On the *Pardosa monticola*-species group from Iran

(Araneae: Lycosidae)

Yuri M. Marusik, Francesco Ballarin, Mikhail M. Omelko

Abstract. A survey of species belonging to the *Pardosa monticola* species group from Iran is presented. A new species, *P. persica* sp. n., from Fars Province is described on the basis of both sexes. Two species, *P. buchari* Ovtsharenko, 1979 and *P. pontica* (Thorell, 1875), are reported from Iran for the first time. All the three species are illustrated. Earlier records of *P. agrestis* (Westring, 1861), *P. agricola* (Thorell, 1856), *P. monticola* (Clerck, 1757) and *P. palustris* (Linnaeus, 1758), from Iran appear to have been based on misidentifications of *P. buchari* and *P. pontica*.

Key words. Iran, spider, new species, new record, *Pardosa monticola*-group.

Introduction

The spider fauna of Iran is relatively poorly studied with respect to species diversity. Only 244 species of spiders were reported in 2006 (SAHRA 2006). Neighboring Turkey and Azerbaijan are much better studied with over 600 species reported in each of these countries (BAYRAM et al. 2012, OTTO & TRAMP 2011). In adjacent Turkmenistan, the number of known species is about 400 (MIKHAILOV, pers. comm.). The spiders of Iran are also poorly known from a taxonomic aspect. So far, only eight *Pardosa* species are known to occur in Iran (SAHRA 2006). Of them five species, *P. agrestis* (Westring, 1861), *P. agricola* (Thorell, 1856), *P. condolens* (O.P.-Cambridge, 1885), *P. monticola* (Clerck, 1757) and *P. palustris* (Linnaeus, 1758), belong to the *monticola*-group according to MARUSIK & FRITZÉN (2009). The *Pardosa monticola*-group is the second largest species-group of the genus with more than 25 species known, mainly with European and Caucasian distribution (MARUSIK & FRITZÉN 2009). Although the features of this group are easily recognisable, the similarity in copulatory organs and extensive intra-specific variability, make it very difficult to separate them using the copulatory organ characters (cf. TONGIORGI 1966b). Females of this species-group are almost indistinguishable and males differ mainly in the colouration of the palp, or leg I, as well as in the thickness of tarsus I and leg I pubescence (TONGIORGI 1966b, MARUSIK & FRITZÉN 2009).

While studying material collected by the senior author in Iran in 2000, we found about a hundred specimens belonging to the *P. monticola*-group. Males from this material belong to three morphospecies, and females seem to belong to more morphospecies. Comparison of the males with species earlier reported from Iran, and species known from adjacent Caucasus, reveals that one of them belongs to a new species and two other are new to the fauna of the country. The goal of this paper is to provide a detailed description of the new species and a comparison with other species of this group occurring in Iran, as well as with the widespread *P. agrestis*.

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Material and methods

Figures of habitus and copulatory organs were photographed using an Olympus E-520 camera mounted on an Olympus SZX16 stereomicroscope belonging to the Zoological Museum, University of Turku. Different sized holes in paraffin on the bottom of dishes have been used to keep the specimens in the correct position. The images have been subsequently pasted-up using the CombineZP image stacking software. Habitus, male left palps, and epigyne are shown. Spination of leg I is reported, but apical spines of the tibia and metatarsus have not been considered because of the difficulty of defining their correct position. Epigynes were macerated in KOH. The comparative specimen of *P. agrestis* here illustrated is from Finland. All measurements are given in millimetres and, when possible, smallest and largest sizes are reported. The material treated here is deposited in the Zoological Museum of the Moscow State University, Russia (ZMMU), the Zoological Museum, University of Turku, Finland (ZMUT), Taurida National University, Department of Zoology, Simferopol, Ukraine (TNU), Ferdowsi University of Mashhad, Iran (FUM) and the Museo Civico di Storia Naturale di Verona, Italy (MSNV).

Key to Iranian species of the *monticola*-group

1 Male 2
– Female 4

2 Palpal femur and patella yellowish (Fig. 5), lighter than cymbium and tibia, palpal patella without whitish hairs, palea with bill (triangle) shaped ridge (Fig. 12), tip of the leg I black (Fig. 35) ..... *P. pontica*
– Palpal femur as dark as cymbium, palpal patella covered with whitish hairs (Figs 2, 8), black tip of the leg I absent 3

3 Tegular apophysis longer than wide (Fig. 9), palea with 5 parallel ridges (Fig. 14), terminal apophysis with a thin tooth (Fig. 20) ..... *P. buchari*
– Tegular apophysis as long as wide (Fig. 3), palea with one distinct shallow ridge (Fig. 10), terminal apophysis with a stumpy tooth (Fig. 16) ..... *P. persica* sp. n.

4 Septum at least 1.4 longer than wide (Figs 30-31, 36-38) ..... *P. persica* sp. n.
– Septum about as wide as long (Figs 33-34, 39-41) 5

5 Septum as long as wide or wider than long (Figs 33-34, 39-40) ..... *P. buchari*
– Septum slightly longer than wide (ca. 1.1) (Fig. 41) ..... *P. pontica*

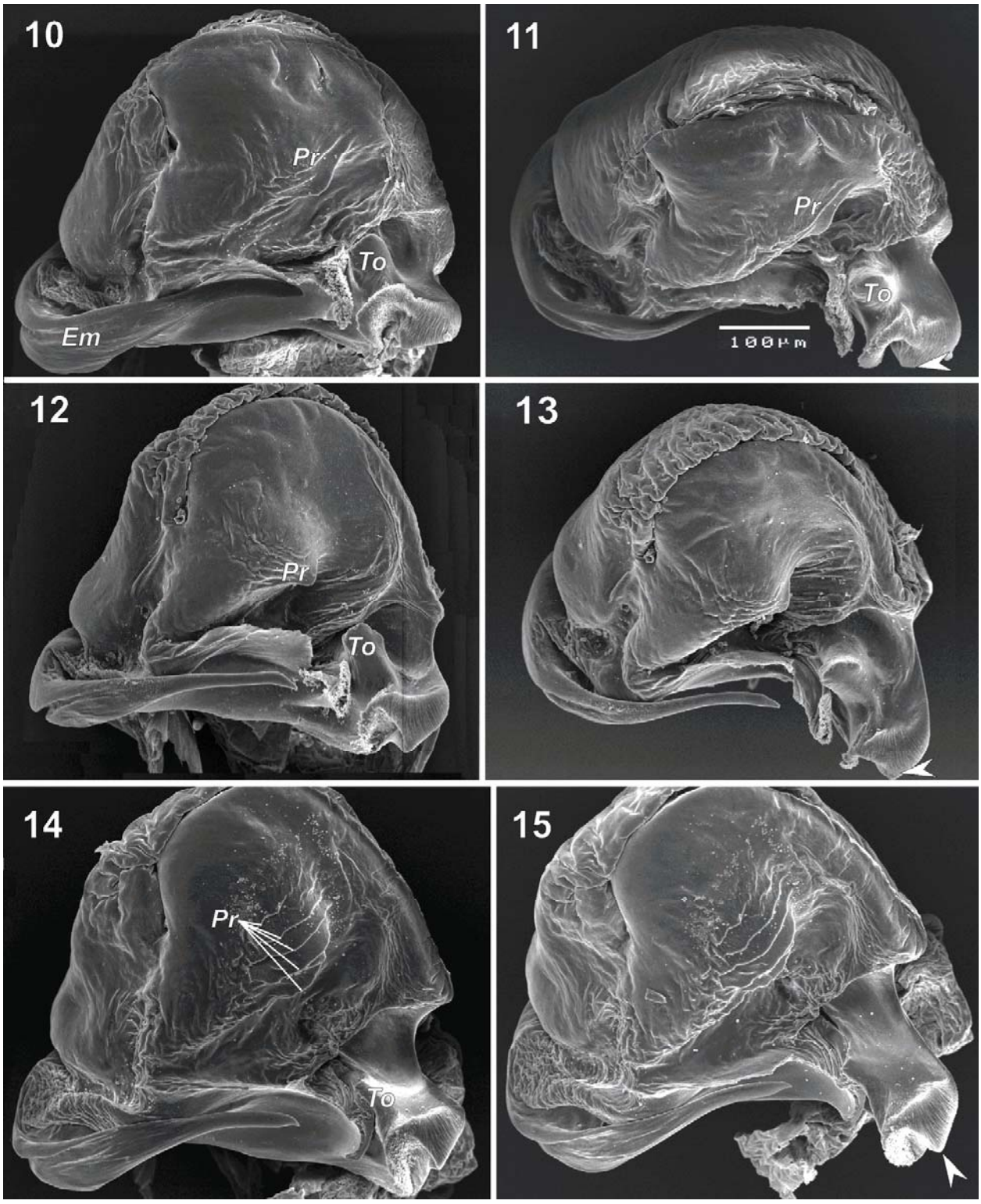
Species survey

Pardosa persica sp. n.
(Figs 1-3, 10-11, 16-17, 22, 29-31, 36-38)

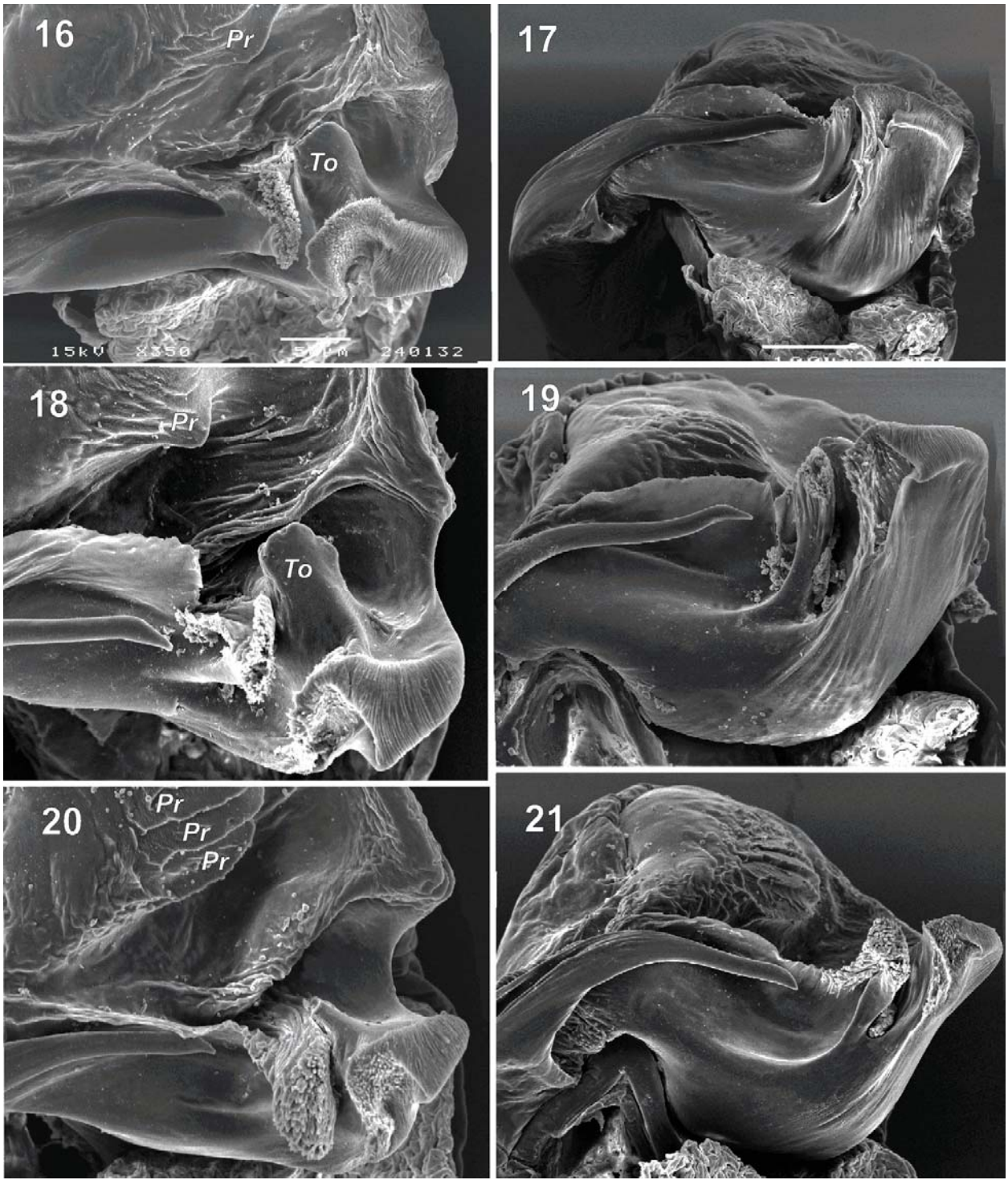
Type material. Holotype ♂ and paratypes: 45♂ 35♀ (ZMMU, ZMUT, MSNV) Iran, Fars Province, Haft Barm, 52°15'E 29°45'N, 24.v.2000 (Y. M. Marusik).

Diagnosis. Males of *P. persica* sp. n. can be easily distinguished from males of *P. pontica* by the presence of white hairs on the palpal patella and from *P. buchari* by the different shape of the tegular and terminal apophyses. Besides, unlike the latter two species, *P. persica* sp. n. has only one ridge on the palea. Females of *P. persica* sp. n. clearly differ from

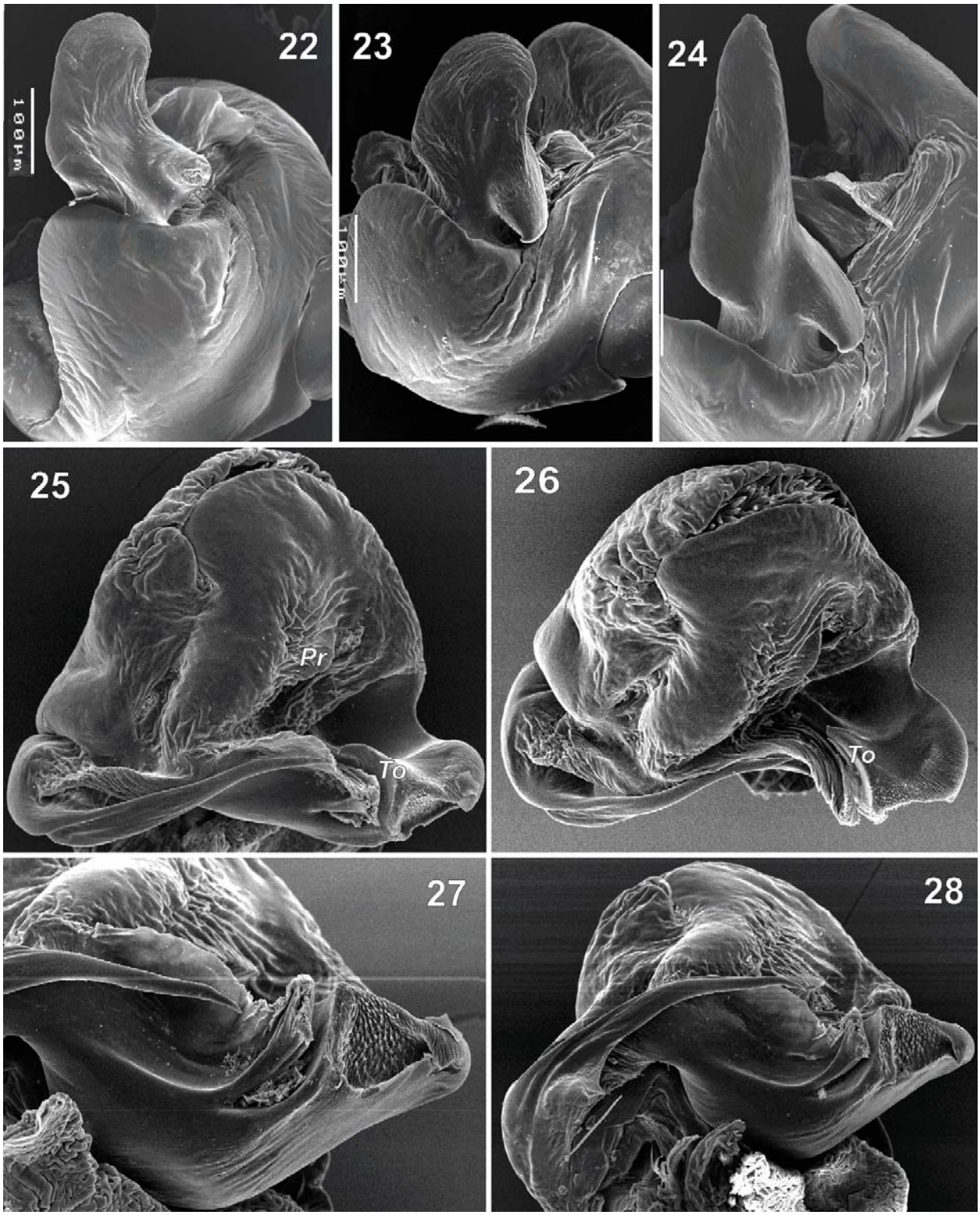
Figs 1-9. Habitus and palps of *Pardosa persica* sp. n. (1-3), *P. pontica* (4-6) and *P. buchari* (7-9). – 1, 4, 7 – habitus, dorsal; 2, 5, 8 – palp, retrolateral; 3, 6, 9 – palp, ventral.



Figs 10-15. Embolic division of *Pardosa persica* sp. n. (10-11), *P. pontica* (12-13) and *P. buchari* (14-15). – 10, 12, 14 – ventral; 11, 13, 15 – anterior.



Figs 16-21. Embolic disvision of *Pardosa persica* sp. n. (16-17), *P. pontica* (18-19) and *P. buchari* (20-21). – 16, 18, 20 – terminal part of embolic division, ventral; 17, 19, 21 – posterior.



Figs 22-28. Male palp of *Pardosa persica* sp. n. (22), *P. pontica* (23), *P. buchari* (24) and *P. agrestis* (25-28). – 22-24 – tegulum with tegular apophysis, ventral; 25, 26, 28 – embolic division, ventral, apical and posterior, respectively; 27 – terminal part of embolic division, posterior.

P. pontica and *P. buchari* by the shape of the epigyne which has a longer and narrower septum than in those of other species.

Description. Male. Total length: 5.10-5.90. Carapace 2.75-2.90 long, 2.07-2.22 wide. Carapace brown with yellow-brownish median band and black cephalic area. Lateral yellowish stripes usually continuous, but in a few samples broken by one or more narrow, perpendicular dark stripes. Clypeus and chelicerae yellowish-brown, chelicerae with some faint brown longitudinal stripes. Sternum black. Abdomen dorsally dark brown with a brownish cardiac mark bordered by black; a couple of brown spots, often fused, surround and follow the cardiac mark. In some specimens the abdomen pattern is faint and barely visible. Ventral side of abdomen usually gray-brownish, sometimes a little lighter, with several short, strong black hairs arranged in the central area. Legs uniformly yellow-brownish without annulations, femora with some dorsal brown marks. Leg I length: 2.18+1.01+1.80+2.01+1.34. Leg I spination: femur d3 p2 r2, patella p1 r1, tibia p2 r2 v 2-2, metatarsus p2 r2 v 2-2. Palp as in Figs 2-3, 10-11, 16-17, 22, brown with yellowish cymbium tip and patella. Patella covered with clearly visible white hairs. Tegular apophysis short and quite stumpy, the ventral side bent into a strong hook. Terminal apophysis with a short, stumpy, square-shaped tooth (*To*). Palea with one distinct shallow ridge (*Pr*).

Female. Total length: 6.06-7.60. Carapace 3.07-3.25 long, 2.27-2.37 wide. Carapace brown with yellowish-brown central stripe and black cephalic area. Yellowish lateral bands unbroken. Clypeus and chelicerae yellowish. Sternum black with a yellow central stripe. Abdomen dark brown with yellowish-brown cardiac mark, surrounded and followed by 5 or 6 pairs of spots of the same colour. Spots are fused near the spinnerets. Ventral side of abdomen yellowish. Legs uniformly yellowish-brown with few brown spots on the dorsal side of femora. In some specimens, more or less clear annulations are present. Leg I length: 2.06+1.03+1.63+1.66+1.23. Leg I spination: femur d3 p2 r2, patella p1(0) r0, tibia p2 r2(1,0) v 2-2, metatarsus p2(1) r1(0) v 2-2. Egg sac brownish. – Epigyne as in Fig 30-31, 36-38, with a long and narrow septum, in some samples very narrow in the median part. Apical pockets widely separated. Insemination ducts short, almost parallel to the median septum.

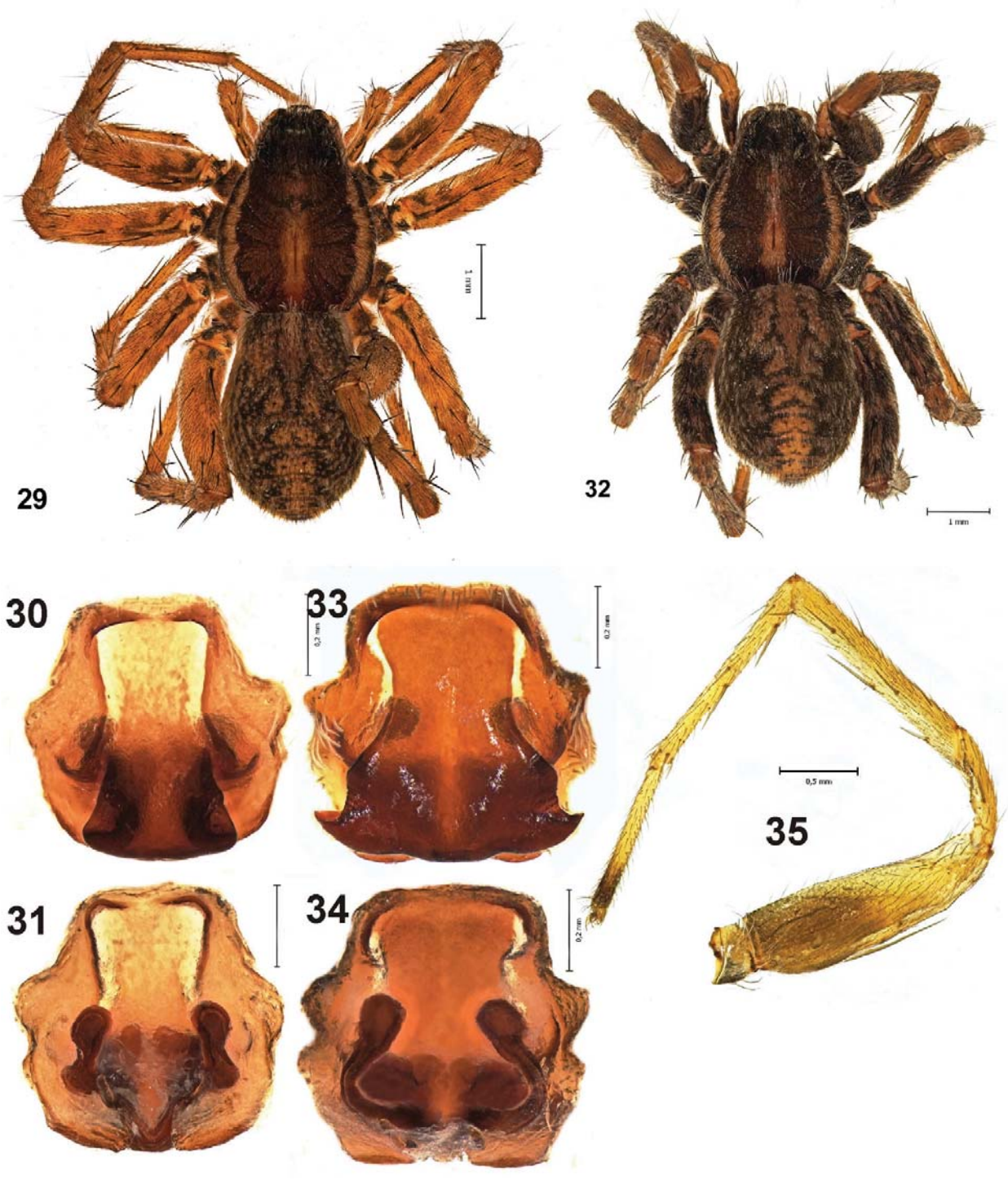
Comments and distribution. In addition to *P. buchari, P. persica* sp. n. has white hairs on the palpal patella in common with two other species belonging to the *monticola*-group: *P. blanda* (C. L. Koch, 1833), endemic to the Alps, and *P. albatula* (Roewer, 1951) distributed in the Alps and the Carpathians. However *P. albatula* males differ in having white pubescence extending from femur to the proximal area of tarsus of the palp, and both *P. albatula* and *P. blanda* have a different shape of the tegular apophysis (see TONGIORGI 1966a). *Pardosa persica* sp. n. is currently known from the type locality only, the Haft Barm area in the Fars Province of Iran.

Pardosa pontica (Thorell, 1875)

(Figs 4-6, 12-13, 18-19, 23, 35, 41)

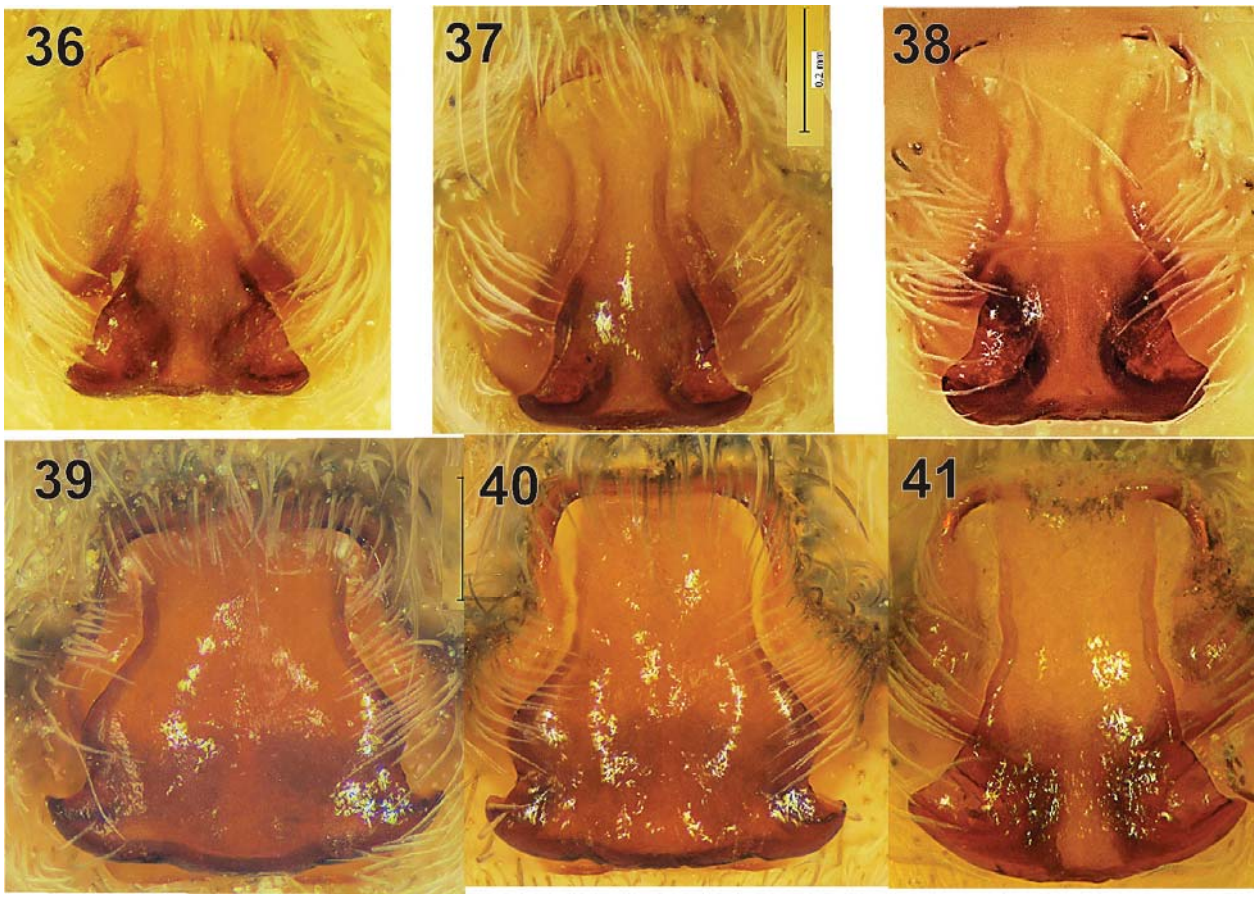
Pardosa pontica: Tongiorgi, 1966b: 351, f. 10-11, 24 (♂♀).
Pardosa pontica: Zyuzin & Logunov, 2000: 316, f. 40-42 (♂♀).

Material examined. 1 ♂ (ZMMU) Iran, Tehran Province, Latian Dam Reservoir, 51°08'E 35°48'N, ca. 1560 m, 6-19.vi.2000 (Y. M. Marusik); 2♀ (ZMMU), Tehran, Plant-Protection-Organization Park, 51°24'E 35°40'N, ca. 1150 m, 7-22.vi.2000 (Y. M. Marusik); 4♂ (FUM), Golestan Province, Karimabad, 6.viii.2010 (R. Kashefi).



Figs 29-35. *Pardosa persica* sp. n. (29-31), *P. buchari* (32-34) and *P. pontica* (35). – 29, 32 – habitus of female; 30, 33 – epigyne, ventral; 31, 34 – epigyne, dorsal; 35 – leg I of male, retrolateral.

Diagnosis. Males of *P. pontica* can be easily separated from all other members of this group (except for *P. agrestis* and *P. pseudomixta* Marusik & Fritzén, 2006) by the black tip of tarsus I. *P. pontica* males are also easily identifiable by the shape of the palp with thick black hairs on the dorsal side of the metatarsus, by the dark colored cymbium and by the stumpy and squared tegular apophysis. Unlike *P. persica* sp. n. and *P. buchari*, the palpal patella lacks white hairs. This species is quite close to *P. agrestis* from which it can be



Figs 36-41. Ventral view of epigyne of *Pardosa persica* sp. n. (36-38), *P. buchari* (39-40) and *P. pontica* (41, from Azerbaijan).

distinguished by the different palp colouration and the stumpy terminal apophysis, which is very reduced in *P. agrestis*. Females of this species can be distinguished from other Iranian species by the shape of the septum, which is slightly longer than wide.

Description. Male. Total length: 4.45. Carapace 2.40 long, 1.62 wide. Carapace brown with darker cephalic area. Yellowish-brown median band, lateral bands of the same color, continuous. Clypeus dark brown, chelicerae of the same color with a yellowish-brown tip. Sternum black with lighter central area. Dorsal side of abdomen dark brown with a yellow cardiac mark followed by spots of the same color. Abdomen ventrally as dark as the dorsal side, with two lighter longitudinal stripes in the centre. Legs yellowish without annulations, proximal part of femora dark brown. Tip of tarsus I black. Leg I length: 1.71 + 0.71 + 1.50 + 1.55 + 1.07. Leg I spination: femur d3 p2 r2, patella p1r1, tibia p2 r2 v 2-2, metatarsus p2 r1 v 2-2. Palp as in Figs 5-6, 12-13, 18-19, 23, uniformly yellow, distal part of tibia and cymbium black. Tibia with a thick tuft of dark hairs on the dorsal side. Tegular apophysis short and stumpy, with a squared shape. Terminal apophysis with a quite stout, square-shaped tooth (*To*). Palea with one triangle shaped ridge (*Pr*).

Female. Total length: 5.30-5.70. Carapace: 2.65-2.85 long, 1.92-2.10 wide. Carapace brown, with darker area near the eye field and a yellowish median stripe. Lateral bands unbroken, yellowish, separated from carapace margin by a dark continuous stripe. Sometimes the dark marginal stripe is broken into some small faint spots. Clypeus and chelicerae yel-

lowish, sternum yellow with a few brown spots in the centre and near the margin. Dorsal abdomen dark brown with 4-5 pairs of reddish-brown or yellowish spots around and following a cardiac mark of the same color. Abdomen ventrally yellowish with two lighter longitudinal stripes. Legs brownish-yellow with dark annulations. Leg I length: 2.14 + 1.01 + 1.78 + 1.77 + 1.17. Leg I spination: femur d3 p2 r2, patella p1 r0(1), tibia p2 r2 v2-2, metatarsus p2 r1 v2-2. Epigyne as in Fig. 41.

Comments and distribution. This species was well described by ZYUZIN & LOGUNOV (2000). Because *P. pontica* seems to have been confused in Iran with *P. agrestis,* we provide comparative figures for this species (Figs 25-28). *Pardosa agrestis* has a smaller and sharply pointed outgrowth of the terminal apophysis. The two species differ also by the shape of the palea and the shape of the terminal apophysis in caudal view. *P. pontica* was known to be distributed from Bulgaria east to western Turkmenistan (ZYUZIN & LOGUNOV 2000). Although its occurrence in Iran was to be expected, it was never reported from that country probably due to confusion with *P. agrestis.* The record from Iran is the southernmost in the range of this species.

Pardosa buchari Ovtsharenko, 1979
(Figs 7-9, 14-15, 20-21, 24, 32-34, 39-40)

Pardosa buchari Ovtsharenko, 1979: 47, f. 14-15, 28-31 (♂♀).
Pardosa buchari Buchar & Thaler 1998: 709, f. 14-15 (♂).
Pardosa buchari Zyuzin & Logunov 2000: 315, f. 31-33, 37-39 (♂♀).

Materail examined. 6♂ 13♀ (ZMMU) Iran, Mazandaran Province, Javaher-Deh Village, 50°28'E 36°52'N, ca. 2100 m, 9.vi.2000 (Y. M. Marusik). – 2♂ 34♀ (TNU) Russia, Adygeya, Caucasian State Biosphere Reserve, 11-21 km SE kordon Guseripl, Abago Mt., 43°53'N, 40°12'E, 1727-2010 m, 18-23.viii.2009 (M. M. Kovblyuk).

Diagnosis. *P. buchari* males clearly differ from other Iranian species of the *P. monticola*-group by having a lengthened and narrow tegular apophysis, five ridges on the palea, and a terminal apophysis with a thin tooth, hardly visible without dissecting the palp. Aditionally, the presence of white hairs on the palpal patella immediately distinguishes this species from *P. pontica* and *P. agrestis*. The shape of the septum allows one to separate *P. buchari* females from *P. persica* sp. n. and *P. pontica*. In both of these species the septum is more or less longer than wide rather than as long as wide or wider than long, as in *P. buchari*. No useful characters are available to clearly distinguish females of *P. buchari* from *P. agrestis.*

Description. Male. Total length 5.20-6-40. Carapace 2.70-3.05 long, 2.05-2.45 wide. Carapace dark brown with black cephalic area and yellowish-brown median stripe. Lateral bands with the same color, broken into three spots by narrow, perpendicular dark stripes. Clypeus yellowish, chelicerae with the same colur and with dark brown longitudinal bands. Sternum black. Dorsal abdomen dark brown with a brownish cardiac mark boardered by black. Brown spots surround and follow the cardiac mark, and are fused in the distal part of the abdomen. Ventral side brownish. Legs brownish-yellow, femora dark brown with lighter distal area. Leg I length: 2.37 + 1.07 + 2.07 + 2.17 + 1.41. Leg I spination: femur d3 p2 r2, patella p1 r1, tibia p2 r2 v 2-2, metatarsus p2(1) r2(1) v 2-2. Palp as in Figs 8-9, 14-15, 20-21, 24, uniformly dark brown with yellow patella covered with white hairs. Tegular apophysis lengthened. Terminal apophysis with small gradually tapering tooth (*To*). Palea with 5 distinct shallow ridges (*Pr*).

Fig 42. Collecting localities of *Pardosa persica* sp. n. (1), *P. pontica* (2) and *P. buchari* (3).

Female. Total length: 5.85-6.45. Carapace 2.95-3.30 long, 2.25-2.47 wide. Carapace brown, darker near the eye field. Yellowish-brown median band extended to the cephalic area with a narrow stripe. Lateral bands of the same colur, unbroken, and absent on the clypeus, terminating on the sides of the cephalic area. Clypeus and chelicerae yellowish-brown. Sternum uniformly black, in some specimens a very small, narrow brownish stripe is present on the anterior side. Abdomen dorsally dark brown with a brownish cardiac mark bordered by black and with pairs of spots of the same colur. Spots are fused in the rear area. Ventral side of abdomen brown with two lighter longitudinal stripes in the middle. Legs brownish with annulations. Leg I length: 2.16 + 0.94 + 1.7 + 1.78 + 1.24. Leg I spination: femur d3 p2 r2, patella p0 r0, tibia p2(1) r2 v 2-2, metatarsus p2(1) r1 v 2-2. Egg sac brownish. Epigyne as in Figs 33-34, 39-40, septum wide, as long as wide or wider than long. Apical pockets separate. Insemination ducts bent inwards. A little variability in septum size and shape is present as is usual in females of this species-group (Figs 39-40).

Comments and distribution. The species was well illustrated by ZYUZIN & LOGUNOV (2000). Earlier it was known from Crimea (KOVBLYUK 2004), across the Caucasus including southern Armenia and Azerbaijan (OTTO & TRAMP 2011). The new record extends the known range about 250 km to the southeast.

Discussion

Of the five species from the *monticola*-group previously reported from Iran, three species, *P. agrestis, P. monticola* and *P. palustris,* were reported by Iranian researchers (GOODARZI 1994, GHAVAMI et al. 2005, GHAVAMI 2006), and two species, *P. agricola* and *P. condolens,* were reported by ROEWER (1955). Considering that identification of the members of *P. monticola*-group is not easy due to intraspecific variability of the epigyne and similarity of male palps in all members, it is very likely that these species were all or in part misidentified. For example, *P. monticola* occurs west of 25°E in Europe (HELSDINGEN 2011) and its occurrence in Asia is highly unlikely. *P. agrestis* and *P. agricola* are reported in the adjacent Caucasus but these records are doubtful. There are only two records of *P. palustris* from the Caucasus Major, and both are old (SCHMIDT 1895). It is very likely that, at least some of these species were incorrectly identified and their records refer to *P. pontica* and *P. buchari*.

Examination of specimens from Iran identified by ROEWER (1955) as *P. condolens* reveals that they belong to the *wagleri*-group. Considering that Roewer saw the types of *P. condolens*, it seems that this species was mistakenly assigned to the *monticola*-group by MARUSIK & FRITZÉN (2009). Placement of *P. condolens* was based on Cambridge's text (CAMBRIDGE 1885), which compared his new species with *P. agricola*.

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Authors' addresses: Yuri M. Marusik, Institute for Biological Problems of the North of the Russian Academy of Sciences, Portovaya Str. 18, 685000 Magadan, Russia – Francesco Ballarin, Museo Civico di Storia Naturale di Verona, Lungadige Porta Vittoria 9, 37129, Verona, Italy and Zoological Museum, University of Turku, 20014, Turku, Finland. – Mikhail M. Omelko, Far Eastern Federal University, Sukhanova, 8, Vladivostok 690950, Russia and Gornotaezhnaya Station FEB RAS, Gornotaezhnoe Vil., Ussuriyski Dist., Primorski Krai 692533, Russia. – Email contact: yurmar@mail.ru.