

On four sibling *Erigone* species occurring in the Arctic (Aranei: Linyphiidae)

О четырех близких видах *Erigone*, распространенных в Арктике (Aranei: Linyphiidae)

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KEY WORDS: Araneae, spider, Erigoninae, tundra, distribution, shore communities, size variation.

КЛЮЧЕВЫЕ СЛОВА: Araneae, пауки, Erigoninae, тундра, распространение, прибрежные сообщества, размерные вариации.

ABSTRACT. Four similar species belonging to the *Erigone longipalpis* group and cooccurring in the tundra zone are illustrated and diagnosed: *E. arctica* Chamberlin et Ivie, 1947, *E. hypoarctica* Eskov, 1989, *E. longipalpis* (Sundevall, 1830) and *E. remota* L. Koch, 1869. Their distribution is commented on, all of the species have disjunctive ranges, either west-east, or north-south. Study of size variations of all four species, each taken from a single population, revealed that *E. arctica*, *E. hypoarctica* and *E. longipalpis* can be differentiated by carapace length / femur I length ratios. *Erigone remota* displays a high level of size variation, overlapping with all three other species.

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РЕЗЮМЕ. Проиллюстрированы и диагностированы четыре близких вида группы *Erigone longipalpis*, совместно встречающиеся в тундровой зоне: *E. arctica* Chamberlin et Ivie, 1947, *E. hypoarctica* Eskov, 1989, *E. longipalpis* (Sundevall, 1830) и *E. remota* L. Koch, 1869. Прокомментировано их распространение. Все виды имеют дизъюнкции в ареале. Показано, что представители *E. arctica*, *E. hypoarctica* и *E. longipalpis* отличаются между собой соотношением длины карапакса к длине бедра I. *Erigone remota* демонстрирует высокую вариацию в размерах, перекрывающихся со другими тремя видами.

Introduction

Erigone Audouin, 1826, with 111 named species, is among the top five largest genera of Linyphiidae. So far, only *Agyneta* Hull, 1911, *Lepthyphantes* Menge, 1866, and *Walckenaeria* Blackwall, 1833 have more species [WSC, 2019: 197, 168 and 198 correspondingly]. Being the type genus for Erigoninae, *Erigone* was for long time a wastebasket for small linyphiids. Many species of unclear belonging were placed in *Erigone*. Over 100 species have been transferred to other genera or considered as *nomina dubia* [WSC, 2019]. The genus has a global distribution, but most of the species (81) occur in the Holarctic [WSC, 2019]. *Erigone* reaches high densities in Arctic communities, for example, four species of *Erigone* in Dolgyi Island [Marusik *et al.*, 2016] composed 30% of all spider specimens collected. *Erigone* is also an abundant genus in marshes along the sea, at least in the Arctic and Sea of Okhotsk. The value of *Erigone* in the marshes near Magadan exceeds 88% (unpublished personal data). Although this genus is very abundant, identification of its species is difficult, due to the similarity of some species and lack of proper figures showing differences. While working in several localities in the tundra zone we faced difficulties in distinguishing females of *E. longipalpis* (Sundevall, 1830) and *E. remota* L. Koch, 1869 which have very similar epigynes, and males of *E. remota* and *E. arctica* Chamberlin et Ivie, 1947 which have similar embolic divisions. The male of *E. arctica* was illustrated only in one publication and the figures are not comparable with existing figures of similar species. Because of the afore-mentioned reasons we decided to

provide this study and demonstrate how to distinguish four similar species occurring in the Arctic and shore habitats in Siberia.

Material and methods

Specimens were photographed at the Zoological Museum (University of Turku, Finland) with a Canon EOS 7D camera attached to an Olympus SZX16 stereomicroscope and a SEM JEOL JSM-5200 scanning microscope. Digital images were montaged using CombineZP and Helicon focus 3.10 image stacking software. Epigynes were cleared in a KOH/water solution until soft tissues were dissolved. Photographs were taken in dishes with paraffin on the bottom holding the specimens in place.

All measurements are given in millimeters. The map given in this work was made to show the distribution of the four species in the Arctic and Siberia. Besides material studied by us we considered records given by experts in taxonomy of Linyphiidae and skipped few ecological papers.

The material treated here will be deposited in the Zoological Museum of the Moscow State University, Russia (ZMMU), the Zoological Museum of the University of Turku, Finland (ZMUT) and Institute for Biological Problems of the North, Magadan (IBPN).

TERMINOLOGY. There is no fixed terminology concerning male palpal parts and epigyne. Here we are using a few terms for the palpal or epigynal parts that are useful for distinguishing the four similar species.

Taxonomic survey

Erigone Audouin, 1826

TYPE SPECIES: *Linyphia longipalpis* Sundevall, 1830 by ICZN decision [ICZN, 1987].

NOTE. Originally *Erigone vagans* Audouin, 1826 was considered to be the type of the genus, but Millidge [1984] recognized that it differed from most of the other *Erigone* species and instead of transferring over a hundred species to a new or another genus, he recommended to the ICZN a change of the type species.

COMMENTS. Although *Erigone* is a species rich genus there have been no real attempts to combine species into the groups. So far, only one group name was used in the literature, but without specifying what species belonged in to it, the *E. psychrophila* group [Crosby, Bishop, 1928; Muster, Hänggi, 2009]. The four species considered in this paper are related to each other and therefore can be placed in the *E. longipalpis* group.

DISTINGUISHING SPECIES. Here we list characters that allow separation of the four similar species. All these four species co-occur in northeastern part of Europe, Polar Ural. Males of the four species can be separated by many characters such as spines of the palpal femur, relative length of palpal patella and tibia (equal length in *E. longipalpis* and *E. remota*, vs. patella longer than tibia in *E. arctica*), relative length of palpal tibia and its terminal width, shape and size of dorsal tibial apophysis and its pit; shape of

retrolateral tibial apophysis either with 2 teeth or laminar in ventral view and its terminal width. There are differences in the shape of paracymbium (cf. Fig. 2C and Fig. 2A, B); in the shape of posterior tooth of radix, shape of tegulum (cf. Fig. 5A and D), and several others, but the most easily observed character is the shape of anterior tooth of the radix in retrolateral view.

Females of two species, *Erigone hypoarctica* and *E. arctica*, differ significantly from the other two by the shape of the plate and its outer surface lacking distinct furrows. *Erigone longipalpis* and *E. remota* have almost identical epigynes and can be easily confused.

Erigone arctica Chamberlin et Ivie, 1947

Figs 1D, 2B, 3C, E, 4D, 5A–C, 6A, B, 7C–G, 9, 10.

Erigone arctica Chamberlin et Ivie, 1947: 37, pl. XI. f. 98 (♀); Holm, 1960: 115, Pl. II, f. 12–15 (♂♀); Tanasevitch, 2013: 279, f. 66 (♀).

Erigone arctophylaxis: Holm, 1973: 82, f. 35 (♀) [misidentified].

MATERIAL EXAMINED: RUSSIA, NE Siberia: **Magadan** Area: 3 ♂♂ 2 ♀♀ (IBPN), 29 km N of Magadan, Dukcha River valley, 1.06.1986 (Yu.M. Marusik). **Wrangel Isl.**: ♂♂♀♀ (ZMUT), SC part, Sominitel'nyye Mts., 70°58.970'N 179°35.200'W, VI–VIII.2006 (O.A. Khrulyova); 1 ♂ 5 ♀♀ (ZMMU), same island, SE part, Mamontovaya R., middle flow, 71°09.592'N 179°45.490'W, 1992–1994, (O.A. Khrulyova); 1 ♂, (ZMUT), same island, upper flow of Neizvestnaya R., VI–VIII.2006 (O.A. Khrulyova).

DIAGNOSIS. Males of *E. arctica* are most similar to those of *E. remota* and differ by the larger size of the palp and relatively larger size of the anterior tooth of the radix (*At*) (cf. Fig. 1D & E, Fig. 2B & C). Palps of the two species also differ in the shape of the dorsal tibial apophysis (Figs 1 and 5, differences arrowed). Females of *E. arctica* differ significantly from *E. longipalpis* and *E. remota* in the smooth surface of the epigynal plate and in the median plate (*Mp*) being as wide as long (vs. wider than long in all other species).

Both sexes of *E. arctica* have longer carapaces than the other species (see Fig. 9) at least among populations that we compared.

COMMENTS. This species is similar to the poorly known *E. arctophylaxis* Crosby et Bishop, 1928, a species known from the Nearctic. *Erigone arctophylaxis* was never properly illustrated. Judging from the figures sent to us by G. Blagoev, it has small teeth on ventral tibial apophysis lacking in *E. arctica*, and epigyne has a semiround median plate, wider than long (vs. a tapering subtriangular median plate as wide as long in *E. arctica*).

HABITATS. In the Upper Kolyma this species inhabits mountain tundra and can be found there along creeks under pebbles. It is much more common on pebbly river banks within *Chosenia* riverside forests in northern Cisokhotia (personal data).

DISTRIBUTION. This species has a Siberian-Alaskan range and properly documented from Novaya Zemlya to Seward Peninsula, and south to Altai (ca. 50°N) and northern Cisokhotia (ca. 60°N) (Fig. 10). It is the northernmost of the species treated here. *Erigone arctica* was found north to 73°N in Novaya Zemlya and ca. 71°N on Wrangel Island. Records of this species from British Columbia [Bennet *et al.*, 2017] may refer to similar *E. arctophylaxis*. In western Siberia there is a disjunction between the tundra zone and the mountains of South Siberia. It is worth noting that a single female was found in Altai, and the figure of its epigy-

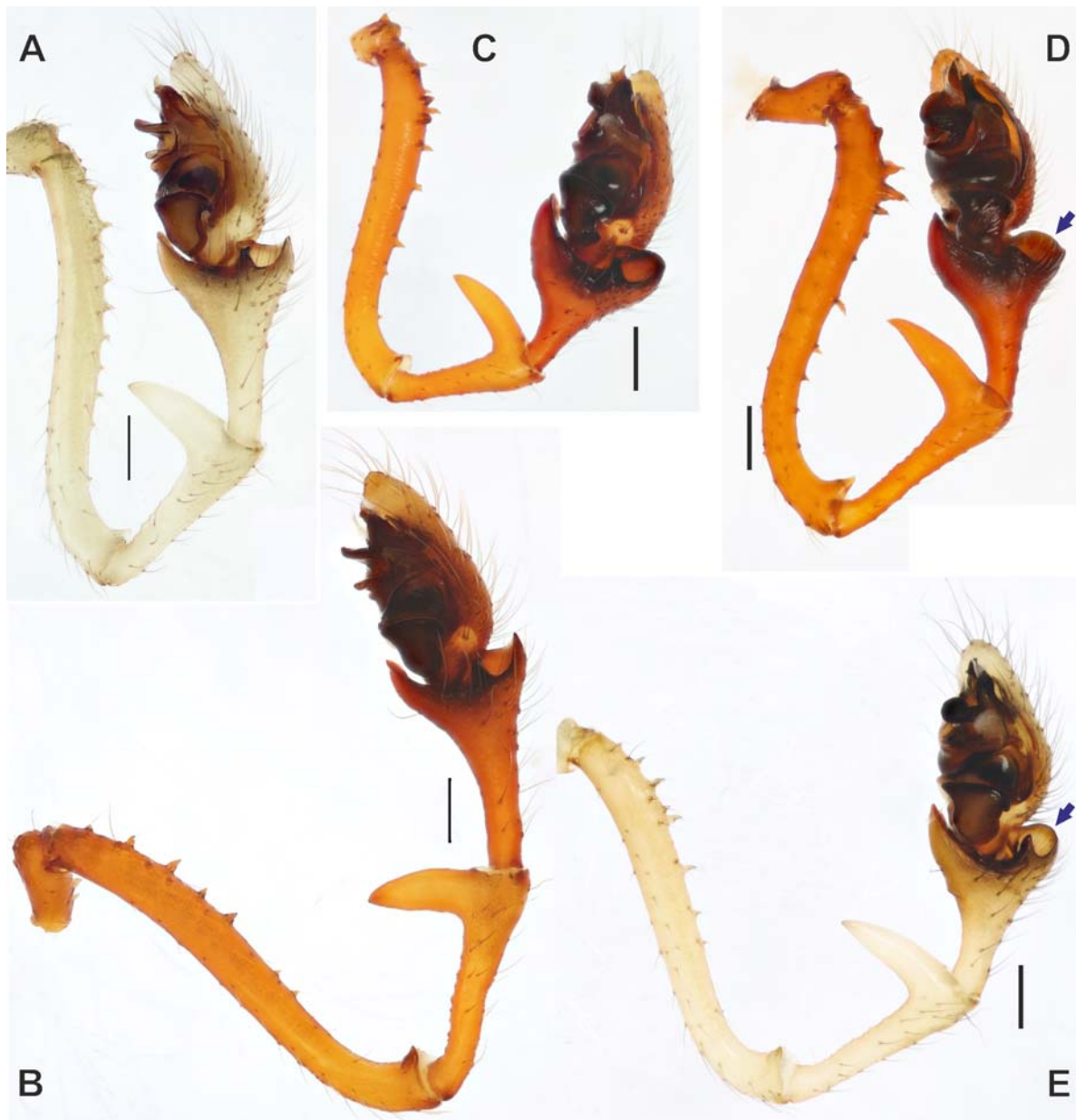


Fig. 1. Retrolateral view the male palp of *Erigone longipalpis* (A, B), *E. hypoarctica* (C), *E. arctica* (D) and *E. remota* (E). C — from Tauysk; B, E — from Apapeligino; D — from Wrangel Isl. Scale = 0.2 mm.

Рис. 1. Пальпа самца, ретролатерально: *Erigone longipalpis* (A, B), *E. hypoarctica* (C), *E. arctica* (D) и *E. remota* (E). C — экземпляр из Тауйска; B, E — из Апапельгино; D — с о. Врангеля. Масштаб = 0,2 мм.

ne [Tanasevitch, 2013: f. 66] corresponds well to our specimens. Tanasevitch [2013] reported this species from Kazakhstan, although his record refers to the Russian Altai.

Erigone hypoarctica Eskov, 1989
Figs 1C, 2A, 3B, F, 5D–F, 6C–D, 7M–P, 8A–B, 9, 10.

Erigone hypoarctica Eskov, 1989: 103, f. 34–37 (♂♀); Tanasevitch, 2013: 282, f. 56–59, 67–68 (♂♀).

MATERIAL EXAMINED: RUSSIA: *Yamalo-Nenets* AO: 9 ♂♂ 1 ♀ (ZMMU), 73 km NE of Labytnangi, foothills of Kharcheruz' Mt. Range, Longotiegan R., ~175 m, 67.3°N 66.72°E, 1–30.07.2015 (V.K. Zinchenko). *Magadan* Area: 6 ♂♂ 2 ♀♀

(ZMMU), env. of Tauysk, 59°43'51"N 149°22'47"E, seashore, pitfall traps, 15–26.07.2017 (M. Bizin, B. Efeikin); 3 ♂♂ 4 ♀♀ (IBPN), 50 km N of Magadan, Splavnaya Vil., Khasyn River valley, 28.05.1986 (Yu.M. Marusik).

COMMENTS. This species is known from only two taxonomic entries [WSC, 2019].

DIAGNOSIS. Male of this species can be easily distinguished from the related species by short (as long as wide) and truncated anterior tooth of the radix (*At*) vs. rounded in *E. arctica* and *E. remota* or digitiform in *E. longipalpis*. Unlike in similar species, the posterior tooth of the radix (*Pt*) is larger than anterior one.

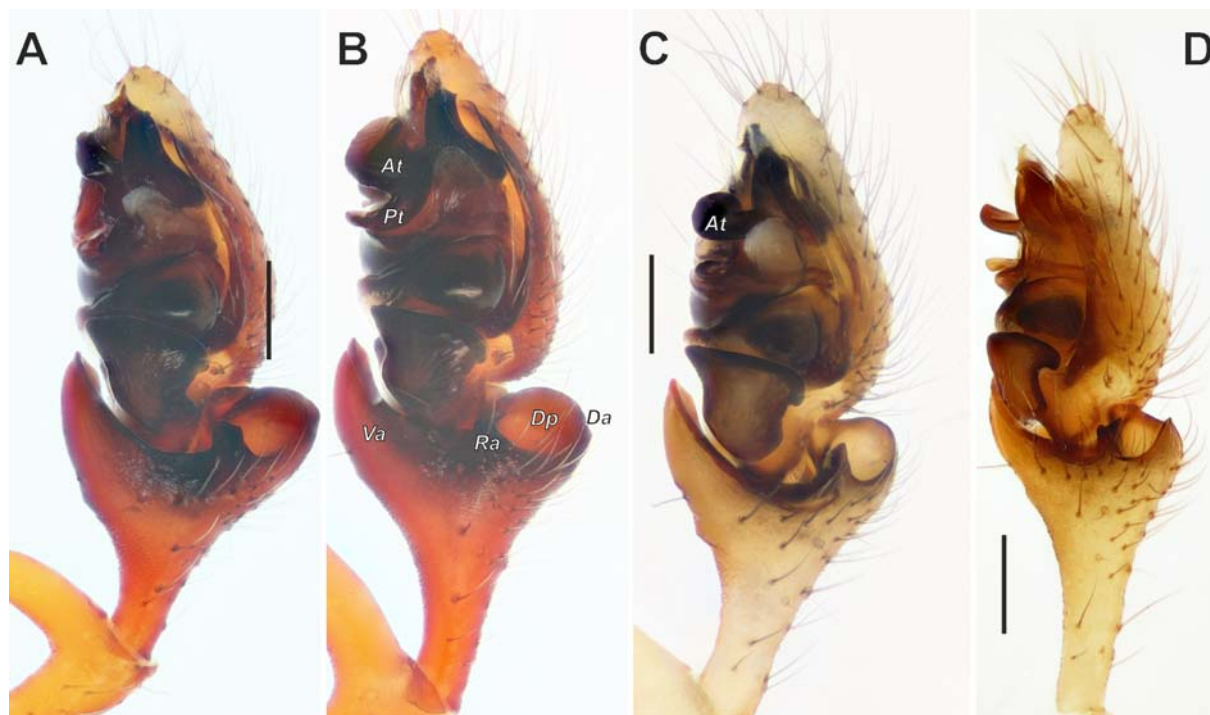


Fig. 2. Retrolateral view of the terminal part of the male palp of *Erigone hypoarctica* (A), *E. arctica* (B), *E. remota* (C) and *E. longipalpis* (D). Scale = 0.2 mm.

Рис. 2. Терминальная часть пальпы самца, ретролатерально: *Erigone hypoarctica* (A), *E. arctica* (B), *E. remota* (C) and *E. longipalpis* (D). Масштаб = 0,2 мм.

Females of *E. hypoarctica* differ significantly from those of the three other species considered in this work by the truncate or even concave posterior edge (vs. cambered in other species). In addition, females of this species differ by having no posterior notch (*Pn*) which is present in the three other species.

HABITATS. In Altai this species was found in taiga at the elevations of 500–800 m [Tanasevitch, 2013]. In the Upper Kolyma it inhabits pebbly river and creek banks and vegetation along the pebbly banks on elevations of 300–500 m (personal data). In the type locality, Ayan Lake it was found along a stream among vegetation [Eskov, 1989].

DISTRIBUTION. *Erigone hypoarctica* has a Siberian range and occurs from Archangelsk Area to Western Chukotka, and south to Altai and Amur River (Fig. 10). In Western Siberia it has a disjunction between the tundra zone and the mountains of South Siberia. In Central and Eastern Siberia, it is known both in tundra and taiga zones.

Erigone longipalpis (Sundevall, 1830)

Figs 1A, B, 2D, 3D, 4C, E, G, 5G–I, 6E, F, 7H–L, 8C–E, 9, 10

Erigone longipalpis: Wiehle, 1960: 576, f. 1071–1077 (♂♀); Palmgren, 1976: 66, f. 11.1, 6, 12.7 (♂♀); Roberts, 1987: 95, f. 43e, 47a (♂♀).

For a complete list of taxonomic references see WSC [2019].

MATERIAL EXAMINED: FINLAND: ♂♂ (ZMUT), *SW Archipelago*, Korppoo Jurmo, seashore, 17.08.–12.10.1968 (P.T. Lehtinen); 1 ♀ (ZMUT), same locality, 16.05.–17.07.1968 (P.T. Lehtinen); ♀♀ (ZMUT), Naantali, Luonnonmaa, Käkölä, seashore meadow, 9.09.–3.11.1970 (R. Mannila); ♀♀ (ZMUT), same locality, seashore meadow, 6.05.–17.06.1970 (R. Mannila); ♂♂♀♀

(ZMUT) Houtskari, Jungfruskär, seashore meadow, 60°08'N 21°13'E, 22.05.–11.09.2007 (S. Koponen); 3 ♂♂ 8 ♀♀, (ZMUT), Åland Islands, Lumparland, Krokstadt, shore, 14.06.1972 (P.T. Lehtinen); 2 ♀♀ (ZMUT), Brändö, Fiskö, shore, 1959 (P.T. Lehtinen). RUSSIA: ca. 770 ♂♀ (ZMMU), *Murmansk* Area, Kola Peninsula, sea meadow on the left bank of the Kola Gulf, 68°54.36'N 33°01.54'E, 28.06.–15.09.2010 (A. Nekhaeva); 35 ♂♂♀♀ (ZMMU), same locality, 14.05.–9.10.2011 (A. Nekhaeva); ca. 460 ♂♀ (ZMMU), same locality, 1.05.–17.10.2012 (A. Nekhaeva); ca. 50 ♂♀ (ZMMU), *Arkhangelsk* Area, Barents Sea, Dolgiy Isl., 69°12'N 59°13'E, Nenets Reserve, 6–28.07.2004 (O. Makarova); ca. 570 ♂♀ (ZMMU), *Yugorskiy* Peninsula, env. of Amderma, sea marshes, 4–18.07.2018 (M. Bizin, B. Efeikin).

COMMENTS. It is the type species of the genus and it has 36 taxonomic entries [WSC, 2019], but only few of the publications provide essential details of the male palp and epigyne conformation.

DIAGNOSIS. Males of this species can be distinguished from similar species by digitiform anterior and posterior teeth of the radix (vs. rounded or abrupt in other species) and also by the concave margin of the dorsal tibial apophysis with distinct angle (vs. cambered and lacking angles). Females of *E. longipalpis* are very similar to those of *E. remota*. Two species have almost indistinguishable epigynes with inclined furrows near posterior edge (Fig. 4F, G). *Erigone longipalpis* has 2 furrows on each side, while *E. remota* has one pair (cf. Fig. 7H, J and A).

HABITATS. According to Harvey *et al.* [2002] within the UK, *Erigone longipalpis*: “usually occurs in wet habitats, often at ground level in coastal estuaries and saltmarsh, sometimes with *E. arctica*. Inland it is associated with damp grassland within river flood plains... Adults can probably be found all year, but mainly in summer and autumn.”

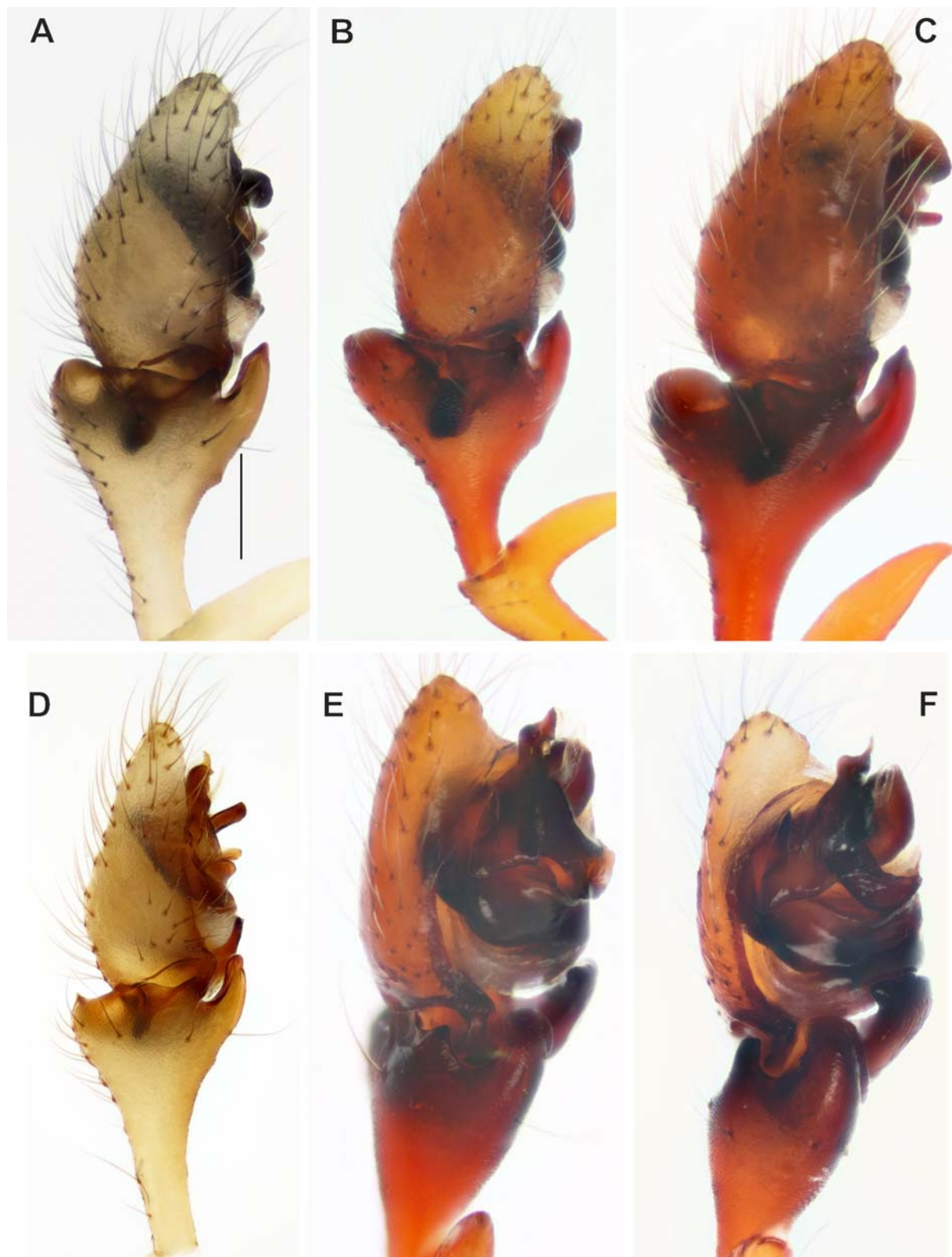


Fig. 3. Male palp of *Erigone remota* (A), *E. hypoarctica* (B, F), *E. arctica* (C, E), *E. longipalpis* (D). A–D — dorso-prolateral; E–F — prolateral. Scale = 0.2 mm.

Рис. 3. Пальпа самца *Erigone remota* (A), *E. hypoarctica* (B, F), *E. arctica* (C, E), *E. longipalpis* (D). A–D — дорзо-пролатерально; E–F — пролатерально. Масштаб = 0,2 мм.



Fig. 4. Copulatory organs of *Erigone remota* (A, B, F), *E. longipalpis* (C, E, G), *E. arctica* (D). A, C, D — male palp, ventral; B, E — male palp, prolateral; F, G — intact epigyne, ventral. Scale = 0.2 mm.

Рис. 4. Копулятивные органы *Erigone remota* (A, B, F), *E. longipalpis* (C, E, G), *E. arctica* (D). A, C, D — пальпа самца, снизу; B, E — пальпа самца, пролатерально; F, G — интактная эпигина, снизу. Масштаб = 0,2 мм.

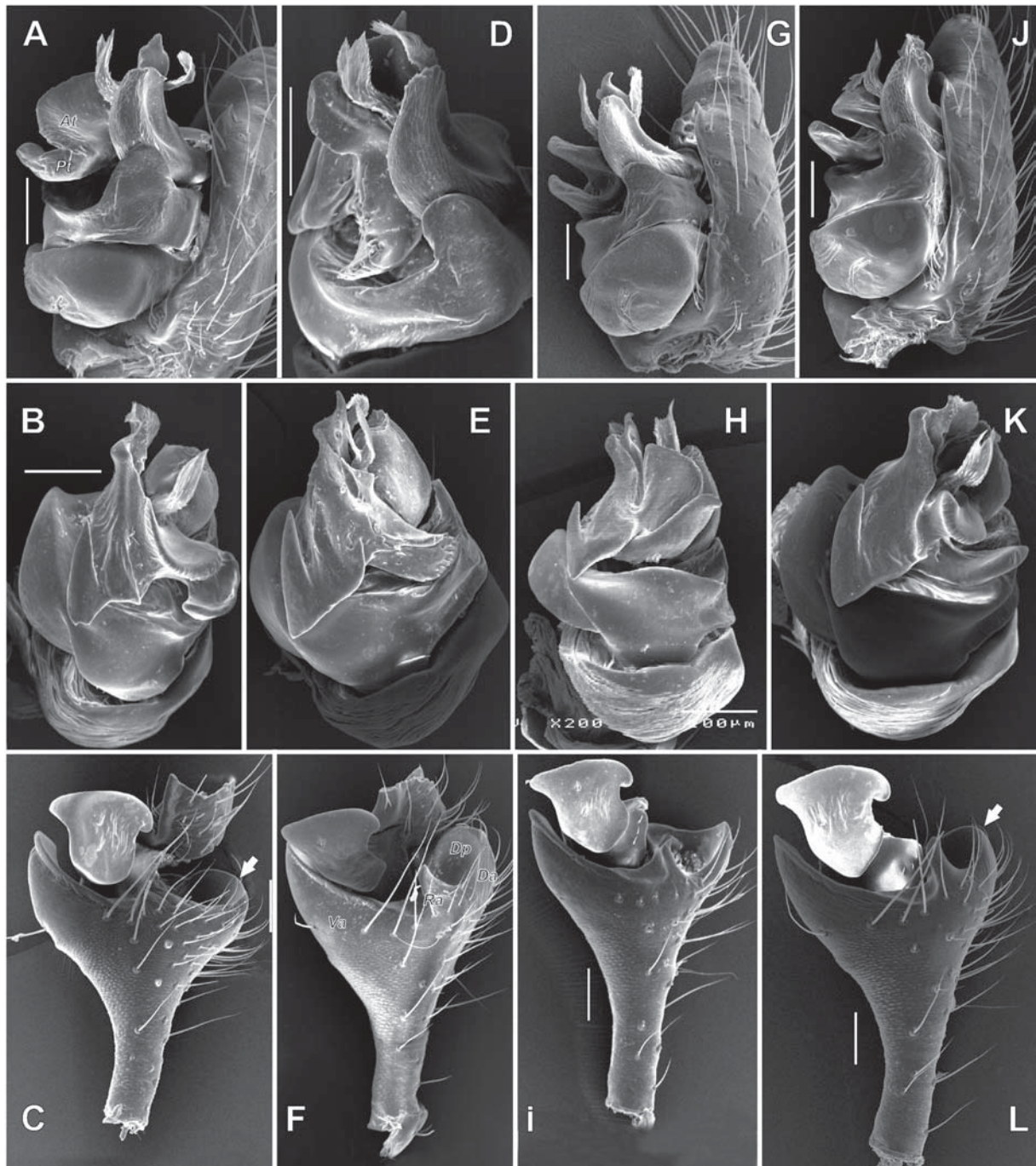


Fig. 5. Male palp of *Erigone arctica* (A–C), *E. hypoarctica* (D–F), *E. longipalpis* (G–I) and *E. remota* (J–L). A, D, G, J — retrolateral; B, E, H, K — bulb, ventro-prolateral; C, F, I, L — palpal tibia and paracymbium, retrolateral. Scale = 0.1 mm.

Рис. 5. Пальпа самца *Erigone arctica* (A–C), *E. hypoarctica* (D–F), *E. longipalpis* (G–I) и *E. remota* (J–L). A, D, G, J — ретролатерально; B, E, H, K — бульбус, вентро-пролатерально; C, F, I, L — голень пальпы и парацимбиум, ретролатерально. Масштаб = 0,1 мм.

On the Kola Peninsula and in Finland, this species is found only on sea shores of the Barents Sea and Baltic Sea, respectively (see also Palmgren, 1976). It lives mainly on shore meadows and marshes. In southwestern archipelago of Finland, *E. longipalpis* has been found also on damp pond sides near the shore [Koponen, 2000], and Lehtinen & Kl-eemola [1962] reported it under stones and among wrack on

the seashore. It can reach huge numbers, and its greatest activity occurs in the first half of summer [Nekhaeva, 2015, unpublished personal data].

DISTRIBUTION. According to the WSC [2019] *Erigone longipalpis* is known from Europe, Caucasus, China and Japan. Platnick [2014] indicated distribution of this species as Palaearctic. It appears that this species has a disjunctive



Fig. 6. Male palp of *Erigone arctica* (A, B), *E. hypoarctica* (C, D), *E. longipalpis* (E, F) and *E. remota* (G–L). A, E, G — tibia without paracymbium, anterior; C — tibia with paracymbium, anterior; B — tibia antero-ventral; D, F, H — tibia, ventro-anterior; I, K — coxa-tibia, retrolateral; J, L — bulb and cymbium, retrolateral. G–J — from Pevek; K, L — from Tauysk. Scale = 0.1 mm.

Рис. 6. Пальпа самца *Erigone arctica* (A, B), *E. hypoarctica* (C, D), *E. longipalpis* (E, F) и *E. remota* (G–L). A, E, G — голень без парацимбиума, спереди; C — голень с парацимбиумом, спереди; B — голень, спереди-снизу; D, F, H — голень, снизу-спереди; I, K — тазик-голень, ретролатерально; J, L — бульбус и цимбиум, ретролатерально. G–J — экземпляры из Певека; K, L — из Тауйска. Масштаб = 0,1 мм.

range; it occurs from Western Europe to Yenisei River [Holm, 1973; Mikhailov, pers. comm.], and is also known from Central and Eastern China [Li, Lin, 2016] and Japan [Ono *et al.*, 2009] (Fig. 10). In Japan, *E. longipalpis* is known from the highlands of Hokkaido (Tanikawa, pers. comm.). There are no properly documented records of this species in China although it was reported from Hebei, Jilin and Gansu. *Erigone longipalpis* is not known in Siberia east of the Yenisei

River and in the Russian Far East. According to Matsuda (pers. comm.) specimens from Hokkaido are almost the same as figured in our paper but have some slight differences. Given the disjunction of the range between Yenisei and Hokkaido, and the isolation of the Japanese population, it is possible to suppose that the population from Hokkaido might belong to a separate species. It is worth noting that there is also a kind of disjunction of this species in Finland. *Erigone*

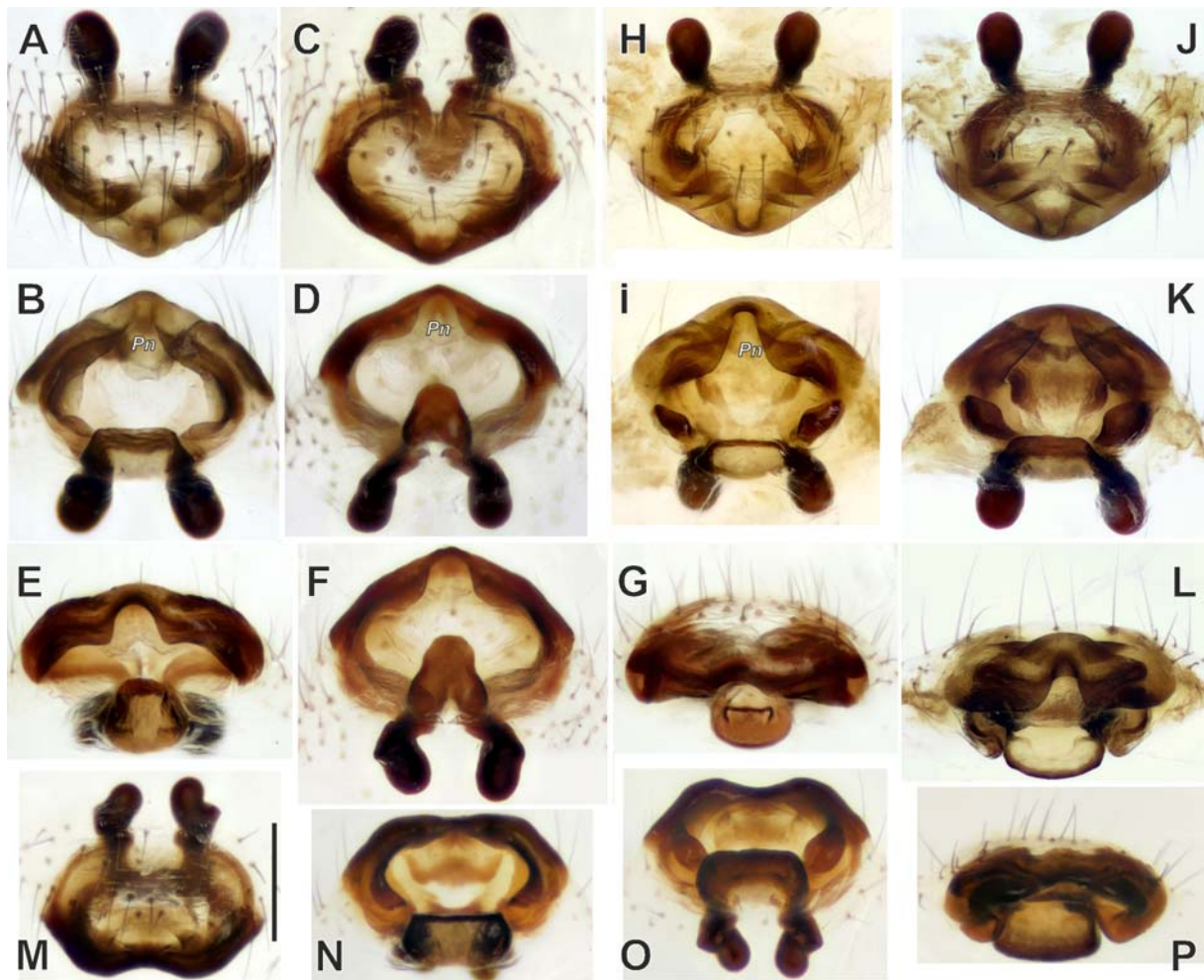


Fig. 7. Epigyne of *Erigone remota* (A, B), *E. arctica* (C–G), *E. longipalpis* (H–L) and *E. hypoarctica* (M–P). A, C, H, J, M — ventral; B, D, F, I, K, N, O — dorsal; E, L, P — dorso-posterior; G — posterior. Scale = 0.2 mm.

Рис. 7. Эпигина *Erigone remota* (A, B), *E. arctica* (C–G), *E. longipalpis* (H–L) и *E. hypoarctica* (M–P). A, C, H, J, M — вентрально; B, D, F, I, K, N, O — сверху; E, L, P — сверху-сзади; G — сзади. Масштаб = 0,2 мм.

longipalpis is known from SW of the country and in the Arctic (Fig. 10).

Erigone remota L. Koch, 1869

Figs 1E, 2C, 3A, 4A, B, F, 5J–L, 6G–L, 7A, B, 8F–J, 9, 10.

Erigone remota: Kulczyński, 1902: 552, pl. 35, f. 6, 21, 43, 55, 68–69 (♂♀); Wiehle, 1967: 9, f. 30–34 (♂♀); Tanasevitch, 2013: 282, f. 60–62, 69, 71–72 (♂♀).

MATERIAL EXAMINED: RUSSIA: 90 ♂♂ 51 ♀♀ (ZMMU), *Arkhangelsk* Area, Barents Sea, Dolgiy Isl., 69°12'N 59°13'E, Nenets Reserve, 6–28.07.2004 (O. Makarova); 3 ♂♂ (ZMMU), *Krasnoyarsk* Prov., down flow of Kotui River, 71°24'N 103°E, 06–07.2010 (O. Khrulyova); 25 ♂♂ 21 ♀♀ (ZMMU), Northern *Yakutia*, Yana River down flow, Kular Vill. env., 70.35°N 134.34°E, July 1996 (N.N. Vinokurov); ca. 150 ♂♂ (ZMMU), NE Siberia, *Magadan* Area, env. of Tauysk, 59°43'51"N 149°22'47"E, pitfall traps, 15–26.07.2017 (M. Bizin, B. Efeikin); 18 ♂♂ 5 ♀♀ (ZMMU), NE Siberia, env. of Magadan, Ola R. mouth, ca 59.567°N, 151.284°E, seashore marshes, 7–14.07.2017 (N.E. Dokuchaev); 9 ♂♂ 31 ♀♀ (ZMMU), NE Siberia, *Chukotka*, Chaun Bay, env. of Pevek Town, 2.2 km SSW Apapeligino, 69°48'44"N 170°36'23"E, seashore marshes, 13–24.07.2018 (K. Makarov, O. Makarova).

DIAGNOSIS. The male of this species is most similar to that of *E. arctica* in having a rounded anterior tooth of the radix (*At*). It can be distinguished from similar species by the relatively smaller dorsal pocket (*Dp*) of its tibia, shorter than the retrolateral tibial apophysis (vs. pocket longer than apophysis in *E. arctica*) and smaller anterior teeth of the radix (cf. Fig. 1D and E, 5A and J). Both males and females of this species in general are smaller in carapace length, and carapace femur I ratio (Fig. 9).

NOTE. The population of this species from Tauysk demonstrates the highest variability of carapace and femur I length among all species/populations compared.

COMMENTS. Here we provide comparative figures of specimens from the tundra zone (Chukotka) and coastal part of the Sea of Okhotsk (taiga zone). Almost all populations of *Erigone* from the Arctic zone are characterized by size polymorphism (personal observation). Here we have calculated no statistics on this subject but wish to point out certain differences and not only those in size. Although specimens from Tauysk are smaller than those from Apapeligino, males have 2 rows of spines on palpal femur, while larger specimens have only one (cf. Fig. 6K and I).

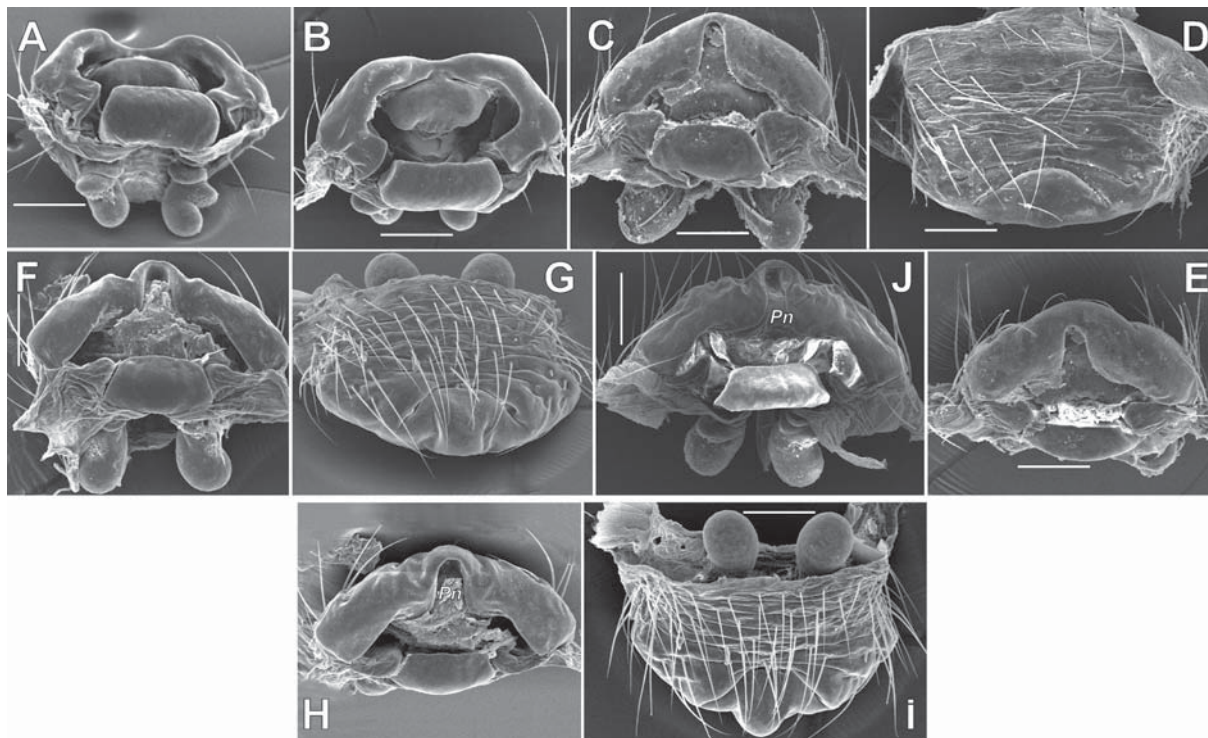


Fig. 8. Epigyne of *Erigone hypoarctica* (A, B), *E. longipalpis* (C–E) and *E. remota* (F–J). A — dorso-posterior; B, C, F, J — dorsal; D, I — ventral; G — posterior-ventral; E, H — postero-dorsal. F–I — from Tausik; J — from Pevek.

Рис. 8. Эпигина *Erigone hypoarctica* (A, B), *E. longipalpis* (C–E) и *E. remota* (F–J). A — сверху-сзади; B, C, F, J — сверху; D, I — снизу; G — сзади-снизу; E, H — сзади-сверху. F–I — экземпляры из Тайгиска; J — из Певека.

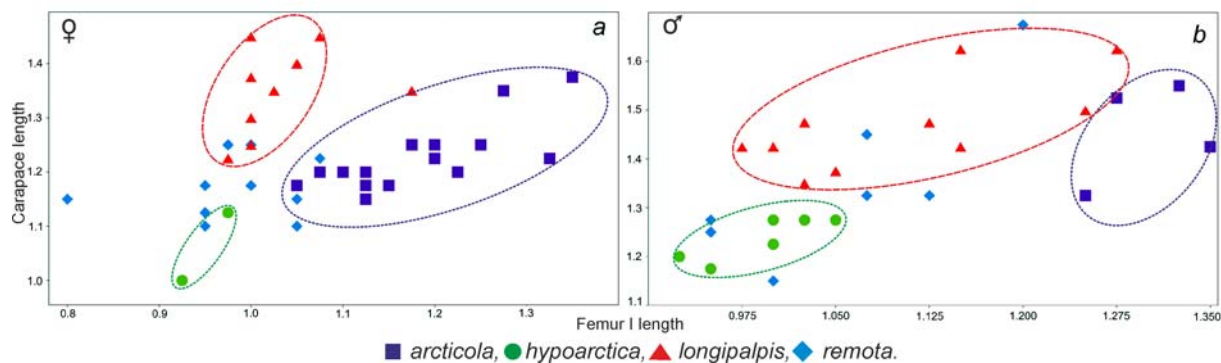


Fig. 9. Carapace length / femur I length ratio in females (a) and males (b) in four *Erigone* species: *E. arctica* (square, Wrangel Isl.), *E. hypoarctica* (dot, Tausik), *E. longipalpis* (triangle, SW Finland) and *E. remota* (diamond, Tausik).

Рис. 9. Отношение длины головогрудки к длине бедра I у самок (a) и самцов (b) четырёх видов *Erigone*: *E. arctica* (квадрат, о. Врангеля), *E. hypoarctica* (кружок, Тайгиск), *E. longipalpis* (треугольник, ЮЗ Финляндия) и *E. remota* (ромб, Тайгиск).

HABITATS. In Austria *E. remota* is known from 1700 to 3280 m [Thaler, 1999]. In Chukotka and Magadan area this species was found in seashore marshes. In the Altai this species was found in mountain tundra on elevations over 2100 m [Tanasevitch, 2013]. In Dolgiy Island, in Chukotka and in northern Cisokhotia *E. remota* was collected in large numbers on sea marshes [Marusik *et al.*, 2016 and present data].

DISTRIBUTION. This species has a Palearctic disjunctive range and is known (Fig. 10) from the Alps, coastal parts of the Pechora Sea [Tanasevitch, Koponen, 2007;

Marusik *et al.*, 2016; Tanasevitch, 2017a, b], and across Siberia to Chukotka (present record). In Siberia it is known from the tundra zone and highlands of the Kazakhstan and Russian Altai [Tanasevitch, 2013] and also from Tuva [Eskov, 1994; Marusik *et al.*, 2000]. Besides the highlands of South Siberia, it was found in seashore marshes by the Sea of Okhotsk at 59°30'N (present record). The southernmost record of this species is Central Tien Shang, Issyk-Kul' Lake in Kyrgyzstan [Tanasevitch, 1989]. This record is far from the others and might be based on misidentification.

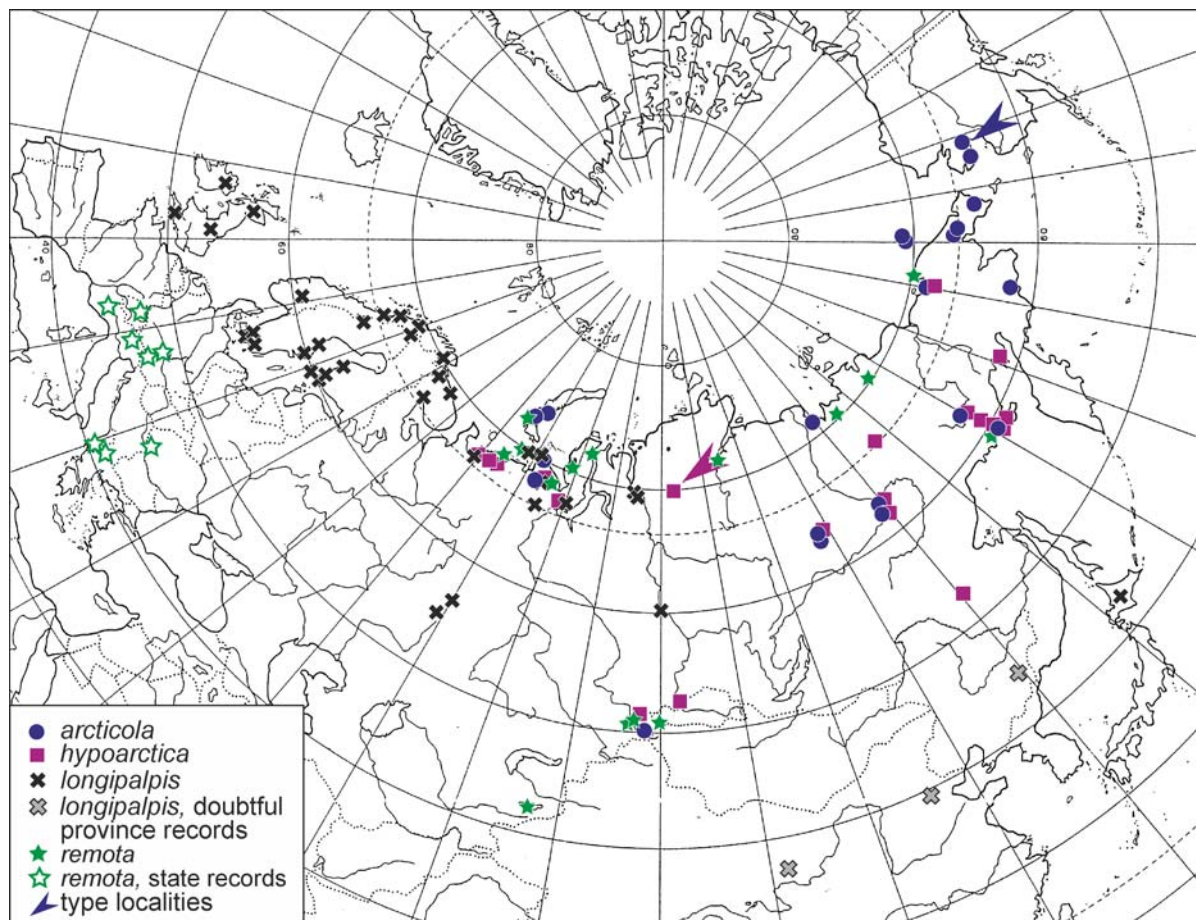


Fig. 10. Distribution of four *Erigone* species: *E. arctica* (circle), *E. hypoarctica* (square), *E. longipalpis* (cross, in Europe only northernmost localities are shown), and *E. remota* (star). Arrow indicates type localities of two species.

Рис. 10. Распространение четырёх видов *Erigone*: *E. arctica* (круг), *E. hypoarctica* (квадрат), *E. longipalpis* (крест, для Европы показаны только самые северные находки), и *E. remota* (звезда). Стрелки указывают типовые местообитания двух видов.

Discussion about size

Measurements of specimens of the four species taken from different populations reveals the possibility of being able to recognize three of them according to carapace/femur I length ratio: *E. arctica*, *E. hypoarctica* and *E. longipalpis* (Fig. 9). Only one species, *E. remota* displays a high level of size variability in males and females and overlaps all the other sibling species. Because we analyzed each species from only one locality it is not evident if other populations of all four species would demonstrate the same pattern of variability. We are going to conduct further studies in this direction and analyze size variation of the same species taken from distant populations.

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