

## Two new jumping spiders of the genera *Epicilla* Thorell, 1887 and *Mogrus* Simon, 1882 from India (Araneae: Salticidae)

## Два новых паука-скакунчика из родов *Epicilla* Thorell, 1887 и *Mogrus* Simon, 1882 из Индии (Araneae: Salticidae)

John T.D. Caleb, Sumantika Chatterjee, Kaomud Tyagi,  
Shantanu Kundu, Vikas Kumar<sup>1</sup>

Дж.Т.Д. Калев, С. Чаттерджи, К. Тяги, Ш. Кунду, В. Кумар

Centre for DNA Taxonomy, Zoological Survey of India, Prani Vigyan Bhawan, M-Block, New Alipore, Kolkata – 700053, West Bengal, India.

<sup>1</sup> Corresponding author: vikaszsi77@gmail.com

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КЛЮЧЕВЫЕ СЛОВА: баркоды, диагнозы, mtCOI ген, новые виды, описания, Раджастхан, таксономия.

**ABSTRACT.** Two new species, *Epicilla sirohi* sp.n. (♂) and *Mogrus rajasthanensis* sp.n. (♀), are described from Rajasthan State of India. Partial sequence data of mitochondrial cytochrome C oxidase (mtCOI) from the holotypes of both new species were generated. The genus *Mogrus* Simon, 1882 is recorded from India for the first time.

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**РЕЗЮМЕ.** Два новых вида, *Epicilla sirohi* sp.n. (♂) и *Mogrus rajasthanensis* sp.n. (♀), описаны из индийского штата Раджастхан. Из голотипов обоих видов выделены частичные сиквенсы митохондриальной цитохром-оксидазы C (mtCOI). Род *Mogrus* Simon, 1882 отмечен из Индии впервые.

### Introduction

Salticidae is the most speciose spider family, with their world fauna consisting of 6010 described species in 634 genera [WSC, 2017]. The Indian salticid diversity is represented by 235 described/recorded species in 77 genera [WSC, 2017]. While examining the specimens collected during the recent field survey in Rajasthan state of India in 2017 two new species of the jumping spiders have been recognized.

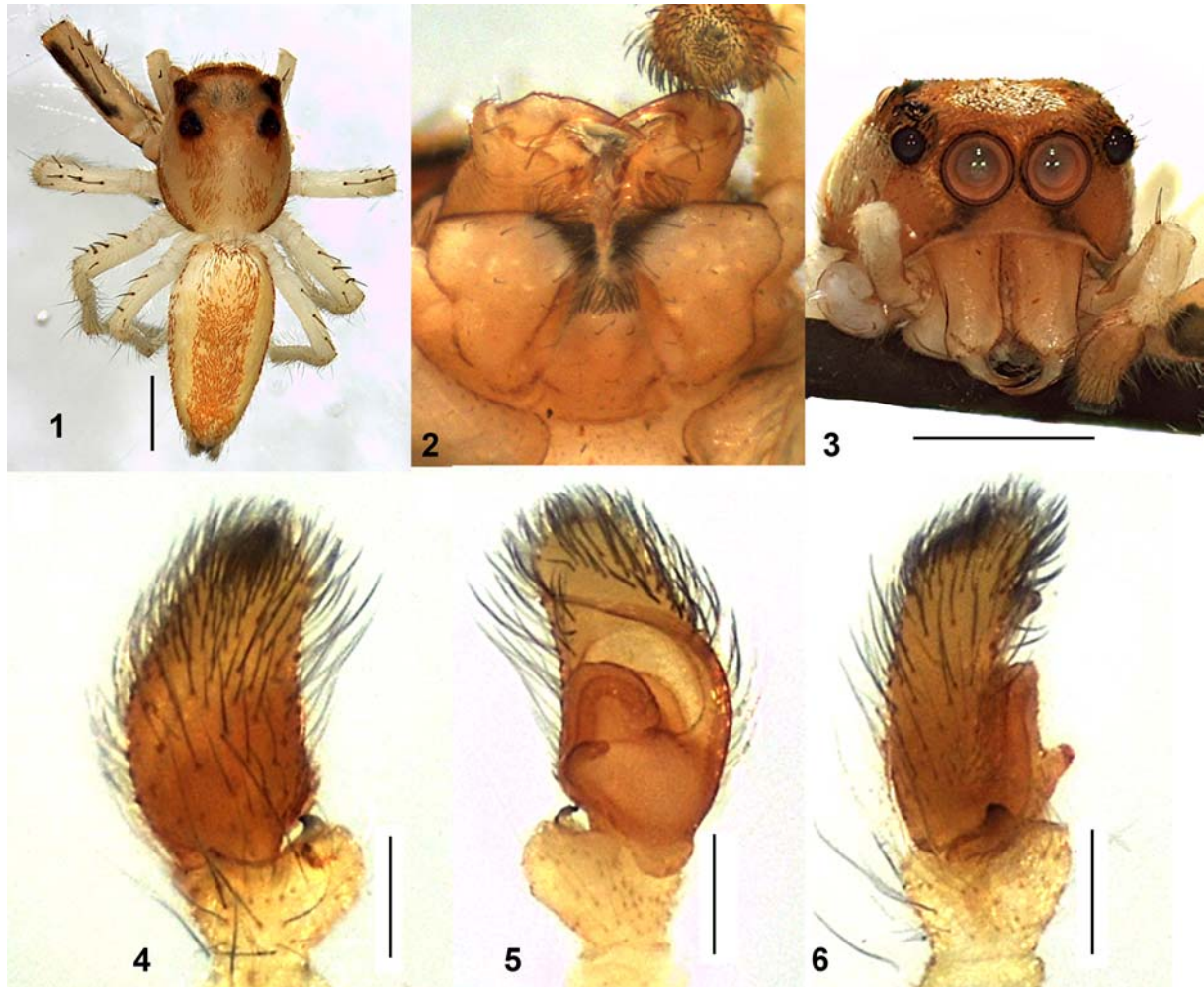
The genus *Epicilla* Thorell, 1887 contains 10 species, of which nine are known from Asia (three from India, one from Bhutan and one from Myanmar). The genus *Mogrus* Simon, 1882 consists of 28 species, including 17 species from Asia [WSC, 2017]. The

present paper is aimed at describing two new species: *Epicilla sirohi* sp.n. (♂) and *Mogrus rajasthanensis* sp.n. (♀). The genus *Mogrus* is recorded from India for the first time.

### Material and methods

Specimens were collected by beating from vegetation and preserved in 70% ethanol. Morphological examination and photography were performed under a Leica EZ4 HD stereomicroscope. All images were processed with the aid of the LAS core software (LAS EZ 3.0). All measurements are in millimeters; leg measurements are given in the following order: total (femur, patella, tibia, metatarsus, tarsus). The types have been deposited in the National Zoological Collections (NZC) Zoological Survey of India, Kolkata.

The isolation of genomic DNA was performed by means of QIAamp® DNA Investigator Kit, following manufacturer's instructions. Amplification of partial fragment (~650bp) of mitochondrial cytochrome C oxidase subunit I (mtCOI) gene were performed using forward primer LCO 1490 [Folmer *et al.*, 1994] and the reverse primer Chelicerate R1 [Barrett, Hebert, 2005]. The PCR product was purified by using the QIAquickR Gel extraction kit. The bidirectional sequencing of the purified PCR product was carried out by the means of the BigDye® Terminator Cycle Sequencing Kit (v3.1) on 3730 DNA Analyzer (Applied Biosystems) in the in-house sequencing facility of the Zoological Survey of India. The generated forward and reverse mtCOI fragments were analyzed with SeqScape software version 2.7 (Applied Biosystems) and consensus sequences were obtained after checking deletion, insertion and stop codons. The generated sequences were submitted to GenBank, NCBI (National



Figs 1–6. *Epocilla sirohi* sp.n., holotype male (ZSI-CDT-AA559): 1 — general appearance, dorsal view; 2 — chelicerae, maxillae and labium, ventral view; 3 — carapace, front view; 4 — right palp, dorsal view; 5 — ditto, ventral view; 6 — ditto, retrolateral view. Scale bars = (1, 3) 1 mm, (4–6) 0.25 mm.

Рис. 1–6. *Epocilla sirohi* sp.n., голотип самец (ZSI-CDT-AA559): 1 — общий вид сверху; 2 — хелицера, максиллы и лабиум, вентрально; 3 — карапакс, вид спереди; 4 — правая пальпа, вид сверху; 5 — тоже, снизу; 6 — тоже, сбоку-сзади. Масштаб (1, 3) 1 мм, (4–6) 0,25 мм.

Centre for Biotechnology Information) and BOLD (Barcode of Life Data System) under the project entitled “Barcoding Spiders of India”.

Abbreviations used in the text are as follows: AER — anterior eye row; ALE — anterior lateral eye; AME — anterior median eye; EFL — eye field length; PER — posterior eye row; PLE — posterior lateral eye; PME — posterior median eye; RTA — retrolateral tibial apophysis; VTA — ventral tibial apophysis.

## Taxonomy

Genus *Epocilla* Thorell, 1887

Type species: *Epocilla praetextata* Thorell, 1887.

DIAGNOSIS. The members of the genus are characterized by orange longitudinal stripes of their body pattern. The males are strongly built, their emboli are

variable in length and the palps are with two RTAs and a tegular bump; the epigyne is weakly sclerotized, with the copulatory ducts being short or absent; the spermathecae are oval, with well-developed accessory glands [Žabka, 1985].

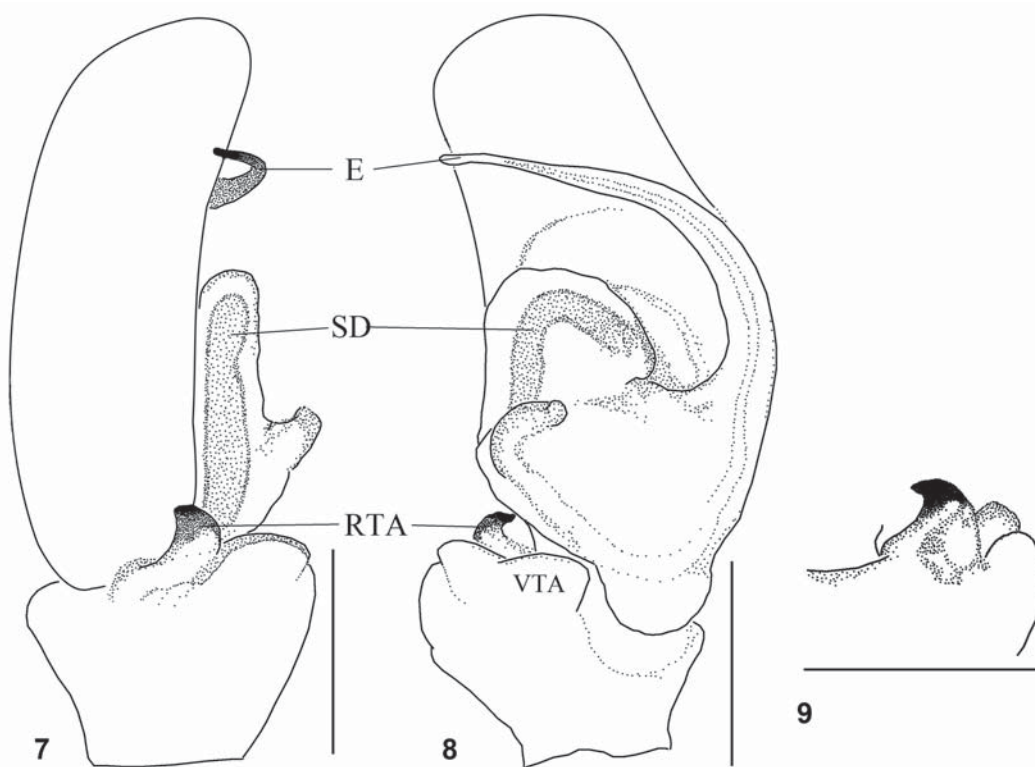
*Epocilla sirohi* sp.n.

Figs 1–9.

TYPE MATERIAL. Holotype male (ZSI-CDT-AA559) from Sirohi, near Mt. Abu (24.5766°N, 72.7164°E), 960 m a.s.l., Rajasthan, India, 14.03.2017, S. Kumar and K. Tyagi.

ETYMOLOGY. The specific name is a noun in apposition deriving from the locality (Sirohi), from where the holotype was collected.

DIAGNOSIS. The species can be distinguished from all the known *Epocilla* species by the longest embolus, as compared to other described males (Figs 5, 7). However, the species is very similar to that of *E. aurantiaca*



Figs 7–9. *Epocilla sirohi* sp.n., holotype male (ZSI-CDT-AA559): 7 — male right palp, retrolateral view; 8 — ditto, ventral view; 9 — RTA, dorsal view. Scale bars = (7–9) 0.25 mm. Abbreviations: E — embolus; RTA — retrolateral tibial apophysis; SD — sperm duct; VTA — ventral tibial apophysis.

Рис. 7–9. *Epocilla sirohi* sp.n., голотип самец (ZSI-CDT-AA559): 7 — правая пальпа, вид сзади-сбоку; 8 — тоже, снизу; 9 — RTA, вид сверху. Масштаб (7–9) 0,25 мм. Сокращения: E — эмболус; RTA — ретролатеральный отросток; SD — семенной канал; VTA — вентральный тибиаальный отросток.

Simon, 1885, but can be distinguished from it by the origin of the embolus (at the three o'clock in the new species and one o'clock position in *E. aurantiaca*) and by the presence of broad VTA (absent in *E. aurantiaca*) (Figs 5–8).

**DESCRIPTION. MALE** (holotype). Total length: 5.06; carapace: 2.21 long, 1.77 wide; abdomen: 2.85 long, 1.41 wide. Carapace yellowish, with a pair of longitudinal patches of orange scales running from the PLEs to the posterior region; the outer edge of carapace dark brown, with orange marginal scales (Fig. 1). Eye field covered with pale fine hairs; posterior eyes surrounded by black. Anterior eyes surrounded by orange orbital setae; a pair of dark grey patches emerges from beneath of AMEs, making a curved marking till the lateral edge of the clypeus (Fig. 3). Eye measurements: AME 0.40, ALE 0.21, PME 0.08, PLE 0.18, AER 1.34, PER 1.36, EFL 0.81. Clypeus height 0.15. Sternum oval, yellowish. Chelicerae yellow-brown, unidentate (Fig. 2); labium and maxillae yellowish. Legs yellowish; leg I robust with black dorsal patch on the trochanter; prolateral and dorsolateral patch on femur I; lateral and ventral dark patches on distal region of patella; tibia with proximal and distal retrolateral patches (Fig. 1). Leg measurements: I 5.54 (1.72, 1.03, 1.27,

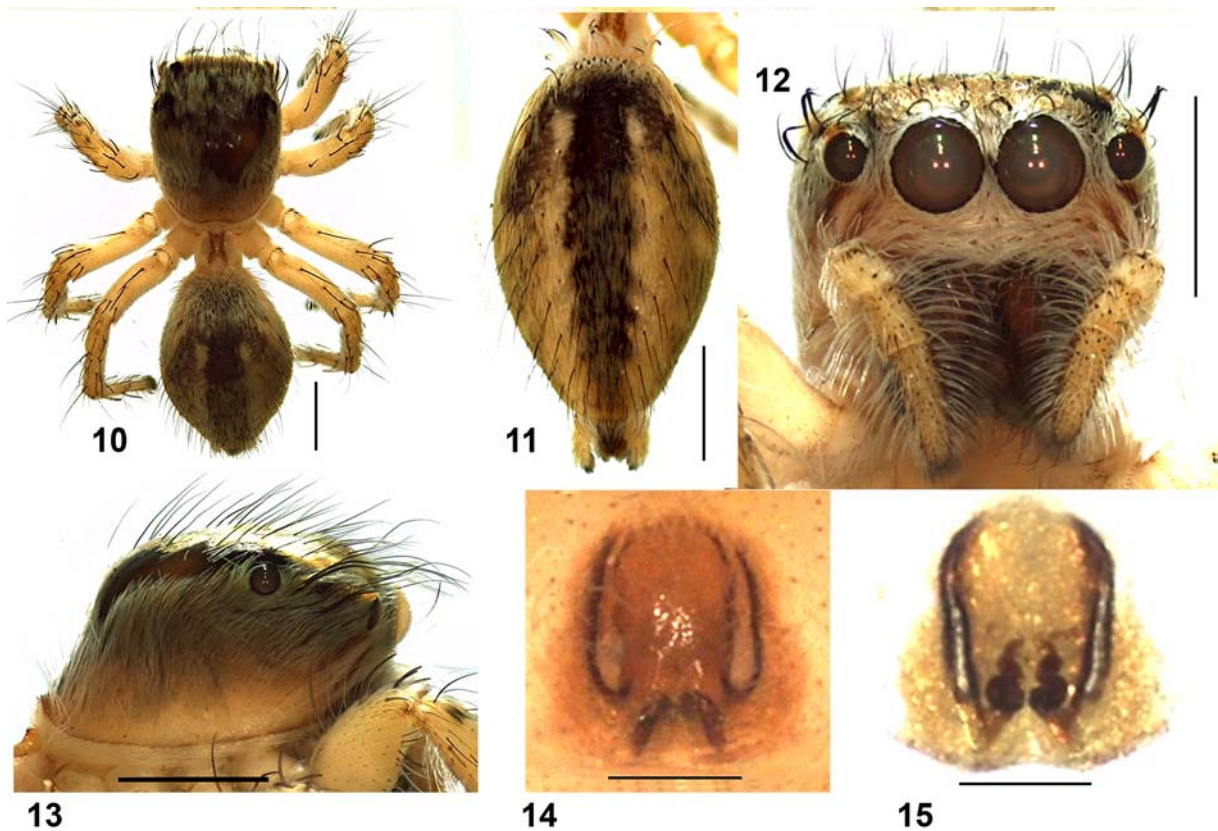
1.05, 0.47); II 4.16 (1.31, 0.71, 0.85, 0.86, 0.43); III 4.37 (1.36, 0.69, 0.87, 1.00, 0.45); IV 4.71 (1.43, 0.67, 1.02, 1.12, 0.47). Leg formula: 1432. Leg spination: femora I 3300, II 0600, III 0500, IV 0300; patellae I–IV 0000; tibiae I 0007, II 0002, III 0000, IV 0000; metatarsi I 0004, II 0004, III 2012, IV 2021; tarsi I–IV 0000. Abdomen with a pair of lateral yellowish-white longitudinal stripes; median and lateral region covered with orange scales; ventral region uniformly yellowish. Spinnerets yellowish (Fig. 1). Palp yellow; embolus long, broad at base; slender and tapering toward the tip; arising from three o'clock position with tip at 11 o'clock position, touching retrolateral margin of cymbium; palpal tibia enlarged retrolaterally; RTA short, curving inward; VTA broad (Figs 4–8).

**FEMALE** unknown.

**DISTRIBUTION.** India (Rajasthan).

**DNA BARCODE DATA:** The barcode data of the species has been submitted to GenBank, NCBI, with the accession number MF135531.

**REMARKS.** *E. aurantiaca*, which is very close to the newly described species (see above), was originally described by Simon [1885] from Ramnad, South India. Roy *et al.* [2016] recently reported on this species from the northern part of West Bengal, India, based on col-



Figs 10–15. *Mogrus rajasthanensis* sp.n., holotype female (ZSI-CDT-AA560): 10 — general appearance, dorsal view; 11 — abdomen, dorsal view; 12 — carapace, front view; 13 — ditto, lateral view; 14 — epigyne, ventral view; 15 — vulva, dorsal view. Scale bars = (10–13) 1 mm, (14, 15) 0.25 mm.

Рис. 10–15. *Mogrus rajasthanensis* sp.n., голотип самка (ZSI-CDT-AA560): 10 — общий вид сверху; 11 — брюшко, вид сверху; 12 — головогрудь, спереди; 13 — тоже, сбоку; 14 — эпигина, вид снизу; 15 — вульва, вид сверху. Масштаб (10–13) 1 мм, (14, 15) 0,25 мм.

lections from various tea estates. Eight females were examined by the latter authors. However, the image of the internal structure they provided strongly resembles *E. praetextata* Thorell, 1887 from Bhutan, as illustrated by Jastrzębski (cf. fig. 27L in Roy *et al.* [2016] with fig. 12 in Jastrzębski [2007]). Moreover, the location of the tea estates is in the close proximity to Bhutan and thus it is likely that the species reported from West Bengal was misidentified and its record actually represents *E. praetextata* rather than *E. aurantica* or the new species described herein.

#### Genus *Mogrus* Simon, 1882

Type species: *Mogrus fulvovittatus* Simon, 1882.

**DIAGNOSIS.** The male palp is with the long and slender embolus, which nevertheless has a well-developed pars pendula, and with the prominent terminal apophysis. The females are characterized by the epigyne with a pair of sub-parallel grooves, with the highly sclerotized ridge separated by a broad, flat median area, and by the heavily sclerotized spermathecae [Andreeva *et al.*, 1981; Logunov, 1995].

#### *Mogrus rajasthanensis* sp.n.

Figs 10–20.

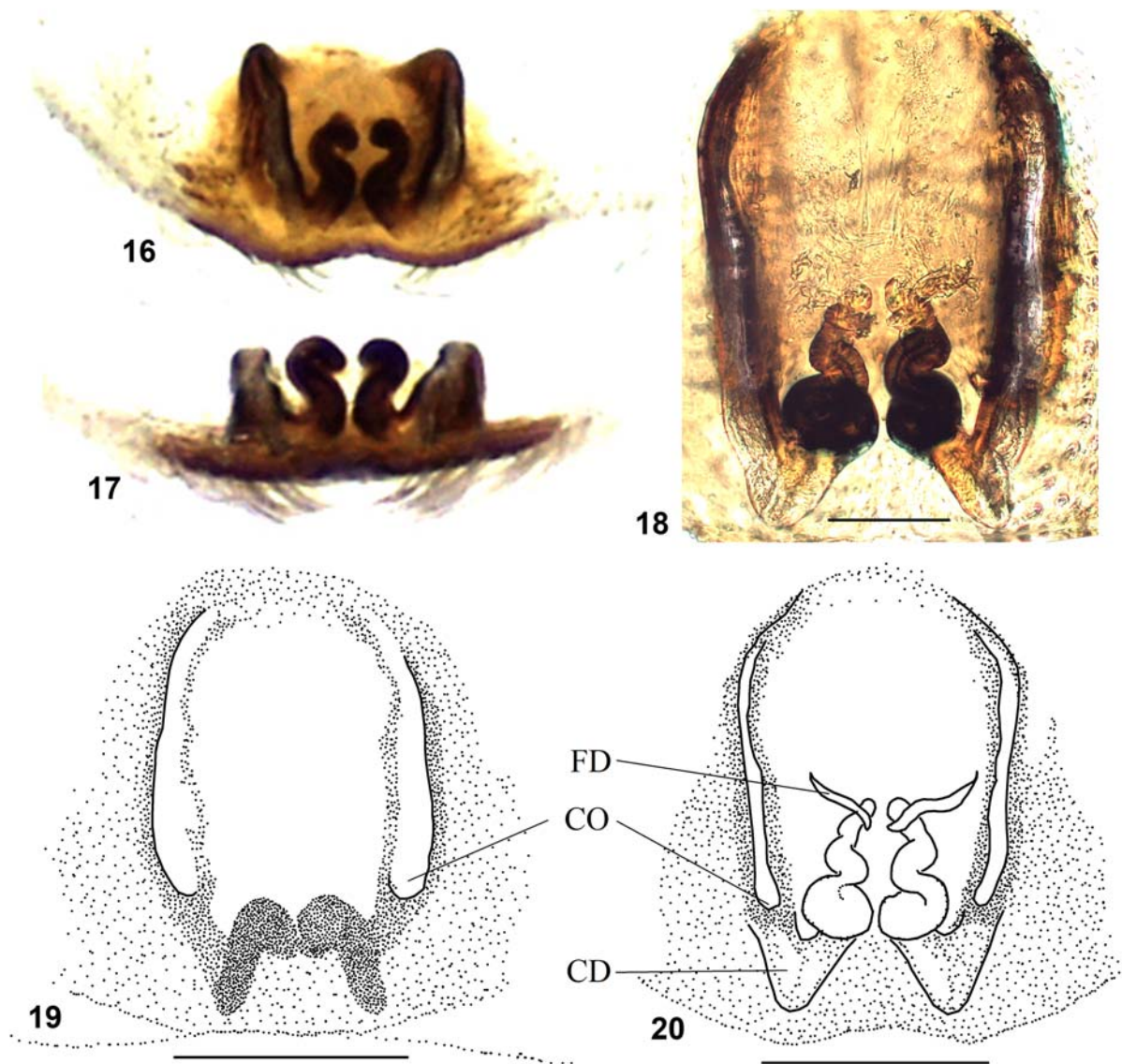
**TYPE MATERIAL:** Holotype female (ZSI-CDT-AA560) from Sirohi, Mount Abu (24.5917°N, 72.7237°E), 1167 m a.s.l., Rajasthan, India, 14.03.2017, K. Tyagi and V. Kumar.

**ETYMOLOGY.** The specific name refers to the Indian state Rajasthan, from where the holotype was collected.

**DIAGNOSIS.** The species resembles *Mogrus canescens* (C.L. Koch, 1846), but differs from it in having the longer terminal section of the spermathecae making s-shaped turns and in a relative placement of the fertilization ducts (cf. Fig. 18 with fig. 111 in Wesolowska & van Harten [1994]).

**DESCRIPTION.** MALE unknown.

**FEMALE (holotype).** Total length: 5.72; carapace: 2.51 long, 1.94 wide; abdomen: 3.31 long, 1.93 wide. Carapace dark brown, covered with yellowish hairs. Eye field with stiff, rod-like, long projecting hairs (Figs 10, 12–13); long black, leaf-like scales present between the PMEs and PLEs. Anterior eyes surrounded by white orbital setae. White hairs cover the clypeal region (Figs 12–13). Thin brown stripes emerge from beneath of



Figs 16–20. *Mogrus rajasthanensis* sp.n., holotype female (ZSI-CDT-AA560): 16 — vulva, postero-dorsal view; 17 — ditto, posterior view; 18 — ditto, dorsal view; 19 — epigyne, ventral view; 20 — vulva, dorsal view. Scale bars = (18) 0.1mm, (19–20) 0.25 mm. Abbreviations: CO — copulatory opening; CD — copulatory ducts; FD — fertilization duct.

Рис. 16–20. *Mogrus rajasthanensis* sp.n., голотип самка (ZSI-CDT-AA560): 16 — вульва, вид сзади-сверху; 17 — то же, вид сзади; 18 — то же, вид сверху; 19 — эпигина, вид снизу; 20 — вульва, вид сверху. Масштаб (18) 0,1 мм, (19–20) 0,25 мм. Сокращения: CO — копулятивное отверстие; CD — копулятивный проход; FD — оплодотворительный канал.

ALEs and lateral sides of AMEs and extend laterally. Eye measurements: AME 0.48, ALE 0.24, PME 0.06, PLE 0.21, AER 1.62, PER 1.82, EFL 0.93. Clypeus height 0.25. Sternum oval, yellowish. Chelicerae reddish brown, unidentate; labium and maxillae brownish with paler outer margins. Legs yellow; patellae and tibiae covered with spots of black hairs dorsally (Fig. 10). Leg measurements: I 4.04 (1.29, 0.80, 0.79, 0.66, 0.50); II 3.70 (1.22, 0.75, 0.70, 0.61, 0.42); III 4.53 (1.55, 0.86, 0.77, 0.80, 0.55); IV 4.38 (1.44, 0.75, 0.79, 0.90, 0.49). Leg formula: 3412. Spination. Legs: femora I 0600, II 1600, III 0610, IV 0500; patellae I–IV 1010;

tibiae I 3005, II 3014, III 3133, IV 1423; metatarsi I 2024, II 2024, III 1334, IV 1434; tarsi I–IV 0000. Abdomen ovoid, dark brown; covered with yellowish hairs interspersed with thick setae. Dark brown median region with chevron shaped faint markings, outlined with thick yellowish-white longitudinal stripes on either sides (Fig. 11); ventral region yellowish, with a mid-ventral light brown longitudinal patch; spinnerets yellowish. Epigyne with longitudinal grooves on the lateral margins leading to the postero-lateral copulatory openings; copulatory ducts make a V-shaped bend and rise inwards leading to the spermathecae (Figs 14–20).

DISTRIBUTION. India (Rajasthan).

DNA BARCODE DATA: The barcode data of the species has been submitted to GenBank, NCBI, with the accession number MF135532.

REMARKS. The taxonomic status of *M. canescens* remains obscure, as its holotype has not been examined/revised. Recent illustrations by Wesolowska & van Harten [1994] and Metzner [1999] show considerable differences and leave doubts regarding an exact identity of the species (Logunov, pers. comm.). The species described herein shows a close morphological resemblance to *M. canescens* [*sensu* Wesolowska & van Harten, 1994: figs 108–111] in its colour pattern and external epigynal structure. However, the internal structures differ in having the slightly longer ducts, making diverging loops sub-terminally (Fig. 18).

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