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Isometrus (*Reddyanus*) *krasenskyi* sp. n. from Indonesia and *I.* (*R.*) *navaiae* sp. n. from the Philippines (Scorpiones: Buthidae)

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Abstract. *Isometrus* (*Reddyanus*) *krasenskyi* sp. n. and *I.* (*R.*) *navaiae* sp. n. are described and compared to all other species of the subgenus *Reddyanus* Vachon, 1972, from which they differ in a combination of characters including five granules on the subaculear tooth. *I.* (*R.*) *krasenskyi* sp. n. is uniformly yellow with dark fourth and fifth segments and telson of the metasoma. *I.* (*R.*) *navaiae* sp. n. is characterized by total length of 19–34.4 mm, 12–14 pectinal teeth, absence of a dark triangle between the median eyes and anterior margin of the carapace, and coloration of the mesosomal segments with two dark bands.

Taxonomy, description, new species, Scorpiones, Buthidae, *Isometrus, Reddyanus,* Oriental region

Isometrus (*Reddyanus*) *krasenskyi* sp. n.
(Figs 1–3, Tab. 1)

Type material. Holotype female preserved in 75% alcohol, labeled: Java, 1980. It is currently in the author's collection, but will be deposited in the Department of Zoology, National Museum (Natural History), Prague.

Etymology. Named in honor of Pavel Krásenský of Chomutov, Czech Republic, who has illustrated the habitus of most of the new species of scorpions described by me.

Description. The total length is 32.8 mm. The habitus is shown in Fig. 1. Measurements of the carapace, telson, segments of the metasoma and of the pedipalps, and numbers of pectinal teeth are given in Table 1. There are 10 and 12 pectinal teeth. For the position and distribution of trichobothria on the tibia of pedipalps see Fig. 2.

The color is uniformly yellow except for the fourth and fifth segments and telson of the metasoma which are dark brown. The fingers of pedipalps are pale brown but darker than manus. Only the immediate vicinity of median and lateral eyes is black. The patella of pedipalps has a large but inconspicuous pale brownish-yellow blotch covering much of the dorsal surface.

The chelicerae are weakly reticulated in the anterior part. Movable fingers of the chelicerae bear a large yellowish-brown spot.

The carapace is without keels but bears large granules evenly distributed over the entire surface.

The femur of pedipalps has five well developed keels. The dorsal surface bears sparse but pronounced granules. The patella has three dorsal keels and only one lateral keel. The movable fingers bear six cutting edges and the fixed fingers bear seven such edges. The sixth cutting edge on the movable fingers has one external granule and no internal granules (Fig. 4). The seventh cutting edge on the fixed fingers lacks external and internal granules.

The dorsal surface of the mesosoma bears a median keel, and its seventh segment bears four keels on the ventral surface.

The legs are yellow and lack tibial spurs.

The first metasomal segment bears 10 keels, the second through fourth segments bear eight keels. All keels are well developed and consist of fine granules of the same size. There are two ventral keels on the first through fourth segments and one ventral keel on the fifth segment. The subaculear tooth bears five granules in three rows (Fig. 3).

AFFINITIES. *I.* (*R.*) *krasenskyi* sp. n. differs from all other species of the subgenus *Reddyanus* in the following diagnostic characters.

It differs from *I.* (*R.*) *assamensis* Oates, 1888, *I.* (*R.*) *corbeti* Tikader & Bastawade, 1983, *I.* (*R.*) *heimi* Vachon, 1976, *I.* (*R.*). *kurkai* Kovařík, 1997, *I.* (*R.*). *rigidulus* Pocock, 1897, and *I.* (*R.*) *basilicus* Karsch, 1879 in having five granules on the subaculear tooth (Fig. 3 and figs 5–10 in Kovařík 1997: 6).

The new species can be distinguished from species belonging to the same group acording to the numbers of granules on subaculear tooth (Kovařík 1997: 7) in having different coloration and different number of pectinal teeth.

The uniformly (not spotted) yellow color of the legs differentiates *I.* (*R.*) *krasenskyi* sp. n. from *I.* (*R.*) *acanthurus* Pocock, 1899 (Pocock 1900: 51 and author's collection), *I.* (*R.*) *besucheti* Vachon, 1982 (author's collection), *I.* (*R.*) *brachycentrus* Pocock, 1899 (Pocock 1900:

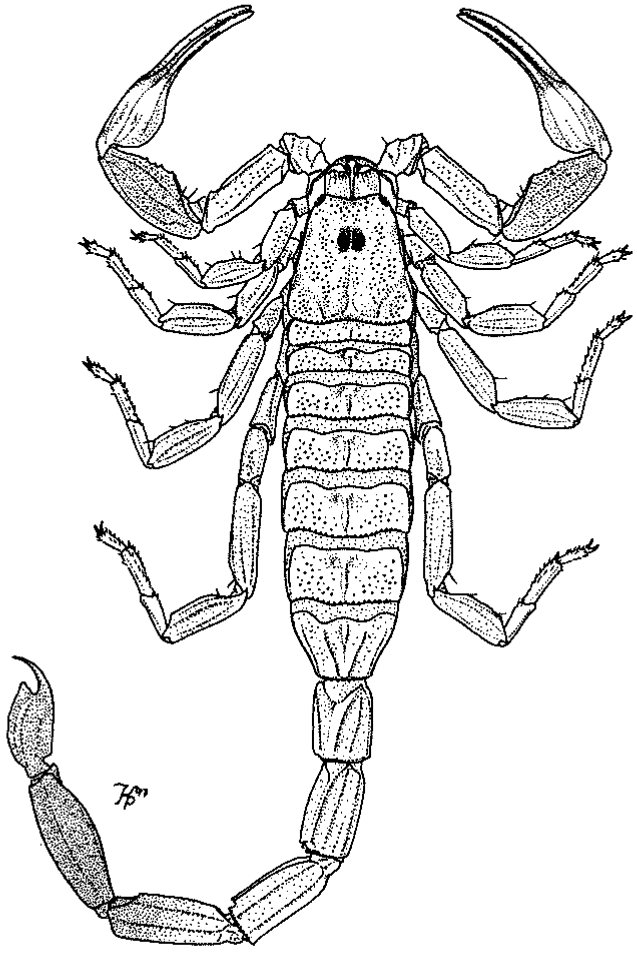


Fig. 1. *Isometrus* (*Reddyanus*) *krasenskyi* sp. n. (holotype). Dorsal aspect.

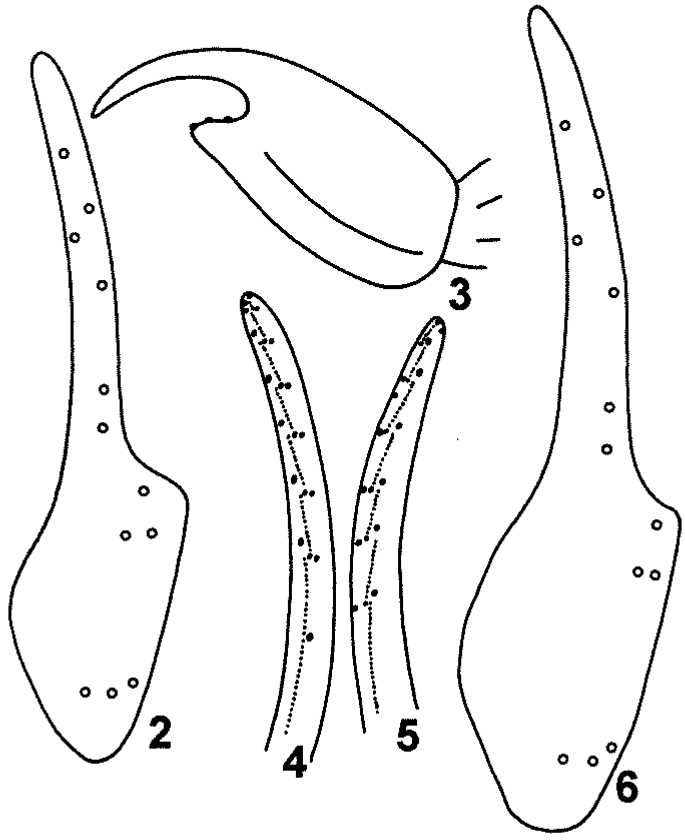
50), *I.* (*R.*) *melanodactylus* (L. Koch, 1867) (author's collection), *I.* (*R.*) *navaiae* sp. n., *I.* (*R.*) *vittatus* Pocock, 1900 (author's collection), and *I.* (*R.*) *zideki* Kovařík, 1994 (Kovařík 1994: 195 and author's collection).

I. (*R.*) *krasenskyi* sp. n. has 10–12 pectinal teeth, whereas *I.* (*R.*) *acanthurus* Pocock, 1899 has 16–17 (see Pocock 1900: 51, Vachon 1982: 98, and author's collection) and *I.* (*R.*) *besucheti* Vachon, 1982 has 13–18 (see Vachon 1982: 95 and author's collection).

Isometrus (*Reddyanus*) *navaiae* sp. n.
(Figs 4–7, Tab. 1)

TYPE MATERIAL. Philippines: S. Mindanao, Port Banga, V.1915, 4F (holotype and paratypes Nos 1–3); N. Mindanao, Kolambugan, I.1905, 1F1juv. (paratypes Nos 4–5); Luzon, Banakao, 2000 m, 25.IV.1914, 1F (Paratype No. 6). All specimens were collected by S. Böttcher & V. Heyne and accessioned as 137D/24. They are preserved in 75% alcohol. The holotype and paratypes Nos 1 and 4–6 are deposited in the Museum für Naturkunde, Zentralinstitut der Humboldt-Universität zu Berlin, Germany, paratype No. 3 in the Department of Invertebrate Zoology, National Museum (Natural History), Prague, and paratype No. 2 is currently in the author's collection, but will be deposited in the Department of Invertebrate Zoology, National Museum (Natural History), Prague.

ETYMOLOGY. Named in honor of Mrs. Shahin Navai of the Museum für Naturkunde, Zentralinstitut der Humboldt-Universität zu Berlin, Germany, in appreciation of her kind help.



Figs 2–6. Figs 2–3 – *Isometrus* (*Reddyanus*) *krasenskyi* sp. n. (holotype). Fig. 2 – tibia, Fig. 3 – telson. Figs 4–6 – *I.* (*R.*) *navaiae* sp. n. (holotype). Fig. 4 – movable finger of pedipalp, Fig. 5 – fixed finger of pedipalp, Fig. 6 – tibia.

Table 1. Measurements in millimeters of the holotype of *Isometrus* (*Reddyanus*) *krasenskyi* sp. n. and *I.* (*R.*) *navaiae* sp. n. Line denoted „pectinal teeth" contains numbers of both left and right teeth separated by a colon

		Isometrus krasenskyi sp. n holotype	*Isometrus navaiae* sp. n holotype
Total	length	32.8	34.4
Carapace	length	3.5	4.0
	width	3.4	3.9
Metasoma	length	18.0	20.9
segment I	length	2.1	2.4
	width	1.5	1.6
segment II	length	2.6	3.1
	width	1.3	1.4
segment III	length	2.9	3.4
	width	1.3	1.3
segment IV	length	3.3	3.9
	width	1.3	1.3
segment V	length	3.7	4.6
	width	1.3	1.3
telson	length	3.0	3.7
Pedipalp			
femur	length	2.8	3.5
	width	0.9	1.2
patella	length	3.4	4.0
	width	1.3	1.6
tibia	length	5.3	6.2
manus	width	1.2	1.4
movable finger	length	3.1	4.1
Pectinal teeth		10:12	13:13

DESCRIPTION. The total length is 19–34.4 mm. The habitus is shown in Fig. 7. Measurements of the carapace, telson, segments of the metasoma and of the pedipalps, and numbers of pectinal teeth are given in Table 1. There are 12–14 pectinal teeth (2×12, 8×13, 3×14). For the position and distribution of trichobothria on the tibia of pedipalps see Fig. 6.

The base color is yellow to reddish brown, with black reticulation. The mesosoma bears two dark bands on dorsal margins. A median band is indicated by dark spots at posterior margins of the segments. The posterior margins of the mesosomal segments and of the carapace bear eight yellow spots or a yellow longitudinal band interrupted by dark transverse bands and spots. The metasoma is dominantly reddish brown. Dark spots are present chiefly on the ventral surface of the metasomal segments and telson.

The chelicerae are weakly reticulated anteriorly, and their movable fingers bear a large dark spot.

The carapace lacks keels but bears large granules.

The femur of the pedipalps has five well developed keels. The dorsal surface is densely and evenly granulated. The patella has three dorsal keels and only one lateral keel. The movable fingers bear six cutting edges (Fig. 4) and the fixed fingers bear seven such edges (Fig. 5). The sixth cutting edge on the movable fingers has one external granule and no internal granules (Fig. 4). The seventh cutting edge on the fixed fingers lacks external and internal granules (Fig. 5).

The dorsal surface of the mesosoma bears a median keel, and the ventral surface of its seventh segment bears two cinspicuous blacks keels with two additional keels between them indicated by granules.

The legs lack tibial spurs.

The first metasomal segment bears 10 keels, the second through fourth segments bear eight keels. All keels are well developed and consist of fine granules of egual size, except for dorsal keels on the second and third segments which terminate in a markedly larger tooth. There are two ventral keels on the first through fourth segments and one ventral keel on the fifth segment and telson. The subaculear tooth bears four to five granules in two or three rows (Fig. 3 and fig. 8 in Kovařík 1997: 6).

AFFINITIES. *I.* (*R.*) *navaiae* sp. n. differs from all other species of the subgenus *Reddyanus* in the following diagnostic characters.

I. (*R.*) *navaiae* sp. n. differs from *I.* (*R.*) *assamensis* Oates, 1888, *I.* (*R.*) *corbeti* Tikader & Bastawade, 1983, *I.* (*R.*) *heimi* Vachon, 1976, *I.* (*R.*) *kurkai* Kovařík, 1997, *I.* (*R.*) *rigidulus* Pocock, 1897, and *I.* (*R.*) *basilicus* Karsch, 1879 in having four to five granules on the subaculear tooth (Fig. 3 and figs 5–10 in Kovařík 1997: 6).

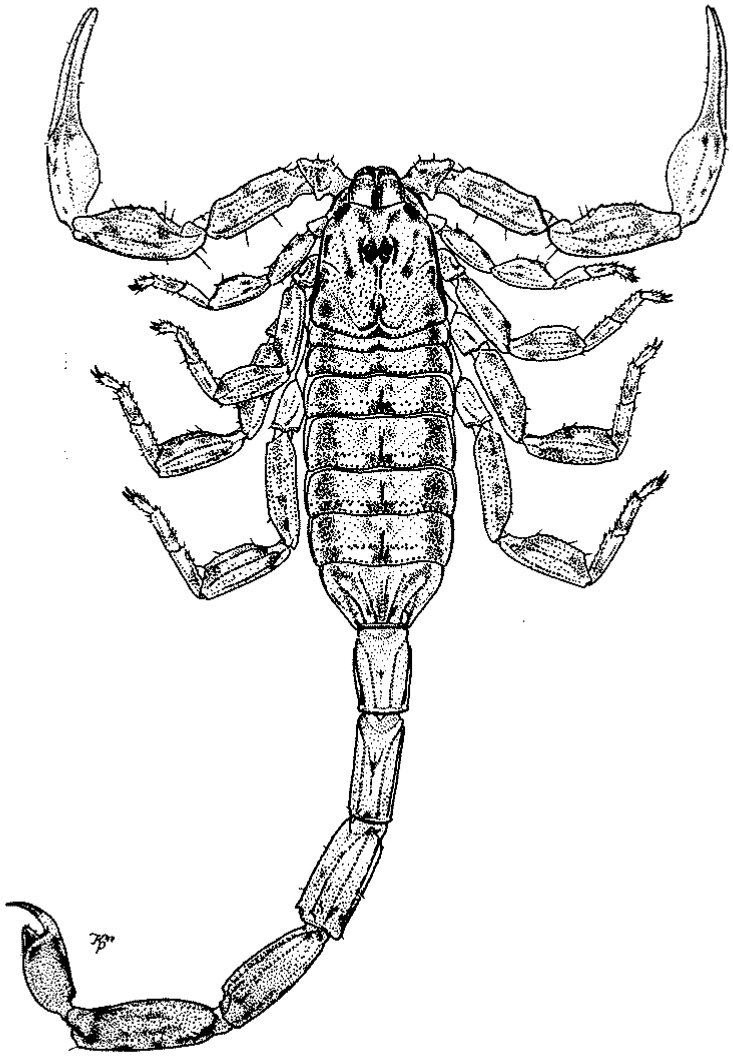


Fig. 7. *Isometrus* (*Reddyanus*) *navaiae* sp. n. (holotype). Dorsal aspect.

The new species can be distinguished from species belonging to the same group acording to the numbers of granules on subaculear tooth (Kovařík 1997: 7) in having different coloration and different number of pectinal teeth.

I. (*R.*) *navaiae* sp. n. is much larger (Tab. 1) than *I.* (*R.*) *besucheti* Vachon, 1982 from Sri Lanka and *I.* (*R.*) *zideki* Kovařík, 1994 from Malaysia and Indonesia, and has a lower number of pectinal teeth as *I.* (*R.*) *acanthurus* Pocock, 1899 from Sri Lanka and India. *I.* (*R.*) *acanthurus* has 16–17 pectinal teeth (see Pocock 1900: 51), and *I.* (*R.*) *navaiae* sp. n. has 12–14 pectinal teeth.

I. (*R.*) *navaiae* sp. n. can be easily distinguished from *I.* (*R.*) *vittatus* Pocock, 1900 of India and Vietnam in coloration, as it lacks a dark triangle between the median eyes and the anterior margin of the carapace. This triangle is well apparent in *I.* (*R.*) *vittatus* and also in *I.* (*R.*) *brachycentrus* Pocock, 1899 (see Pocock 1899: 263) from India. Furthermore, the median dark band on the dorsal surface of the mesosoma is solid in *I.* (*R.*) *vittatus* whereas in *I.* (*R.*) *navaiae* sp. n. it is merely a series of dark spots (Fig. 7).

Two dark bands on the dorsal surface of the mesosoma distinguish *I.* (*R.*) *navaiae* sp. n. from *I.* (*R.*) *melanodactylus* (L. Koch, 1867) of New Guinea, which has dark spots but lacks clear and continuous bands. Also, females of *I.* (*R.*) *melanodactylus* do not reach the size of *I.* (*R.*) *navaiae* sp. n.

DISCUSSION

Examination of a fair number of specimens convinces me that a division of species of the subgenus *Reddyanus* based on the number of granules on the subaculear tooth is warranted (Vachon 1976: 43, Kovařík 1997: 7). However, the terminal granules on the pointed or rounded tip of the subaculear tooth are often variable and sometimes so minute and inconspicuous that their inclusion or exclusion is not unequivocal and thus likely to be handled differently by different authors. It is therefore desirable to divide the species into groups with (1) two granules (without any on the tip) to four granules (with two on the tip) as in figs 5–7 of Kovařík 1997: 6, (2) four to six granules as in figs 8–9 of Kovařík 1997: 6, and (3) the species *I.* (*R.*) *basilicus* with seven granules as in fig. 10 of Kovařík 1997: 6. This divides the species into three groups rather than into four as recently suggested by myself (Kovařík 1997: 7). However, even the three-tie division does not quite dispose of variability, necessitating inclusion of *I.* (*R.*) *zideki* and *I.* (*R.*). *melanodactylus* in groups 1 and 2. Examination of this character in a larger number of specimens would be helpful.

Acknowledgements

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