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The harvestman fauna (Opiliones) of the Cis-Urals steppe region, Russia

Фауна сенокосцев (Opiliones) степного Приуралья, Россия

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KEY WORDS: harvestmen, *Opilio*, new species, new records, steppe zone.
КЛЮЧЕВЫЕ СЛОВА: сенокосцы, *Opilio*, новый вид, новые указания, степная зона.

ABSTRACT. Based on extensive fieldwork conducted in the last decade, new taxonomic and faunistic data on harvestmen from the Cis-Urals steppe zone are presented. One species, *Opilio uralicus* Snegovaya sp.n. (♂♀), is described as new. The two species — *Odiellus lendli* (Sørensen, 1894) and *Oligolophus tridens* (C.L. Koch, 1836) — are reported from Orenburg Area for the first time. At present, the harvestman fauna of the Urals accounts for 13 species in 3 families.

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РЕЗЮМЕ. Представлены новые таксономические и фаунистические данные о сенокосцах степной зоны Предуралья, полученные в результате обширных полевых работ, проведенных в последнее десятилетие. Один вид, *Opilio uralicus* Snegovaya sp.n. (♂♀), описан как новый. Два вида — *Odiellus lendli* (Sørensen, 1894) и *Oligolophus tridens* (C.L. Koch, 1836) — впервые зарегистрированы в фауне Оренбургской области. На данный момент в фауне сенокосцев Урала насчитывает 13 видов из 3 семейств.

Introduction

This paper is a continuation of the study of the Urals harvestman fauna [Esyunin, 1991; Farzalieva, Esyunin, 2000a, 2000b; Esyunin *et al*., 2021]. To date, 10 harvestman species have been reported from the Urals [Farzalieva, Esyunin, 2000a]. All of them were found in the forest or forest-steppe zones of the Urals. Yet, the harvestman fauna of the Cis-Urals steppe region has remained completely unexplored. During the past decade new materials have been collected from various localities of the steppe zone of Orenburg Area. A new *Opilio* species has been found in these samples, as well as one species new to the Urals harvestman fauna.

To date, the genus *Opilio* Herbst, 1798 in the Urals fauna has been presented by the single species, *Opilio parietinus* (De Geer, 1778). A species that is distinct from all the known *Opilio* species has been found in the Cis-Urals steppe. The aims of the present paper are: (1) to describe a new *Opilio* species, and (2) to report on all new faunistic records.

Material and Methods

This paper is based on newly collected harvestman specimens. Type specimens are shared between the Zoological Museum of the Moscow State University, Moscow, Russia (ZMMU; curator: K.G. Mikhailov), the Zoological Institute of the Russian Academy of Sciences, St. Petersburg, Russia (ZISP, curator: D.V. Logunov) and the first author's reference collection, Baku, Azerbaijan. Other materials studied have been deposited in ZMMU, ZISP and Institute of Systematics and Ecology of Animals, Novosibirsk, Russia (ISEA; curator: G.N. Azarkina).

SEM micrographs were made by means of a Hitachi TM3000 SEM microscope with BSE (back-scattered electrons) at the Department of Invertebrate Zoology and Aquatic Ecology of the Faculty of Biology of Perm State University. Stacks of colour digital images were manually generated using an Olympus OMD EM-10 digital camera with a Zuiko Digital ED 60 mm f/2.8 lens mounted on a Zeiss Axio Imager.A2 at Leading Laboratory of Microbial and Cell Technologies of the Faculty of Biology of the Perm State University.

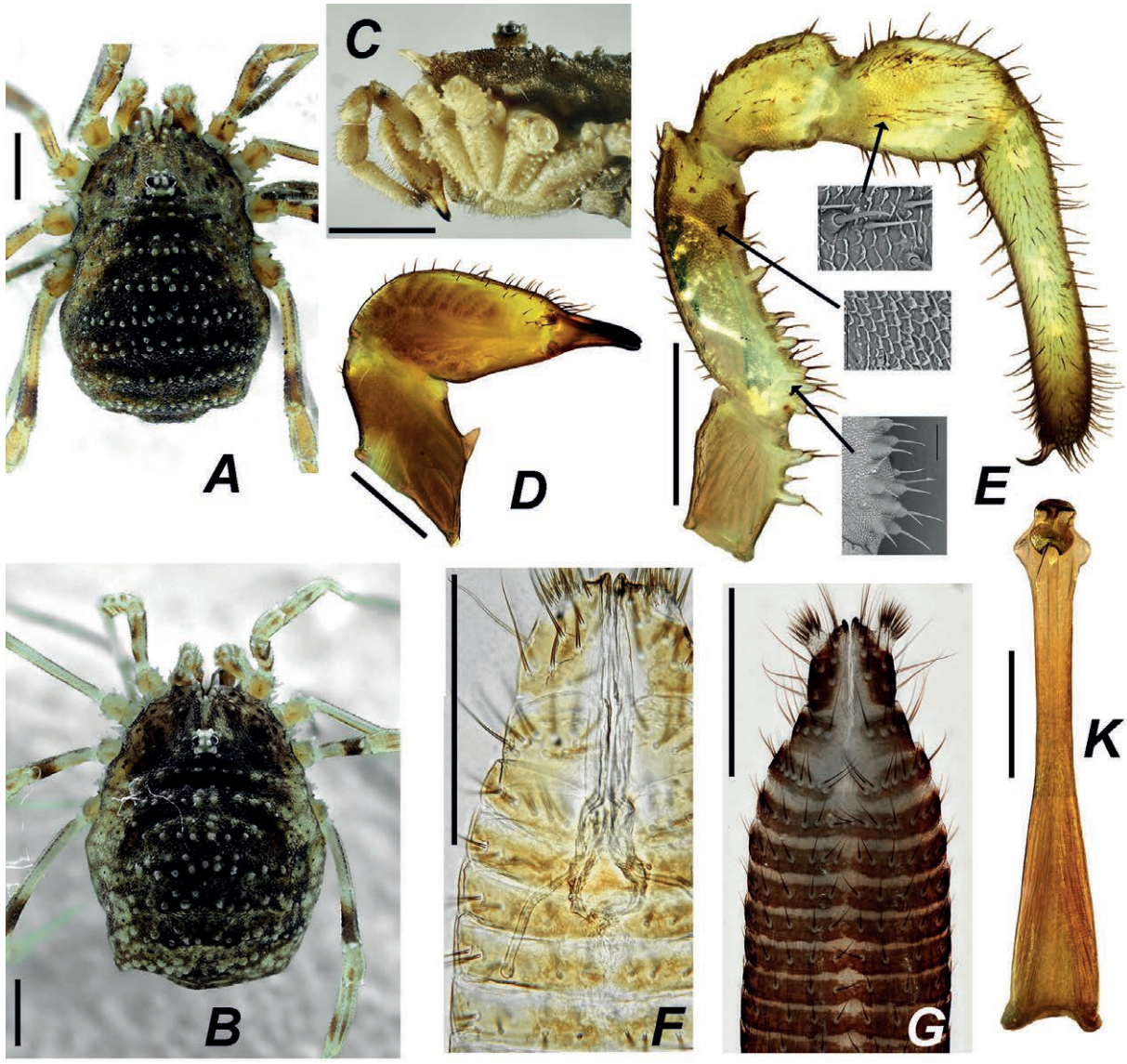

Fig. 1. *Odiellus lendli* (Sørensen, 1894), male and female: A — male body, dorsal view; B — female body, dorsal view; C — male carapace, lateral view; D — male chelicera, lateral view; E — male pedipalp with denticles and surface microstructure, prolateral view; F — distal part of female ovipositor with seminal receptacle; G — female ovipositor; K — penis. Scale bars: A–C — 1.0 mm, E–K — 0.5 mm.

Рис. 1. *Odiellus lendli* (Sørensen, 1894), самец и самка: A — тело самца, сверху; B — тело самки, сверху; C — карапакс самца, сбоку; D — хелицера самца, сбоку; E — педипальпа самца с зубчиками и микроструктурой поверхности, сбоку; F — дистальная часть яйцеклада самки с семеприемником; G — яйцеклад самки; K — пенис. Масштаб: A–C — 1,0 мм, D–K — 0,5 мм.

Survey of species

Odiellus lendli (Sørensen, 1894)
Figs 1−2.

MATERIAL. Orenburg Area: 1 ♂, 2 ♀♀, 1 juv. (ZMMU), c. 15 km N of Orenburg, Grebeni Vil., steppe, 30.VII.2007–18.IV.2008, V.O. Koz'minykh; 2 ♀♀, same locality, *Quercus-Tilia* forest, 9–16. IX.2007, V.O. Koz'minykh; 38 ♂♂, 71 ♀♀ (ZMMU, ZISP, ISEA), Belyaevskiy Distr., Burtinskaya steppe, division of the Orenburg State Reserve, IX.2020, S. Vlasov: 2 ♂♂, 5 ♀♀, *Artemisia* steppe; 1 ♂, *Helictochloa-Poa versicolor* steppe; 1 ♀, *Galatella villosa-Stipa* steppe; 2 ♂♂, 2 ♀♀, saline land; 1 ♂, 1 ♀, slope of ravine; 21 ♂♂, 19 ♀♀, multiherbaceous-grass meadow at the bottom of a ravine; 2 ♂♂, bank of lake; 3 ♀♀, birch-aspen open forest; 5 ♂♂, 17 ♀♀, multiherbaceous meadow; 3 ♂♂, 5 ♀♀, *Alnus* thicket; 1 ♂, 22 ♀♀, multiherbaceous-ling (*Carex* sp.) meadow; 1 ♀, *Festuca-Stipe* steppe; 7 ♀♀ (ZMMU), Predural'skaya Steppe, division of the Orenburg State Reserve, IX.2022, S. Vlasov. — Mordovia: 1 ♀ (ZMMU), Ichalkovsky District, National Park "Smolny", Barakhmanovskoye forestry, 22.VIII–18.IX.2018, G.B. Semishin; 1 ♀ (ZISP), Temnikovsky Distr., State Nature Reserve, Steklyannyi cordon, 30.VIII–27.IX.2018, G.B. Semishin.

DESCRIPTION. For a detailed description see Martens [1978]. In front of the eye tubercle, there is a group of three massive denticles pointing forward; the tergites with transverse rows of large denticles (Fig. 1A−C). Pedipalps small, coxa and femora ventrally with denticles (Fig. 1E). Truncus penis slightly widened at its basis, with small lateral wings (Fig. 1K). Glans of penis with lateral notches and two pairs of setae (Fig. 2A−C). Seminal receptacles are located within

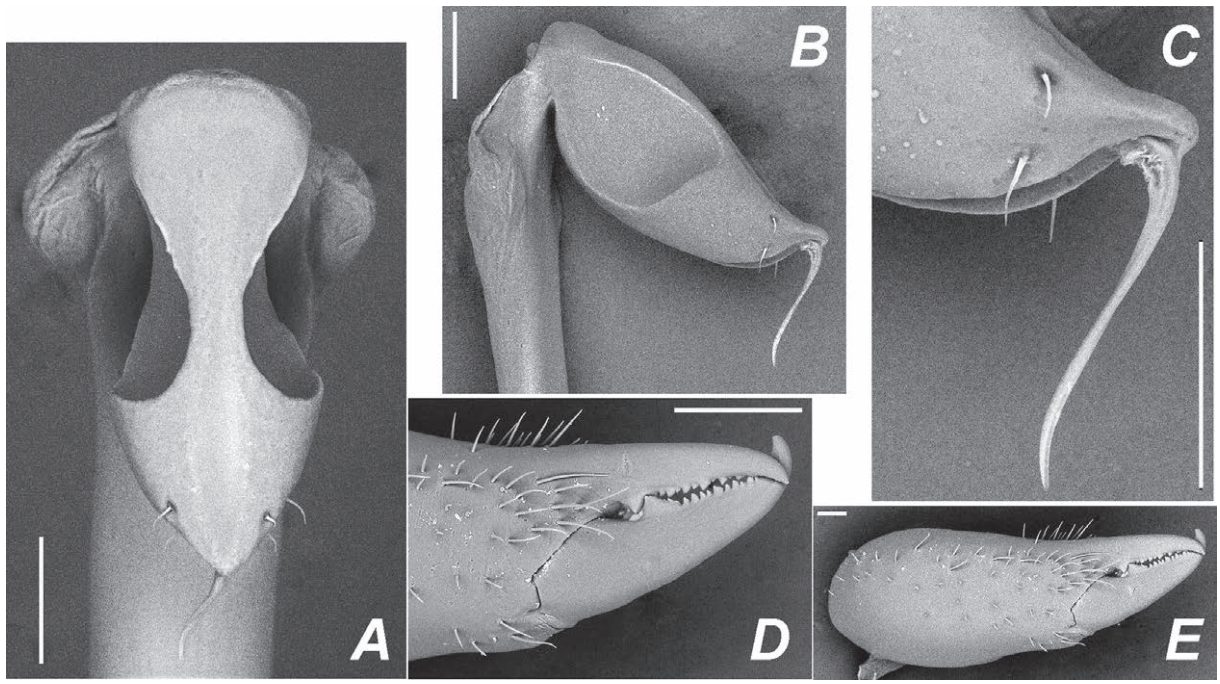

Fig. 2. Male *Odiellus lendli* (Sørensen, 1894): A–B — glans of penis, dorsal and lateral view, respectively; C — distal part of glans of penis, lateral view; D — forceps of chelicera, front view; E — distal segment of chelicera, front view. Scale bars: 0.1 mm.

Рис. 2. Самец *Odiellus lendli* (Sørensen, 1894): A–B — головка пениса, сверху и сбоку, соответственно; C — дистальная часть головки пениса, вид сбоку; D — клешня хелицеры, спереди; E — дистальный сегмент хелицеры, спереди. Масштаб: 0,1 мм.

the 4–6th segments of the ovipositor (Fig. 1F, G). Seminal receptacle as in Fig. 1F.

HABITATS. A biotopic distribution of the species remains poorly studied [Martens, 1978]. As pointed out by Chemeris & Kovblyuk [2005: 326], in the Crimea, *O. lendli* "demonstrates a high ecological plasticity, as it was collected from the majority of studied biotopes, though it preferred moister places". In Turkey, the species was collected from the forest [Kurt, Erman, 2011]. In the South Urals steppe zone, the species occurs in various steppes and meadows, as well as in forests and thickets; yet it was most abundant in mesophytic meadows.

DISTRIBUTION. New to the fauna of Mordovia and Orenburg Area. *O. lendli* is widespread in central and eastern Europe [Chemeris, Kovblyuk, 2005], Turkey [Kurt, Erman, 2011; Snegovaya, Marusik, 2012]. In the Russian Plain, the northern border of its known distribution runs along the line of Bryansk Area [Chevrizov, 1979a] – Kaluga Area [Garkunov, 2022] – Moscow Area [Chevrizov, 1979b] – Mordovia (present data) – Samara Area [Chevrizov, 1979b] – Orenburg Area (present data).

Oligolophus tridens (C.L. Koch, 1836)

MATERIAL. Orenburg Area: 1 ♂, 2 ♀♀ (ZMMU), c. 15 km N of Orenburg, Grebeni Vil. *Quercus-Tilia* forest, 9–16.IX.2007, V.O. Koz'minykh.

DESCRIPTION. For a detailed description see Farzalieva & Esyunin [2000a].

HABITATS. *O. tridens* is a common forest inhabitant of the forested Urals, it is less common in meadows [Farsalieva, Esyunin, 2020a; Esyunin *et al*., 2021]; in the mountains, it occurs up to the mountain-tundra belt [Esyunin, 1991]. It has been first recorded from the Urals steppe zone where it penetrates through floodplain forests.

DISTRIBUTION. A Euro-Siberian temperate species; new to the fauna of Orenburg Area.

Opilio uralicus Snegovaya **sp.n.**
Figs 3−5.

HOLOTYPE ♂ (ZMMU), Orenburg Area, c. 3 km NW of Pervomayskiy, Donguz, steppe, pitfall traps, 7–21.IX.2007, V.O. Koz'minykh.

PARATYPES: 1 ♀ (ZMMU), 1 ♂, 2 ♀♀ (RCNS), 2 ♀♀ (ZISP), together with the holotype.

ETYMOLOGY. The species is named after the Urals, where its type locality lies.

DIAGNOSIS. The new species is most similar to *Opilio lederi* Roewer, 1911 [Snegovaya, 2010], but differs from it in the followings characters: the smaller body size, the leg structure and their length (in *lederi*, legs short and robust; Fig. 5A and 5I), structure of femora I and III (in *lederi*, femora larger and thicker; Fig. 5A and 5I), structure and armament of pedipalps (in *lederi*, pedipalp stronger armored and thick; Fig. 5B and 5J) and a different conformation of the penis (in *uralicus,* glans of penis more thickened; Fig. 5D–G and 5L–O).

DESCRIPTION. Male. A small-sized harvestman, body 4.1 mm long, 2.5 mm wide. Body oval, brown, with a darker saddle (Fig. 3A). In front of eye mound and on each side of it there are groups of large denticles. Tergite borders with same denticles. Eye mound small, low, with 3-4 denticles on each ring. Ventral body part and coxae covered with thin setae.

Pedipalps small, femora dorsally and ventrally with denticles, Patella dorsally with denticles (Fig. 3D). Chelicera also not very large: I segment 1.6 mm, II segment 1.6 mm long; I segment dorsally with small denticles, II segment dorsally with some denticles (Fig. 3B–C).

Legs long, I and III pairs thickened, femora I spindle-shaped. Femora of all legs with transverse rows of denticles (Fig. 3H).

Penis 2.0 mm long, glans 0.25 mm, stylus 0.1 mm. Truncus of penis slightly expanded at its basis, with small wings (Fig. 3F, I). Glans of penis banana-shaped, wide, with 2 setae (Fig. 3G).

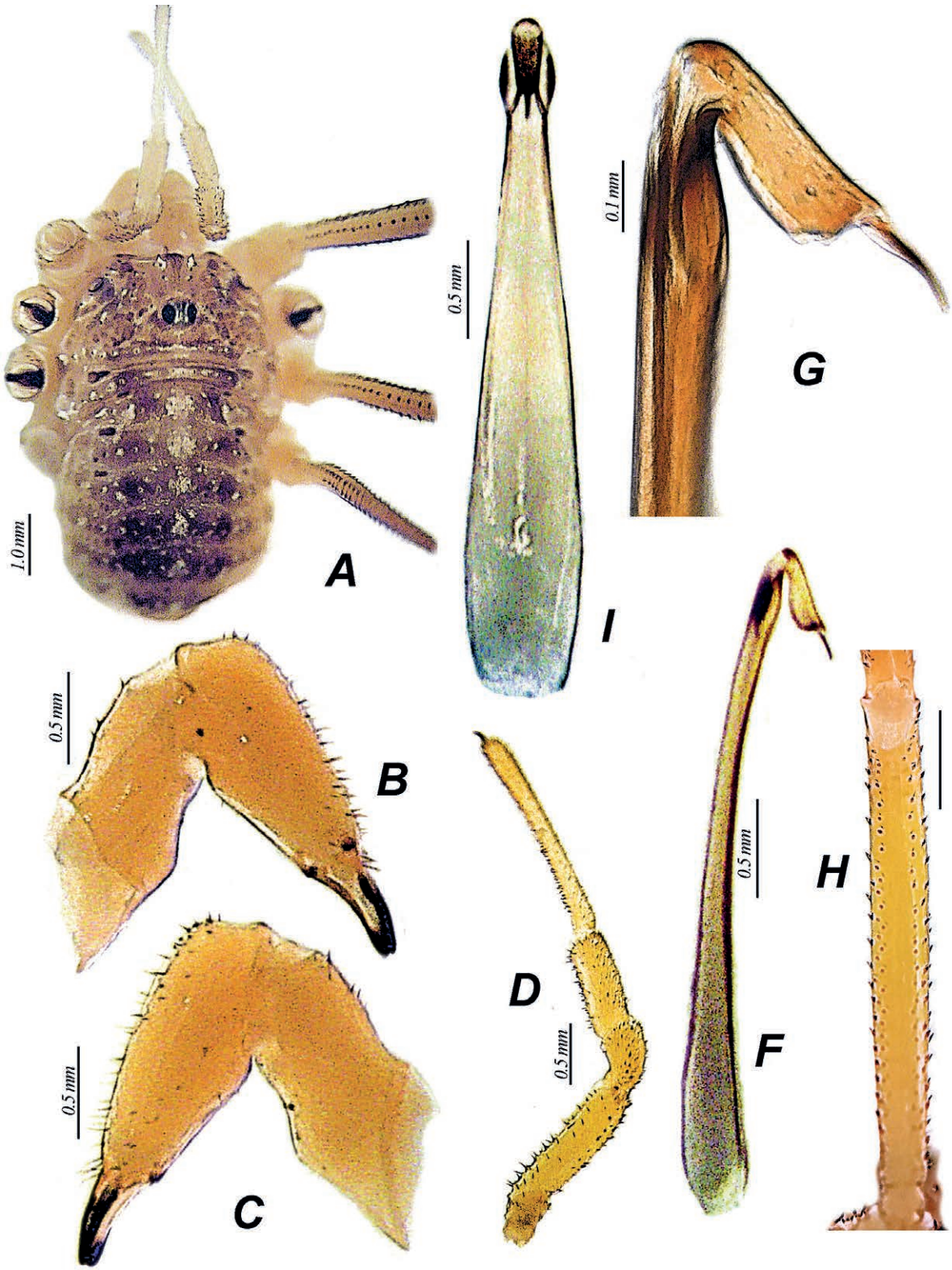

Fig. 3. *Opilio uralicus* sp.n., male: A — body, dorsal view; B — right chelicera, prolateral view; C — right chelicera, retrolateral view; D — right pedipalpus, prolateral view; I — penis, dorsal view; F — penis, lateral view; G — glans of penis, lateral view; H — Femora of the 1st leg, ventral view. Scale bars: A — 1.0 mm, B–F — 0.5 mm, G — 0.1 mm.

Рис. 3. *Opilio uralicus* sp.n. Самец: A — тело, сверху; B — правая хелицера, пролатерально; C — правая хелицера, ретролатерально; D — правая педипальпа, сбоку; I — пенис, сверху; F — пенис, сбоку, G — головка пениса, сбоку; H — бедро 1-й ноги, снизу. Масштаб: A — 1,0 мм, B-F — 0,5 мм, G — 0,1 мм.

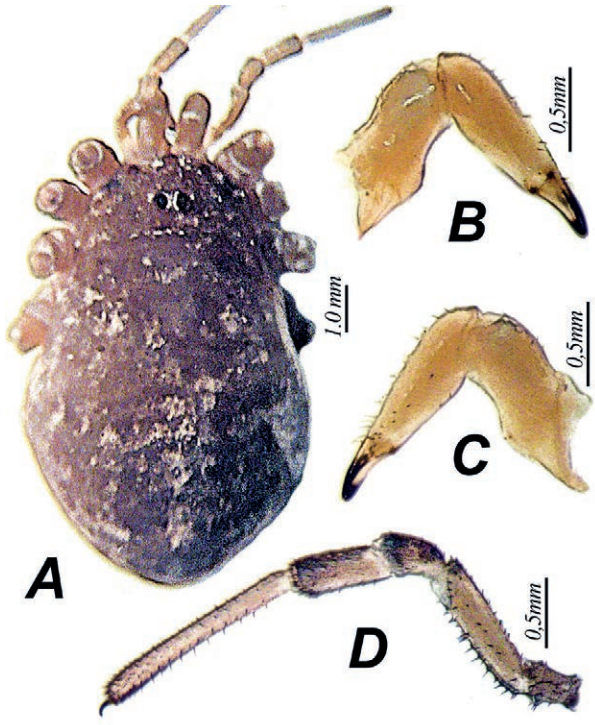

Fig. 4. *Opilio uralicus* sp.n., female: A — body, dorsal view; B — right chelicera, prolateral view; C — right chelicera, retrolateral view; D — right pedipalpus, prolateral view. Scale bars: A — 1 mm, C–D — 0.5 mm.

Рис. 4. *Opilio uralicus* sp.n. Самка: A — тело, сверху, B — правая хелицера, пролатерально; C — правая хелицера, ретролатерально; D — правая педипальпа, сбоку. Масштаб: A — 1 мм, C–D — 0,5 мм.

Length (mm) of palp and leg segments (male):

	Femur	Patella	Titia	Metatarsus	Tarsus	Total
Pedipalp	1.1	0.5	0.75	–	1.5	3.85
Leg I	3.5	1.1	3.0	3.5	6.7	17.8
Leg II	7.5	1.6	6.0	3.8	15.0	33.9
Leg III	3.5	1.1	3.0	3.8	6.7	18.1
Leg IV	5.2	1.3	4.0	5.0	9.5	25.0

Female. Body size 9.56 (n=5) mm long, 5.0 (n=5) mm wide. It differs from male by more big, roundish body (Fig. 4A). Chelicerae: I segment 1.2 mm, II segment 1.5 mm long. Ovipositor 2.7 mm long. Seminal receptacle as in Fig. 5H.

Length (mm) of palp and leg segments (female; legs II and IV absent):

	Femur	Patella	Titia	Metatarsus	Tarsus	Total
Pedipalp	1.0	0.5	0.7	–	1.5	3.7
Leg I	2.6	0.75	2.6	2.3	5.3	13.55
Leg III	2.6	0.8	2.25	2.75	5.5	13.9

DISTRIBUTION. The type locality only.

Conclusion

At present, the harvestman fauna of the Urals accounts for 13 species in 3 families (Table) [Farsalieva, Esyunin, 2000a; present data]. Such assessment of species diversity is likely to be very close to the maximum, as we have surveyed all-natural zones and regions of the Cis-Urals and Urals over the last 20 years.

The species number in natural zones decreases from the taiga to the steppe zone (Table). In the Urals tundra

Table. Harvestman species composition and distribution in natural zones of the lowland Cis-Urals and physical-geographical regions of the Urals (after Farsalieva, Esyunin [2000a] and present data).
Таблица. Состав и распространение видов сенокосцев в природных зонах равнинного Приуралья и физико-географических регионах Урала (по Farsalieva, Esyunin [2000a] и представленным данным)

Zones and Regions / Species	NZ of Cis-Urals				PGR of Urals			
	T	MF	FS	St	CP	N	M	S
Nemastomatidae								
Nemastoma lugubre (Müller, 1776)	+	+				+	+	+
Phalangiidae								
Egaenus sp.		+						
Homolophus nordenskioeldi (C.L. Koch, 1879)	+					+		+
Lacinius ephippiatus (Koch, 1835)	+	+				+	+	+
Lophopilio palpinalis (Herbst, 1799)	+	+						
Mitopus morio (Fabricius, 1779)	+	+			+	+	+	+
Odiellus lendli (Sørensen, 1894)				+				
Oligolophus tridens (Koch, 1836)	+	+		+			+	+
Opilio parietinus (DeGeer, 1778)	+	+	+			+		
Opilio uralicus Snegovaya sp.n.				+				
Phalangium opilio Linnaeus, 1758	+	+	+					+
Rilaena triangularis (Herbst, 1799)	+					+	+	+
Sclerosomatidae								
Leiobunum sp.*	+							
Total	10	8	2	3	1	6	5	7

Abbreviations. Regions: NZ — natural zones; PGR — physical-geographical regions. Natural zones: T — taiga (coniferous forest); MF — mixed and broadleaved forest, FS — forest-steppe, St — steppe. Physical-geographical regions: CP — Cispolar, N — North, M — Middle, and S — South Urals. * — synanthropic species (S.L. Esyunin, unpublished data).

Сокращения: Регионы: NZ — природные зоны; PGR — физико-географичекие регионы. Природные зоны: T — тайга (хвойных лесов); MF — смешанных и широколиственных лесов, FS — лесостепь, St — степь. Физико-географические регионы: CP — Приполярный, N — Северный, M — Средний, и S — Южный Урал. * — синантропный вид (С.Л. Есюнин, неопубликованные данные).

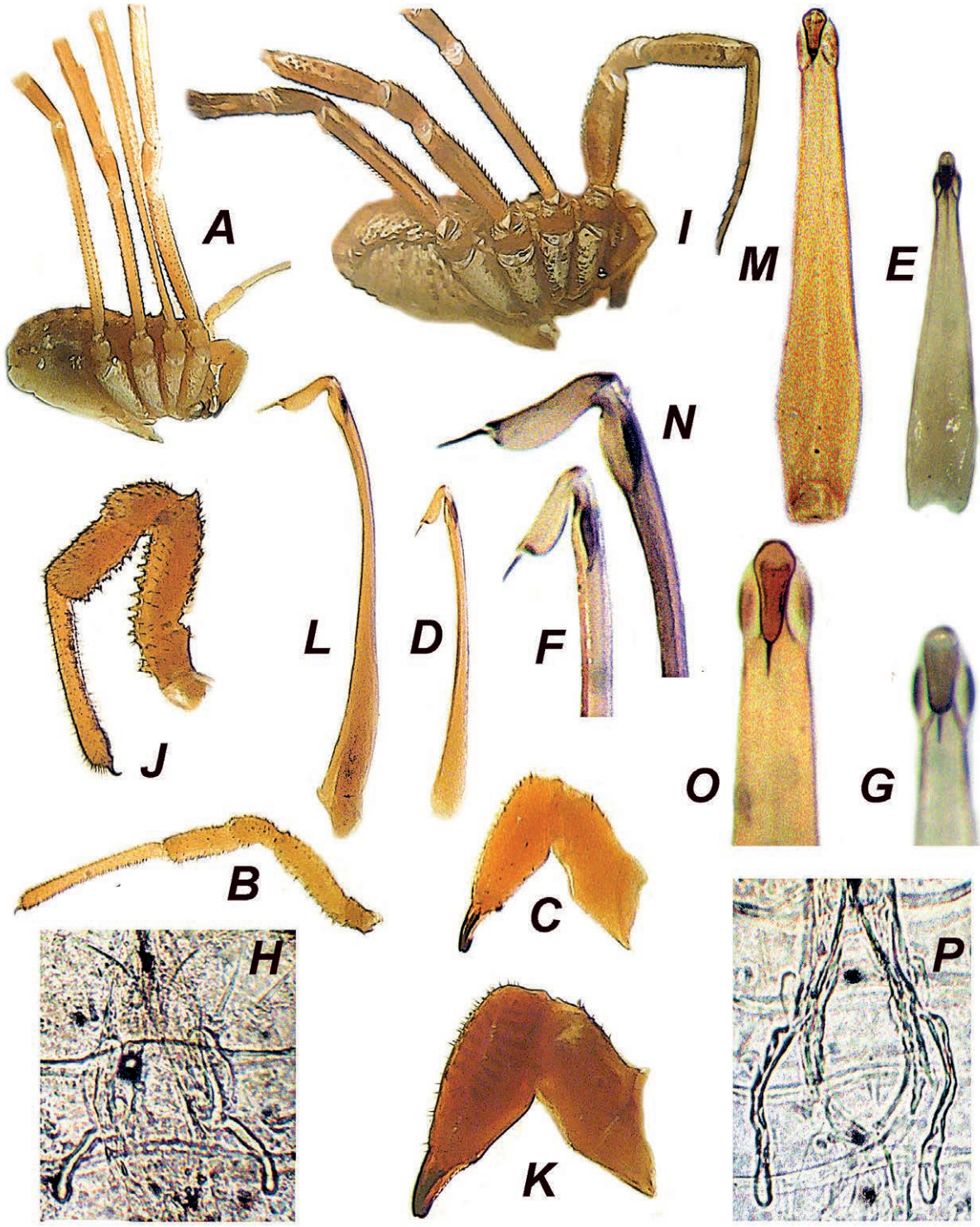

Fig. 5. General view and structure details of *Opilio uralicus* sp.n. (A–H) and *O. lideri* (I–P): A, I — male body, lateral view; B, J — pedipalpus, lateral view; C, K — chelicerae, lateral view; D, L — penis, lateral view; E, M — penis, dorsal view; F, N — glans of penis, lateral view; G, O — glans of penis, dorsal view; H, P — seminal receptacle.

Рис. 5. Общий вид и детали строения *Opilio uralicus* sp.n. (A–H) и *O. lideri* (I–P): A, I — тело самца, сбоку; B, J — педипальпа, сбоку; C, K — хелицера, сбоку; D, L — пенис, сбоку; E, M — пенис, сверху; F, N — головка пениса, сбоку; G, O — головка пениса, сверху; H, P — семеприемник.

zone, harvestmen are represented by a single species, *Mitopus morio*. The small number of species in the zone of broad-leaved forests could be an artefact due to fragmentary data from this area.

In the mountainous part, the species diversity of the harvestmen fauna is relatively constant from the South to the North Urals and sharply decreases in the Cis-Polar Urals (Table).

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