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A review of the linyphiid spider genus *Proislandiana* Tanasevitch, 1985 with description of a new high mountainous species from Turkey and Armenia (Araneae: Linyphiidae)

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Abstract

A new species of the hitherto monotypic spider genus *Proislandiana* Tanasevitch, 1985 is described from the high altitude belt of Ararat Mountain (Turkey) and Aragats Mountain (Armenia). The genus *Proislandiana* is reviewed, its taxonomic relationships to the other genera are discussed. The diagnoses of the genus and its type species are revised. The distribution and the zoogeography of the two known *Proislandiana* species are summarized and discussed.

Key words: Taxonomy, faunistic elements, Ararat Mountain, Aragats Mountain, zoogeography

Introduction

Kulczyński (1908) describes *Microneta (?) pallida* from Russia, based only on the female. The author questions its place in the genus *Microneta* and discusses that a new genus might be described for it in the future. Tanasevitch (1985) creates the genus *Proislandiana* for *M. pallida* Kulczynski, 1916 and describes the unknown male. The citation of the species original description in his paper is incorrect, as the species is described by Kulczyński (1908) and has not been mentioned in Kulczyński (1916). Tanasevitch diagnoses the genus *Proislandiana* as close to *Islandiana* Brændegaard, 1932, referring to Ivie (1965). According to him, the new genus differs from *Islandiana* by the structure of the embolic part and the ring-like epigynum (from lateral view). The last record of *P. pallida* comes from Tanasevitch & Khruleva (2017). The authors record it as new to Europe and classify it as Siberian arcto-montane species.

While processing unidentified spider materials from Turkey and Armenia, kept in the collection of the National Museum of Natural History, Sofia, I found a new *Proislandiana* species from the high altitude zones (3500–4200 m) of Ararat Mountain, Turkey and Aragats Mountain, Armenia. The new species is morphologically very similar to *P. pallida* which implies for close phylogenetic relationships. When studying it, I concluded that the genus *Proislandiana* is much closer to *Wabasso* Millidge, 1984, than to *Islandiana*, which prompted me to examine the type species and to renew the generic diagnose. So far, *P. pallida* is known only from the arctic region of Russia while the new species is distributed only in the high altitude zones of Ararat and Aragats mountains. Thus, the distribution range of the genus *Proislandiana* shows typical glacial disjunction which could be explained with the migration of the Arctic fauna to the south during the Pleistocene and back to the north in the interglacial periods. This process is well studied for the European fauna, but we still know very little about the migration of the eastern Arctic species. The new discovery could shed some more light on it.

Material and methods

The material is preserved in 80% ethanol. The specimens were examined and measured using Wild M5A stereomicroscope. All measurements are in mm. Pictures were taken with Canon EOS 1100D digital camera, attached to

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Amplival microscope. The drawings were made with Wacom tablet. The map is generated through the SimpleMappr API. Color is described from specimens preserved in ethanol. Female epigyna have been cleared with lactic acid. Leg measurements formula: Total length (coxa + trochanter, femur, patella, tibia, metatarsus, tarsus). Dorsal tibial spination formula: Leg I, II, III, IV.

Abbreviations: ALE—anterior lateral eyes, AME—anterior median eyes, EM—embolic membrane, E—embolus, PC—paracymbium, PLE—posterior lateral eyes, PME—posterior median eyes, PT—protegulum, PTA—prolateral tibial apophyse, RTA—retrolateral tibial apophyse, S—scape, ST—subtegulum, T—tegulum, TmI—trichobothrium on metatarsus I, DMP—dorsal median plate, VPE—ventral part of embolic division.

The material is deposited in the following institutions: National Museum of Natural History, Sofia, Bulgaria (NMNHS); Muséum d'histoire naturelle de Genève, Switzerland (MHNG).

Taxonomy

Linyphiidae Blackwall, 1859

Proislandiana Tanasevitch, 1985

Type species: *Microneta pallida* Kulczyński, 1908

Diagnosis. The genus is very close to *Wabasso* Millidge, 1984, and differs by the following character states: (1) tarsus I is shorter than metatarsus I in *Proislandiana*, while in *Wabasso* it is longer; (2) males of *Wabasso* have 2 short prolateral spines near the distal end of metatarsus I, that are missing in *Proislandiana*. (3) Males differ also by the structure of the palps: tibial apophyses are much longer in *Proislandiana* than in *Wabasso*, especially the prolateral one. The subtegulum is bigger and the paracymbium is more massive and complex, notched on the inner side of the distal part in *Proislandiana*.

Description. Small spiders, total length 1.60–2.40. Carapace unmodified, abdomen without scuta. Carapace and legs colored light yellow to light orange. Metatarsi I–III with trichobotria. TmI 0.4–0.5. Dorsal tibial spination 2, 2, 2, 1. Legs thin and comparatively long. Tarsus I shorter than metatarsus I. Male palp: tibia with one short retrolateral and one long, curved prolateral apophysis. Paracymbium comparatively large, the distal part deeply notched on the inner side, forming a hook. Subtegulum large, oval. Tegulum translucent anteriorly, ending in small protegulum. The embolic membrane long and complex, exceeding the length of cymbium. The embolic division consists of two parts—the embolus (dorsal part) and a small sclerotized ventral part. Embolus long and thin. Epigynum: Scape short and broad, with an upturned distal part, shaped as ring or semi-ring. Spermathecae oval, ducts simple.

Proislandiana beroni new species

Figs 1–16

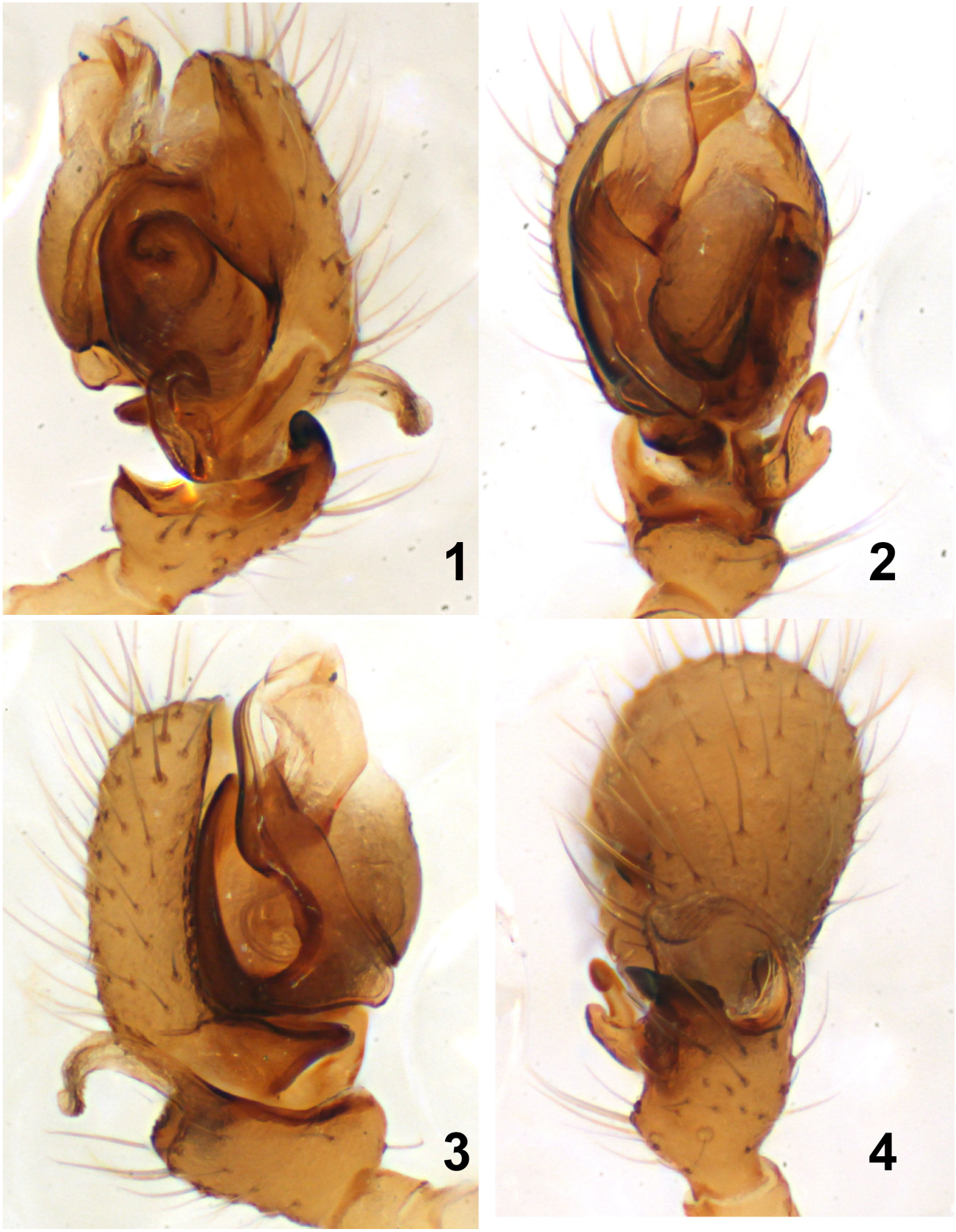
Type material. Holotype. ♂. Turkey, Ararat Mountain, Agri Dag, 4000–4200 m, 20.08.2010, Boyan Petrov leg (NMNHS). **Paratypes.** 1 ♂, 1 ♀ with the same data as the holotype (MHNG); 1 ♀ with the same data as the holotype; 2 ♀. Armenia, Aragats Mountain, 3500–3600 m, 03.08.1988, Petar Beron leg (NMNHS).

Etymology. Named after the well-known Bulgarian arachnologist and biospeleologist Petar Beron who collected part of the paratypes.

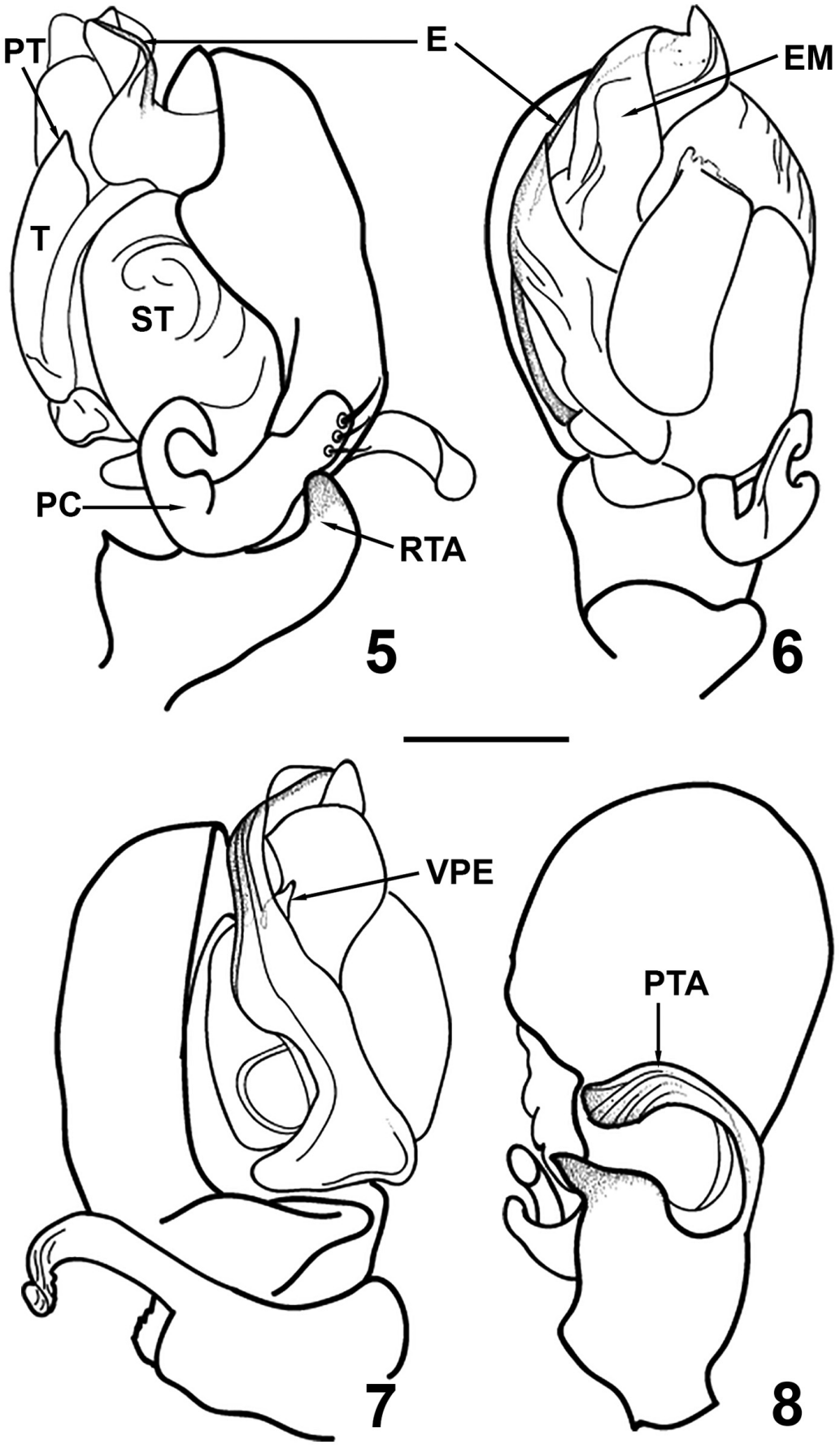
Diagnosis. The new species *Proislandiana beroni* **n. sp.** is very close to *Proislandiana pallida* (Kulczyński, 1908). Males can be distinguished by the smaller and unmodified paracymbium (Figs 1, 5), not bulged as in *P. pallida* (Fig 17), as well as by the shape of the characteristically twisted embolic membrane (Figs 2, 6) and the more curved prolateral tibial apophyse (Figs 4, 8), than in *P. pallida* (Fig 20). The females differ from those of *P. pallida* by the shorter and broader epigynal scape (Figs 9, 11, 13, 15). Seen from lateral view, the scape of *P. beroni* **n. sp.** looks like semi-ring (Figs 10, 14), unlike those of *P. pallida* which makes a full ring (Fig 22).

Description. Male. Measurements. Total length 1.92; carapace length 0.80, width 0.58; sternum length 0.47, width 0.40; abdomen length 1.12, width 0.68; clypeus length 0.13; chelicerae length 0.35; eye diameters AME

0.035, ALE 0.050, PME 0.050, PLE 0.050; leg measurements I—2.43 (0.30, 0.61, 0.22, 0.54, 0.40, 0.36), II—2.23 (0.22, 0.61, 0.20, 0.43, 0.42, 0.35), III—1.74 (0.18, 0.32, 0.15, 0.40, 0.37, 32), IV—2.56 (0.25, 0.65, 0.18, 0.60, 0.50, 0.38); palpal cymbium length 0.30.



FIGURES 1–4. *Proislandiana beroni* **n. sp.**, holotype male, left palp. 1, Retrolateral. 2, Ventral. 3, Prolateral. 4, Dorsal. Scale bar, 0.1 mm.



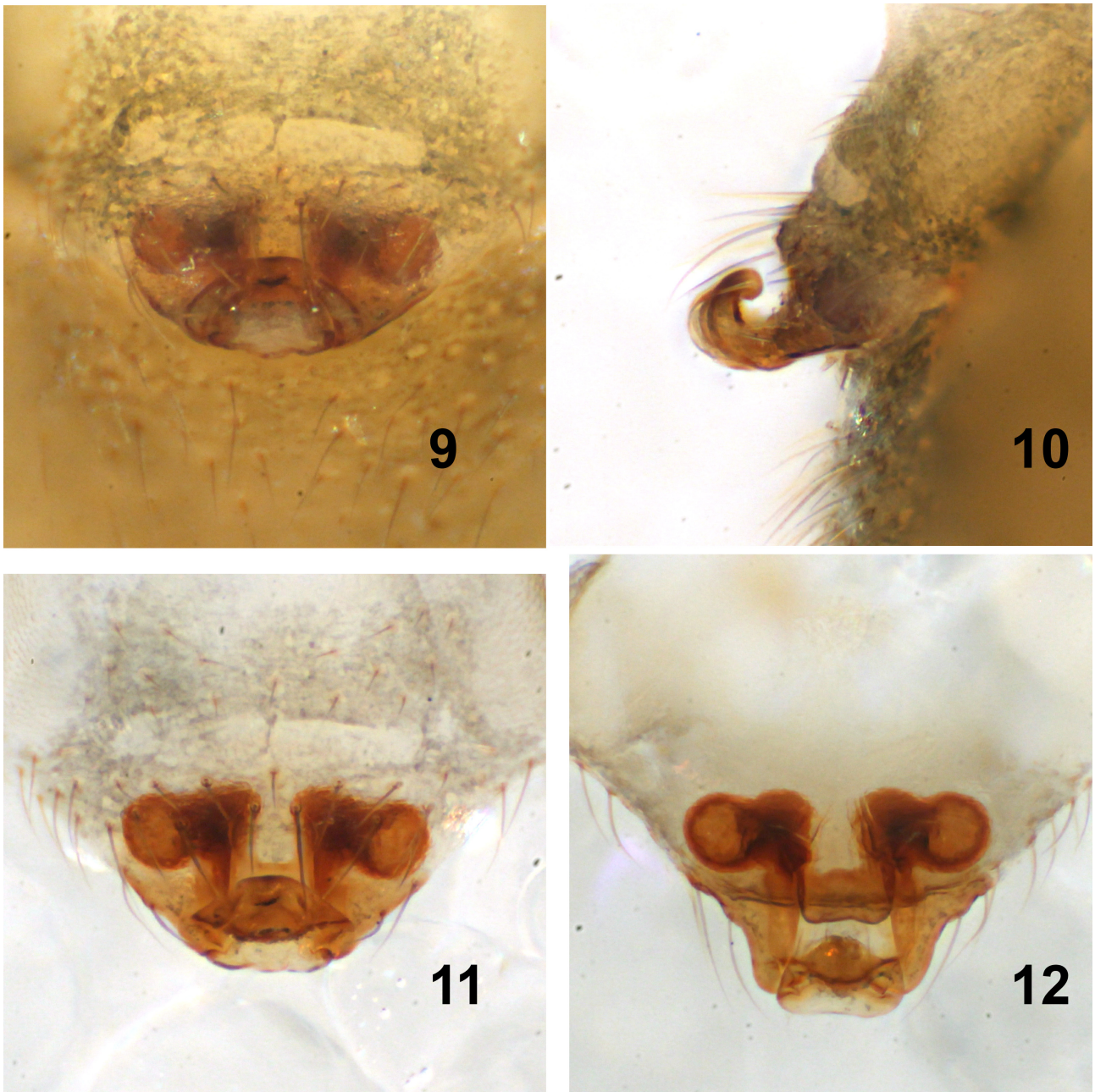
FIGURES 5–8. *Proislandiana beroni* **n. sp.**, holotype male, left palp. 5, Retrolateral. 6, Ventral. 7, Prolateral. 8, Dorsal.

Carapace unmodified. Chelicerae with four large, sharp promarginal and four small retromarginal teeth. The retromarginal teeth located in the distal part of the chelicerae, near the cheliceral fang.

Coloration. Carapace, chelicerae and legs yellow to pale orange. Sternum a little darker than the carapace. Abdomen whitish-gray, without pattern, covered with small dark hairs.

Dorsal tibial spination 2, 2, 2, 1. The position of TmI—0.44.

Palp (Figs 1–8). Tibia with two apophyses, one prolateral and another retrolateral (Figs 4, 8). The retrolateral one small, curved, narrowing apically. The prolateral one long, thin and curved, shaped as an arc behind the cymbium. Cymbium simple, covered with thin black hairs. Paracymbium curved, the distal part deeply notched on the inner side, forming a hook. The base of paracymbium bears 3 stout spines near the tip (Figs 1, 5). Embolus long, thin, curved out apically (Figs 2–3, 6–7). Ventral part of the embolic division small, semi-transparent. Embolic membrane large, coiled spirally (Figs 2, 6).



FIGURES 9–12. *Proislandiana beroni* **n. sp.**, paratype female from Turkey. 9, Epigynum ventral. 10, Epigynum, lateral. 11, Vulva, ventral. 12, Vulva, dorsal.

Female. Measurements. Total length 2.31; carapace length 0.83, width 0.58; sternum length 0.47, width 0.40; abdomen length 1.48, width 0.90; clypeus length 0.14; chelicerae length 0.36; eye diameters AME 0.036, ALE

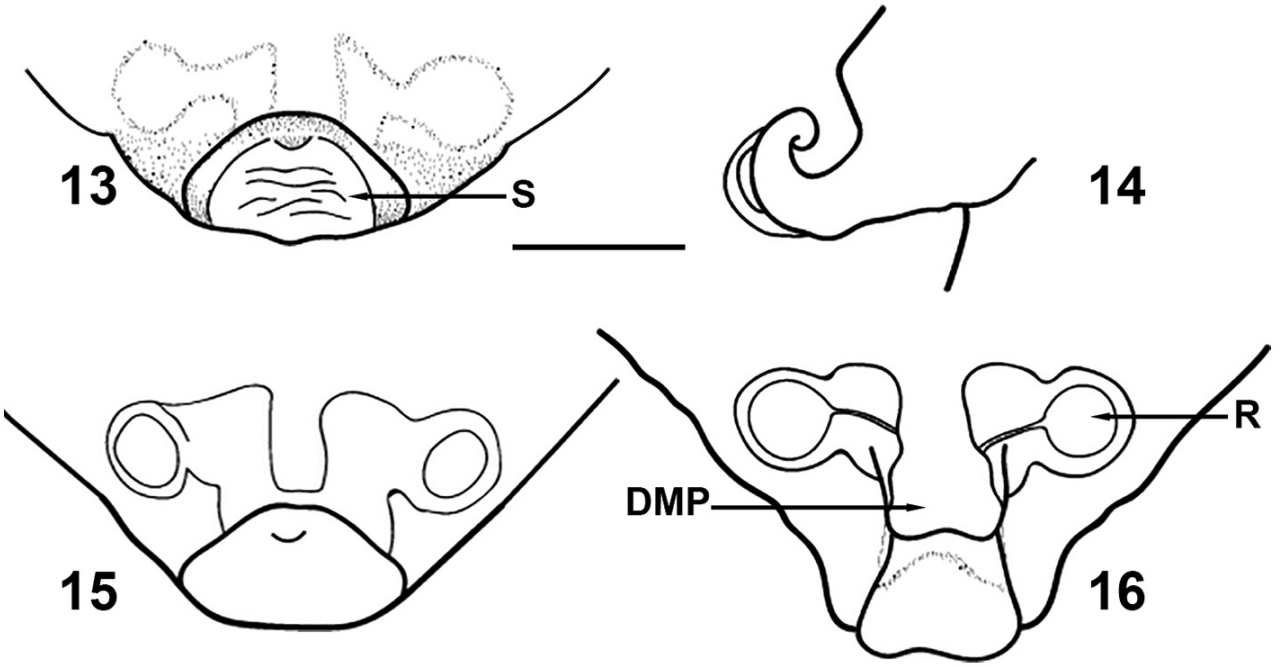
0.055, PME 0.55, PLE 0.055; leg measurements I—2.48 (0.32, 0.61, 0.22, 0.54, 0.43, 0.36), II—2.36 (0.32, 0.58, 0.20, 0.50, 0.40, 0.36), III—2.09 (0.24, 0.54, 0.20, 0.40, 0.39, 32), IV—2.81 (0.32, 0.70, 0.22, 0.65, 0.54, 0.38).

Chelicerae with four large teeth on promargin and four small ones on retromargin. The arrangement is the same as in male, but the promarginal teeth are bigger.

Epigynum (Figs 9–16). Scape simple, short and broad, with an upturned distal part, shaped as semi ring (Figs 9–11, 13–15). The dorsal median plate rectangular, notched (Figs 12, 16). Receptacles oval, ducts simple and strait (Figs 12, 16). The genital openings are on the dorsal side, near the tip.

Coloration as in male. Dorsal tibial spination 2, 2, 2, 1. The position of TmI—0.46.

Distribution. Known only from two localities in the high altitude belt (3500–4200 m) of Ararat Mountain (Turkey) and Aragats Mountain (Armenia).



FIGURES 13–16. *Proislandiana beroni* **n. sp.**, paratype female from Turkey. 13, Epigynum ventral. 14, Epigynum, lateral. 15, Vulva, ventral. 16, Vulva, dorsal. Scale bar, 0.1 mm.

Proislandiana pallida (Kulczyński, 1908)

Figs 17–24

Micronetа (?) pallida Kulczyński, 1908: 36, pl. 1, Figs 34–35
Proislandiana pallida: Tanasevitch, 1985: 56, Figs 10–12
Proislandiana pallida: Tanasevitch & Khruleva, 2017: 355

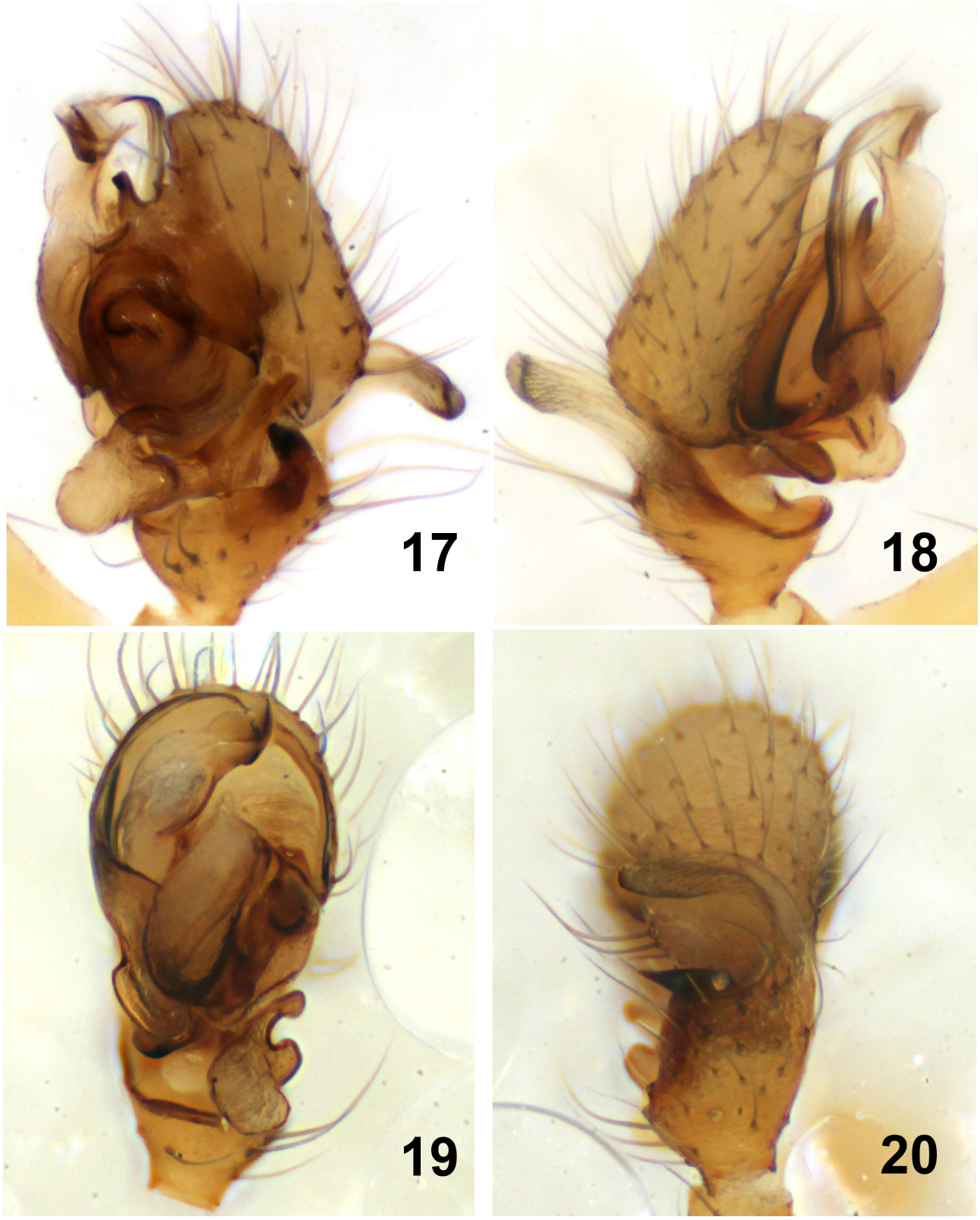
Material examined. 2♂, 2♀. Russia, Arkhangelsk area, Nenets AO, env. of Amderma, 69.760° N, 61.659° E, 23.07.–06.08.2016, leg. A. Tanasevitch, O. Khruleva (MHNG).

Diagnosis. The species is close to *P. beroni* **n. sp.** Males can be distinguished by the bulged paracymbium (Fig 17), as well as by the shape of the embolic membrane (Fig 17–19) and the shape of the prolateral tibial apophyse. In *P. pallida* the prolateral tibial apophyse is bent in the middle, the distal part is strait, situated perpendicularly to the cymbium (Fig 20), while in *P. beroni* **n. sp.** it is arc-shaped (Figs 4, 8). The females differ from those of *P. beroni* **n. sp.** by the longer and narrower epigynal scape (Figs 21, 23). Seen from lateral view, the scape of *P. pallida* is ring-shaped (Fig 22), while in *P. beroni* **n. sp.** it looks like semi-ring (Figs 10, 14).

Redescription. Male. Measurements. Total length 1.66; carapace length 0.76, width 0.55; sternum length 0.45, width 0.40; abdomen length 0.90, width 0.72; clypeus length 0.11; chelicerae length 0.35; eye diameters AME 0.035, ALE 0.050, PME 0.050, PLE 0.050; leg measurements I—2.57 (0.30, 0.65, 0.20, 0.54, 0.45, 0.43), II—2.28 (0.32, 0.45, 0.18, 0.50, 0.43, 40), III—2.02 (0.29, 0.54, 0.15, 0.36, 0.36, 0.32), IV—2.56 (0.29, 0.66, 0.18, 0.60, 0.54, 0.40); palpal cymbium length 0.26.

Carapace unmodified. Chelicerae with four large, sharp promarginal and four small retromarginal teeth. The retromarginal teeth located in the distal part of the chelicerae, near the cheliceral fang.

Coloration. Carapace, chelicerae and legs light yellow. Sternum a little darker than the carapace. Abdomen gray, without pattern, covered with small dark hairs.



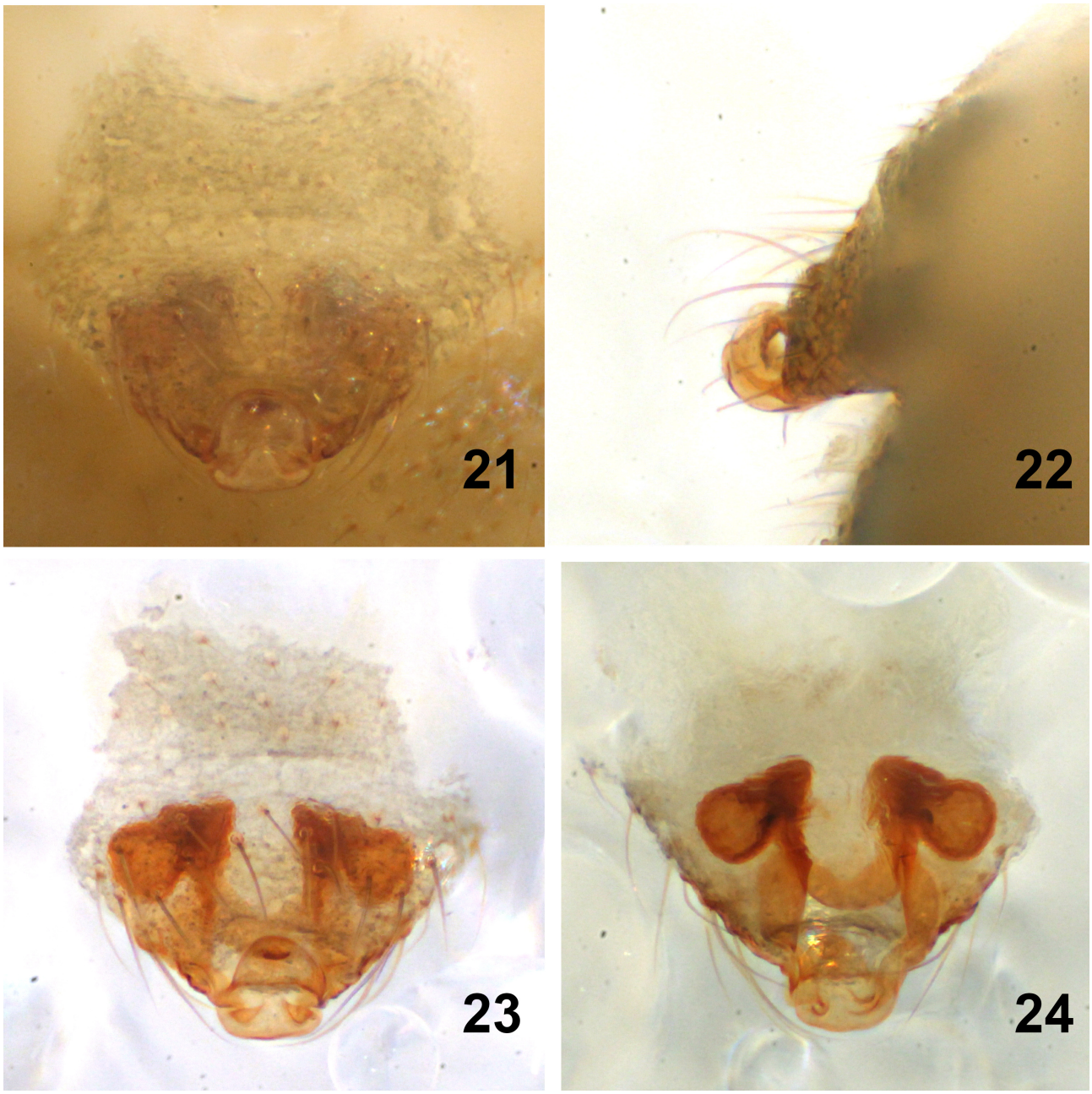
FIGURES 17–20. *Proislandiana pallida*, male from Russia, left palp. 17, Retrolateral. 18, Prolateral. 19, Ventral. 20, dorsal.

Dorsal tibial spination 2, 2, 2, 1. The position of TmI—0.45.

Palp (Figs 17–20). Tibia with one prolateral and one retrolateral apophyses (Fig 20). The retrolateral one small, curved, narrowing apically. The prolateral one long, curved at the middle. Its apical part straight, positioned perpendicularly to the cymbium (Fig 20). Cymbium simple, covered with thin black hairs. Paracymbium bulged. Its distal part notched on the inner side. The base of paracymbium bears 3 stout spines near the tip (Fig 17). Embolus long, thin, curved out apically (Figs 18–19). Ventral part of the embolic division thin, thorn-shaped, well chitinized (Fig 18). Embolic membrane large and complex (Fig 19).

Female. Measurements. Total length 2.35; carapace length 0.85, width 0.60; sternum length 0.54, width 0.40; abdomen length 1.50, width 0.94; clypaeus length 0.11; chelicerae length 0.35; eye diameters AME 0.036, ALE 0.055, PME 0.55, PLE 0.055; leg measurements I—2.78 (0.32, 0.70, 0.22, 0.58, 0.54, 0.42), II—2.66 (0.30, 0.68, 0.22, 0.58, 0.48, 0.40), III—2.31 (0.25, 0.58, 0.20, 0.45, 0.47, 36), IV—2.87 (0.30, 0.75, 0.22, 0.76, 0.44, 0.40).

Chelicerae with four large teeth on promargin and four small ones on retromargin. The promarginal teeth bigger than in male.



FIGURES 21–24. *Proislandiana pallida*, female from Russia. 21, Epigynum, ventral. 22, Epigynum lateral. 23, Vulva, ventral. 24, Vulva, dorsal.

Epigynum (Figs 21–24). Scape short and relatively narrow, with an upturned distal part, making a full ring, clearly seen from lateral view (Figs 21–23). The dorsal median plate rounded at the end (Fig 24). Receptacles oval, ducts simple and strait. The genital openings are on the dorsal side, near the tip.

Coloration as in male. Dorsal tibial spination 2, 2, 2, 1. The position of TmI—0.43.

Distribution. Arctic region of Russia, from the polar Ural Mts. to the Far East.

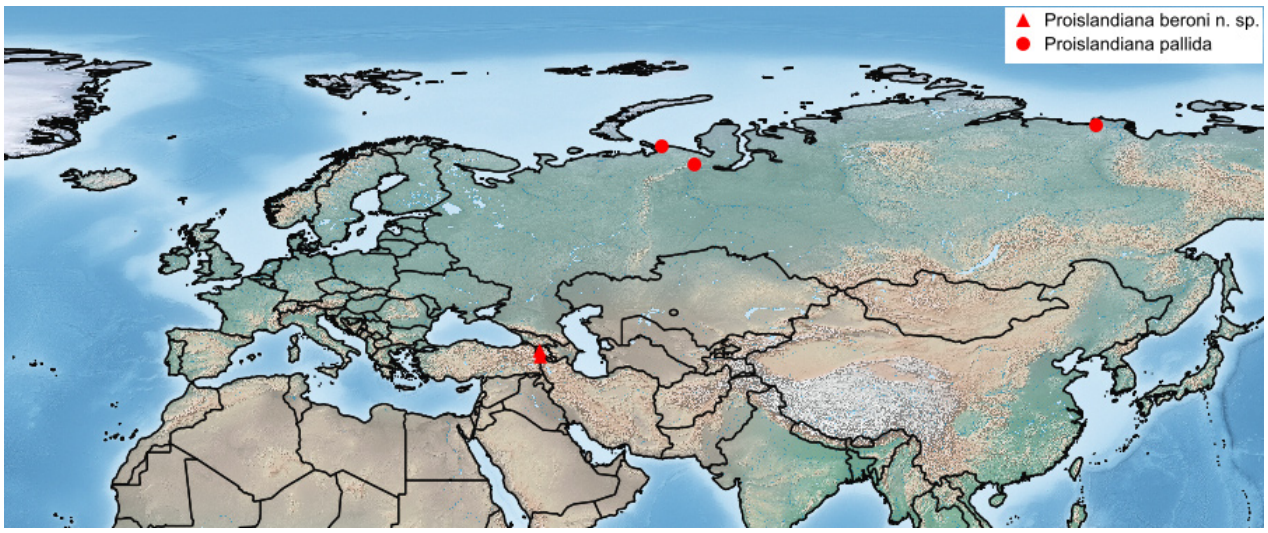


FIGURE 25. Distribution map.

Discussion

Tanasevitch (1985) diagnoses the genus *Proislandiana* as close to *Islandiana* Brændegaard, 1932 without providing any arguments for their relationships. After an examination and comparison of the two congeners, however, I can conclude that by both somatic and genital characters the genus is more close to *Wabasso*. The size range, dorsal tibial spination and the position of TmI are very similar in the two genera. The epigyna have almost identical structure and shape. Male palps have similar embolic divisions, consisting of two parts—long and thin embolus and small ventral part. The exact differences between the two genera are described above in the "Diagnosis" of *Proislandiana*.

Since the distribution of the genus *Proislandiana* is quite unusual, here I try to interpret it based on the zoogeographical classification proposed by Gruev & Kuzmanov (1994) with some improvements (Gruev 2000). The northern species *P. pallida* obviously belongs to the Arctic faunistic element (subordinate of the Northern Holarctic complex, Gruev ibid.), judging from its distributional range and especially its occurrence in the tundra. I suppose that Tanasevitch & Khruleva (2017) mean the same by classifying it as Siberian arcto-montane species, but according to Gruev & Kouzmanov (1994) the Arctic species belong to the Northern Holarctic rather than to the Siberian complex. In my view, the second species, *P. beroni* **n. sp.**, could belong to the South-Western Asiatic Mountainous element. This faunistic element is first proposed here and is analogous to the European Mountainous element, according to Gruev & Kuzmanov, 1994. On my opinion the South-Western Asiatic Mountainous faunistic element belongs to the Southwestern Asiatic complex. Considering the close relationships of the two *Proislandiana* species, it can be concluded that the species of this faunistic element could have originated *in situ*, in the mountains of the South-Western Asia and the Caucasus as a result of geographical isolation as glacial relics. They are most likely derivates of the northern forms that have migrated to the south during the Pleistocene glaciations, probably near the eastern Black Sea and the western Caspian Sea shores. In the interglacial periods they moved back to north, but some populations migrated in the high altitude zones and in geographical isolation evolved to neoendemic species. This hypothesis is supported by the fact that the present distribution of the genus *Proislandiana* shows typical glacial disjunction.

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References

Blackwall, J. (1859) Descriptions of newly discovered spiders captured by James Yate Johnson Esq., in the island of Madeira. *Annals and Magazine of Natural History*, Series 3, 4, 255–267. https://doi.org/10.1080/00222935908697122

Brændegaard, J. (1932) Araneae. *In*: Isländische Spinnentiere. *Göteborgs Kungliga Vetenskaps och Vitterhets Samhälles Handlingar*, Series 5B, 2 (7), 8–36.

Gruev, B. & Kuzmanov, B. (1994) *General Biogeography*. Sofia University Press, Sofia, 498 pp. [in Bulgarian]

Gruev, B. (2000) About the Submediterranean biotic zone in Palearctic and the Submediterranean faunistic element in Bulgaria. *Travaux Scientifiques Université de Plovdiv, Animalia*, 36 (6), 73–94. [in Bulgarian]

Ivie, W. (1965) The spiders of the genus *Islandiana* (Linyphiidae, Erigoninae). *American Museum Novitates*, 2221, 1–25.

Kulczyński, W. (1908) Araneae et Oribatidae. Expeditionum rossicarum in insulas Novo-Sibiricas annis 1885-1886 et 1900-1903 susceptarum. *Mémoires de l'Académie Impériale des Sciences de Petrograd*, Series 8, 18 (7), 1–97.

Kulczyński, W. (1916) Araneae Sibiriae occidentalis arcticae. *Mémoires de l'Académie Impériale des Sciences de Petrograd*, Series 8, 28 (11), 1–44.

Millidge, A.F. (1984) The erigonine spiders of North America. Part 7. Miscellaneous genera. *Journal of Arachnology*, 12, 121–169.

Tanasevitch, A.V. (1985) A study of spiders (Aranei) of the polar Urals. *Trudy Zoologicheskogo Instituta Akademii Nauk SSSR*, 139, 52–62.

Tanasevitch, A.V. & Khruleva, O.A. (2017) Spiders (Aranei) of the typical tundra subzone of the Yugorsky Peninsula, Russia. *Arthropoda Selecta*, 26 (4), 341–368. https://doi.org/10.15298/arthsel.26.4.10