Six new species of *Orthochirus* Karsch, 1892 from Iran (Scorpiones: Buthidae)

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**Publication date:** 8 July 2020

**Introduction**

This paper continues a comprehensive field study of the scorpion fauna of Iran by the RRLS team under Shahrokh Navidpour which led to a series of publications on separate Iranian provinces (Navidpour et al., 2008a, 2008b, 2008c, 2008d, 2010, 2011, 2012, 2019; Pirali-Kheirabadi et al., 2009). We summarize the information about Iranian scorpions of the genus *Orthochirus* in a distribution map (Fig. 228) and a key. Six new species are described, collected primarily by the RRLS team but also by Czech and Italian zoologists. This paper also continues a broader study of the genus *Orthochirus*, which included a number of apparently morphologically uniform species found in the large area from North Africa through the Middle East to India. Fet & Lowe (2000) listed nine valid species and compiled all references until 1998. Kovařík (2004) revised *Orthochirus*, described 11 new species from Asia, and defined eight major diagnostic characters for the genus. Among other publications focused on the Asian *Orthochirus*, see primarily Kovařík & Fet (2006) and Kovařík et al. (2019).

**Methods, Material & Abbreviations**

Nomenclature and measurements follow Stahnke (1971), Soleglad & Sissom (2001), Kovařík (2009), and Kovařík & Ojanguren Affilastro (2013), except for cheliceral dentition (Vachon, 1963) and trichobothriotaxy (Vachon, 1974).

*Specimen Depositaries*: All examined specimens are deposited in the first author’s collection (FKCP), which will in future be merged with the collections of the National Museum of Natural History, Prague, Czech Republic.

*Morphometrics*: D, depth; L, length; W, width.

*Movable finger dentition*: ID, inner denticles; MD, median denticles; OD, outer denticles.

**Systematics**

**Family Buthidae** C. L. Koch, 1837

*Orthochirus* Karsch, 1892

(Figures 1–234, Tables 1–3)


*Orthodactyulus* Hitchcock, 1858 (Reptilia), type species: *Orthodactyulus olivaceus* Karsch, 1881 = *Orthochirus scrobiculosus* (Grube, 1873) (syn. by Kraepelin, 1895: 84).


*Pseudorthochirus* [nomen nudum; lapsus calami]: Lourenço & Vachon, 1995: 304.

Type species. *Orthodactyulus olivaceus* Karsch, 1881 = *Orthochirus scrobiculosus* (Grube, 1873).
Figures 1–4: Orthochirus hormazganensis sp. n. Figures 1–2. Holotype male, dorsal (1) and ventral (2) views. Figures 3–4. Paratype female from type locality, dorsal (3) and ventral (4) views. Scale bar: 10 mm.
Kovařík & Navidpour: Six new species of Orthochirus from Iran


Orthochirus hormozganensis sp. n. (Figures 1–40, 222, 228–230, Table 1)

http://zoobank.org/urn:lsid:zoobank.org:act:B22A452D-E09D-4688-96F9-7AFA7AE369E4

<table>
<thead>
<tr>
<th>Dimensions (mm)</th>
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<th>O. hormozganensis sp. n.</th>
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<tr>
<td></td>
<td>♂ holotype</td>
<td>♀ paratype</td>
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<tr>
<td>Carapace L / W</td>
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<td>4.04 / 4.81</td>
</tr>
<tr>
<td>Mesosoma L</td>
<td>6.29</td>
<td>12.03</td>
</tr>
<tr>
<td>Tergite VII L / W</td>
<td>1.88 / 4.09</td>
<td>2.84 / 5.67</td>
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<tr>
<td>Metasoma + telson L</td>
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<td>20.92</td>
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<tr>
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<td>2.09 / 3.08 / 2.11</td>
<td>2.26 / 3.37 / 2.51</td>
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<tr>
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<td>2.54 / 3.12 / 2.18</td>
<td>2.76 / 3.28 / 2.43</td>
</tr>
<tr>
<td>Segment III L / W / D</td>
<td>2.97 / 3.29 / 2.45</td>
<td>3.20 / 3.47 / 2.55</td>
</tr>
<tr>
<td>Segment IV L / W / D</td>
<td>3.84 / 3.45 / 2.62</td>
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<tr>
<td>Segment V L / W / D</td>
<td>3.70 / 3.31 / 2.62</td>
<td>4.25 / 3.60 / 2.57</td>
</tr>
<tr>
<td>Telson L / W / D</td>
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<td>4.49 / 1.44 / 1.35</td>
</tr>
<tr>
<td>Pedipalp L</td>
<td>11.27</td>
<td>12.22</td>
</tr>
<tr>
<td>Femur L / W</td>
<td>3.05 / 0.75</td>
<td>3.19 / 0.92</td>
</tr>
<tr>
<td>Patella L / W</td>
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<td>3.88 / 1.07</td>
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<td>Chela L</td>
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<td>36.99</td>
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</table>

Table 1. Comparative measurements of Orthochirus hormozganensis sp. n. types. Abbreviations: length (L), width (W, in carapace it corresponds to posterior width), depth (D).

**Orthochirus hormozganensis sp. n.**

Type locality and type depository. **Iran, Hormozgan Province**, Shahre Babak, Jask–Bashagard road, 25°50′53.1″N 57°50′40.7″E, 178 m a. s. l.; FKCP.

Type material (FKCP). **Iran, Hormozgan Province**, Shahre Babak, Jask–Bashagard road, 25°50′53.1″N 57°50′40.7″E, 178 m a. s. l. (Locality No. HO-120), V.2008, 1 ♂ (holotype) 1 ♀ (paratype), leg. Masihipour, Bahrani & Habibzadeh; Jask–Minab road, 25°55′18.4″N 57°49′42.3″E, 274 m a. s. l. (Locality No. HO-121), V.2008, 1 ♂ 1 juv. (paratypes), leg. Masihipour, Bahrani & Habibzadeh.

**Diagnosis** ($♀$). Total length of adults 28–38 mm. Trichobothrium $d_2$ on the dorsal surface of pedipalp femur absent or reduced. Moderate tibial spurs present on third and fourth legs. Pectines with fulcra, densely hirsute. Movable fingers of pedipalps with 7–10 rows of denticles and 2–5 subterminal denticles. Tibial spurs present on third and fourth legs. Pectines with fulcra, densely hirsute. Movable fingers of pedipalps with 7–10 rows of denticles and 2–5 subterminal denticles. Carapace in lateral view distinctly inclined downward from median eyes to anterior margin. First and second metasomal segments with carinae. Metasomal segments IV and V ventrally punctate. Telson elongate, aculeus as long as or longer than vesicle.

**Orthochirus hormozganensis sp. n.**

http://zoobank.org/urn:lsid:zoobank.org:act:B22A452D-E09D-4688-96F9-7AFA7AE369E4

**Type locality and type depository.** **Iran, Hormozgan Province**, Shahre Babak, Jask–Bashagard road, 25°50′53.1″N 57°50′40.7″E, 178 m a. s. l.; FKCP.

**Type material (FKCP).** **Iran, Hormozgan Province**, Shahre Babak, Jask–Bashagard road, 25°50′53.1″N 57°50′40.7″E, 178 m a. s. l. (Locality No. HO-120), V.2008, 1 ♂ (holotype) 1 ♀ (paratypes), leg. Masihipour, Bahrani & Habibzadeh; Jask–Minab road, 25°55′18.4″N 57°49′42.3″E, 274 m a. s. l. (Locality No. HO-121), V.2008, 1 ♂ 1 juv. (paratypes), leg. Masihipour, Bahrani & Habibzadeh.

**Etymology.** Named after the province of occurrence.

**Diagnosis (♀♀).** Total length of adults 28–38 mm. Trichobothrium $d_2$ on the dorsal surface of pedipalp femur absent or reduced. Moderate tibial spurs present on third and fourth legs. Pectinal teeth number 20–22 in both sexes. Movable finger of pedipalps with 8 rows of denticles, 8–9 ID and 7–8 OD. Dorsal carinae on pedipalp patella present and smooth. Metasoma V dorsal surface mesially smooth. Metasoma I–II with 10 carinae, metasoma III with 8 carinae. Metasoma V with weak/reduced ventrolateral carinae, at least in the male. Metasoma IV–V ventrally and laterally shallowly punctate; spaces among punctae smooth ventrally and granulated laterally; metasoma II–III ventrally and laterally granulated and bumpy with punctation reduced; ventral carinae of metasoma I–III consist of small granules irregularly in two or three rows. Sternite VII roughly irregularly granulated, with wide granulated carinae developed. Pedipalp, metasoma and telson glabrous. Tarsomere I of legs with bristlecombs composed of 5–7 bristles. Ratio length/width of metasoma V 1.12–1.18 in both sexes.

**Description.** Total length of adults 28–38 mm in both sexes. Measurements of the carapace, telson, segments of the metasoma and segments of the pedipalps are given in Table 1. For habitus, see Figs. 1–4.
Figures 5–10: Orthochirus hormozganensis sp. n. Figures 5–7. Paratype female from type locality, metasoma and telson, lateral (5), dorsal (6), and ventral (7) views. Figures 8–10. Holotype male, metasoma and telson, lateral (8), dorsal (9), and ventral (10) views. Scale bar: 10 mm.
Figures 11–19: Orthochirus hormozganensis sp. n. Figures 11–12, 15–18. Holotype male, carapace and tergites (11), sternpectinal region and sternites (12), and distal segments of right legs I–IV, retrolateral aspect (15–18 respectively). Figures 13–14, 19. Paratype female from type locality, carapace and tergites I–IV (13), sternpectinal region and sternites III–V (14), and distal segments of right leg III, retrolateral aspect (19).
Figures 20–22. Orthochirus hormozganensis sp. n., holotype male, carapace and tergites (20), sternpectinal region and sternites (21), and metasoma and telson dorsal (22) under UV light.
Figures 23–40: Orthochirus hormozganensis sp. n., segments of pedipalps. Figures 23–31. Holotype male. Pedipalp chela, dorsal (23), external (24), and ventral (25) views. Pedipalp patella, dorsal (26), external (27), and ventral (28) views. Pedipalp femur and trochanter, dorsal (29), and ventral (30) views. Pedipalp chela, movable finger dentate margin (31). Figures 32–40. Paratype female from type locality. Pedipalp chela, dorsal (32), external (33), and ventral (34) views. Pedipalp patella, dorsal (35), external (36), and ventral (37) views. Pedipalp femur and trochanter, dorsal (38), internal (39), and ventral (40) views. The trichobothrial pattern is indicated in Figures 33–36, 38–39 (white circles).
**Coloration** (Figs. 1–4). Carapace, tergites, metasoma and usually femur of pedipalps and legs black, tibia and tarsomerest of legs and fingers of pedipalps yellow. Patella of legs and pedipalps and pedipalp chela yellowish brown to brown. Sternite VII black, other sternites reddish brown to black with yellow median area present in posterior margin of sternites IV–VI. Telson reddish brown.

**Mesosoma and carapace** (Figs. 11–14, 20–21). Mesosoma with a median carina, densely granulated. Carapace roughly granulated with smooth areas, mainly around median eyes. Carination of carapace reduced to absent. The seventh sternite granulated, with four wide granulated carinae, the other sternites are granulated except smooth median area. Pectinal teeth number 20–22 in both sexes.

**Metasoma and telson** (Figs. 5–10, 22, 222). Metasoma I–II with 10 granulated carinae. Metasoma II–V lack lateral carinae, ventromedian carinae present on metasoma I–III, ventrolateral carinae present on all metasomal segments, dorsolateral carinae present on metasoma I–III and reduced to absent on metasoma IV–V. Ventral carinae of metasoma I–III consist of small granules irregularly forming two or three rows. All metasomal segments are granulated laterally, more in metasoma I–III; granulation absent on dorsal surfaces of all metasomal segments and ventral surfaces of segments IV–V. Segments IV–V ventrally and laterally are shallowly punctate; spaces among punctae are smooth. The entire metasoma and telson glabrous; short, thin setae might issue from some punctae. Telson shallowly punctate and lacks granules.

**Pedipalps** (Figs. 23–40). The distance between trichobothria $d_1$ and $d_2$ on the femur of pedipalp approximately equals that between $d_3$ and $d_4$; trichobothrium $e$, is situated in level with $d_3$. Trichobothrium $d_4$ on the dorsal surface of pedipalp femur absent or reduced. Femur of pedipalp with five granulated carinae. Patella with seven smooth reduced carinae; chela with smooth carinae, which might be discernible throughout the length of the fixed finger. The entire pedipalp only very sparsely hirsute. Movable fingers with 8 rows of denticles, 8–9 ID and 7–8 OD.

**Legs** (Figs. 15–19). Moderate tibial spurs present on third and fourth legs. Femur with four partly granulated carinae; patella with five rather smooth carinae; tibia smooth. Patella with only a few bristles. Tibia with bristles on the outer side of legs I–II. Tarsomere I of first to third legs with bristlecombs composed of 5–7 bristles, short in male and long in female; fourth legs lack bristlecombs. Tarsomerest I–II of all legs with two rather irregular rows of bristles.

**Measurements.** See Table 1.

**Affinities.** The described features distinguish *O. hormozganensis* sp. n. from all other species of the genus. They are recounted in the key below. *O. hormozganensis* sp. n. is similar to *O. varius* Kovářík, 2004. These two species can be distinguished according to the metasoma morphology. In the key below, we used the difference in the granulation of the ventral surfaces on metasoma I–III, which are densely granulated in the male of *O. hormozganensis* sp. n. (Fig. 10) and rather smooth with several granules in *O. varius*.

**Distribution.** Iran, Hormozgan Province (Fig. 228).

**Orthochirus kermanensis** sp. n. (Figures 41–87, 223, 228, Table 2) http://zoobank.org/urn:lsid:zoobank.org:act:D261993A-EB6B-4A67-821C-045235B88779

**Type locality and type depository.** Iran, Kerman Province, Shahre Babak–Anar road, 30°10′53″N 55°04′56″E, 1906 m a. s. l.; FKCP.

**Type material (FKCP).** Iran, Kerman Province, Shahre Babak–Anar road, 30°10′53″N 55°04′56″E, 1906 m a. s. l. (Locality No. KE-52), V.2009, 1♂ (holotype) 1♀ (paratype), leg. Koohpaye, Jamalizadeh & Ebrahimi; Dehdasht, Pabdana, 30°57′24″N 56°32′23″E, 1975 m a. s. l. (Locality No. KE-34), V.2009, 1♀ (paratype), leg. Koohpaye, Jamalizadeh & Ebrahimi; Zandar, 30°47′42″N 56°35′19″E, 1678 m a. s. l. (Locality No. KE-36), V.2009, 1♂ (paratype), leg. Koohpaye, Jamalizadeh & Ebrahimi; Bardsir-Sirjan road, 29°56′59″N 56°38′17″E, 2036 m a. s. l. (Locality No. KE-103), V.2009, 1♀ (paratype), leg. Koohpaye, Jamalizadeh & Ebrahimi.

**Etymology.** Named after the province of occurrence.


**Description.** Total length of adults 33–40 mm in both sexes. Measurements of the carapace, telson, segments of the metasoma and segments of the pedipalps are given in Table 2. For habitus, see Figs. 41–44.

**Coloration** (Figs. 41–44). Carapace, tergites, and metasoma
Figures 41–44: Orthochirus kermanensis sp. n. Figures 41–42. Holotype male, dorsal (41) and ventral (42) views. Figures 43–44. Paratype female from locality KE-34, dorsal (43) and ventral (44) views. Scale bar: 10 mm.
brown to black. Pedipalps and legs yellow, yellowish brown, or black. Sternite VII brown or black, other sternites yellowish or reddish brown to black, with yellow median area in posterior margin of sternites IV–VI reduced or absent. Telson reddish brown.

**Mesosoma and carapace** (Figs. 51–54, 65–66). Mesosoma with a median carina and is roughly granulated in middle but laterally smooth with several fine granules in males; females can have roughly granulated whole tergites. Carapace without carinae, roughly granulated posteriorly and laterally, interocular triangle is smooth. The seventh sternite is finely granulated and with four wide granulated carinae, the other sternites are rather smooth, sparsely granulated mainly in anterior parts. Pecitinal teeth number 19 in male and 17–19 in females.

**Metasoma and telson** (Figs. 45–50, 63–64, 67, 223). Metasoma I–II with 10 granulated carinae. Metasoma III–V lack lateral carinae, ventromedian carinae present on metasoma I–III, ventrolateral carinae present on all metasomal segments, dorsolateral carinae present on metasoma I–IV and reduced to absent on metasoma V. Ventral carinae of metasoma I–III consist of a row of large granules. Metasoma I granulated laterally, other segments are laterally smooth; granulation absent on dorsal surfaces of all metasomal segments except several fine granules on metasoma V dorsal mesially. Punctuation on metasoma IV–V is ventrally and laterally developed, spaces among punctae are smooth. The entire metasoma and telson glabrous; short, thin setae might issue from some punctae. Telson shallowly punctate and lacks granules.

**Pedipalps** (Figs. 68–87). Trichobothrium $d_1$ on the dorsal surface of pedipalp femur is absent or reduced; trichobothrium $e_1$ is situated in level with $d_p$. Femur of pedipalp with five granulate carinae. Patella with seven smooth carinae; the chela with smooth carinae which may be discernible throughout the length of the fixed finger. The entire pedipalp only very sparsely hirsute. Movable fingers with 7–8 rows of denticles, 6–8 ID and 4–6 OD.

**Legs** (Figs. 55–62). Moderate to strong tibial spurs present on third and fourth legs. Femur with four partly granulated carinae; patella with five rather smooth carinae; tibia smooth. Patella with only a few bristles. Tibia with bristles on the outer side of legs I–II. Tarsomere I of first to third legs with bristlecombs composed of 5–7 bristles long in both sexes, fourth legs lack bristlecombs. Tarsomeres I–II of all legs with two rather irregular rows of bristles.

**Measurements.** See Table 2.

**Affinities.** The described features distinguish *O. kermanensis* sp. n. from all other species of the genus. They are recounted in the key below. *O. kermanensis* sp. n. is similar to *O. zagrosensis* Kovařík, 2004. These two species can be differentiated according to the metasoma morphology. Metasomal segments II–III are laterally smooth and punctate with lateral carinae absent or smooth in *O. zagrosensis* versus granulated and bumpy with lateral carinae present and granulated at least on metasoma II in *O. kermanensis* sp. n. (Figs. 45 and 48). Pedipalp movable finger has 4–6 OD outside of MD row in *O. kermanensis* sp. n. and 8 OD in *O. zagrosensis*.

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### Table 2. Comparative measurements of Orthochirus kermanensis sp. n. and *O. kucerai* sp. n. types.

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<tr>
<th>Dimensions (mm)</th>
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<th><em>O. kucerai</em> sp. n.</th>
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<td></td>
<td>♂ holotype</td>
<td>♂ paratype</td>
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<tr>
<td>Carapace L / W</td>
<td>1.14 / 0.65</td>
<td>1.29 / 0.69</td>
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<tr>
<td>Mesosoma L</td>
<td>0.91</td>
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<td>0.47 / 0.86</td>
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<td>Metasoma + telson L</td>
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<td>Segment I L / W / D</td>
<td>0.28 / 0.56 / 0.80</td>
<td>0.30 / 0.58 / 0.90</td>
</tr>
<tr>
<td>Segment II L / W / D</td>
<td>0.32 / 0.64 / 0.96</td>
<td>0.35 / 0.67 / 1.02</td>
</tr>
<tr>
<td>Segment III L / W / D</td>
<td>0.47 / 0.94 / 1.28</td>
<td>0.50 / 0.98 / 1.32</td>
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<tr>
<td>Segment IV L / W / D</td>
<td>0.64 / 1.28 / 2.00</td>
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<tr>
<td>Segment V L / W / D</td>
<td>0.85 / 1.70 / 2.40</td>
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<tr>
<td>Telson L / W / D</td>
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<td>0.40 / 0.65 / 1.00</td>
</tr>
<tr>
<td>Pedipalp L</td>
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<td>1.00</td>
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<tr>
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<tr>
<td>Movable finger L</td>
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**Total** L | 3.305 | 3.893 | 2.959 | 4.411
Figures 45–50: *Orthochirus kermanensis* sp. n. Figures 45–47. Paratype female from locality KE-34, metasoma and telson, lateral (45), dorsal (46), and ventral (47) views. Figures 48–50. Holotype male, metasoma and telson, lateral (48), dorsal (49), and ventral (50) views. Scale bar: 10 mm.
Figures 51–64: Orthochirus kermanensis sp. n. Figures 51–52, 55–58, 63–64. Holotype male, carapace and tergites (51), sternopectinal region and sternites (52), distal segments of right legs I–IV, retrolateral views (55–58 respectively), metasoma IV–V and telson under white light (63) and UV light (64). Figures 53–54, 59–62. Paratype female from locality KE-34, carapace and tergites I–IV (53), sternopectinal region and sternites III–V (54), and distal segments of right legs I–IV retrolateral aspect (59–62 respectively).
Figures 65–67. *Orthochirus kermanensis* sp. n., holotype male, carapace and tergites (65), sternpectinal region and sternites (66), and metasoma and telson dorsal (67) under UV light.
Figures 68–87: Orthochirus kermanensis sp. n., segments of pedipalps. Figures 68–78. Holotype male. Pedipalp chela, dorsal (68), external (69), and ventral (70) views. Pedipalp patella, dorsal (71), external (72), and ventral (73) views. Pedipalp femur and trochanter, dorsoexternal (74), internodorsal (75) and ventrointernal (76) views. Pedipalp chela, movable (77) and fixed (78) fingers dentate margins. The trichobothrial pattern is indicated in Figures 68–72, 74–75 (white circles). Figures 79–87. Paratype female from locality KE-34. Pedipalp chela, dorsal (79), external (80), and ventral (81) views. Pedipalp patella, dorsal (82), external (83), and ventral (84) views. Pedipalp femur and trochanter, dorsal (85), and ventrointernal (86) views. Pedipalp chela, movable finger dentate margin (87).
Orthochirus kucerai sp. n.
(Figures 88–127, 224, 228, 231, Table 2)
http://zoobank.org/urn:lsid:zoobank.org:act:54B82FC4-2C77-4160-850B-58966A50CCFB

Type locality and type depository. Iran, Kerman Province, Sar Telo, Khajeh Askar Village, 29°10’01”N 58°16’27”E, 1155 m a. s. l.; FKCP.

Type material (FKCP). Iran, Kerman Province, Bam, Sar Telo, Khajeh Askar Village, 29°10’01”N 58°16’27”E, 1155 m a. s. l. (Locality No. KE-27), V.2009, 3♀2♂ (holotype femur of pedipalps and legs are black. Patella of pedipalps (Figs. 88–91). Carapace, tergites, metasoma and telson very sparsely hirsute, rather glabrous.

Coloration
For habitus, see Figs. 88–91.

Measurements of the carapace, telson, segments of the metasoma and telson are given in Table 2. For habitus, see Figs. 88–91.

Description. Total length of adults 26–45 mm in both sexes. Measurements of the carapace, telson, segments of the metasoma and segments of the pedipalps are given in Table 2. For habitus, see Figs. 88–91.

Coloration (Figs. 88–91). Carapace, tergites, metasoma and femur of pedipalps and legs are black. Patella of pedipalps and legs yellowish brown to brown. Sternite VII black, other sternites yellowish brown with yellow median area in posterior margin of sternites IV–VI present. Telson reddish brown.

Mesosoma and carapace (Figs. 98–101, 106–107). Mesosoma with a median carina and is roughly granulated. Carapace with carinae indicated, roughly granulated except smooth interocular triangle. The seventh sternite is finely granulated laterally, medially smooth and with four granulated carinae, the other sternites are rather smooth in middle, granulated in anterior and lateral parts. Pectinal teeth number 21 in males and 19–20 in females.

Metasoma and telson (Figs. 92–97, 108, 224). Metasoma I–II with 10 granulated carinae. Metasoma III–V lack lateral carinae, ventromedian and ventrolateral carinae are present on metasoma I–III, dorsolateral carinae are present on all metasomal segments but reduced to absent on metasoma IV–V. Ventral carinae of metasoma I–III consist of irregular rows of granules. Metasoma I–II are rather smooth laterally with several granules, metasoma III–V laterally smooth and punctate; granulation absent on dorsal surfaces of all metasomal segments except several fine granules on metasoma V dorsal mesially. Punctuation on metasoma IV–V is developed ventrally and laterally; spaces among punctae are smooth. The entire metasoma and telson are glabrous; short, thin setae might issue from some punctae. Telson shallowly punctate and lacks granules.

Pedipalps (Figs. 109–127). Trichobothrium d₂ on the dorsal surface of pedipalp femur is absent or reduced; trichobothrium e₁ is situated in level with e₂. Femur of pedipalp with five granulate carinae. Patella has seven smooth carinae, and the chela has smooth carinae which may be discernible throughout the length of the fixed finger. The entire pedipalp only very sparsely hirsute. Movable fingers with 8 rows of denticles, 7 ID and 8–9 OD. Dorsal carinae on pedipalp patella present and smooth. Metasoma V dorsal surface mesially smooth or with only several granules present. Metasoma I–II with 10 carinae, metasoma III with 6–8 carinae, metasoma IV–V with 2–4 carinae. Ventral carinae of metasoma I–III consist of irregular rows of granules. Metasoma IV–V ventrally and laterally with punctuation developed; spaces among punctae smooth; metasoma II–III ventrally and laterally granulated and bumpy with punctuation reduced. Entire tergites roughly granulate, at least in the male. Sternite VII finely granulated, medially smooth, with granulate carinae developed. Pedipalp, metasoma and telson very sparsely hirsute, rather glabrous. Tarsomeres I of legs with 4–7 moderate bristles. Ratio length/width of metasoma V 1.18–1.26 in both sexes. Pedipalp femur length/width ratio 4.1–4.3 in male, 3.3–3.5 in female.

Affinities. The described features distinguish O. kucerai sp. n. from all other species of the genus. They are recounted in the key for the Iranian species below. O. kucerai sp. n. is similar to O. Zagrosensis Kovář, 2004. In the key below, we used the difference in the shape of pedipalp femur. Another difference is in granulation of metasomal carinae: ventral carinae of metasoma I–III consist of irregular rows of granules. Metasoma I–II with four partly granulated carinae; patella with five rather smooth carinae; tibia smooth. Patella with only a few bristles. Tibia with bristles on the outer side of legs I–II. Tarsomeres I of first to third legs with 4–7 moderate bristles; fourth legs usually lack bristles. Tarsomeres I–II of all legs with two rather irregular rows of bristles.

Measurements. See Table 2.
Figures 88–91: Orthochirus kucerai sp. n. Figures 88–89. Holotype male, dorsal (88) and ventral (89) views. Figures 90–91. Paratype female from type locality, dorsal (90) and ventral (91) views. Scale bars: 10 mm.
Figures 92–97: Orthochirus kucerai sp. n. Figures 92–94. Paratype female from type locality, metasoma and telson, lateral (92), dorsal (93), and ventral (94) views. Figures 95–97. Holotype male, metasoma and telson, lateral (95), dorsal (96), and ventral (97) views. Scale bars: 10 mm.
Figures 106–108. _Orthochirus kucerai_ sp. n., holotype male, carapace and tergites (106), sternoplectinal region and sternites (107), and metasoma and telson dorsal (108) under UV light.
Figures 109–127: Orthochirus kucerai sp. n., segments of pedipalps. Figures 109–117. Holotype male. Pedipalp chela, dorsal (109), external (110), and ventral (111) views. Pedipalp patella, dorsal (112), external (113), and ventral (114) views. Pedipalp femur and trochanter, dorsal (115), and ventral (116) views. Figures 118–127. Paratype female from type locality. Pedipalp chela, dorsal (118), external (119), and ventral (120) views. Pedipalp patella, dorsal (121), external (122), and ventral (123) views. Pedipalp femur and trochanter, dorsalextrenal (124), internodorsal (125), and ventral (126) views. Pedipalp chela, movable finger dentate margin (127). The trichobothrial pattern is indicated in Figures 119–122, 124–125 (white circles).
Orthochirus masihipouri sp. n.  
(Figures 128–153, 225, 228, 232, Table 3)  
http://zoobank.org/urn:lsid:zoobank.org:act:397424AB-6BFE-4E25-917F-E23E1368C0D8

Orthochirus stockwelli: Navidpour et al., 2008b: 17, figs. 6, 23, 69–72.

Type locality and type depository. Iran, Bushehr Province,  
Behbahan–Genaveh road, 29°40.71′N 50°24.04′E, 17 m a. s. l.; FKCP.

Type material (FKCP). Iran, Bushehr Province, Behbahan–Genaveh road, 29°40.71′N 50°24.04′E, 17 m a. s. l. (Locality. No. B-G803, Fig. 232), VII.2007, 1♀ (holotype), leg. Navidpour & Masihipour.

Etymology. The species epithet is a patronym honoring Behzad Masihipour, who helped the second author in the field studies of scorpions of Iran for about 15 years.


Description. Total length of adult female 40.5 mm. Measurements of the carapace, telson, segments of the metasoma and segments of the pedipalps are given in Table 3. For habitus, see Figs. 128–129.

Coloration (Figs. 128–129). Carapace, tergites, and metasoma black. Femur of pedipalps and legs yellowish brown, other segments of pedipalps and legs yellow. Sternite VII black, other sternites yellowish brown with yellow median area in posterior margin of sternites IV–VI indicated. Telson reddish brown.

Mesosoma and carapace (Figs. 135–138). Mesosoma with a median carina and is roughly to finely granulated. Carapace without carinae, roughly granulated except smooth interocular triangle. The seventh sternite densely granulated and with four granulated carinae, the other sternites are granulated but smooth in middle and posteriorly. Pectinal teeth number 22–23 in female holotype.

Metasoma and telson (Figs. 130–134, 225). The metasoma I–II with 10 granulated carinae. The metasoma III–V lacks lateral carinae, ventromedian and ventrolateral carinae are present on metasoma I–III, dorsolateral carinae are present on all metasomal segments but reduced to absent on metasoma V. Ventral carinae of metasoma I–III consist of a row of large granules. Metasoma I–III and partly metasoma IV are granulated laterally, metasoma III–V laterally punctate; granulation absent on dorsal surfaces of all metasomal segments except several fine granules on metasoma V dorsal mesially. Fine punctuation on metasoma IV–V ventrally developed, spaces among punctae are smooth. The entire metasoma and telson are densely hirsute. The telson shallowly punctate, without granules.

Pedipalps (Figs. 143–153). Trichobothrium d1 on the dorsal surface of pedipalp femur is present; trichobothrium e1 is situated between trichobothria d1 and d1. Femur of pedipalps with five granulate carinae and is dorsally granulated. Patella has seven smooth carinae, and the chela has smooth carinae which may be discernible throughout the length of the fixed finger. The entire pedipalps are hirsute. Movable fingers with 8 rows of denticles, 8–9 ID and OD.

Legs (Figs. 139–142). Moderate tibial spurs present on third and fourth legs. Femur with four partly granulated carinae; patella with five rather smooth carinae; tibia smooth. Patella with only a few bristles. Tibia with bristles on the outer side of legs I–II. Tarsomere I of first to third legs with 6–9 long bristles, fourth legs with 3 or 4 bristles. Tarsomeres I–II of all legs with two rather irregular rows of bristles.

Measurements. See Table 3.

Affinities. The described features distinguish O. masihipouri sp. n. from all other species of the genus. They are recounted in the key below. O. masihipouri sp. n. is similar to O. stockwelli (Lourenço & Vachon, 1995) with which it was initially confused (see Navidpour et al., 2008b). These two species are possible differentiate according to several characters. In the key below, we used difference in granulation of pedipalp femur and sternites but these two species differ also in the shape of metasoma, which is wider in O. masihipouri sp. n., and in the shape of pedipalp patella, which is narrower in O. stockwelli. Ratio length/width of pedipalp patella is 2.9 in O. masihipouri sp. n. vs. 3.2–3.9 in O. stockwelli. Punctuation of metasoma IV–V is finer in O. masihipouri sp. n. (Fig. 225) than in O. stockwelli (fig. 54 in Kovafik et al., 2019: 10).
Figures 128–129. *Orthochirus masihipouri* sp. n., holotype female, dorsal (128) and ventral (129) views. Scale bar: 10 mm.
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### Table 3. Comparative measurements of *Orthochirus* sp. n., *O. semnanensis* sp. n., and *O. vignolii* sp. n.

<table>
<thead>
<tr>
<th>Dimensions (mm)</th>
<th><em>O. masihipouri</em> sp. n.</th>
<th><em>O. semnanensis</em> sp. n.</th>
<th><em>O. vignolii</em> sp. n.</th>
<th><em>O. vignolii</em> sp. n.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carapace L / W</td>
<td>4.77 / 5.59</td>
<td>3.59 / 4.16</td>
<td>3.33 / 3.88</td>
<td>4.12 / 4.86</td>
</tr>
<tr>
<td>Mesosoma L</td>
<td>10.84</td>
<td>6.38</td>
<td>7.45</td>
<td>9.63</td>
</tr>
<tr>
<td>Tergite VII L / W</td>
<td>2.72 / 6.09</td>
<td>1.79 / 4.68</td>
<td>2.17 / 4.03</td>
<td>2.61 / 5.38</td>
</tr>
<tr>
<td>Metasoma + telson L</td>
<td>24.88</td>
<td>19.55</td>
<td>18.32</td>
<td>21.44</td>
</tr>
<tr>
<td>Segment I L / W / D</td>
<td>2.70 / 3.93 / 3.51</td>
<td>2.18 / 3.24 / 2.71</td>
<td>2.08 / 2.80 / 2.14</td>
<td>2.24 / 3.52 / 2.87</td>
</tr>
<tr>
<td>Segment II L / W / D</td>
<td>3.39 / 4.00 / 3.59</td>
<td>2.62 / 3.28 / 2.69</td>
<td>2.41 / 2.82 / 2.24</td>
<td>2.81 / 3.49 / 2.65</td>
</tr>
<tr>
<td>Segment III L / W / D</td>
<td>3.75 / 4.27 / 3.62</td>
<td>3.08 / 3.53 / 2.92</td>
<td>2.77 / 3.04 / 2.36</td>
<td>3.37 / 3.72 / 2.86</td>
</tr>
<tr>
<td>Segment IV L / W / D</td>
<td>4.90 / 4.48 / 3.54</td>
<td>3.75 / 3.68 / 3.00</td>
<td>3.56 / 3.06 / 2.65</td>
<td>4.18 / 3.71 / 3.20</td>
</tr>
<tr>
<td>Segment V L / W / D</td>
<td>5.08 / 4.44 / 3.19</td>
<td>4.06 / 3.55 / 2.71</td>
<td>3.92 / 3.00 / 2.47</td>
<td>4.65 / 3.57 / 2.82</td>
</tr>
<tr>
<td>Telson L / W / D</td>
<td>5.06 / 1.98 / 1.72</td>
<td>3.86 / 1.46 / 1.17</td>
<td>3.58 / 1.35 / 1.08</td>
<td>4.19 / 1.65 / 1.47</td>
</tr>
<tr>
<td>Pedipalp L</td>
<td>13.13</td>
<td>11.14</td>
<td>10.66</td>
<td>11.72</td>
</tr>
<tr>
<td>Femur L / W</td>
<td>3.25 / 1.09</td>
<td>2.98 / 0.75</td>
<td>2.76 / 0.77</td>
<td>3.05 / 0.91</td>
</tr>
<tr>
<td>Patella L / W</td>
<td>4.12 / 1.44</td>
<td>3.48 / 1.01</td>
<td>3.26 / 0.99</td>
<td>3.69 / 1.24</td>
</tr>
<tr>
<td>Chela L</td>
<td>5.76</td>
<td>4.68</td>
<td>4.64</td>
<td>4.98</td>
</tr>
<tr>
<td>Manus W / D</td>
<td>0.96 / 1.05</td>
<td>0.88 / 0.79</td>
<td>0.78 / 0.77</td>
<td>1.05 / 0.96</td>
</tr>
<tr>
<td>Movable finger L</td>
<td>3.92</td>
<td>2.92</td>
<td>3.11</td>
<td>3.29</td>
</tr>
<tr>
<td><strong>Total</strong> L</td>
<td>40.49</td>
<td>29.52</td>
<td>29.10</td>
<td>35.19</td>
</tr>
</tbody>
</table>

**Orthochirus semnanensis sp. n.**

(Figures 154–178, 226, 228, 233, Table 3)

http://zoobank.org/urn:lsid:zoobank.org:act:C880BD3F-0025-4DC4-A669-F9C90F28FA42

**Type locality and type depository.** **Iran, Semnan Province, Garmsar, Ghasre-Bahram, 36º22' N, 54º23'E; FKCP.**

**Type material (FKCP).** **Iran, Semnan Province, Garmsar, Ghasre-Bahram, 36º22' N, 54º23'E (Locality No. SE-61, Fig. 233), VI.2011, 2♂ (holotype and paratype), leg. Saeed Adibi.**

**Etymology.** Named after the province of occurrence.


**Description.** Total length of adult males 27–30 mm. Measurements of the carapace, telson, segments of the metasoma and segments of the pedipalps are given in Table 3. For habitus, see Figs. 154–155.

**Coloration** (Figs. 154–155). Carapace, tergites, metasoma and femur of pedipalps and legs are black. Patella of pedipalps and legs brown to black. Pedipalp chela reddish brown with yellowish brown tip of fingers. Tarsomeres of legs are yellow to yellowish brown. Sternite VII black, other sternites reddish brown to black with yellow median area in posterior margin of sternites IV–VI. Telson reddish brown to black.

**Mesosoma and carapace** (Figs. 160–163). Mesosoma with a median carina and is roughly granulated. Carapace without carinae, roughly granulated except smooth interocular area. The seventh sternite granulated and with four wide granulated carinae, the other sternites are smooth in the middle, granulated in anterior and lateral parts. Pectinal teeth number 21–23 in males.

**Mesosoma and telson** (Figs. 156–159, 226). Metasoma I with 10 granulated carinae. Metasoma II–V lacks lateral carinae, ventromedian and ventrolateral carinae are present on metasoma I–III, ventrolateral carinae are also developed on metasoma V, dorsolateral carinae are present on metasoma I–III and reduced to absent on metasoma IV–V. Ventral carinae of metasoma II–III consist of a row of large granules. Metasoma I granulate laterally, other segments laterally smooth; granulation absent on dorsal surfaces of all metasomal segments.
Figures 130–134. *Orthochirus masihipouri* sp. n., holotype female, metasoma IV–V and telson lateral (130), metasoma and telson, lateral (131), ventral (132), and dorsal under white light (133) and UV light (134). Scale bar: 10 mm (131–133).
segments except several fine granules on metasoma V dorsal mesially. Punctuation on metasoma IV–V ventrally and laterally developed; spaces among punctae are smooth. The entire metasoma and telson are glabrous; short, thin setae might issue from some punctae. Telson shallowly punctate and lacks granules.

Pedipalps (Figs. 168–178). Trichobothrium $d_2$ on the dorsal surface of pedipalp femur is absent; trichobothrium $e_1$ is situated between trichobothria $d_3$ and $d_4$. Femur of pedipalp with five granulated carinae. Patella has seven smooth carinae, and the chela has smooth carinae which may be discernible throughout the length of the fixed finger. The entire pedipalp only very sparsely hirsute. Movable fingers with 8–9 rows of denticles, 6 ID and 0–1 OD.

Legs (Figs. 164–167). Moderate tibial spurs present on third and fourth legs. Femur with four partly granulated carinae; patella with five rather smooth carinae; tibia smooth. Patella with only a few bristles. Tibia with bristles on the outer side of legs I–II. Tarsomere I of first to third legs with bristlecombs composed of 5–8 long bristles; fourth legs lack bristlecombs. Tarsomeres I–II of all legs with two rather irregular rows of bristles.

Measurements. See Table 3.

Affinities. The described features distinguish O. semnanensis sp. n. from all other species of the genus. They are recounted in the key below. O. semnanensis sp. n. differs from all species of the region by absence of OD on pedipalp movable
Figures 137–153: Orthochirus masihipouri sp. n., holotype female. Figures 137–138. Carapace and tergites (137), and steromepical region and sternites (138). Figures 139–142. Left legs I–IV, retrolateral aspect. Figures 143–153. Segments of pedipalps. Pedipalp chela, dorsal (143), external (144), and ventral (145) views. Pedipalp patella, dorsal (146), external (147), and ventral (148) views. Pedipalp femur and trochanter, dorsal (149), internal (150), and ventral (151) views. Pedipalp chela, movable (152) and fixed (153) fingers dentate margins. The trichobothrial pattern is indicated in Figures 144–147, 149–150 (white circles).
Finger (Fig. 177), the character typical for *O. scrobiculosus* (Grube, 1873) which is cited mainly from Turkmenistan and Uzbekistan.

**Orthochirus vignolii sp. n.**
(Figures 179–221, 227, 228, 234, Table 3)


**Type Locality and Type Depository.** *Iran*, Yazd Province, Kosk Abad Village, 31°43′52″N 53°17′12″E, 2023 m a. s. l.; FKCP.

**Type Material (FKCP).** *Iran*, Yazd Province, Kosk Abad Village, 31°43′52″N 53°17′12″E, 2023 m a. s. l. (Locality No. Ya-11, Fig. 234), V.2016, 1♂ (holotype), leg. Saeed Abadi; Bafghan–Tehran road, 31°36′26″N 54°14′22″E, 1843 m a. s. l. (Locality No. Ya-01), V.2016, 1♀ (paratype), leg. Saeed Abadi; Chenar–Mehriz road, 31°34′26″N 54°28′30.9″E, 2023 m a. s. l. (Locality No. Ya-26), V.2016, 1♂1♀ (paratypes),
Figures 156–159. Orthochirus semnanensis sp. n., holotype male, metasoma IV–V and telson dorsal under UV light (156), metasoma and telson, lateral (157), dorsal (158), and ventral (159) views under white light.
Figures 160–167: Orthochirus semnanensis sp. n., holotype male. Figures 160–163. Carapace and tergites under UV light (160) and white light (161), and sternopsectinal region and sternites under UV light (162) and white light (163). Figures 164–167. Left legs I–IV, retrolateral aspect.
ETYMOLOGY. The species epithet is a patronym honoring the Italian arachnologist Valerio Vignoli, the collector of two specimens initially identified as *O. zagrosensis*.


DESCRIPTION. Total length of adults 29–44 mm in both sexes. Measurements of the carapace, telson, segments of the metasoma and segments of the pedipalps are given in Table 3. For habitus see Figs. 179–182.

COLORATION (Figs. 179–182). Carapace, tergites, metasoma and femur of pedipalp and legs usually black. Patella of pedipalps and legs brown to black. Pedipalp chela reddish brown, with yellowish brown fingertips. Tarsomeres of legs yellow to yellowish brown. Sternite VII is black, other sternites reddish brown to black with yellow median area in posterior margin of sternites IV–VI. Telson reddish brown to black.
Figures 183–188: Orthochirus vignolii sp. n. Figures 183–185. Holotype male, metasoma and telson, lateral (183), dorsal (184), and ventral (185) views. Figures 186–188. Paratype female from locality Ya-27, metasoma and telson, lateral (186), dorsal (187), and ventral (188) views.
Figures 199–201. Orthochirus vignolii sp. n., holotype male, carapace and tergites (199), sternopectinal region and sternites (200), and metasoma and telson dorsal (201) under UV light.
Figures 202–221: Orthochirus vignoli sp. n., segments of pedipalps. **Figures 202–211.** Holotype male. Pedipalp chela, dorsal (202), external (203), and ventral (204) views. Pedipalp patella, dorsal (205), external (206), and ventral (207) views. Pedipalp femur and trochanter, dorsoexternal (208), internal (209) and ventral (210) views. Pedipalp chela, movable finger dentate margin (211). The trichobothrial pattern is indicated in Figures 202–206, 208–209 (white circles). **Figures 212–221.** Paratype female from locality Ya-27. Pedipalp chela, dorsal (212), external (213), and ventral (214) views. Pedipalp patella, dorsal (215), external (216), and ventral (217) views. Pedipalp femur and trochanter, dorsal (218), and ventral (219) views. Pedipalp chela, movable (220) and fixed (221) fingers dentate margins.
Figures 222–227: Metasoma and telson in ventral views under UV light, holotypes of newly described species. Figure 222. Orthochirus hormozganensis sp. n., male. Figure 223. O. kermanensis sp. n., male. Figure 224. O. kucerai sp. n., male. Figure 225. O. masihipouri sp. n., female. Figure 226. O. semnanensis sp. n., male. Figure 227. O. vignoli sp. n., male.
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Figure 228. Geographic distribution of the *Orthochirus* spp. in Iran, Turkey and Iraq.

**Mesosoma and carapace** (Figs. 189–192, 199–200). Mesosoma with a median carina and is roughly granulated. Carapace is without carinae, roughly granulated except smooth interocular triangle. Sternites granulated except the median area in posterior margin. Pectinal teeth number 19–22 in males and 18–20 in females.

**Metasoma and telson** (Figs. 183–188, 201, 227). Metasoma I–II with 10 granulated carinae. Metasoma III–V lacks lateral carinae, ventromedian and ventrolateral carinae are present on metasoma I–III, dorsolateral carinae are present on metasoma I–III and strongly reduced to absent on metasoma IV–V. Ventral carinae of metasoma I–III consist of a row of large granules. Metasoma I is granulate laterally, metasoma II–V laterally smooth; granulation absent on dorsal surfaces of all metasomal segments. Punctuation on metasoma IV–V is ventrally and laterally developed, spaces among punctae are smooth. The entire metasoma and telson are glabrous, short, thin setae might issue from some punctae. Telson is shallowly punctate and lacks granules.

**Pedipalps** (Figs. 202–221). Trichobothrium *d*₂ on the dorsal surface of pedipalp femur is absent or reduced; trichobothrium *e*₁ is situated in level with *d*₄. Femur of pedipalp with five granulate carinae. Patella has seven smooth carinae, and the chela has smooth carinae which may be discernible throughout the length of the fixed finger. The entire pedipalp only very sparsely hirsute. Movable fingers with 7–8 rows of denticles, 7–8 ID and 5–8 OD.

**Legs** (Figs. 193–198). Moderate tibial spurs present on third and fourth legs. Femur with four partly granulated carinae; patella with five rather smooth carinae; tibia is smooth. Patella with only a few bristles. Tibia with bristles on the outer side of legs I–II. Tarsomere I of first to third legs with 4–6 bristles which are longer in female, fourth legs usually lack bristles. Tarsomeres I–II of all legs with two rather irregular rows of bristles.

**Measurements.** See Table 3.
Affinities. The described features distinguish *O. vignolii* sp. n. from all other species of the genus. They are recounted in the key below. *O. vignolii* sp. n. was confused with *O. zagrosensis* Kovářík, 2004, two here cited specimens of *O. vignolii* sp. n. from Yazd Province are part of type series of *O. zagrosensis*. However, these two morphologically very similar species differ by granulation of sternite VII (see key below).

**Key to Orthochirus of Iran, Turkey and Iraq**

1. Metasoma V dorsal mesially densely granulated (figs. 159–160 in Kovařík et al., 2019: 27). ........................................... 2  
   – Metasoma V dorsal mesially smooth or with several fine granules only (Fig. 134). ........................................... 4

2. Metasoma II–III ventrally and laterally smooth, without granules, punctate and bumpy (fig. 171 in Kovařík et al., 2019: 28). ........................................... *O. fomichevi* Kovářík et al., 2019  
   – Metasoma II–III ventrally and laterally granulate (fig. 173 in Kovařík et al., 2019: 28) ........................................... 3

3. Metasomal segments wide (fig. 159 in Kovařík et al., 2019: 27), ratio length/width of metasoma V is in males 1.06–1.11. Ventral and lateral surfaces of metasoma IV–V are densely granulate (fig. 173 in Kovařík et al., 2019: 28). ........................................... *O. iranus* Kovářík, 2004  
   – Ratio length/width of metasoma V is in males 1.18–1.24. Ventral and lateral surfaces of metasoma IV–V are sparsely granulate (fig. 116 in Kovařík et al., 2019: 20). ........................................... *O. mesopotamicus* Birula, 1918

4. Metasoma hirsute. ........................................... 5  
   – Entire metasoma glabrous (short, thin setae might issue from some punctae) (Figs. 222–224). ........................................... 8

5. Metasoma densely hirsute (Fig. 225). ........................................... 6  
   – Metasoma sparsely hirsute. ........................................... *O. gruberi* Kovářík & Fet, 2006

6. Pedipalp patella with dorsal carinae granulated (fig. 58 in Kovařík et al., 2019: 11). ........................................... *O. gantenbeini* Kovářík et al., 2019  
   – Pedipalp patella with dorsal carinae smooth (Fig. 146). 7

7. Pedipalp femur dorsal granulated (Fig. 149). Sternite VII densely granulated (136). ........................................... *O. masihipouri* sp. n.  
   – Pedipalp femur dorsal smooth (fig. 70 in Kovařík et al., 2019: 11). Sternite VII rather sparsely granulated (fig. 48 in Kovařík et al., 2019: 9). ........................................... *O. stockwelli* (Lourenço & Vachon, 1995)

8. Sternite VII smooth, without developed granulate carinae (fig. 156 in Kovařík et al., 2019: 27). ........................................... *O. iranus* Kovářík, 2004  
   – Sternite VII usually at least partly granulated, always with four developed granulated carinae (Figs. 21 and 66). 9

9. Pedipalp movable finger dentition with 0–1 external (OD/OAD) denticles. ........................................... *O. semmanensis* sp. n.  
   – Pedipalp movable finger dentition with 3–9 external (OD/OAD) denticles. ........................................... 10

10. Metasoma IV–V ventrally only shallowly punctate and in males punctuation may be altogether absent. ........................................... 11  
   – Punctuation on metasoma IV–V ventrally developed. 12

11. Ventral carinae of metasoma I–III consist of a row of large granules. ........................................... *O. varius* Kovářík, 2004  
   – Ventral carinae of metasoma I–III consist of small granules irregularly in two or three rows. ........................................... *O. hormozganensis* sp. n.

12. Tergites roughly granulated in middle but laterally smooth with several small granules at least in the male (Fig. 65). ........................................... *O. kermanensis* sp. n.  
   – Entire tergites roughly granulated at least in the male (Fig. 160). ........................................... 13

13. Sternite VII densely granulated among carinae. ........................................... 14  
   – Sternite VII smooth medially with several solitary granules among carinae. ........................................... 16

14. Pedipalp patella with dorsal carinae smooth. Anterior median part of carapace smooth, with granules medially only (Fig. 199). ........................................... 15  
   – Pedipalp patella with dorsal carinae granulated. Anterior median part of carapace densely granulated. ........................................... *O. navidpouri* Kovářík et al., 2019

15. Tarsi of third legs with 7–10 bristles, long in both sexes. ........................................... *O. carinatus* Navidpour et al., 2019  
   – Tarsi of third legs with 4–6 bristles, long in female and short in male. ........................................... *O. vignolii* sp. n.

16. Pedipalp femur length/width ratio 4.1–4.3 in male, 3.3–3.5 in female. ........................................... *O. kucerai* sp. n.  
   – Pedipalp femur length/width ratio 2.7–3.0 in both sexes. ........................................... 17

17. Tarsi of leg III with long bristles, which form a reduced bristlecomb. At least femur of legs dark. Pedipalp chela dark. ........................................... *O. zagrosensis* Kovářík, 2004  
   – Tarsi of leg III with short bristles, which do not form a bristlecomb. Legs usually yellow. Pedipalp chela yellow. ........................................... *O. farzanpayi* (Vachon & Farzanpay, 1987)

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Figures 229–234: Localities of Orthochirus spp., Iran. **Figures 229–230.** *O. hormozganensis* sp. n., Hormozgan Province, Bandare Jask-Bashagard road, 25°50′11.4″N 57°50′14.6″E, 146 m a. s. l. (229) and Jask to Minab road, 25°52′34.9″N 57°29′47.4″E, 46 m a. s. l. (230). **Figure 231.** *O. kucerai* sp. n., Kerman Province, Jamalizadeh and Ebrahimi; Shahdad, 30°29′06″N 57°48′28″E, 331 m a. s. l. **Figure 232.** *O. mashipouri* sp. n., Bushehr Province, Behbahan–Genaveh road, 29°40′71″N 50°24′04″E, 17 m a. s. l. **Figure 233.** *O. semnanensis* sp. n., Semnan Province, Garmser, Ghasre-Bahram, 36°22′23″N 50°23′08″E. **Figure 234.** *O. vignolii* sp. n., Yazd Province, Kosk Abad village, 31°43′52″N 53°17′12″E, 2023 m a. s. l.
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References


