

Country roads, take me home: *Cyclocosmia johndenveri*, a new species of trapdoor spider from the mountains of West Virginia (Araneae: Halonoproctidae)

DANNIELLA SHERWOOD^{1,2,*}, VALERIE WARHOL³ & AMY BIANCO³

¹Arachnology Research Association, 124 City Road, London, EC1V 2NX, United Kingdom

²Fundación Ariguanabo, 4111, Calle 58, e/ave. 41 y ave. 43, San Antonio de los Baños, Provincia Artemisa c.p. 18100, Cuba

³Carnegie Museum of Natural History 4400 Forbes Avenue Pittsburgh, PA 15213-4080

* Corresponding author: danni.sherwood@hotmail.com

SHERWOOD, D., WARHOL, V. & BIANCO, A. 2025: Country roads, take me home: *Cyclocosmia johndenveri*, a new species of trapdoor spider from the mountains of West Virginia (Araneae: Halonoproctidae). - *Natura Somogyiensis* 45: 27-40.

Abstract: A new species of the enigmatic trapdoor spider genus *Cyclocosmia* Ausserer, 1871 is described from West Virginia, United States of America. *Cyclocosmia johndenveri* sp. nov. represents a significant northeasterly range extension for the genus and is described based on the male.

Keywords: taxonomy, morphology, museum, *Cyclocosmia*

Introduction

The genus *Cyclocosmia* Ausserer, 1871 currently comprises 12 species: *Cyclocosmia abramovi* Sherwood, 2024 (♂, Vietnam), *Cyclocosmia lannaensis* Schwendinger, 2005 (♂♀, China and Thailand), *Cyclocosmia latusicosta* Zhu, J. X. Zhang & F. Zhang, 2006 (♂♀, China and Vietnam), *Cyclocosmia liui* Xu, Xu & Li, 2017 (♀, China), *Cyclocosmia loricata* (C. L. Koch, 1842) (♂♀, Mexico), *Cyclocosmia ricketti* (Pocock, 1901) (♂♀, China), *Cyclocosmia ruyi* Yu & F. Zhang, 2023 (♂♀, China), *Cyclocosmia siamensis* Schwendinger, 2005 (♂♀, Laos and Thailand), *Cyclocosmia sublatusicosta* Yu & Zhang, 2018 (♂, China), *Cyclocosmia subricketti* Yu & Zhang, 2018 (♂♀, China), *Cyclocosmia torreyi* Gertsch & Platnick, 1975 (♂♀, United States), and the type species *Cyclocosmia truncata* (Hentz, 1841) (♂♀, United States).

As can be seen, the type species was described from North America, where two other congeners occur (HENTZ 1841, KOCH 1942, GERTSCH & PLATNICK 1975), whilst the current hotspot of diversity for the genus is in Southeast Asia (POCOCK 1901, SCHWENDINGER 2005, ZHU et al. 2006, XU et al. 2017, YU & ZHANG 2018, Yu et al. 2023, SHERWOOD 2024). The seminal study on the morphology of the species within the United States was by GERTSCH & PLATNICK (1975) who devised an objective methodology for counting the opisthosomal ribs. A recent molecular study of *C. torreyi* and *C. truncata* (amongst other taxa) by OPATOVA, BOURGUIGNON & BOND (2023) showed potential for further

speciation within these traditionally (morphologically) defined lineages, but opted for a cautious approach to avoid over-splitting.

In this work, we describe a new species of *Cyclocosmia*, the third from the United States and fourth from North America more broadly, based on specimens deposited in the Carnegie Museum of Natural History. The new species represents a significant range extension northeasterly for the genus.

Materials and methods

Specimens were examined under an AmScope SM-1 stereomicroscope. Photographs were made using a Canon EOS Rebel T6 with a Canon MP-E 65mm macro lens and Canon Macro Twin Lite MT-24EX mounted on a StackShot Macro Rail with images stacked with Zerene Stacker. Description style follows SHERWOOD (2024). All type material is deposited in the Carnegie Museum of Natural History, Pittsburgh, Pennsylvania, United States of America (CMNH). Abbreviations: ALE = anterior lateral eyes, AME = anterior median eyes, D = ventral medial depression, leg. = legit (collected by), PLE = posterior lateral eyes, PME = posterior median eyes, PS = prolateral superior keel, RS = retrolateral superior keel. Leg formulae start with the longest leg to the shortest in order of decreasing size, e.g. 4,1,2,3. All measurements are in millimetres. In accordance with the International Code of Zoological Nomenclature, this article was registered in ZooBank prior to publication: urn:lsid:zoobank.org:pub:D7615AB0-73BF-458F-B7EE-20CA766460B7.

Taxonomy

Cyclocosmia johndenveri sp. nov.

urn:lsid:zoobank.org:act:3F379FBB-DAFA-4380-81A5-824EA023DDE1

Type material: Holotype ♂ (CMNH-IZ-A1618), UNITED STATES: West Virginia, Greenbrier County, Droop Mountain, VII-VIII/1994, pitfall traps set near the base of trees, site is wooded area near carpark, leg. Eric van den Berghe; paratypes: 1 ♂ (CMNH-IZ-A1619), same data; 2 ♂♂ (CMNH-IZ-A1484), same data.

Diagnosis: *Cyclocosmia johndenveri* sp. nov. can be readily distinguished from *C. abramovi*, *C. liui*, *C. ricketti*, *C. ruyi*, *C. siamensis*, *C. sublatusicosta* and *C. subricketti* by possessing less than 29 ribs on the opisthosoma (≥ 29 in *C. abramovi*, *C. liui*, *C. ricketti*, *C. ruyi*, *C. siamensis*, *C. sublatusicosta* and *C. subricketti*). *Cyclocosmia johndenveri* sp. nov. can be easily differentiated from *C. lannaensis* by the more pronounced apical tapering of the embolus in its apical third (embolus only tapering sharply at apex where keels start in *C. lannaensis*), from *C. latusicosta* by the much thinner embolus (embolus thick and with no sharp apical taper in *C. latusicosta*), from *C. loricata* by the tip of the embolus straight (tip of embolus curved upwards in *C. loricata*) and the abdominal ribs not protruding from the seam of the disc (protruding in *C. loricata*), from *C. torreyi* by the aforementioned non-protruding abdominal ribs (protruding in *C. torreyi*), and from *C. truncata* by the embolus not distinctly curved prolaterally in apical third when viewed ventrally (distinctly curved in *C. truncata*), presence of only one,

rounded, prolateral palpal tibial lobe situated apically (two lobes, both with pointed apex, one situated apically and the other prolatero-ventrally in *C. truncata*), basal half of the palpal tibia incrassate (not incrassate in *C. truncata*), and presence of 20–21 ribs (≥ 24 in *C. truncata*).

Etymology: The specific epithet is a patronym in honour of the American singer and songwriter John Denver (1943–1997), whose music has enriched the life of millions of people, including the first author.

Description of holotype male: Total length including chelicerae: 19.5. Carapace: length 7.1, width 6.4. Caput: slightly raised. Ocular tubercle: raised, length 1.1, width 1.8. Eyes: AME > ALE, ALE > PLE, PLE > PME, anterior eye row slightly procurved, posterior row recurved (Figs. 1A, AC). Fovea: deep, recurved. Abdomen: length 9.5, width 7.2. Chelicera: length 2.8, width 1.2. Maxilla lacking cuspules. Labium: length 0.9, width 1.4, lacking cuspules. Labio-sternal mounds: joined to sternum (Fig. 1D). Sternum: length 3.8, width 3.5, with two pairs of sigilla (Fig. 1B). Tarsi I–IV: scopulate. Lengths of legs and palpal segments: see table 1, legs 4132. Trichobothria: not scored (see below). Spination: not scored (see below). Posterior median spinnerets with single segment, 0.61 long. Posterior lateral spinnerets with 3 segments, basal 0.5, median 0.3, apical 0.5, basal and median segments incrassate, apical segment domed. Opisthosomal disk with 21 ribs on either side, length of disk 6.9. Palp: tibia basally incrassate, one prolateral palpal tibial protuberance present, situated apically, with rounded apex, prolatero-ventral ridge present and weakly developed; cymbium with two unequal lobes separated by sclerotized groove (Figs. 3A–D). Palpal bulb with embolus of moderate length, tapering sharply in apical third, developed prolateral curve at apex; D weakly developed; PS and RS present and weakly developed, apical keel absent; sperm pore situated ventro-laterally (Figs. 4A–H). Colour (in alcohol): brown; abdomen, labium, sternum, maxillae, and coxae lighter than dorsal cephalothorax, chelicerae, and legs (Figs. 1A–D, 2A–D).

Variation: Minimal body length differences were found in the type series, ± 5 mm. The prominence of the chelicerae varies, with the holotype and paratype CMNH-IZ-A1619 having large and more divergent chelicerae, whereas the other paratypes have smaller and less divergent chelicerae, a variation as is typically seen in this genus. Abdominal rib counts: 20 (all paratypes)–21 (holotype). Number of setae per rib: 1–3 (range observed in all specimens).

Spination, setation, and trichobothria of the legs: For curatorial reasons, it was preferred not to excessively manipulate the legs of the holotype, thus only standard measurements were taken and the typical process of moving the legs to count all types of setae avoided. Paratype male CMNH-IZ-A1619 has four legs dissected and offers ample opportunity to explore this area. As reported in another *Cyclocosmia* species (SHERWOOD 2024), *C. johndenveri* **sp. nov.** has legs covered in thorn-like setae, which can have distinct or indistinct bases and extremely closely resemble spines (Figs. 5–8). Indeed, some of the thin thorn-like setae, when broken off, can resemble the bases of trichobothria. The true spines are limited almost exclusively to the ventral and prolateral faces of the legs and are much thicker. Very thick thorn-setae can, for example, be found on the dorsal femora and patellae, and resemble true spines. The position, size, and number of spines, thorn-like setae and trichobothria differ on the left and right-hand sides of a single specimen, in addition to varying between different specimens. This variability,

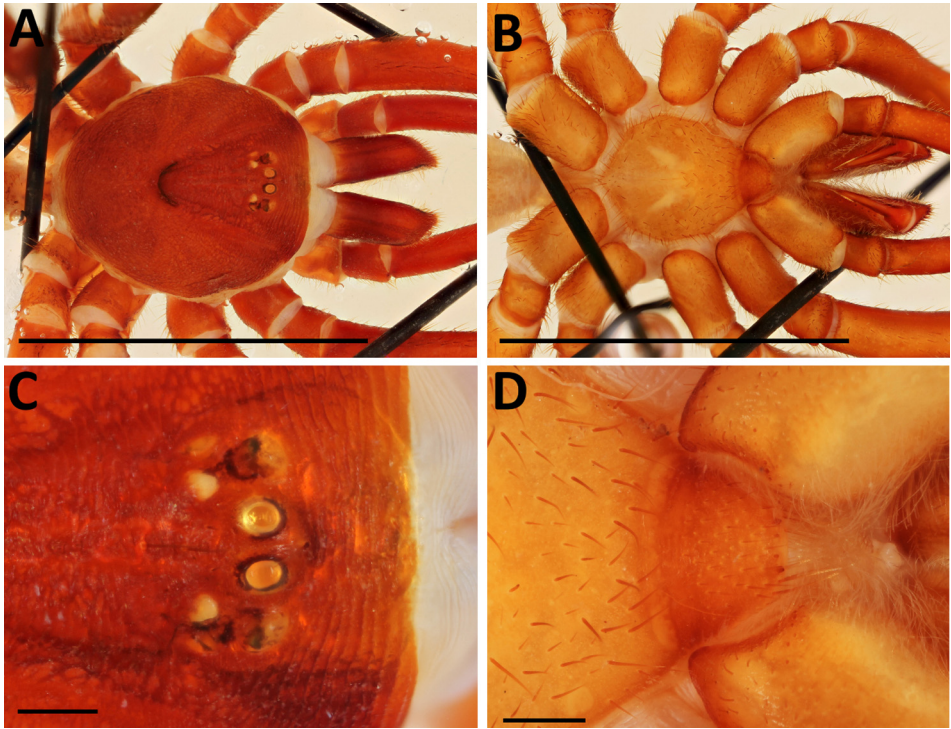


Fig. 1: *Cyclocosmia johndenveri* sp. nov. holotype male (CMNH-IZ-A1618), A – cephalothorax, dorsal view, B – labium, sternum, coxae and maxillae, ventral view, C – ocular tubercle, dorsal view, D – labium, ventral view. Scale bars = 10mm (A–B), 1mm (C–D).

observed in the type series, leads us to conclude that, broadly, these characters are of inadequate use for delineation of species within *Cyclocosmia*. Thus, given the lack of taxonomic value to these characters for alpha taxonomy like that undertaken here, we present photographs of the left-hand legs of and palp of one paratype in lieu of scoring these three types of setae on the holotype – and indeed all other specimens – to illustrate the variation found in these structures. The palp is aspinose and does not present with trichobothria, only thin thorn-like setae are present (Figs. 9A–D).

Distribution: Known only from the type locality: Droop Mountain, Greenbrier County, West Virginia, United States of America (38.0465, -80.2660) (Fig. 10).

Remarks: *Cyclocosmia johndenveri* sp. nov. represents a significant northeasterly range extension for *Cyclocosmia*, being over 400 miles from the most northerly specimen examined by OPATOVA, BOURGUIGNON & BOND (2023), which was collected in Christiana, Tennessee (35.722940, -86.214110). In our map (Fig. 10) we figure all *Cyclocosmia* specimens from Tennessee reported by OPATOVA, BOURGUIGNON & BOND (2023) in comparison to the type locality of *Cyclocosmia johndenveri* sp. nov.

DE LUNA et al. (2021) were the first to comment explicitly on the utility of structure(s) on the male palpal tibia to distinguish North American species of the genus. However, they simply refer to it as a “prolateral ridge in the distal region” (DE LUNA et al. 2021:

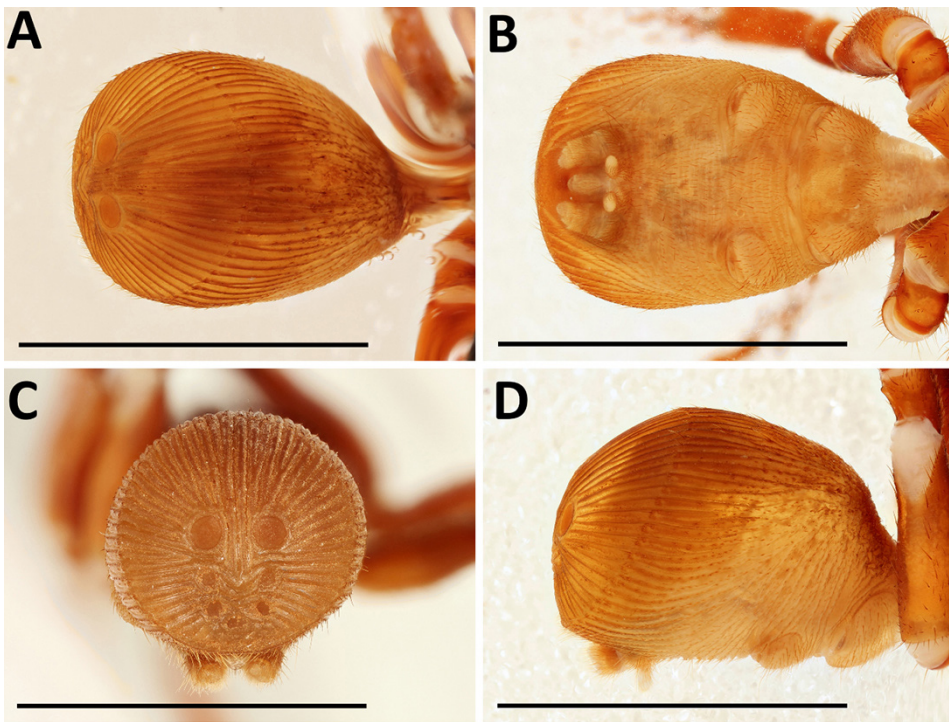


Fig. 2: *Cyclocosmia johndenveri* sp. nov. holotype male (CMNH-IZ-A1618), abdomen, A – dorsal view, B – ventral view, C – posterior view, D – lateral view (right-hand side). Scale bars = 10mm.

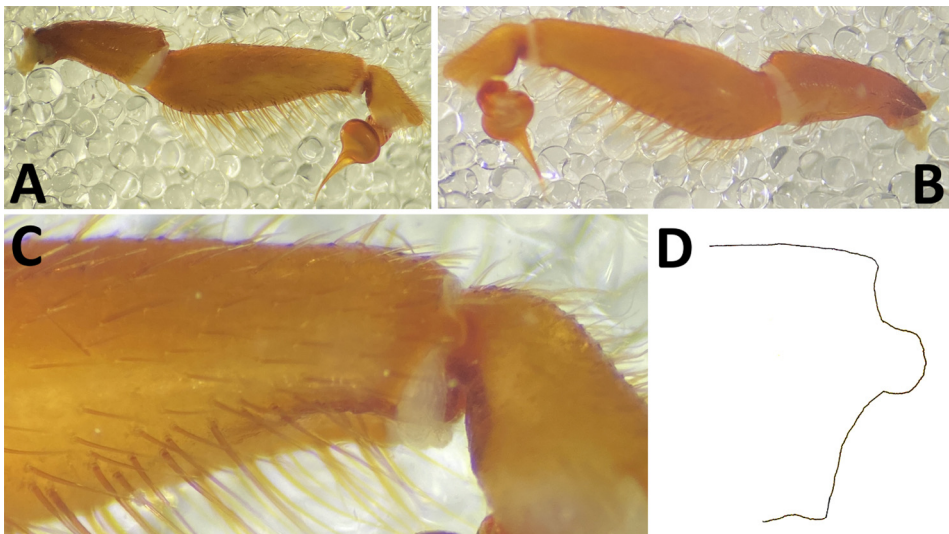


Fig. 3: *Cyclocosmia johndenveri* sp. nov. holotype male (CMNH-IZ-A1618), palp (with undissected palpal bulb), A – prolateral view, B – retrolateral view, C – close-up of prolateral palpal tibial protuberance, D – outline drawing of prolateral palpal tibial protuberance.

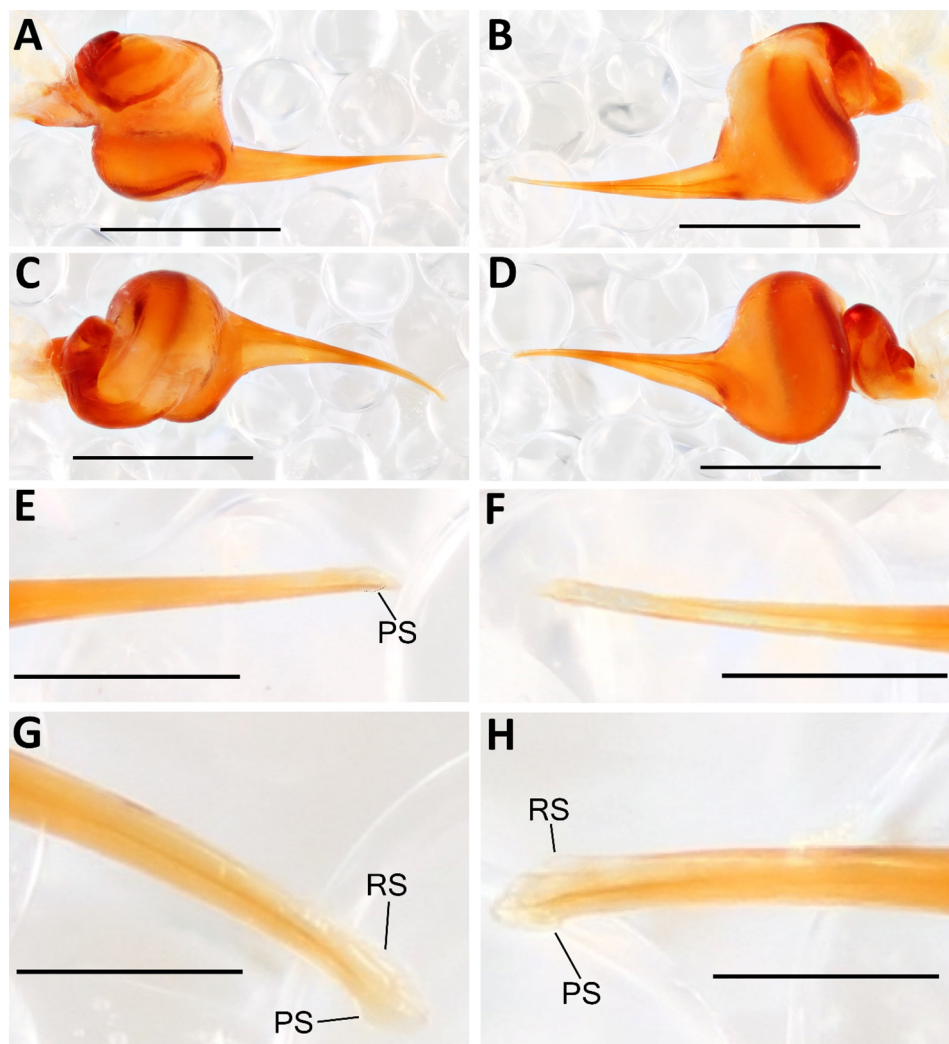


Fig. 4: *Cyclocosmia johndenveri* sp. nov. holotype male (CMNH-IZ-A1618), palpal bulb (left-hand side), A – prolateral view, B – retrolateral view, C – dorsal view, D – ventral view, E – close-up of apex of embolus, prolateral view, F – close-up of apex of embolus, retrolateral view, G – close-up of apex of embolus, dorsal view, H close-up of apex of embolus, ventral view. Scale bars = 1mm (A–D), 0.5mm (E–H).

90) without acknowledging or discussing the protuberances found on said ridge in *C. truncata*. Here, we formally classify the protuberance(s), which we demonstrate can intragenerically vary in number (one in *C. johndenveri* sp. nov. and two in *C. truncata*) and position (see diagnosis), as **prolateral palpal tibial protuberance(s)**. Furthermore, the “prolateral ridge” of the palpal tibia *sensu* DE LUNA et al. (2021) is more accurately termed a **prolatero-ventral ridge** and is restricted to solely refer to the darkened and sclerotised surface found on the prolatero-ventral apex of the palpal tibia in males of *Cyclocosmia*. These characters should be checked for in all other known congeners as it



Fig. 5: *Cyclocosmia johndenveri* sp. nov. paratype male (CMNH-IZ-A1619), leg I (left-hand side), A – dorsal view, B – prolateral view, C – retrolateral view, D – ventral view.

may, along with elements of palpal bulb morphology (see remarks of SHERWOOD 2024), be an understudied yet useful character for further differentiation of other species.

Acknowledgements

DS thanks Jason Bond (University of California, Davis) for providing useful literature and Pedro Peñaherrera-R. (Universidad San Francisco de Quito) for discussion on palpal bulb keels. Two reviewers are thanked for their comments which improved the work.

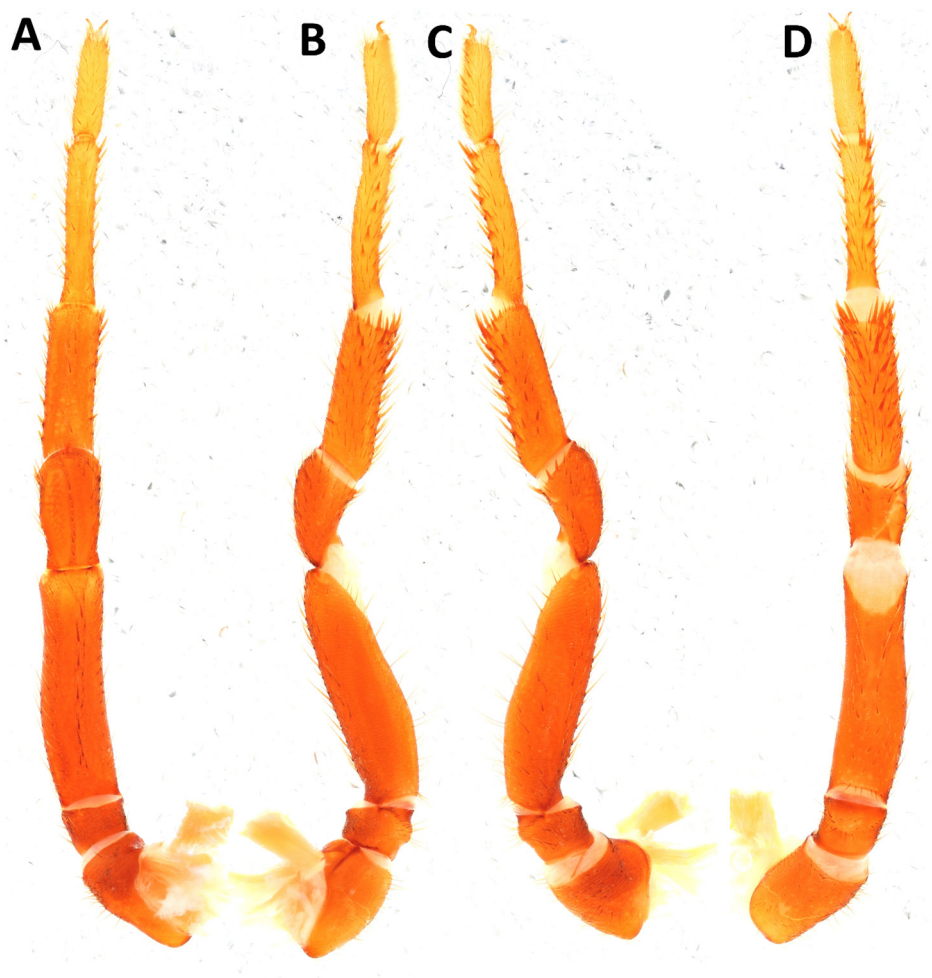


Fig. 6: *Cyclocosmia johndenveri* sp. nov. paratype male (CMNH-IZ-A1619), leg II (left-hand side), A – dorsal view, B – prolateral view, C – retrolateral view, D – ventral view..

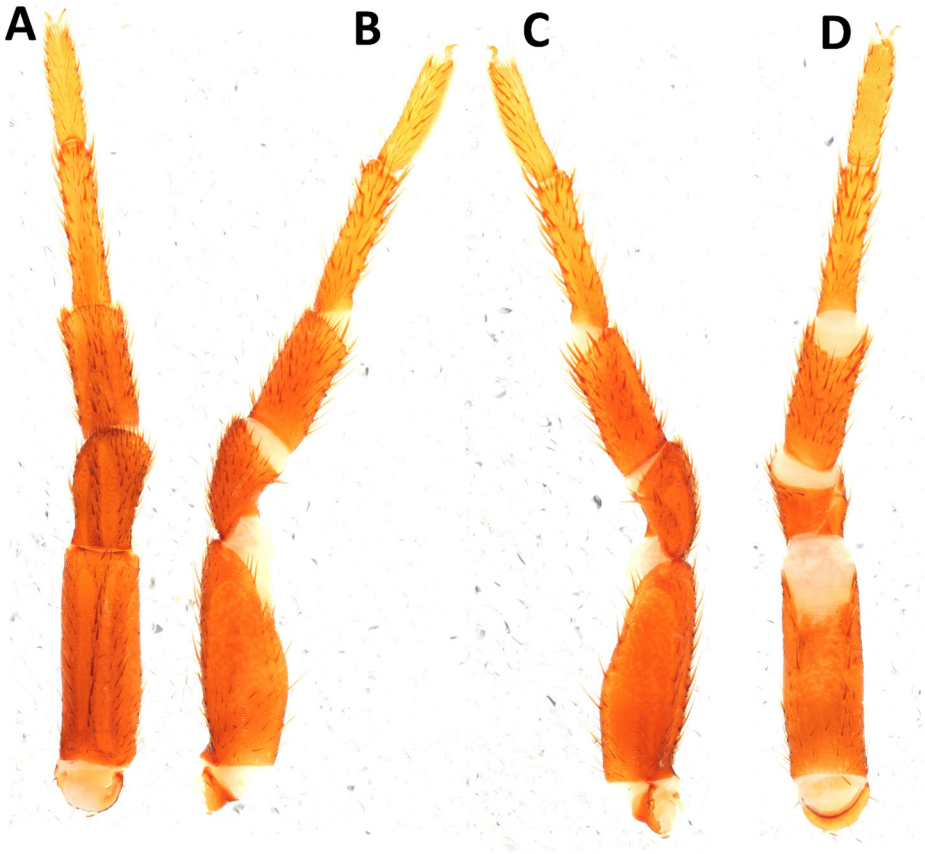


Fig. 7: *Cyclocosmia johndenveri* sp. nov. paratype male (CMNH-IZ-A1619), leg III (left-hand side), A – dorsal view, B – prolateral view, C – retrolateral view, D – ventral view.

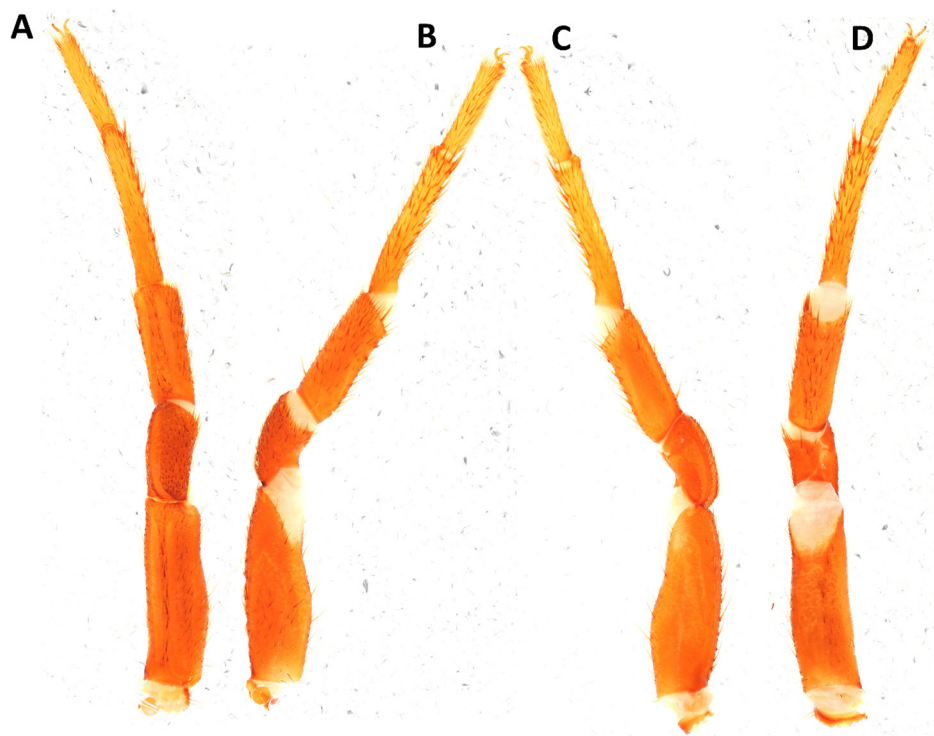


Fig. 8: *Cyclocosmia johndenveri* sp. nov. paratype male (CMNH-IZ-A1619), leg IV (left-hand side), A – dorsal view, B – prolateral view, C – retrolateral view, D – ventral view.



Fig. 9: *Cyclocosmia johndenveri* sp. nov. paratype male (CMNH-IZ-A1619), palp (left-hand side), A – dorsal view, B – prolateral view, C – retrolateral view, D – ventral view.

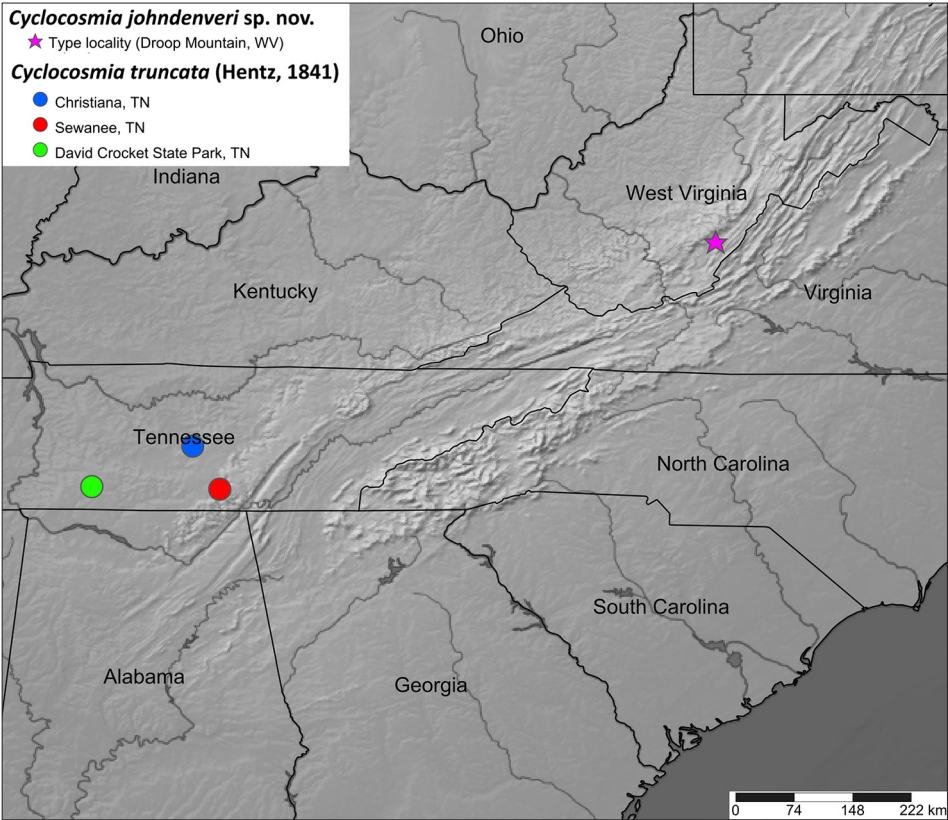


Fig. 10: Type locality of *Cyclocosmia johndenveri* sp. nov. (pink star) compared with the northernmost localities (circles) of *C. truncata* (Hentz, 1841) given by OPATOVA, BOURGUIGNON & BOND (2024).

References

- DE LUNA, M.; SOLÍS-ROJAS, C.; GARCÍA-BARRIOS, R.; MILLÁN, A. B. 2021: New data on *Cyclocosmia loricata* (C.L. Koch, 1842) (Aranei: Halonoproctidae) with first description of the male palp. – *Arthropoda Selecta* 30(1): 89–93.
<http://dx.doi.org/10.15298/arthscl.30.1.07>
- GERTSCH, W. J.; PLATNICK, N. I. 1975: A revision of the trapdoor spider genus *Cyclocosmia* (Araneae, Ctenizidae). – *American Museum Novitates* 2580: 1–20.
- HENTZ, N. M. 1841: Species of Mygalae of the United States. – *Proceedings of the Boston Society of Natural History* 1: 41–42.
- KOCH, C. L. 1842: Die Arachniden. C. H. Zeh'sche Buchhandlung, Nürnberg, Neunter Band, pp. 57–108, pl. 307–324 (figs. 727–755); Zehnter Band, pp. 1–36, pl. 325–336 (figs. 756–776).
<https://doi.org/10.5962/bhl.title.43744>
- OPATOVA, V.; BOURGUIGNON, K.; BOND, J. E. 2023: Species delimitation with limited sampling: An example from rare trapdoor spider genus *Cyclocosmia* (Mygalomorphae, Halonoproctidae). – *Molecular Ecology Resources* 2024: e13894.
<https://doi.org/10.1111/1755-0998.13894>
- POCOCK, R. I. 1901: On some new trap-door spiders from China. – *Proceedings of the Zoological Society of London* 70(2): 207–215, pl. 21.
<https://doi.org/10.1111/j.1469-7998.1901.tb08540.x>
- SCHWENDINGER, P. J. 2005: Two new *Cyclocosmia* (Araneae: Ctenizidae) from Thailand. – *Revue Suisse de Zoologie* 112(1): 225–252.
<https://doi.org/10.5962/bhl.part.80297>
- SHERWOOD, D. 2024: A new species of *Cyclocosmia* Ausserer, 1871 from Vietnam (Araneae: Halonoproctidae). – *Arthropoda Selecta* 33(1): 106–111.
<https://doi.org/10.15298/arthscl.33.1.10>
- WORLD SPIDER CATALOG 2025: World Spider Catalog, version 26.0. Natural History Museum Bern, online at: <http://wsc.nmbe.ch>
- XU, X.; XU, C.; LI, F.; PHAM, D. S.; LI, D. Q. 2017: Trapdoor spiders of the genus *Cyclocosmia* Ausserer, 1871 from China and Vietnam (Araneae, Ctenizidae). – *ZooKeys* 643: 75–85.
<https://doi.org/10.3897/zookeys.643.10797>
- YU, K.; ZHANG, Z. S. 2018: On three species of the trapdoor spider genus *Cyclocosmia* from China (Araneae, Halonoproctidae). – *Zootaxa* 4532(2): 248–256.
<https://doi.org/10.11646/zootaxa.4532.2.4>
- YU, K.; LI, C. Z.; ZHANG, S. Y.; ZHANG, F. 2023: A new trapdoor spider of *Cyclocosmia* Ausserer, 1871 from southern China (Araneae, Halonoproctidae). – *Biodiversity Data Journal* 11(e98311): 1–23.
<http://dx.doi.org/10.3897/BDJ.11.e98311>
- ZHU, M. S.; ZHANG, J. X.; ZHANG, F. 2006: Rare spiders of the genus *Cyclocosmia* (Arachnida: Araneae: Ctenizidae) from tropical and subtropical China. – *Raffles Bulletin of Zoology* 54: 119–124.
<http://zenodo.org/record/13244930>

