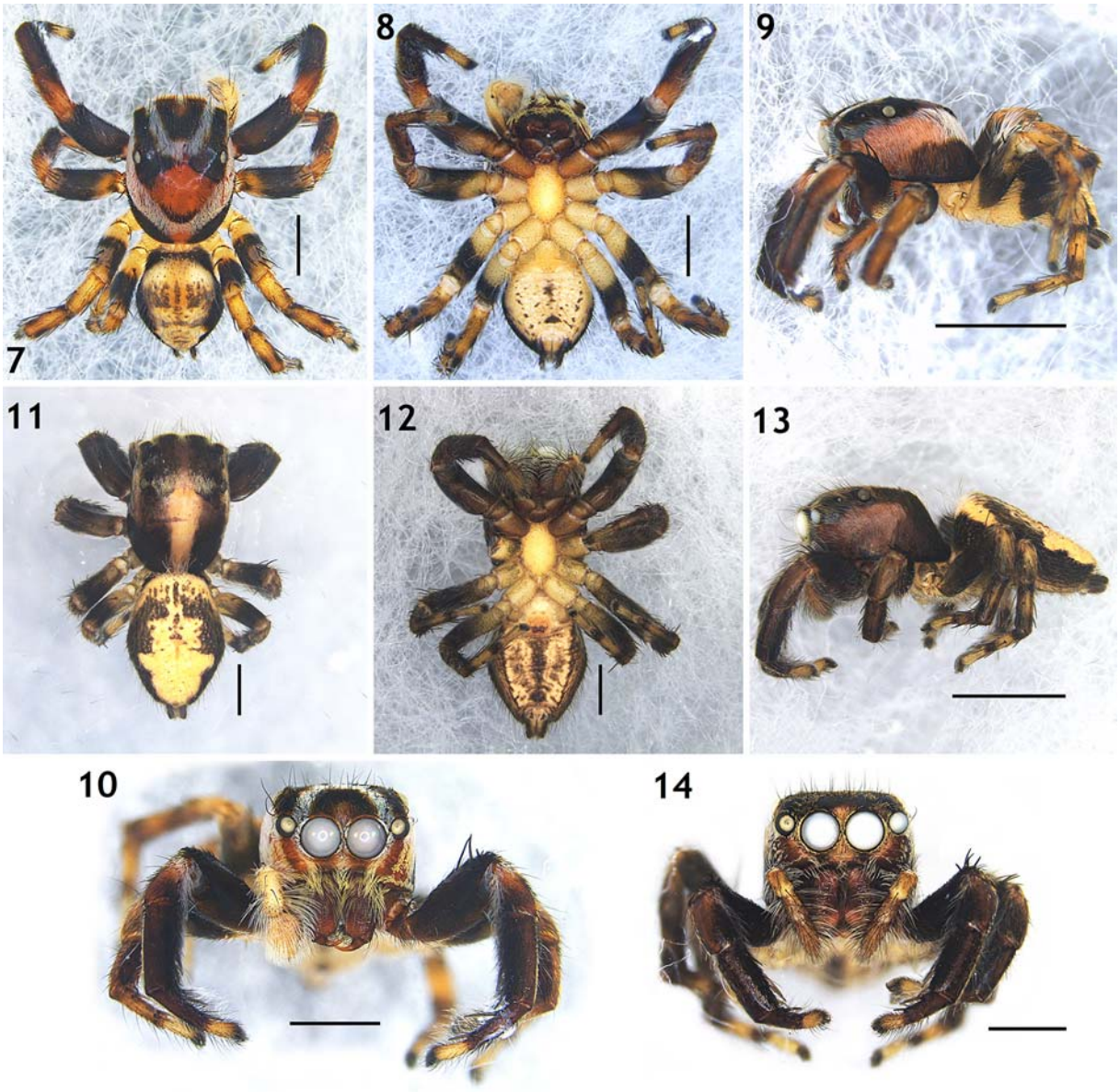
Figs 1–16, 22–28, Map.

TYPES. Holotype ♂ (ZSIC-I/SP 38), INDIA, Karnataka, Heggadahalli village, near Nandi Hills (13.3593°N, 77.6538°E), 987 m a.s.l., 4.02.2022, Y.T. Lohit. – Paratype: 1♀ (ZSIC-I/SP 39), same locality as that of the holotype, 20.02.2022.

ETYMOLOGY. The specific epithet is a noun in apposition taken after the River Arkavathi originating in Nandi Hills. The river has been running dry and polluted due to urbanization and industrialization for almost half a century.

DIAGNOSIS. The male of *C. arkavathi* sp.n. is most similar to that of *C. manu* (see below), but can be easily distinguished by the v-shaped white marking in the ocular area and three yellowish white clypeal stripes (absent in *C. manu*); the palpal tibia as long as wide (longer than wide in *C. manu*); RTA with a broad base, protruding laterally and benting at an obtuse angle with the tip directed apically in ventral view (gently curved, relatively longer, thorn-like in *C. manu*). The female can be distinguished by the broader, laterally aligned copulatory ducts (cf. Figs 1–3, 15, 16 & 22–24 with Figs 17–21).

DESCRIPTION. MALE. Total length 4.40; carapace 2.29 long, 1.74 wide; abdomen 2.11 long, 1.46 wide. Carapace black; v-shaped marking composed of white hairs present in ocular region, white stripes begin from between AMEs and ALEs and meet before fovea; a small patch of white hairs present between AMEs; lateral margins covered with broad white stripes meeting at posterior region of carapace. Anterior eyes surrounded by white and brown orbital setae (Figs 1–3, 7–10). Eye measurements: AME 0.47, ALE 0.25, PME 0.05, PLE 0.22; AER 1.49; PER 1.51; EFL 1.02. Clypeus height 0.11. Clypeus rusty brown, covered with three longitudinal stripes of yellow-white hairs below AMEs and patch of yellowish hairs on ‘cheeks’ below ALEs (Figs 3, 10). Sternum oval, yellow, covered with white hairs; labium and maxillae brown, maxillae apically paler (Fig. 8). Chelicerae brown, covered with dense yellowish white hairs in basal halves. Abdomen black, with a broad pale yellow median band and faint chevron markings in its posterior half; venter yellowish white, with black spots (Figs 1, 7). Spinnerets yellow-brown. Legs brownish yellow; leg I robust, brown, with yellow patella and tarsus; patella I with a stripe of white hairs prolaterally; legs I & II with fringes of dense black hairs, less dense on leg II; proximal portion of femur II–IV yellow (Figs 1–3, 7–10). Leg measurements: I



Figs 7–14. Somatic morphology of *Colopsus arkavathi* sp.n. 7 — holotype male, dorsal view; 8 — ditto, ventral view; 9 — ditto, lateral view; 10 — ditto, front view; 11 — paratype female, dorsal view; 12 — ditto, ventral view; 13 — ditto, lateral view; 14 — ditto, front view. Scale bars: 1 mm (7, 8, 10, 11, 12, 14), 2 mm (9, 13).

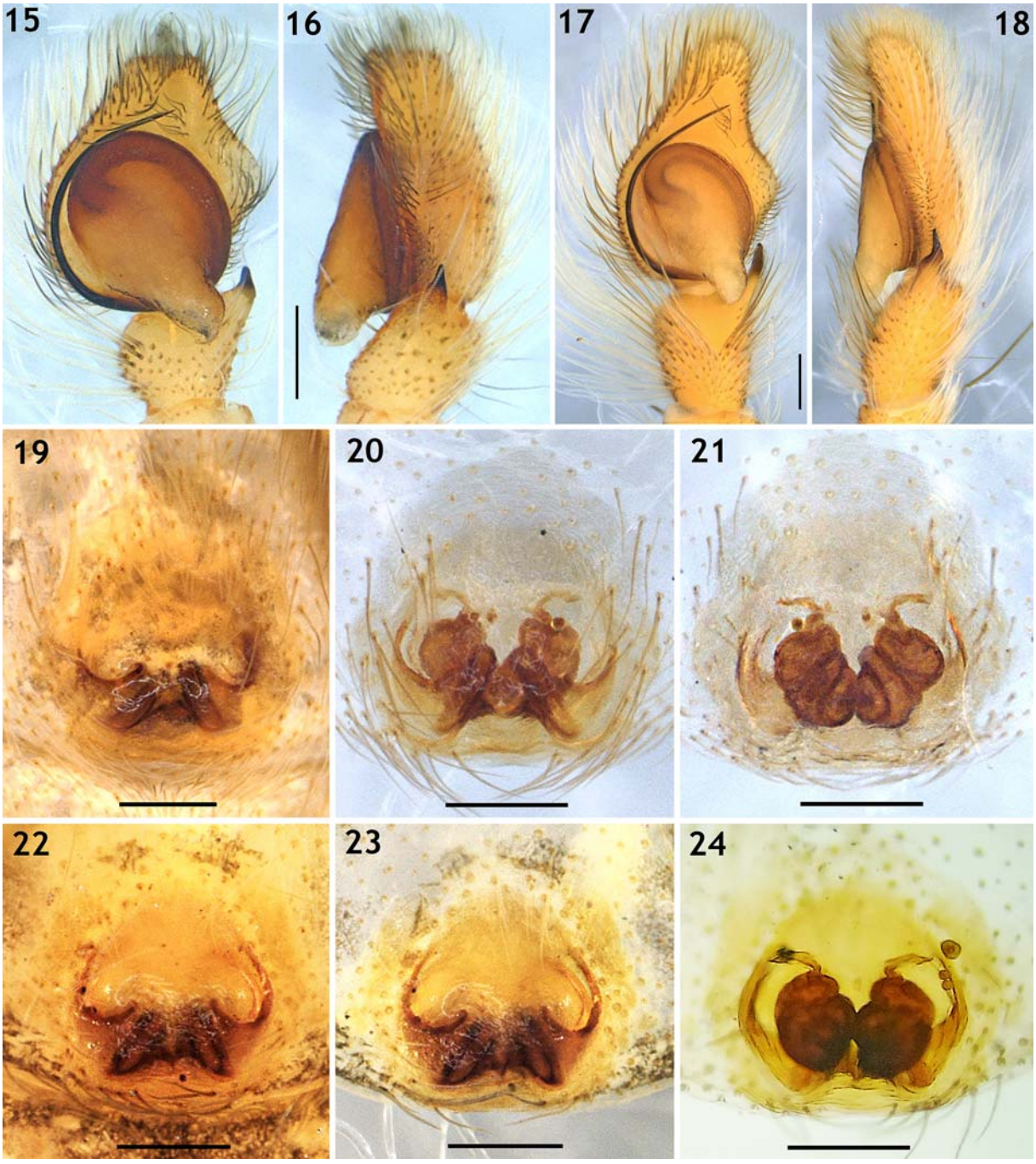
Рис. 7–14. Соматическая морфология *Colopsus arkavathi* sp.n. 7 — голотип самец, сверху; 8 — то же, снизу; 9 — то же, сбоку; 10 — то же, спереди; 11 — паратип самка, сверху; 12 — то же, снизу; 13 — тоже, сбоку; 14 — то же, спереди. Масштаб: 1 мм (7, 8, 10, 11, 12, 14), 2 мм (9, 13).

4.70 (1.41, 0.89, 1.11, 0.78, 0.51); II 4.03 (1.28, 0.78, 0.81, 0.74, 0.42); III 4.45 (1.55, 0.78, 0.76, 0.79, 0.57); IV 4.16 (1.35, 0.61, 0.84, 0.83, 0.53). Leg formula 1342. Palp as shown in Figs 15, 16, 25, 26.

FEMALE. Total length 5.28; carapace 2.67 long, 2.00 wide; abdomen 2.61 long, 1.93 wide. Eye measurements: AME 0.52, ALE 0.28, PME 0.06, PLE 0.26; AER 1.72; PER 1.73; EFL 1.09. Clypeus height 0.12. Leg measurements: I 4.62 (1.39, 0.95, 0.99, 0.67, 0.62); II 4.13 (1.31, 0.86, 0.81, 0.61, 0.54); III 4.86 (1.69, 0.89, 0.83, 0.86, 0.59); IV 4.60 (1.50, 0.74, 0.89, 0.92, 0.55). Leg formula 3142. In all aspects like the male, except for the following: carapace without a v-shaped marking in ocular region, but median longitudinal white stripe on the thorax; lateral margins covered with broad white stripes; anterior eyes surrounded by yellowish white orbital setae (Figs 4–6, 11–14); clypeus brown, with dark brown thin patches below AMEs, covered with white hairs (Figs 6, 14); venter yellow, with brown patches (Fig. 12). Epigyne and internal structures as shown in Figs 22–24, 27, 28.

DISTRIBUTION. Known only from the type locality (Karnataka, India) (Map).

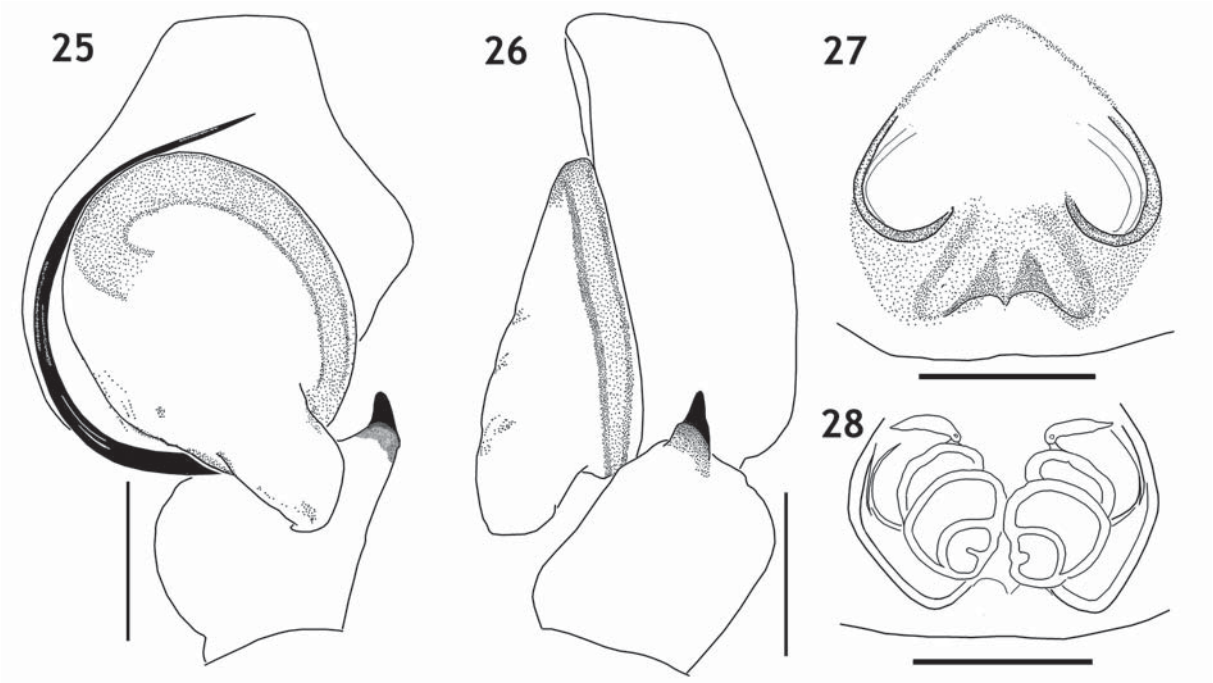
OBSERVATIONS. Day-active spiders that were observed to rest in silken retreats constructed in curled dry leaves (Figs 29–31). The paratype female was also observed in captivity. In the absence of leaves it preferred corners of the



Figs 15–24. Copulatory organs of the holotype males and paratype females of *Colopsus arkavathi* sp.n. (15, 16, 22–24) and *Colopsus manu* comb.n. (17–21). 15, 17 (ZSIC-I/SP-12) — left male palp, ventral view; 16, 18 (ZSIC-I/SP-12) — ditto, retrolateral view; 19 (ZSIC-I/SP-14), 22 — intact epigyne, ventral view; 20 (ZSIC-I/SP-13), 23 — dissected epigyne, ventral view; 21 (ZSIC-I/SP-13), 24 — vulva, dorsal view. Scale bars: 0.2 mm.

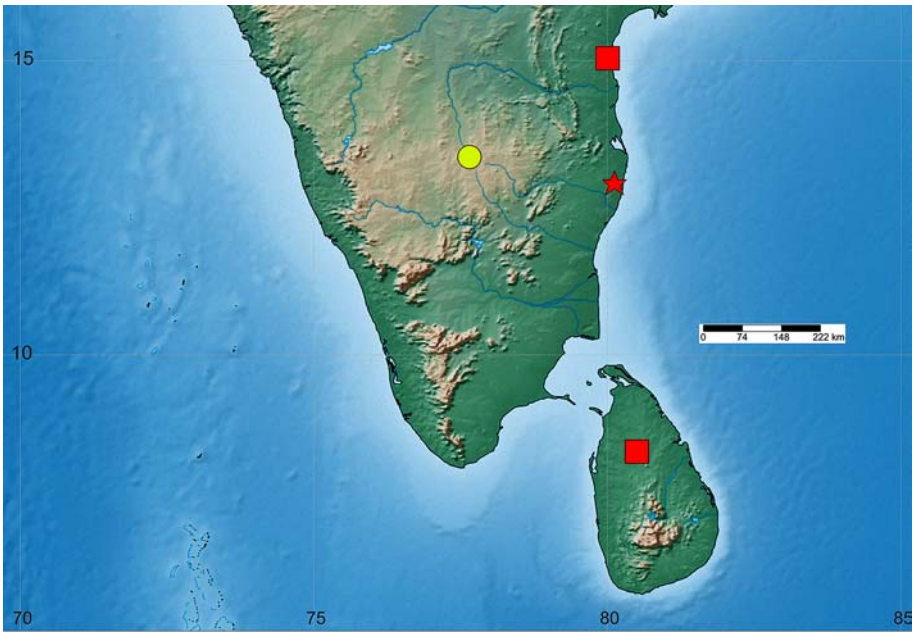
Рис. 15–24. Копулятивные органы голотипов самцов и паратипов самок *Colopsus arkavathi* sp.n. (15, 16, 22–24) и *Colopsus manu* comb.n. (17–21). 15, 17 (ZSIC-I/SP-12) — левая пальпа самца, снизу; 16, 18 (ZSIC-I/SP-12) — то же, сбоку-сзади; 19 (ZSIC-I/SP-14), 22 — целая эпигина, снизу; 20 (ZSIC-I/SP-13), 23 — препарированная эпигина, снизу; 21 (ZSIC-I/SP-13), 24 — вульва, сверху. Масштаб: 0,2 мм.

aquarium during nights. The spider avoided mosquitoes, houseflies and odorous ants but lavishly fed on fruit flies. At one instance, about 30 fruit flies were released into the box to the female, and all of them were consumed in the same day. The female laid eggs twice during the captivity period. It guarded the egg sac and ventured out only for catching prey when the fruit flies were released into the container. About 15–20 eggs (Fig. 32) were laid each time and it took for them about 15 days to hatch. The second egg sac was laid after a gap of about ten days. Cannibalism among the newly



Figs 25–28. Copulatory organs of *Colopsus arkavathi* sp.n., holotype male (25, 26) and paratype female (27, 28). 25 — left palp, ventral view; 26 — ditto, retrolateral view; 27 — epigyne, ventral view; 28 — vulva, dorsal view. Scale bars: 0.2 mm.

Рис. 25–28. Копулятивные органы *Colopsus arkavathi* sp.n., голотип-самец (25, 26) и паратип-самка (27, 28). 25 — левая пальпа, вентрально; 26 — тоже, сзади-сбоку; 27 — эпигина, снизу; 28 — вульва, сверху. Масштаб: 0,2 мм.

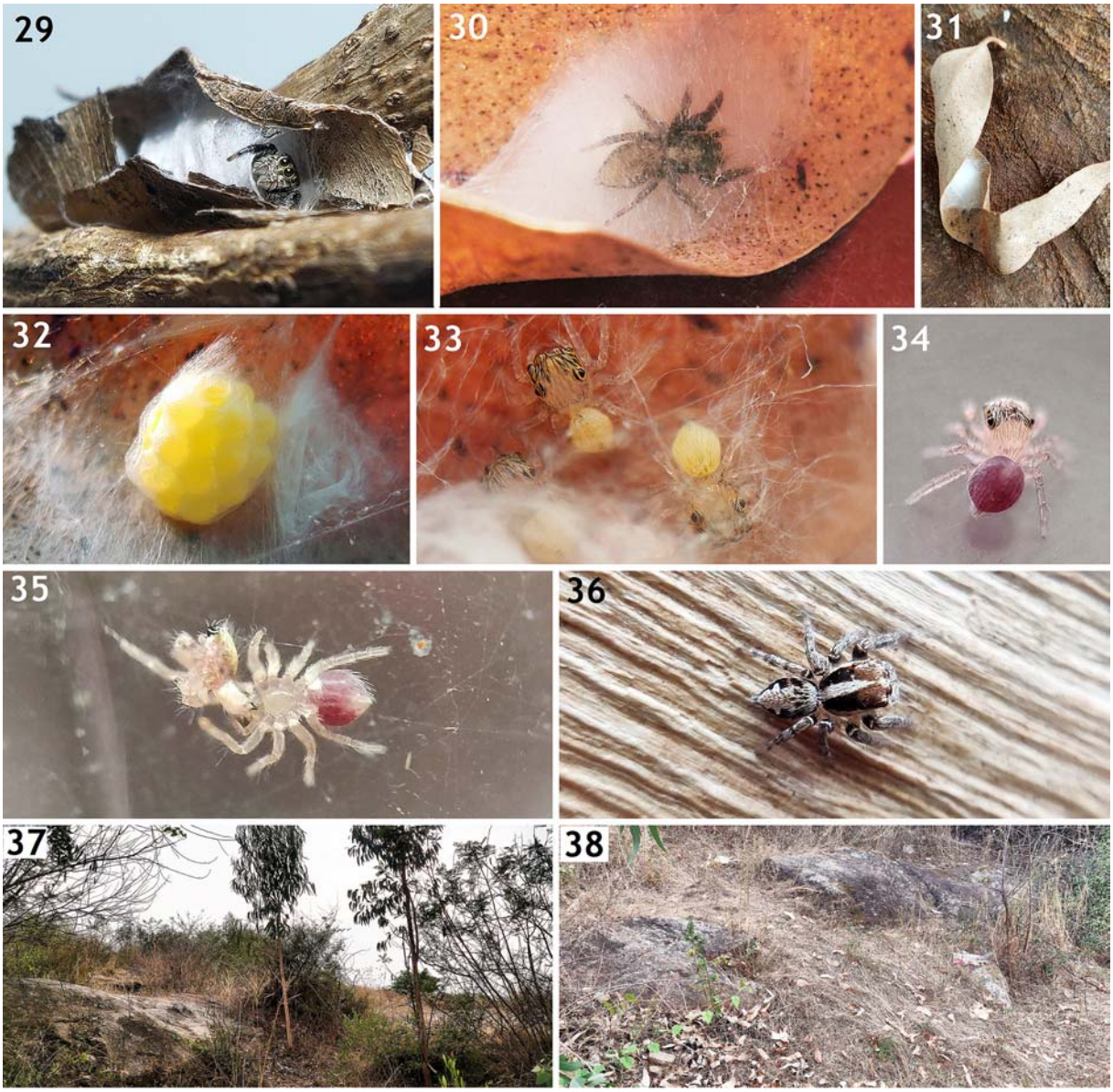


Map. Collecting localities of *Colopsus arkavathi* sp.n. (yellow sign) and *C. manu* (red signs); yellow circle and red star — the type localities; red squares — other records.

Карта. Точки находок *Colopsus arkavathi* sp.n. (желтый значок) и *C. manu* (красные значки); желтый кружок и красная звёздочка — типовые локалитеты; красные квадраты — другеи точки.

hatched spiderlings was observed and it was noted that one or two in the group were active in cannibalism (Fig. 35). It took about 2 hours and 40 minutes for a spiderling to consume a fruit fly, and about 15 minutes for the female.

HABITAT. The region is rocky with shrubs and thin dry leaf litter on the ground (Figs 37, 38). The species was spotted on the ground at all times and never observed on trees, plants, fallen bark pieces or rocks.



Figs 29–38. Life history and habitat of *Colopsus arkavathi* sp.n. 29, 30 — female guarding an egg sac; 31 — egg sac laid in a dried, curled leaf; 32 — egg sac; 33 — first instar spiderlings; 34 — juvenile after consuming a fruit fly; 35 — juvenile exhibiting cannibalism (feeding on its sibling); 36 — subadult specimen; 37, 38 — habitat.

Рис. 29–38. Биология и местообитание *Colopsus arkavathi* sp.n. 29, 30 — самка, охраняющая кокон; 31 — кокон, отложенный в сухой завернутый лист; 32 — кокон; 33 — нимфы первого возраста; 34 — ювенил, высосавший дорозофилу; 35 — ювенил, демонстрирубущий каннибализм (питающийся сородичем); 36 — субадультный экземпляр; 37, 38 — местообитание.

Colopsus manu (Caleb, Christudhas, Laltanpuii et Chitra, 2014), **comb.n.**
Figs 17–21, Map.

Hyllus manu Caleb Christudhas, Laltanpuii et Chitra, 2014: 635, figs 1–10 (D♂♀); the types at the Southern Regional Centre, Zoological Survey of India, Chennai, India, examined

H. manu: Caleb, 2020: 15734, figs 16F–H, 28F–G (♂♀).

Colopsus cinereus Kanesharatnam, Benjamin, 2021: 2779, figs 8a–e, 9a–b (D♂); holotype ♂ at the National Institute of Fundamental Studies, Kandy, Sri Lanka; not examined, **Syn.n.**

C. cinereus: Logunov, 2021a: 355, figs 15–26 (♂, D♀).

COMMENTS. *Colopsus cinereus* was originally described based on the holotype ♂ from Mihintale Sanctuary, Sri Lanka [Kanesharatnam, Benjamin, 2021] and was later redescribed and reported from Andhra Pradesh, India [Logunov, 2021a]. The species however, is identical to *C. manu* described earlier in 2014 from Chennai, India [Caleb *et al*., 2014: sub *Hyllus m.*] in both somatic morphology and details of the copulatory organs. The male palp with thin long embolus, the oval bulb with a prominent posterior lobe; the short RTA, with a straight pointed tip; the epigyne with a median pocket; the large, laterally placed copulatory openings; and the long and coiled copulatory ducts match unambiguously with those of *C. manu* (cf. Figs 17–21 with figs 1–

10 in Caleb *et al.* [2014] and figs 16F–H and 28F, G in Caleb [2020] with figs 8, 9 in Kanesharatnam & Benjamin [2021] and figs 15–26 in Logunov [2021]). Thus, it is safe to conclude that the name *C. cinereus* is to be considered a junior synonym of *C. manu*.

Finally, the species has been transferred from *Hyllus* to *Colopsus* in view of the systematic study by Kanesharatnam & Benjamin [2021]. However, as the current scope of *Colopsus* is likely to be in need of revision [Logunov, 2021b], the placement of *C. manu* and *C. arkavathi* sp.n. requires further verification by molecular evidence.

DISTRIBUTION. India (Tamil Nadu, Andhra Pradesh) [Caleb, 2019: sub *Hyllus m.*; Logunov, 2021a], Sri Lanka [Kanesharatnam, Benjamin, 2021] (Map).

Compliance with ethical standards

Conflict of interest: The authors declare that they have no conflict of interest.

Ethical approval: No ethical issues were raised during our research.

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