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Assamhoplites martensi n. sp. female chelicerae frontal.

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African highland harvestman: New genus and new species of Filopalpinae Martens, 2022 (Opiliones, Assamiidae) from Wonchi crater, Oromia province, Ethiopia

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ABSTRACT
The family Assamiidae Sørensen, 1884, within the suborder Laniatores Thorell, 1876, of Opiliones remains poorly studied, with challenges arising from typology-based systematics and limited sampling, especially in sub-Saharan Africa. The recent discovery of Filopalpinae Martens, 2022, a new subfamily, highlighted the underexplored richness in Ethiopia. In this study, we describe a new genus and species, *Assamhoplites martensis* n. gen., n. sp., from the northwestern Ethiopian Highlands, adding a crucial piece to the understanding of the diversity of harvestmen in the region. Our findings reveal the unique distribution of Filopalpinae within the Ethiopian Montane Moorlands ecoregion, a biodiversity hotspot. This area high altitudes, humidity, and temperate climate make it an ideal refuge for harvestmen. This discovery prompts further exploration to determine if Filopalpinae represents altitude relicts or a widespread lineage. The sexual dimorphism in pedipalp morphology, observed not only in *Assamhoplites martensis* n. gen., n. sp. but also in related species, raises intriguing questions about the evolutionary significance of such extreme modifications. The study underscores the importance of considering both morphological and biogeographical factors in taxonomic classifications, illustrated by the creation of the monotypic genus *Assamhoplites* n. gen. based on differences in pedipalp morphology and distribution. The northwestern Ethiopian Highlands, separated by the Great Rift Valley, act as a possible biogeographical barrier influencing the diversification of these harvestmen. This study provides insights into the intricate evolutionary processes shaping the unique diversity of the fauna of the Ethiopian highlands.

KEY WORDS
Afrotropics,
genital morphology,
Grassatores,
sexual dimorphism,
new species,
new genus.

RÉSUMÉ
Un opilion des hauts plateaux africains : nouveau genre et nouvelle espèce de Filopalpinae Martens, 2022 (Opiliones, Assamiidae) du cratère de Wonchi, province d'Oromia, Éthiopie.
La famille des Assamiidae Sørensen, 1884, au sein du sous-ordre des Laniatores Thorell, 1876, des Opilions, reste peu étudiée, des difficultés subsistant liées à une systématique basée sur la typologie et à un échantillonnage limité, en particulier en Afrique subsaharienne. La récente découverte des Filopalpinae Martens, 2022, une nouvelle sous-famille, a mis en évidence la richesse sous-explorée de l'Éthiopie. Dans cette étude, nous décrivons un nouveau genre et une nouvelle espèce, *Assamhoplites martensis* n. gen., n. sp., du nord-ouest des landes d'altitude éthiopiennes, ajoutant ainsi une pièce cruciale à la compréhension de la diversité des opilions de la région. Nos résultats révèlent la distribution unique des Filopalpinae dans l'écorégion des hauts plateaux éthiopiens, un point chaud de la biodiversité. Les hautes altitudes, l'humidité et le climat tempéré de cette région en font un refuge idéal pour les opilions. Cette découverte incite à approfondir les recherches pour déterminer si les Filopalpinae représentent des reliques d'altitude ou une lignée plus largement répandue. Le dimorphisme sexuel dans la morphologie du pédipalpe, observé non seulement chez *Assamhoplites martensis* n. gen., n. sp. mais aussi chez des espèces apparentées, soulève des questions intrigantes sur la signification évolutive de ces modifications extrêmes. L'étude souligne l'importance de prendre en compte à la fois les facteurs morphologiques et biogéographiques dans les classifications taxonomiques, illustrée par la création du genre monotypique *Assamhoplites* n. gen. sur la base de différences dans la morphologie des pédipalpes et dans la distribution. Les hauts plateaux du nord-ouest de l'Éthiopie, séparés par la vallée du Grand Rift, constituent possiblement une barrière biogéographique susceptible d'influencer la diversification de ces opilions. Cette étude offre apporte des informations sur les processus évolutifs complexes qui façonnent la diversité unique de la faune des hauts plateaux éthiopiens.

MOTS CLÉS
Afrotropiques, morphologie génitale, grassatores, dimorphisme sexuel, espèce nouvelle, genre nouveau.

INTRODUCTION

Among Opiliones Sundevall, 1833, Assamiidae Sørensen, 1884 (suborder Laniatores Thorell, 1876) remain one of the most understudied families. The strong typological-based systematics (e.g., Roewer 1935) used to describe the poorly supported subfamilies (Palmieri *et al.* 2023), as well as the fact that the family is under-sampled in sub-Saharan Africa, have created a great challenge to the taxonomic treatment of this group. This case is even more evident in East African countries, where the taxonomic research has been even more neglected. Among those countries, Ethiopia includes only 20 Assamiidae species; (Staręga 1992; Martens 2022), a low number in comparison with other African countries such as Congo (109 species) and Tanzania (65 species) (Staręga 1992). The Assamiidae fauna of Ethiopia was initially studied by Pavesi (1895, 1897), who described three new species, while the works of Caporiacco (1940, 1949) and Roewer (1912, 1935, 1957) added twelve species to the fauna. Thereafter, the study of the group received scant attention and no considerable advance has been noted for decades.

The recent discovery of Filopalpinae Martens, 2022, a new subfamily of Assamiidae, described by Martens (2022) brought to light once again the high diversity of the region. A distinguishable trait of this subfamily includes their extreme sexual dimorphism, where the pedipalps of the males are thread-like structures that can be 2-5 times longer than their body length, demarcating this group from the other Assamiidae subfamilies. Filopalpinae originally contained only the genus *Filopalpus* Martens, 2022, and five species with ranges across the Bale and Arsi mountains, the western section of the southeastern Ethiopian Highlands. In this paper, we describe a new genus and a new species of Filopalpinae from Wonchi crater, Oromia province, in the northwestern Ethiopian Highlands.

MATERIAL AND METHODS

The specimens used in this study were deposited in the following institutions: Arachnological collection (Opiliones section) of the Royal Museum for Central Africa (BE_RMCA_ARA.Opi) and Museo Argentino de Ciencias Naturales Bernardino Rivadavia (MACN).

The specimens were examined using a Leica M205A microscope equipped with a Leica DF295 camera. Male genitalia was dissected and temporarily mounted on microscope slides as described in Acosta *et al.* (2007). They were examined using an Olympus BH3 microscope equipped with a DXM 1200 and then returned to 80% ethanol in microvials containing their respective specimens. Morphological nomenclature follows Martens (2022), while scutum-shape outline nomenclature follows Kury & Medrano (2016). The ecoregions shapefiles were obtained from WWF terrestrial ecoregions (Olson *et al.* 2001). The images were treated with consideration for individuals with color blindness using a color palette generated by Adobe Color (Anonymous n.d.). Map visualization was performed using R Statistical Software (R Core Team 2022) and the following packages: sf (Pebesma 2018; Pebesma & Bivand 2023), ggplot2 (Wickham 2016), ggspatial (Dunnington *et al.* 2023), ggpubr (Kassambara 2023), tidyverse (Wickham *et al.* 2019), giscoR (Hernangómez 2023), terra (Hijmans 2023), marmap (Pante & Simon-Bouhet 2013), and elevatr (Hollister *et al.* 2023).

RESULTS

Family Assamiidae Sørensen, 1884
Subfamily Filopalpinae Martens, 2022

Genus Assamhoplites n. gen.

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Type species. — *Assamhoplites martensis* n. sp.

Included species. — Monotypic.

Etymology. — The genus name is formed by the combination of *Assam-*, as a reference to the family Assamiidae where the new genus is allocated, and *-hoplites* from Ancient Greek ὁπλῖται, romanized *hoplîtai*, the famous soldiers of Ancient Greece who were armed with spears and shields. The spears are metaphorically associated with the highly elongated male pedipalp and the shield with the *scutum magnum* of these opilionids. Gender masculine.

Comparative diagnosis. — Even though males of both Filopalpinae genera, *Assamhoplites* n. gen. and *Filopalpus*, have characteristically long, thread-like pedipalps considerably longer than body length, the contribution of the podomeres elongation to this architecture differs in each genus. The highly elongated male pedipalps in *Assamhoplites* n. gen. include the strong elongations of the tibia and tarsus, where the tibia and patella have almost the same length. On the contrary, the highly elongated male pedipalp in *Filopalpus* does not exhibit a strong elongation in the tibia and tarsus (in fact, the tarsus is similar to that of a female), and the patella is remarkably more elongated than the tibia. *Assamhoplites* n. gen. has a wider granulated ocularium in males and females without other conspicuous armature, whereas *Filopalpus* exhibits a small and narrow ocularium strongly armed with a number of long, pointed spiniform apophyses, which are longest on the anterior and posterior ocularium rim. In fact, bodies of *Filopalpus* species are much more roughly granulated than *Assamhoplites* n. gen., generally with strong paramedian tubercles on the abdominal area. Additionally, the armature of the free tergites, in *Filopalpus*, is commonly differentiated from the armature of scutal area (at least in males) with a row of slender, drawn-out, pointed tubercles, longest in central third in comparison, *Assamhoplites* n. gen. has uniformly less body granulation, with no remarkable difference between scutal area and free tergite armature. Another remarkable difference between the two genera is in regard to the degree of sexually dimorphic male chelicerae. Males of *Assamhoplites* n. gen. exhibit a much bigger and more strongly armed male chelicerae compared to *Filopalpus*, where the elongated basichelicerite has a weakly marked bulla, is conspicuously granulated, and has a ventral surface heavily armed with many strong, pointed apophyses. The *Assamhoplites* n. gen. cheliceral hand is also strongly elongated and has a conspicuous modification of the fixed finger. In *Filopalpus*, the chelicerae are only slightly bigger in males, with few armature differences compared to the females but with neither a strong pointed apophysis in ventral basichelicerite nor a modified fixed finger in the cheliceral hand. The male genitalia of the two genera are very similar (probably signifying close phylogenetic proximity) and only show slight differences. In *Assamhoplites* n. gen. the apical rim of the *pars distalis* is slightly convex and contains two small mounts each with an apical macroseta, and the *pars distalis*, in an unexpanded state, is pointed downwards. In contrast, the penis in *Filopalpus* has a concave or straight apical rim of the *pars distalis*, and the *pars distalis*, in an unexpanded state, is pointed upwards.

Distribution. — Ethiopia, Oromia province, Ambo, Wonchi crater.

Assamhoplites martensis n. sp.
(Figs 1-5)

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Type material. — **Holotype. Ethiopia** • 1 ♂; Oromia province, Ambo, Wonchi crater at high point, 6 N road, in moss grass; alt. 3200 m a.s.l.; 4.IV.1988; Russel-Smith A. leg.; BE_RMCA_ARA.Opi.236192.
Paratypes. Ethiopia • 2 ♀; same data as for holotype; BE_RMCA_ARA.Opi.247652 • 1 ♀; same data as for holotype; MACN-Ar 46909.

Etymology. — Patronymic in honor of the German arachnologist, Professor Jochen Martens, in recognition of his contribution to advances in arachnology. Name in the genitive case.

Diagnosis. — The combination of body size (3.57 mm), scutum covered by polygonal tubercles, male pedipalp three times as long as body, femur of the pedipalp notably larger than patella (60%).

Distribution. — Only known from the type locality.

Description
Male (BE_RMCA_ARA.Opi.236192)
Measurements (mm). Total length: 3.57; carapace length: 1.30; dorsal scutum length: 3.03; carapace max. width: 1.69; dorsal scutum max. width: 2.03. Appendage measurements. Pedipalp. Trochanter: 0.52; femur: 3.69; patella: 2.32; tibia: 1.87; tarsus: 1.77; claw: 0.58. Leg I: trochanter (tr): 0.42; femur (fe): 1.82; patella (pa): 0.70; tibia (ti): 1.13; metatarsus (mt): 1.58; tarsus (tr): 1.03. Leg II: tr: 0.45; fe: 3.06; pa: 0.85; ti: 2.51; mt: 2.03; tr 1.99. Leg III: tr: 0.43; fe: 1.87; pa: 0.72; ti: 1.32; mt: 1.71; tr 1.20. Leg IV: tr: 0.56; fe: 2.52; pa: 0.82; ti: 1.89; mt: 2.67; tr: 1.42.

Dorsum (Fig. 2A-C). Outline almost rectangular with iota (ι) shape. Ocularium rounded and covered by small tubercles with setae, with eyes located on the lateral rim of the ocularium. Scutum covered by small setiferous tubercles, carapace smaller than mesotergum, anterior margin bearing a row of small tubercles, and five pointed apophyses in the following order or length and robustness: 35253. Mesotergal areas clearly defined. Posterior margin and free tergites bearing a row of setiferous tubercles and a row of small tubercles.

Venter (Fig. 2D-F). Ventral surface and anal plate covered by small setiferous tubercles.

Chelicerae (Fig. 2G-I). Basichelicerite covered dorsally by small setiferous tubercles, proventral surface with a row of conical tubercles with setae, and two small setiferous tubercles on the mesal-distal surface. Second article elongated, bearing sparse small tubercles with setae on the frontal surface and a robust spine above the fingers. Fixed finger with a central strong thickening in frontal view. Sparse long setae on the frontal surface.

Pedipalps (Fig. 3A). Long, thin, and filiform trochanter bearing four ventral setiferous tubercles, the distal one longer than the others. Femur smooth, longer than dorsal scutum, bearing sparse setae. All articles with sparse setae. Long distal claw.

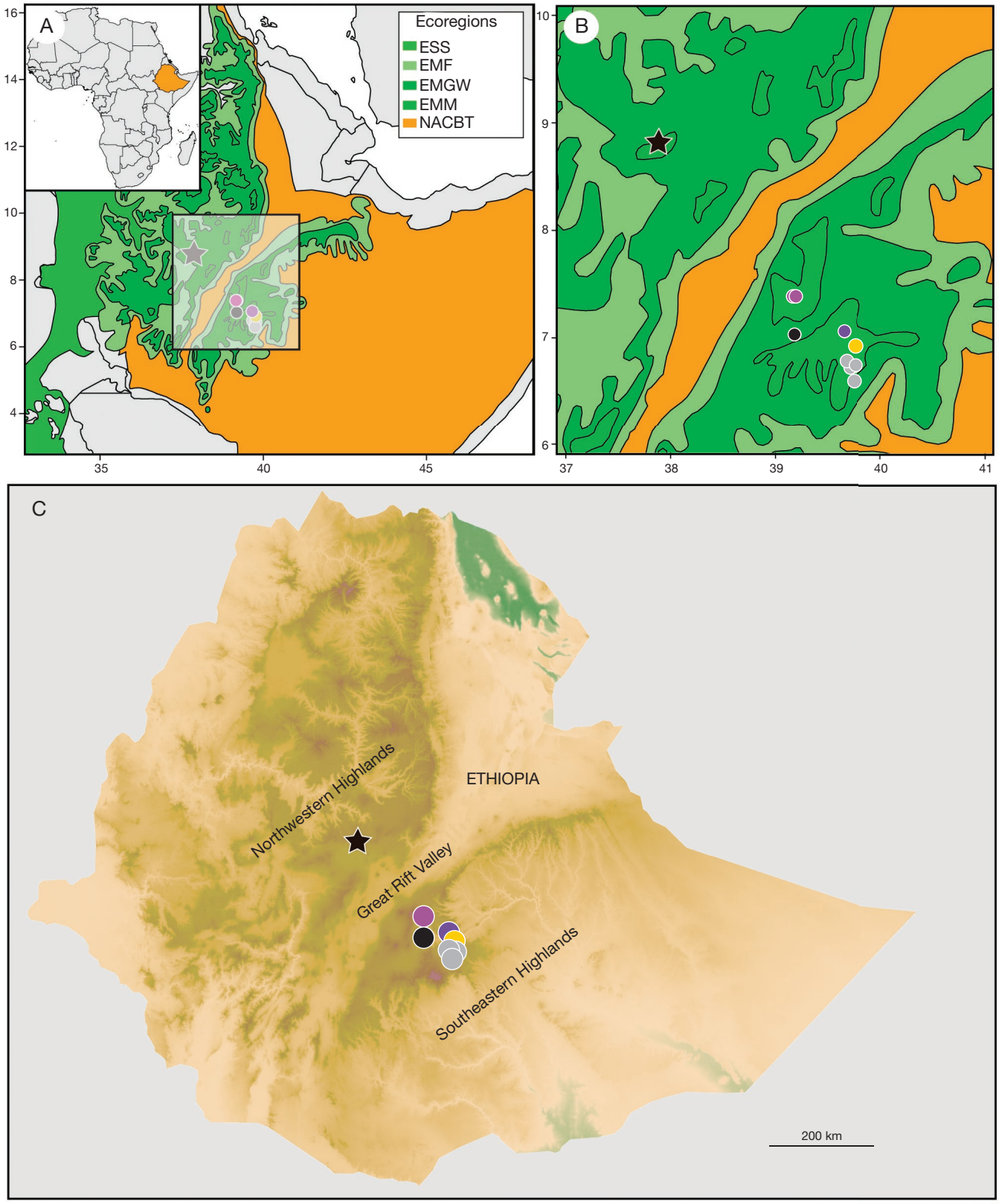

FIG. 1. — **A**, **B**, Geographic distribution of Filopalpinae Martens, 2022. Ecoregions: **ESS**, East Sudanian savanna; **EMF**, Ethiopian montane forests; **EMGW**, Ethiopian montane grasslands and woodlands; **EMM**, Ethiopian montane moorlands; **NACBT**, Northern Acacia-Commiphora bushlands and thickets. ●, *Filopalpus joschmidti* Martens, 2022; ●, *Filopalpus kakaensis* Martens, 2022; ●, *Filopalpus bale* Martens, 2022; ●, *Filopalpus altomontanus* Martens, 2022, ●, *Filopalpus niger* Martens, 2022; ★, : *Assamhoplites martensi* n. sp.; **C**, topographic map of Ethiopia with the distribution of Filopalpinae.

FIG. 2. — *Assamhoplites martensi* n. sp. male: **A**-**C**; habitus dorsal; **D**-**F**, habitus lateral; **G**, habitus ventral; **H**, chelicerae ventral; **I**, chelicerae frontal. Scale bars: A, D, E, 2 mm; B, G, I, 1 mm; C, F, H, 500 µm.

Legs. All articles irregularly covered with small tubercles. Tarsal count: 5:9:5:6.

Genitalia (Fig. 4). *Pars distalis* composed of an expandable *capsula externa* (in form of *follis sensu* Macías-Ordoñez *et al.* 2010, fig. 13.4 or "prick funnel" (Stacheltrichter) *sensu* Martens 1977) and a *capsula interna* reduced to a stylus. The expansion of the *capsula externa* exposing their internal digitiform projections. Four macrosetae on each side of lateral margin of the *pars distalis*, a pair of dorsal macrosetae flanking the *capsula externa* and two pairs of ventral small setae. Apical rim of the *pars distalis* slightly convex and containing two small mounts with an apical macrosetae each.

Female (BE_RMCA_ARA.Opi.247652) (Figs 3B; 5)
Similar to male, presenting dimorphism by the presence of a raptorial pedipalp, and chelicera small and not thickened.

Measurements (mm). Total length: 3.31; carapace length: 1.10; dorsal scutum length: 3.17; carapace max. width: 1.48; dorsal scutum max. width: 1.90. Appendage measurements. Pedipalp. Trochanter: 0.33; femur: 1.05; patella: 0.51; tibia: 0.68; tarsus: 0.70; claw: 0.60. Leg I: trochanter (tr): 0.32; femur (fe): 1.32; patella (pa): 0.56; tibia (ti): 0.96; metatarsus (mt): 1.16; tarsus (tr): 0.96. Leg II: tr: 0.39; fe: 2.33; pa: 0.79; ti: 1.89; mt: 1.69; tr 1.57. Leg III: tr: 0.38; fe: 1.49; pa: 0.61; ti: 1.07; mt: 1.42; tr 1.06. Leg IV: tr: 0.43; fe: 2.03; pa: 0.65; ti: 1.51; mt: 2.10; tr: 1.28. Tarsal count: 4:8/9:5:6/7.

Female Chelicerae (Fig. 5G-I). Basichelicerite shorter than that of males, dorsally covered by small setiferous tubercles, ventrally covered by a prolateral row of small conical tubercles. Second segment small, bearing sparse long setae, without spine above the fingers.

Female Pedipalps (Fig. 3E-H). Female pedipalp shorter than male, composed of a raptorial trochanter with a ventral-distal tubercle bearing setae, femur with a ventral row of small setiferous tubercles, tibia and tarsus covered with long setae,

FIG. 3. — *Assamhoplites martensi* n. gen., n. sp. ectal view of the left pedipalp: **A**, male; **B**, female. Scale bar: 500 µm.

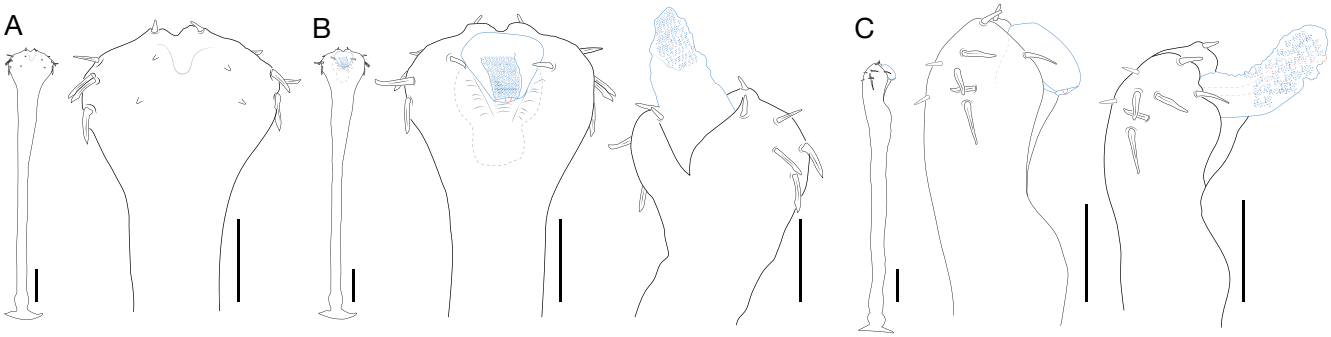

FIG. 4. — Male genitalia of *Assamhoplites martensi* n. gen., n. sp.: **A**, ventral; **B**, dorsal not expanded and expanded respectively; **C**, lateral not expanded and expanded respectively. Scale bars: 100 µm.

FIG. 5. — *Assamhoplites martensi* n. gen., n. sp. female: **A**-**C**, habitus dorsal; **D**-**F**, habitus lateral; **G**, habitus ventral; **H**, chelicerae ventral; **I**, chelicerae frontal. Scale bars: A, D, 2 mm; B, E, F, G, 1 mm; C, H, I, 500 µm.

the tibia with (Fig. 3B; 5H) two prolateral and one retrolateral strong spines, and the tarsus two prolateral and two retrolateral spines.

Ovipositor. Simple, bearing long distal bifid setae, as in Martens (2022: fig. 24).

DISCUSSION

Filopalpinae species are distributed in the Afromontane forests of Ethiopia, which are considered a global biodiversity hotspot (Asefa *et al.* 2017). All records of Filopalpinae are located within the Ethiopian Montane Moorlands ecoregion (Olson *et al.*

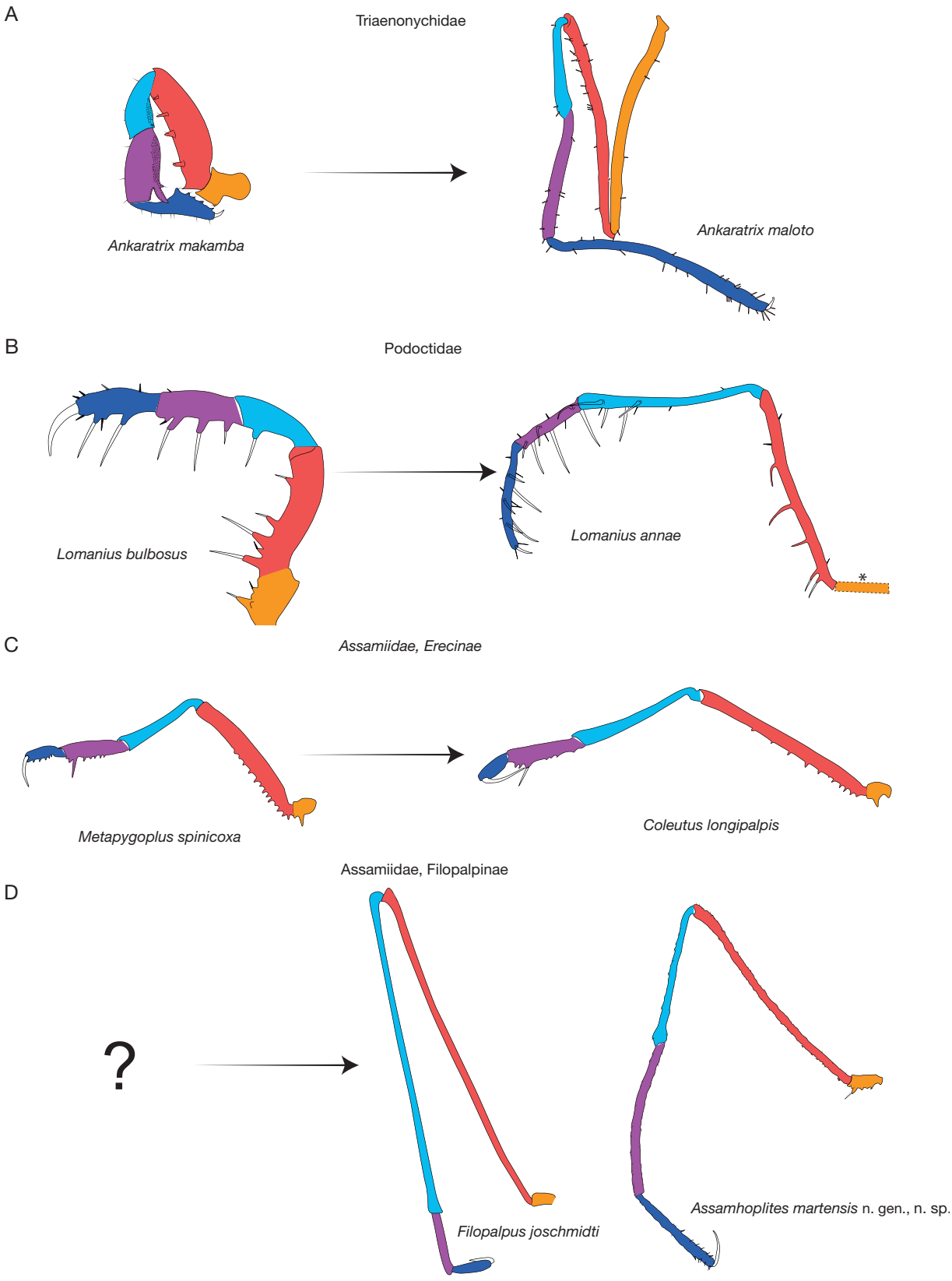

FIG. 6. — Examples of convergent pedipalp elongations in different groups of Laniatores harvestmen, including "short" to extremely elongated morphology in related species. All images representing males sexually dimorphic pedipalps. To compare the proportional variations across different podomeres they were colored as: trochanter (**orange**), femur (**red**), patella (**light blue**), metatarsus (**purple**), tarsus (**dark blue**). Pedipalps were vectorized from original figures taken in: Porto & Pérez-González (2020) (**A**); Kury & Machado (2018) and Zhang *et al.* (2013) (**B**) and Martens (2022) (**E**). Pedipalps of **C** were vectorized directly from pictures of the species type specimens kindly sent by Darko Cotoras. Symbol: ***** The size of the trochanter of *Lomanius annae* Kury & Machado, 2018 was estimated by utilizing images from Kury & Machado (2018).

2001) or its surrounding areas (Fig. 1A, B). This ecoregion is home to endemic animals and plants (Tesfahunegny 2016; Mengistu *et al.* 2023). At the high altitude (3000-4500 m a.s.l.), ample humidity and mild temperature make this area suitable as a refuge for harvestmen species. It is likely that as the suitable habitat shifted to higher elevations, the harvestmen populations also shifted together. These habitats, and the harvestmen that live within them, may have become isolated leading to what is now a relict species. Or they are a diverse and widespread lineage that have yet to be discovered. Once we have a better survey of Ethiopian opiliofauna and their phylogenetic affinities, we could have an idea if Filopalpinae are in fact altitude relicts or part of a more widespread lineage.

Within Assamiidae, sexually dimorphic characters are often related to the morphology of chelicerae, legs, and pedipalps (Roewer 1935: 3). Males of several species exhibit more elongated pedipalps than females, but this elongation is not extreme, and the spiniform armature is maintained and generally thickened. Particularly in Filopalpinae, male dimorphic pedipalps are remarkably elongated, often reaching two to five times the length of the body, and the armature is fully reduced compared to the females. Among other assamiids, a similar extreme elongation of pedipalps can also be observed in the southeastern Asian species (Myanmar) *Coleutus longipalpis* Roewer, 1940 (currently in Erecinae) (Fig. 6C). Analyzing in detail the male pedipalp of *Coleutus longipalpis*, we can see that it is only superficially similar to the Filopalpinae pedipalp (Fig. 6C, D) because the elongated palpal femur of *C. longipalpis* retains the strong proximal curvature (near the junction with the trochanter) typical of many assamiids, as well as reminiscent of the ventral femur armature; further, it also retains some of the major spines in the tibia (Fig. 6C).

Besides assamiids, this kind of extreme long pedipalp with attenuated armature has evolved several times in disparate lineages of Laniatores. For example, we found extremely long pedipalps in the triaenonychid *Ankaratrix maloto* Porto & Pérez-González, 2020, and the podoctid *Lomanius annae* Kury & Machado, 2018. Interestingly, in both cases, closely related species (i.e., within the same genus) exhibit short or slightly elongated pedipalps (Fig. 6A, B), providing insight into the morphological modifications during the process of selection for the extremely long pedipalps. For Assamiidae, we can also see an only slightly elongated pedipalp with armature in the femur in *Metapygoplus spinicoxa* Roewer, 1940 (Fig. 6C). This is a species found in Myanmar and is morphologically very close to *Coleutus longipalpis* (probably congeneric, but this requires further study). These examples demonstrate that extremely long pedipalps could represent a highly derived morphology within a lineage. Because they are sexually dimorphic characters, sexual selection was indicated by Kury & Machado (2018) as the most plausible hypothesis to explain this modification, but it was also suggested by Martens (2022) that males and females could use different pedipalpal functionality to gain food, and that both sexes could display different trophic adaptations. Up until now, all known male specimens of Filopalpinae exhibit the extremely elongated pedipalp morphology, and no "normal" (i.e., armed, shorter) male pedipalps are yet known (Fig. 6D). It is plausible that normal pedipalp filopalpines could be detected in the future among the unknown males or other undiscovered species of Filopalpinae. However, it is also possible that Filopalpinae is currently represented by a group of relict species with extremely elongated pedipalps, and the "normal" pedipalps are part of an extinct species of the larger lineage. While we do not have yet a definitive explanation for why the males of *Assamhoplites martensis* n. gen., n. sp. and especially *Filopalpus joschmidti* Martens, 2022, boast pedipalps that exceed several times their body size, such a dramatic alteration is impressive and creates an opportunity for further research.

Although it seems "unhealthy" to describe another monotypic genus for assamiid messy typological taxonomy, we believe that a monotypic genus reflects more accurately the systematic position of *Assamhoplites martensis* n. gen., n. sp. within Filopalpinae. Despite the fact that *Assamhoplites* n. gen. has an extremely long pedipalp, the elongation is differentially generated compared to *Filopalpus*, with a remarkable contribution of the tibia and tarsus podomeres (Fig. 6D). In Podoctidae Roewer, 1912, Kury & Machado (2018) considered that the elongate pedipalp that appears in their "facies reclinobunoides clade" and in other podoctids without "facies reclinobunoides" are only superficially similar, pointing out that both groups have differences in the armature and morphology of the pedipalp podomeres. For Kury & Machado (2018), those morphological differences evidence multiple lineages where pedipalp elongation occurs independently. Beside the pedipalp differences between *Assamhoplites* n. gen. and *Filopalpus*, the strongly incrassate sexually dimorphic chelicerae in males is another remarkable morphology to support the proposition of *Assamhoplites* n. gen. as a new genus.

Further, the distribution of *Assamhoplites martensis* n. gen., n. sp. in the northwestern Ethiopian Highlands supports the decision to create a new monotypic genus from a biogeographical point of view. All *Filopalpus* species form a group with conservative morphology distributed in a small region of the southeastern Ethiopian Highlands, separated from *Assamhoplites* n. gen. distribution by the impressive barrier of the Great Rift Valley (Fig. 1C). This rift system, originated 31 million years ago by the collision of the African and Arabian Plates with Eurasia, extends from Djibouti through the Ethiopian highlands to Mozambique. In Ethiopia, it is referred to as the Ethiopian rift, dividing the highlands into the Abyssinian and Harar plateaus in the Northwest and Southeast, respectively (Mairal *et al.* 2017). The significance of the Ethiopian Rift as a biogeographical barrier has mostly been explored in vertebrates. Studies on the gecko genus *Hemidactylus* Oken, 1817 (Šmíd *et al.* 2013) reveal distinct lineages on each side (Northwest and Southeast) of the Ethiopian rift, each consisting of different species. Additionally, significant genetic isolation has been observed in *Xenopus* Wagler, 1827, frogs (Evans *et al.* 2011) between populations on either side of the Rift, persisting for approximately 1-3.5 million years. A study by Freilich *et al.* (2016) also highlights a substantial genetic break among northwest and southeast highland anuran spe-

cies due to the Ethiopian Rift. Even though these examples are focusing on taxa with higher dispersal abilities, it is safe to expect similar patterns or even more prominent diversification in low-dispersal arthropods. In this sense, the Great Rift Valley might form a significant biogeographical barrier contributing to the wider evolutionary mechanisms that formed the striking biodiversity of the Ethiopian highlands.

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