



Beneath the surface: A new northern species of *Trogloaptor* (Araneae: Trogloaptoridae), genetic diversity and natural history

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Abstract

We present a morphological description of a recently discovered species of spider in the family Trogloaptoridae from the Columbia River Gorge in northwestern Oregon. The family was previously monotypic (*Trogloaptor marchingtoni*) and only known from populations near the southwestern Oregon—northern California border. *Trogloaptor tulishpun* **sp. nov.** retains the key family synapomorphy, distinctive subsegmented raptorial tarsi, and an oblique membranous division of the basal segment of the anterior lateral spinnerets. *Trogloaptor tulishpun* is distinguished from *T. marchingtoni* by its color pattern, clypeal height, vulvar and palp structure. We have found *T. tulishpun* in four localities in the Columbia River Gorge, which show little mitochondrial sequence divergence from one another, but are highly genetically distinct from *T. marchingtoni*. *Trogloaptor tulishpun* is found in basalt features, including lava tubes and shallow talus caves, and has been observed to eat arachnids and moths, making them top predators in these environments.

Key words: arachnophagy, caves, invertebrate conservation, mitochondrial divergence, subterranean biodiversity

Introduction

In 2012, Trogloaptoridae, a new family of spiders, was described by Griswold *et al.* from specimens found in caves in the Klamath-Siskiyou region of southwestern Oregon. The generic name for this taxon comes from the Greek troglo-, which means “cave-dwelling,” and the Latin raptor, which means “robber” or a “beast or bird of prey”. The family is formally monotypic (*Trogloaptor marchingtoni*), but there are surface populations in northern California noted in the original species description. The synapomorphy of this family is a distinctive subsegmented raptorial leg tarsus (Griswold *et al.*, 2012). As a distinctive and divergent lineage of spiders, the inclusion of *Trogloaptor* in higher level phylogenetic and comparative analyses has informed our understanding of patterns and processes influencing spider morphological evolution including female reproductive systems (Michalik *et al.*, 2019), respiratory systems (Ramírez *et al.*, 2021) and large raptorial feet (Caetano *et al.*, 2023). While *Trogloaptor* are well supported as Synspermiata based on both morphological (Michalik *et al.*, 2019) and molecular data (Michalik *et al.*, 2019, Ramírez *et al.*, 2021, Kulkarni *et al.*, 2023), they have a flow through female genital system reflecting an independent origin of the entelegyne condition (Michalik *et al.*, 2019).

Not only are *Trogloaptor* of interest as a distinct representative of the tree of life, they represent a fauna that is poorly documented, and may be vulnerable to extinction. The Klamath-Siskiyou region of southwestern Oregon, where Trogloaptoridae was discovered, is a biodiversity hotspot and home to numerous endemic plants and invertebrate species (Myers *et al.*, 2000, Hamilton *et al.*, 2022, Hedin *et al.*, 2025). The limestone and basalt caves (and cave features) in the Pacific Northwest likely present a trove of undescribed species (Benedict and Malcolm, 1973) and one is a new species of *Trogloaptor*.

In this paper we present a morphological description of *Troglooraptor tulishpun* sp.nov. recently discovered in talus caves in the Columbia River Gorge in northwestern Oregon. This species is distinguished in many ways from *T. marchingtoni* including carapace and abdominal patterning. We detail genitalic species-level differences and include, to our knowledge, the first light images of intact vulvae in *Troglooraptor*. Our mitochondrial Cytochrome c Oxidase subunit I (COI) phylogeny provides evidence that *T. tulishpun* are genetically distinct from southern Oregon and northern Californian *Troglooraptor* indicating the lineage has a deep evolutionary history in the Pacific Northwest, the extent of which remains to be discovered. Understanding species-level diversity for potentially species-poor, highly divergent taxa like *Troglooraptor* is critical for assessing extinction vulnerability.

Materials and Methods

Collecting and Specimen Storage

Specimens were collected by hand in snap cap vials. Some specimens were kept alive in climate-controlled conditions for observation, and some were preserved directly following collection. At least one specimen from each locality was preserved in 95% ethanol to preserve DNA for further analysis. All other specimens were preserved in 80% ethanol for morphological examinations and imaging.

Mitochondrial Phylogeny and Diversity Analyses

Details of taxon sampling for COI sequences and the source of previously-published and new sequences are in Table 1. We extracted genomic DNA from single legs by homogenizing legs in buffer (100mM Tris-HCl, pH 7.5, 100 mM EDTA, 100 mM NaCl, and 1% SDS), adding 4.29M LiCl and 1.43M potassium acetate, then precipitating DNA from the supernatant with ice cold isopropanol. We amplified COI with Chelicerate-F1 (Barrett & Hebert 2005) and HCO2198 (Folmer *et al.* 1994). PCR products were cleaned using the DNA Clean & Concentrator Kit (Zymo Research Corporation, Irvine, CA) and sequenced at Azenta/Genewiz (South Plainfield, NJ). Chromatograms were checked for sequence quality using SnapGene. For one specimen (Wahkeena Falls) we used standard procedures to gather ultraconserved element (UCE) sequence capture data using the Spider 2Kv1 probeset (Kulkarni *et al.* 2020); COI by-catch sequences were then extracted from assembled UCE contigs using methods as in Hedin *et al.* (2025). We include two *Dysdera* sequences as outgroup taxa based on Michalik *et al.* (2019).

After aligning sequences using the MAFFT online server (Katoh *et al.*, 2019), we used IQ Tree v2.1.2 on the CIPRES (Miller *et al.*, 2010) to test models, quantify ML distances, and infer a maximum likelihood phylogeny with 1000 ultrafast bootstrap replicates. We estimated p-distances and maximum composite likelihood (MCL) distances using MEGA 12 (Kumar *et al.*, 2024).

Morphological Study

Larger structures were examined using a stereomicroscope. Vulvae were excised and placed in a pancreatin solution for 1–5 hours to digest the surrounding tissue, then placed in water and manually cleaned with a pipette using methods according to Álvarez-Padilla & Hormiga (2007). Some structures were imaged using an FEI Quana 450 FEG Scanning Electron (SEM). Specimens were cleaned with a fine brush and pipette, placed in a concentration series up to 100% EtOH, and critical point dried with a Samdri-790 Critical Point Dryer. All structures were sputter-coated with a 6 nm platinum coating using an EMS 150 Sputter Coater before examination with SEM.

Specimens were mounted for imaging using PURELL® or sand and ethanol to prevent movement during imaging. Photographs were taken using a Canon digital camera with 50mm, 65mm, and 100mm lenses and a 1.4x teleconverter attached to a Visionary Digital Imaging lift system. Multiple stacked images were combined using Helicon Focus®, and Photoshop was used to insert scale bars and minimally edit the photos to remove dust from the background. Vulvae were also mounted for imaging in PURELL® and ethanol or with ethanol alone. Illustrations were done with a camera lucida and reworked with Procreate illustration software.

All measurements are in millimeters and are taken at the widest or longest part of each structure. Variation is reported for the most conspicuous and variable characters, following Griswold *et al.* (2012), to represent the range in overall size in collected adult specimens. Variation for females is noted for the two localities where mature specimens were collected, with a sample size of three individuals per locality. Males were only found at one locality, so variation is noted for the three individuals collected at that locality.

Holotype (USNMENT02418340) and paratype (USNMENT02418341) specimens have been deposited at the National Museum of Natural History. Additional specimens are deposited at the San Diego State University Biodiversity Museum (paratype male SDSU_TAC001200, and female SDSU_TAC001201), and the Oregon State University's Oregon State Arthropod Collections (paratype female OSAC_0001425656). Specimens will also be deposited at the California Academy of Sciences. Following the example of Michalik *et al.* (2024), we detailed localities only at the higher level (name of the natural area) and did not include GPS coordinates associated with the collections. We retain those details and they are included in the deposition information for all specimens now in museums. Interested scholars can access them either through the authors or the institutions where they are deposited.

TABLE 1. Taxon sampling details for COI phylogeny.

Taxon	Accession number	Locality	Authors	Notes, specimen IDs
<i>T. marchingtoni</i>	KY018033.1	USA: Oregon, Josephine Co., No Name Cave. Type Locality.	Wheeler <i>et al.</i> , 2016	CASENT 9040051-1
<i>T. marchingtoni</i>	KX514694.1	As directly above	Chousou-Polydouri <i>et al.</i> , 2019	CASENT9040051 "Trogloraptor sp. 2 NCP-2017" in GenBank
<i>T. aff marchingtoni</i>	KY018034.1	USA: California, Del Norte Co., NE Crescent City, Jedediah Smith Redwood St. Park, Ruth Perry Hatton Grove	Wheeler <i>et al.</i> , 2016	CASENT 9040069
<i>T. aff marchingtoni</i>	KX514695.1	As directly above	Chousou-Polydouri <i>et al.</i> , 2019	CASENT9040069
<i>T. tulishpun</i> sp. nov.	PZ334587	USA: Oregon, Hood River. Co., Herman Creek; Mar 21, 2025	This work	GB202503210101 mature♀
<i>T. tulishpun</i> sp. nov.	PZ334588	USA: Oregon, Hood River. Co., Herman Creek, Oct 20, 2024	This work	GB202410200404 mature♀
<i>T. tulishpun</i> sp. nov.	PZ334584	USA: Oregon, Hood River. Co., Herman Creek, April 30, 2023	This work	GB202304300201 mature♀
<i>T. tulishpun</i> sp. nov.	PZ334586	USA: Oregon Multnomah Co., Angel's Rest, Oct 20, 2024	This work	GB202410200103 mature♀
<i>T. tulishpun</i> sp. nov.	PZ334585	USA: Oregon Multnomah Co., Angel's Rest, April 30, 2023	This work	GB202304300101 mature♀; imaged
<i>T. tulishpun</i> sp. nov.	PRJNA1466607	USA: Oregon Multnomah Co., Wahkeena Falls, Oct 6, 2021	This work UCE bycatch	GB202110060101 juvenile
<i>Dysdera spinidorsa</i>	EU139629_1	Spain: Canary Islands, Fuerteventura, Cuchillete Montana Penos	Macias-Hernandez, N. <i>et al.</i> , 2008	haplotypeN89
<i>Dysdera lusitanica</i>	GQ285629_1	Spain: Burgos, Puentedey	Arnedo, M.A. <i>et al.</i> , 2009	voucherCRBA1002

Results & Discussion

Molecular analyses

We generated COI sequences for six individuals from three localities in the Columbia River Gorge (Table 1, Fig. 1). Original sequences have been submitted to GenBank (numbers PZ334584–PZ334588), and the Short Read Archive (SRA) database (PRJNA1466607). Our final alignment including the four *Trogloraptor* sequences from GenBank had 621 nucleotides, however the Wahkeena Falls sequence captured as by-catch from UCE data is partially incomplete at the 5' end. IQTree inferred GTR+I+G as the best model, and cautioned that distances were saturated both with and without the *Dysdera* outgroup taxa included.

We detected two COI haplotypes among the six specimens from three localities in the Columbia River Gorge and these differed in three of the 621 nucleotides (0.48%). One haplotype includes two specimens from Herman Creek and the other includes a third individual from Herman Creek, and both specimens from Angel's Rest. The shorter sequence from Wahkeena Falls is identical to the haplotype that includes Angel's Rest. The maximum physical distance between the Columbia River Gorge localities (Wahkeena Falls and Herman Creek) is approximately 19 miles (30 km). These data are consistent with all populations sampled being *T. tulishpun*. The data preliminarily suggest potential gene flow between localities, but more refined analyses of population structure require more thorough taxon sampling and resolution from deeper sequencing of more loci.

Our ML phylogeny supports deep divergence between southern *Troglooraptor* (*T. marchingtoni* and the northern California population) and northern *T. tulishpun* (Fig. 1). With average p-distances between these clades of 14%, the mitochondrial evidence supports a relatively ancient most recent common ancestor of the southern and northern taxa.

Our phylogeny unambiguously supports two genetically distinct southern clades, including *T. marchingtoni* from the type locality, and a western forest-dwelling population from Del Norte County, California here treated as *T. aff. marchingtoni* (Fig. 1). Although each of these locations includes two separate GenBank submissions, the separate submissions represent identical sequences, derived from the same CASENT voucher specimen for each respective population (Table 1). In our phylogenetic analysis we treated each GenBank submission as distinct. Genetic distances between these disjunct locations are relatively high, with p-distances nearly 7%, and model corrected distances of 24% and 15% from ML and MCL respectively; these limestone cave versus "surface" populations could represent different species.

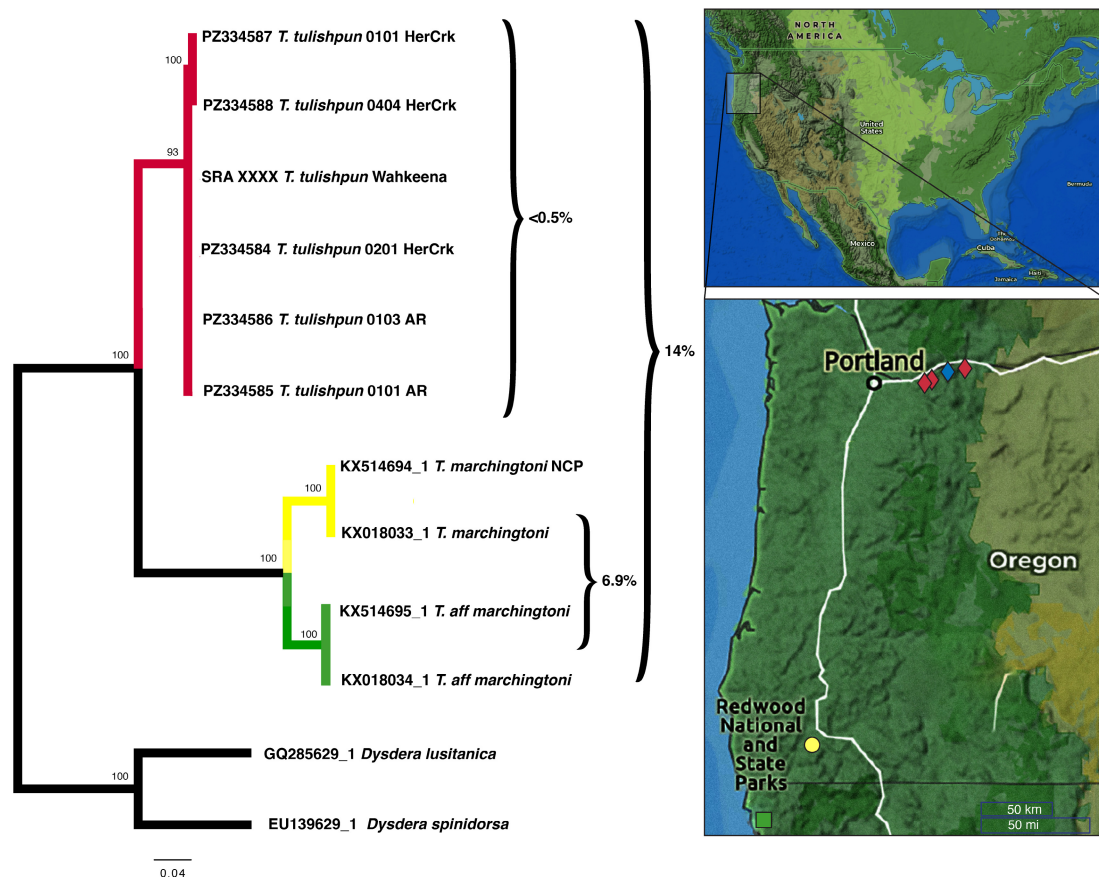


FIGURE 1. Maximum likelihood tree of COI sequences with bootstrap values for node support. Numbers by brackets are average COI p-distances within and among the two *Troglooraptor* clades. *Troglooraptor* localities are overlain on the map with diamond shapes representing *T. tulishpun*- red sites are included in the phylogeny, the blue site is not included. The yellow circle is the type locality for *T. marchingtoni*, and the green square is the locality for *T. aff. marchingtoni* (maps made with Gaia GPS (gaiagps.com)).

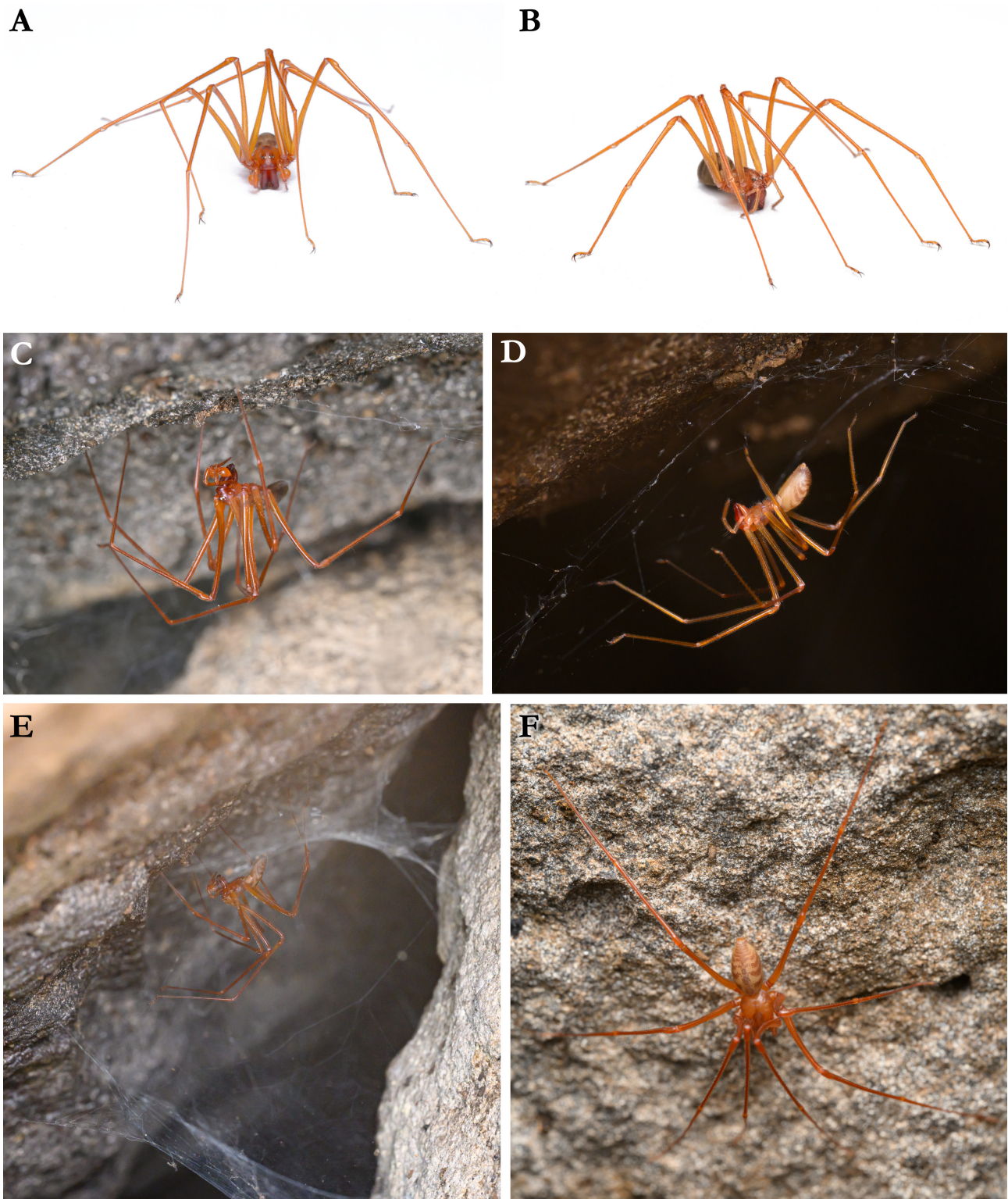


FIGURE 2. Habitus of live *Trogloraptor tulishpun* from Herman Creek Talus Cave (all photos by M. Hedin). A male in captivity, B female in captivity, C male in Herman Creek Talus Cave, D female in Herman Creek Talus Cave on sparse web, E male on non *Trogloraptor* web, F female in Herman Creek Talus Cave.

Taxonomy

Family Trogloraptoridae Griswold *et al.*, 2012

Genus *Trogloraptor* Griswold *et al.*, 2012

Type species. *Trogloraptor marchingtoni* Griswold *et al.*, 2012

Trogloraptor tulishpun, Jones and Binford, sp. nov.

urn:lsid:zoobank.org:act:6BB41C80-54CC-4E4B-8A6C-7D761D51EFD6

(Figs 2–7)

Types. Holotype male from Herman Creek Talus Cave, Herman Creek, Hood River County, Oregon, USA, collected 5 August 2025 by G. Binford, M. Hedin, O. Hedin, F. Watson, USNMENT02418340. Paratype female from Herman Creek Talus Cave, Herman Creek, Hood River County, Oregon, USA, collected 21 March 2025 by G. Binford, A. Kerschner, K. Luper, and M. Jones, USNMENT02418341.

Etymology. *Tulishpun* (pronounced too-lish-pun) is a word, simplified for ease of pronunciation, from the Sahaptin River dialect meaning “cave predator, owner of the domain”. The Sahaptin River dialect is from the Columbia River area, the type locality of this species, and the name was given to us by elders from the Columbia River Inter-Tribal Fish Commission. The specific epithet is to be treated as a noun in apposition.

Diagnosis. *Trogloraptor tulishpun* resembles *T. marchingtoni* (Griswold *et al.*, 2012) by its similar carapace and abdominal shape and coloration, its subsegmented raptorial tarsi, and the partly sclerotized genital region (Figs 2, 3, 5, 7). It is clearly distinguished by its conspicuous scalloped patterning along the lateral and posterior edges of the carapace which is absent in *T. marchingtoni*. The abdominal patterning is different from the chevron pattern of *T. marchingtoni*, with oval-shaped spots down the center of the dorsal side that have a thin line of beige down the center, and stripes extending laterally on each side of the abdomen. It also has teardrop-shaped markings pointing toward the pedicel at the anterior edge of the abdomen which are absent in *T. marchingtoni* (Fig. 2, 3, 5). The clypeus height is less than 6 times the diameter of the PME in contrast to the clypeal height of *T. marchingtoni* which is greater than 6 times the PME diameter (Fig. 3, 5). This species is also distinguished by the structure of the genitalia. The male pedipalpal bulb is piriform and lacks processes as in *T. marchingtoni* (Fig. 4). The embolus of *T. tulishpun* is much longer and curves around less tightly than *T. marchingtoni*, curving around back onto itself and then extending towards the tip of the pedipalp. The female genital region is anteriorly sclerotized, but the sclerotized bar does not extend to become continuous with the sclerotized region around the opening of the booklungs as they do in *T. marchingtoni* (Fig. 5E). The vulva has a separation between copulatory and fertilization ducts instead of the closely entwined ducts in *T. marchingtoni* (Fig. 6).

Description

Male (Holotype, USNMENT02418340):

MEASUREMENTS: Total length 6.58. Carapace 3.11 long, 2.29 wide; clypeus 0.78 high; ocular area 0.35 long, 0.96 wide; ratio of eyes ALE:PME:PLE, 1.12:1.00:1.12, diameter of PME 0.19; chelicerae 1.89 long; sternum 1.43 long, 1.40 wide; Leg measurements (Femur + Patella + Tibia + Metatarsus + Tarsus = [Total]): I: 7.61 + 1.12 + 8.04 + 8.55 + 1.19 = [26.51]; II: 7.44 + 1.15 + 7.65 + 8.07 + 1.27 = [25.58]; III: 6.14 + 1.07 + 6.00 + 5.86 + 1.25 = [20.32]; IV: 6.56 + 1.11 + 6.49 + 5.49 + 1.19 = [21.84]; pedipalp: 1.13 + 0.40 + 1.04 + 1.38 = [4.13].

PROSOMA: Orange with rust colored heart-shaped marking on pars cephalica, extending anteriorly to the PLEs and posteriorly to the fovea, and rust colored undulate patterning along the lateral and posterior edges of the carapace. Carapace red-orange towards clypeus. Sternum red-orange and heart-shaped. Labium darker than sternum, more narrow than long, and fused with sternum (Fig. 3).

CHELICERAE: Reddish brown, free at base with weak mesal lamellar ridge on basal $\frac{2}{3}$.

LEGS: Orange, darker towards the distal end of each segment. Tarsus I–III with flexible, subsegmentations basal and subapical, tarsus IV with only subapical segmentation. Tarsus of legs I–III with 4 pairs of ventral spines, one proximal and three distal of basal subsegmentation. Tarsus of leg IV lacks these spines. Tarsus with 1–3 dorsal trichobothria, bothrium with proximal hood (Fig. 3, 7).

OPISTHOMA: Tan with purple-brown oval-shaped spots down the center of the dorsal abdomen with a thin line of beige down the center, stripes extending laterally from between each oval to the ventral spinnerets, and teardrop-shaped markings pointing toward the pedicel at the anterior edge of the abdomen (Fig. 3, 5).

PALPS: Pedipalpal bulb is yellow-orange, piriform, and lacks processes. The embolus is reddish-brown, long, and curves around loosely, curving around back onto itself and then extending towards the tip of the pedipalp (Fig. 4).

Variation (n=3): Total length 6.58–7.19; carapace length 1.27–1.36 times width; PER width 0.35–0.38 times OAL; clypeal height 3.52–4.17 times PME diameter, 0.38–0.40 times cheliceral length; sternum length 0.95–1.02 times width; labium length 1.61–1.69 times width; pedipalpal coxa length 1.41–1.63 times width; femur I length 2.45–2.62 times carapace length; metatarsus I length 6.30–7.12 times total carapace length.

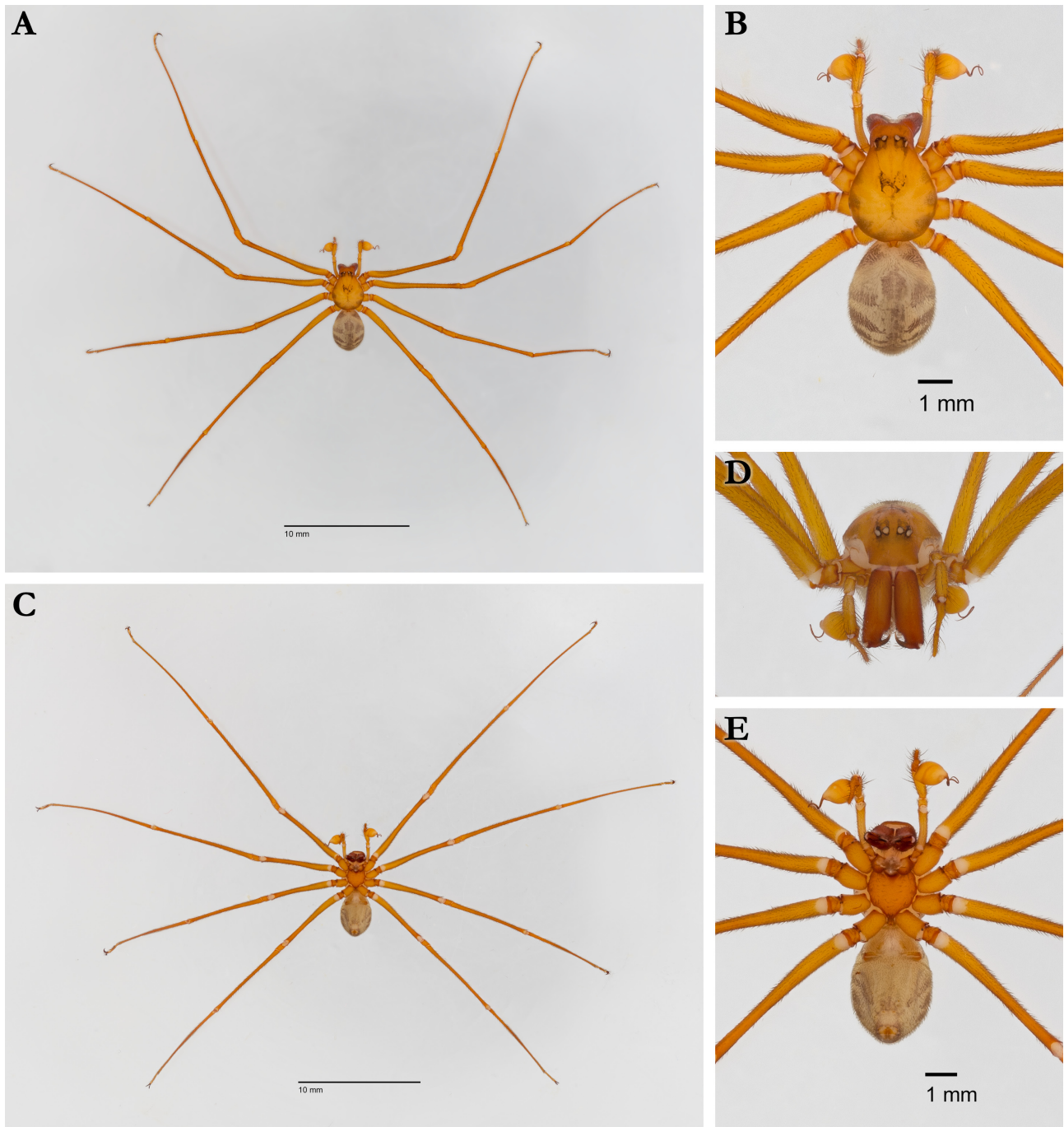


FIGURE 3. Habitus of male *T. tulishpun* (holotype, USNMENT02418340) from Herman Creek Talus Cave. **A, B** dorsal views, **C, E** ventral views, **D** anterior view.

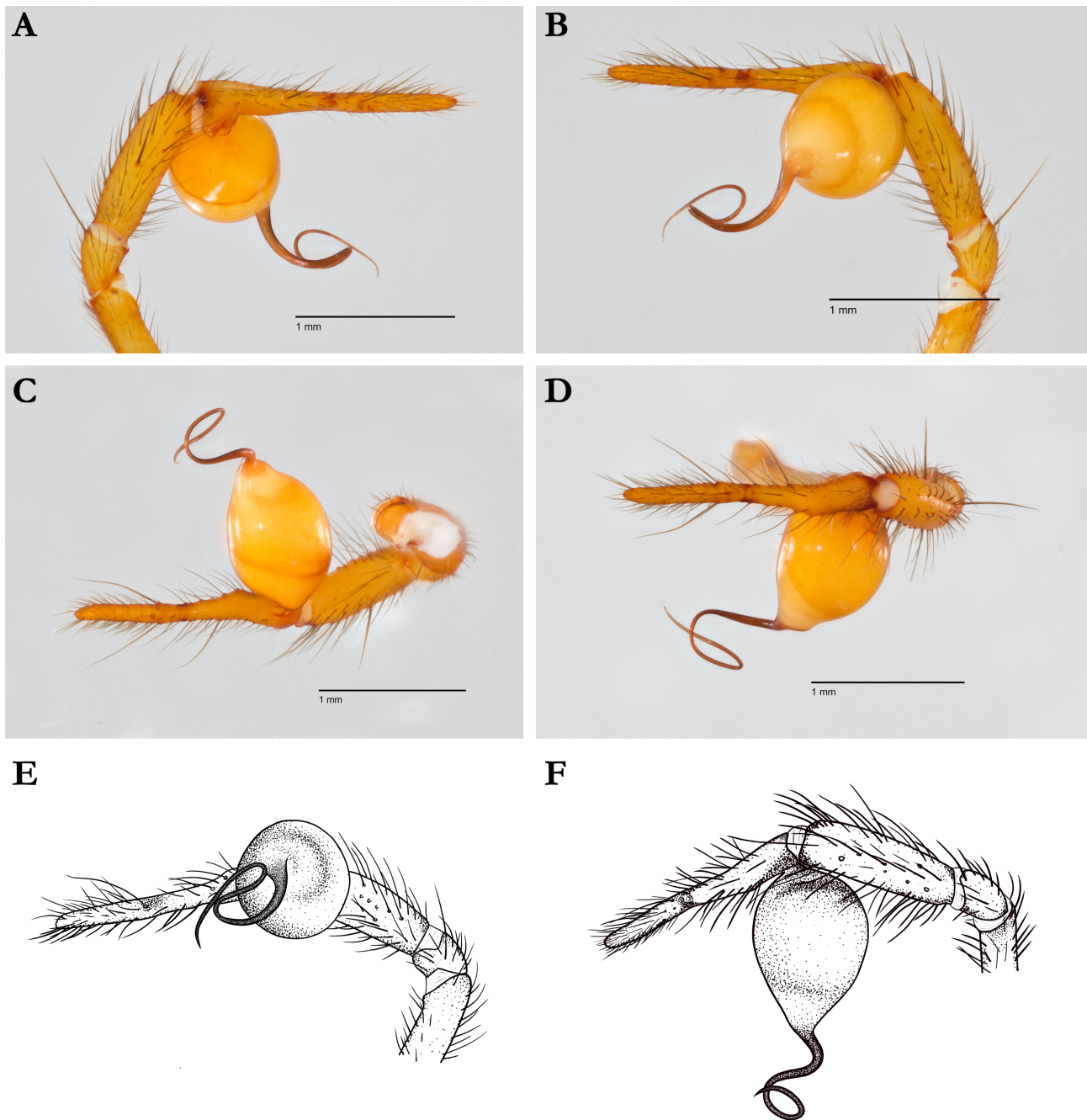


FIGURE 4. Pedipalp of male *T. tulishpun* (holotype, USNMENT02418340) from Herman Creek Talus Cave. **A** prolateral view, **B** retrolateral view, **C** ventral view, **D** dorsal view; Drawings of pedipalp of male *T. tulishpun* **E** retrolateral view, **F** dorsal view.

Female (Paratype, USNMENT02418341):

MEASUREMENTS: Total length 9.74. Carapace 3.94 long, 2.98 wide; clypeus 0.95 high; ocular area 0.43 long, 1.15 wide; ratio of eyes ALE:PME:PLE, 1.00:1.00:1.14, diameter of PME 0.22; chelicerae 2.27 long; sternum 1.77 long, 1.83 wide; Leg measurements (Femur + Patella + Tibia + Metatarsus + Tarsus = [Total]): I: 8.08 + 1.43 + 8.27 + 8.22 + 1.31 = [27.31]; II: 7.83 + 1.40 + 7.83 + 7.88 + 1.33 = [26.27]; III: 6.71 + 1.33 + 6.15 + 5.98 + 1.35 = [21.50]; IV: 6.92 + 1.25 + 6.58 + 6.61 + 1.31 = [22.67]; pedipalp: 1.82 + 0.52 + 1.48 + 2.17=[5.99].

Differs from male by the following:

LEGS: Tarsus I-IV with flexible, subsegmentations basal and subapical (Fig. 7).

GENITALIA: The female genitalia are partly sclerotized and conspicuous externally. The anterior edge of the epigastric furrow is strongly sclerotized. The vulva has curved copulatory ducts that extend anterior from the copulatory opening and connect to the round, membranous spermatheca; they are completely sclerotized near the copulatory opening and become membranous towards their attachment to the spermatheca. The copulatory duct on either side is strongly sclerotized and forms a U-shape. A weakly sclerotized bursa extends from the epigastric furrow. The fertilization ducts are narrower than the copulatory ducts and extend medially from the spermathecae, then distally, where they connect with the bursa. The fertilization ducts are more sclerotized near their connection to the bursa and the connection to the spermatheca. These ducts are not closely entwined with the copulatory ducts (Fig. 6).

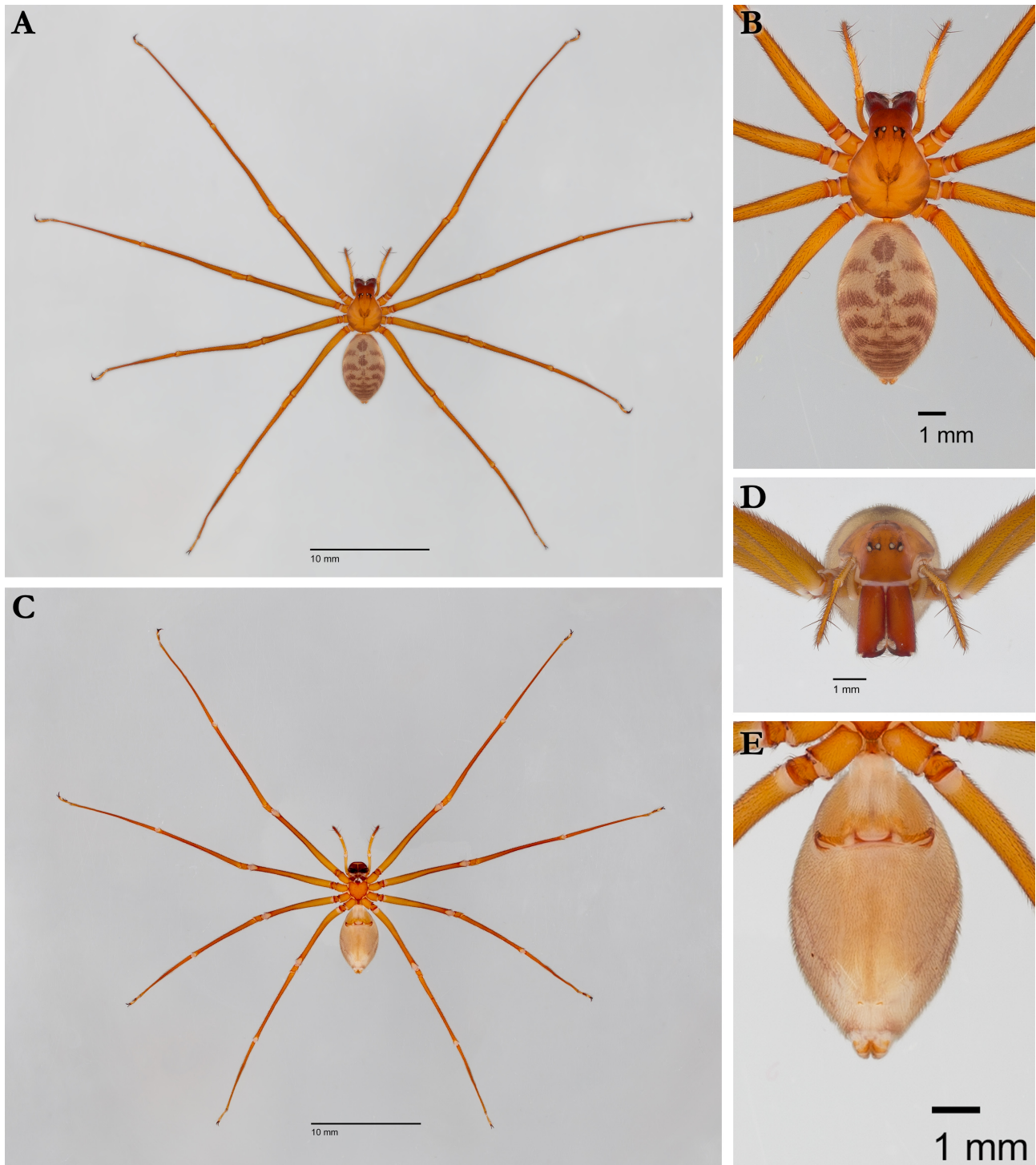


FIGURE 5. Habitus of female *T. tulishpun* (paratype, USNMMENT02418341) from Herman Creek Talus Cave. **A, B** dorsal views, **C, E** ventral views, **D** anterior view.

Variation (n=6): Total length 7.45–9.74; carapace length 1.26–1.38 times width; PER width 0.33–0.43 times cheliceral length; clypeal height 3.65–4.88 times PME diameter, 0.33–0.39 times OAL; sternum length 0.96–1.07 times width; labium length 1.46–1.70 times width; pedipalpal coxa length 1.77–2.23 times width; femur I length 1.97–2.15 times carapace length; metatarsus I length 5.17–6.23 times total carapace length.

Distribution. Basalt features, (shallow caves and lava tubes) in the Columbia River Gorge in northwestern Oregon (Fig. 1). The known distribution is on the ancestral land of the Confederated Tribes of Grand Ronde, Confederated Tribes of Warm Springs, Cascades, Stl’pulmsh, Confederated Tribes of Siletz Indians, Cayuse, Umatilla, and Walla Walla (Native Land Digital, 2025).

Additional material examined. USA: Oregon: Multnomah County, Angels Rest, 30 April 2023, G. Binford, N. Marchington, J. Taylor, and K. Luper, 2 females, GB202304300101 and GB202304300102; Multnomah County, Angels Rest, 20 October 2024, G. Binford, M. Jones, N. Marchington, J. Taylor, and N. Schmidt, 1 female, GB202410200103; Hood River County, Herman Creek, 30 April 2023, G. Binford, N. Marchington, J. Taylor, and K. Luper, 2 females, GB202304300201, GB202304300203, and 1 juvenile male GB202304300202; Hood River County, Herman Creek, 20 October 2024, G. Binford, M. Jones, N. Marchington, J. Taylor, N. Schmidt, and K. Luper, 1 female, GB202410200405; Hood River County, Herman Creek, 6 June 2025, G. Binford, M. Jones, F. Watson, 3 females, GB202506060102, GB202506060103, and GB202506060104; Hood River County, Herman Creek, 5 August 2025, G. Binford, M. Hedin, O. Hedin, F. Watson, 2 males, GB202508050101 and SDSU_TAC001200; USA: Oregon: Multnomah County, Wahclella Falls, 20 October 2024, G. Binford, M. Jones, M. Thorne, N. Marchington, J. Taylor, N. Schmidt, K. Luper, 1 juvenile, GB202410200301; USA: Oregon: Multnomah County, Wahkeena Falls, 6 October 2021, G. Binford, 1 juvenile, GB202110060101.

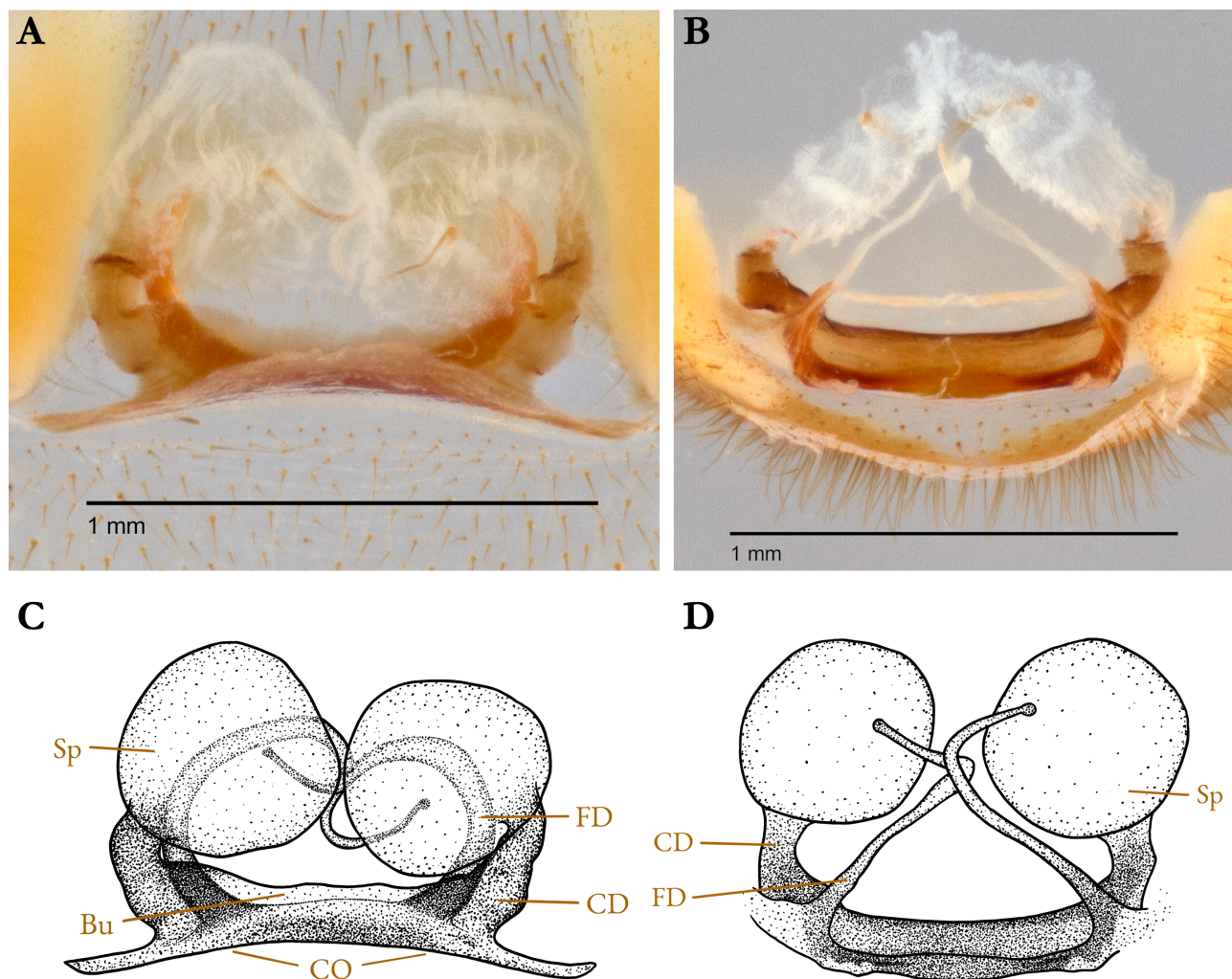


FIGURE 6. Internal vulvar anatomy of female *T. tulishpun*. (GBJ202304300102) from Angel’s Rest Talus Cave. **A** vulva dorsal view, **B** vulva anterior view, **C** vulva dorsal view, drawing, **D** vulva anterior view, drawing. Bu, bursa; CD, copulatory duct; CO, copulatory opening; FD, fertilization duct; Sp, spermatheca.

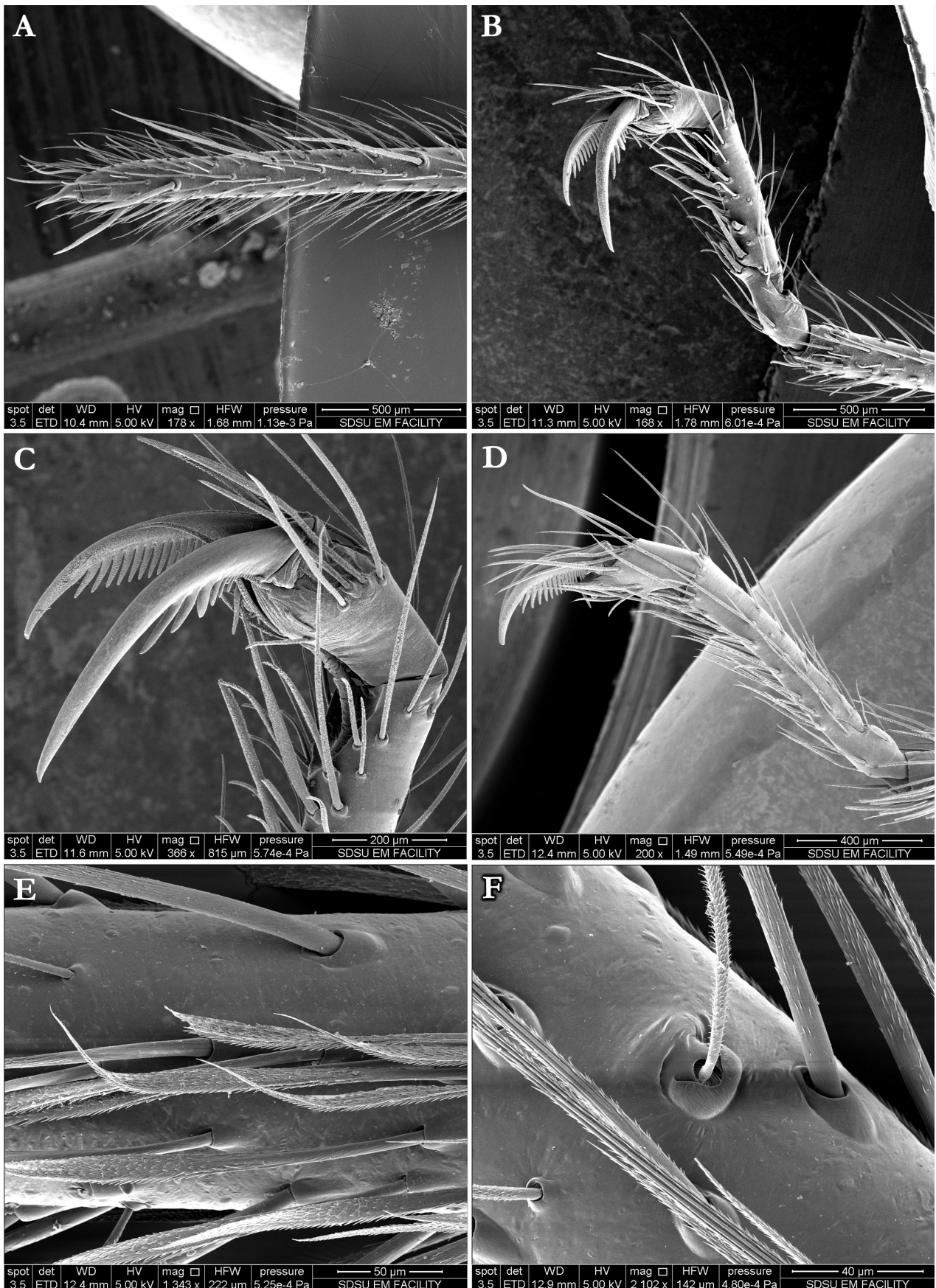


FIGURE 7. Scanning electron micrographs of female *T. tulishpun* (GB202506060104) from Herman Creek Talus Cave. **A** right pedipalp, prolateral view **B, C** leg III tarsus, prolateral view, **D** leg IV tarsus, prolateral view, **E** curved setae on metatarsus of leg IV, prolateral view, **F** trichobothrium on tibia of leg III.

Natural history. *Trogloaptor tulishpun* specimens have been found in caves in the Columbia River Gorge in northwestern Oregon. This is about 380 linear kilometers from the nearest locality where *T. marchingtoni* has been collected (Fig. 1). They live in talus caves between approximately 2 and 10 meters beneath the surface, and in lava tubes, and are found clinging to the surfaces of rocks on sparse strands of silk (Fig. 2). A juvenile was also collected under a large rock on the surface. *Trogloaptor* collected at Herman Creek were larger on average than those collected at Angels Rest, but no other significant differences were noted between specimens collected at the two localities. *Trogloaptor* were sometimes found near the webs of other spiders and have been collected with *Pimoa* spider and *Taracus* opilion prey (Fig. 2). Living specimens were reared in humid, climate-controlled conditions and constructed loose, irregular tangle webbing. Early attempts to feed the specimens *Gryllodes sigillatus* and *Drosophila melanogaster* were unsuccessful as reported by Griswold *et al.*, 2012; however, attempts to feed them *Pimoa* collected from the caves were successful. *Trogloaptor tulishpun* were also observed eating moths, suggesting a possible preference for arachnid prey but not a specialization.

Conclusions

Our discovery of a new species of *Trogloaptor* that is both geographically and genetically divergent from other known taxa reveals that trogloraptorids are more geographically widespread than previously known. Much work is needed to understand the niche requirements, geographic range and diversity of the family, but the substantial genetic depth that separates *T. tulishpun* from *T. marchingtoni* suggests that *Trogloaptor* have been in the Pacific Northwest for a long time. As subterranean dwellers they may be great models for improving our understanding of Pacific Northwest biogeography at both deep and shallow timeframes. While we are encouraged that *T. tulishpun* individuals were not uncommon in the Columbia River Gorge in talus caves, they represent a potentially delicate fauna that relies on the narrow habitat conditions of the caves and other types of shallow subterranean environments. Biodiversity in these habitats is poorly known, and perhaps particularly high risk due to forest conversion and changing climate (Mammola *et al.*, 2019). As tertiary consumers in subterranean habitats they are important “owners of the domain” likely playing a role in ecosystem stability in these fragile environments.

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