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## ***Androctonus sumericus* sp. nov., a new scorpion from Dhi Qar Province, Iraq (Scorpiones: Buthidae)**

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A new species *Androctonus sumericus* sp. nov. is described and illustrated from the Dhi Qar Province of Iraq, based on the material previously misidentified as *A. crassicauda* (Olivier, 1807). Therefore, the new species were compared particularly with that species, as well as with all species of *Androctonus* distributed in the Middle East, using their published descriptions.

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**Keywords:** Taxonomy; new species; Mesopotamia

### **Introduction**

The scorpion genus *Androctonus* was established by Ehrenberg (in: Hemprich & Ehrenberg 1828). As of today, 37 species are recognized, distributed in North Africa, the Middle East, and West Asia (Fet & Lowe, 2000; Rein, 2023). The species *Scorpio crassicauda* was described from Kashan (Iran) by Olivier (1807), and Kraepelin (1891) transferred it to the genus *Androctonus*. Kraepelin (1899) recorded it for the first time in Iraq. It is widely distributed in almost all of Iraq's 18 provinces, except for Kirkuk, Al-Muthana, and Basra (Kachel et al., 2021; Hussien et al., 2022).

In this study, we re-examined *Androctonus* material from the Dhi Qar Province, which had previously been reported as *A. crassicauda* by Al-Khazali and Yağmur (2019) and found that it represents a new species. We compared it to its congeners, *A. crassicauda*, *A. kunti*, *A. turkiyensis*, and *A. tihamicus* based on Yağmur (2021, 2023) and Alqahtani et al. (2023).

### **Material and Methods**

Material of the new species was collected during the night using ultraviolet light from the Dhi Qar Province in the summer of 2017. The collected scorpions were preserved in 96% alcohol. The focus stacking method is modified from Canon-Cognisys system recommended by Brecko et al. (2014). Photographs were taken with the method described in Yağmur (2021). The trichobothrial nomenclature notation follows Vachon (1974) and morphological nomenclature follows Francke (1977), Stahnke (1971), and Hjelle (1990).

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Figure 1. Habitus of *Androctonus sumericus* sp. nov., A-B. Male holotype. C-D. Female paratype. A, C. Dorsal view. B, D. Ventral view (Scale bar: 10 mm).

## Systematics

Buthidae C. L. Koch, 1837, *Androctonus* Ehrenberg, 1829

*Androctonus sumericus* sp. nov. (Figures 1–7)

*Type material* (all from Iraq). Holotype ♂: Dhi Qar Province, Al-Kar region (Al-Nasr town), 31°29'27"N, 45°54'55"E, 6 m, 12.viii.2017, A. M. Al-Khazali (AZMM/Sco-2017:1). – Paratypes: 1♂, 1 subad. ♂, 3♀, 2 subad. ♀, same data as holotype (AZMM/Sco-2017:3-8). – 1 subad. ♂, Dhi Qar Province, Abu Gar (Al-Nasiriyah town), 30°41'14"N, 46°25'52"E, 23 m, 15.viii.2017, A. M. Al-Khazali leg. (AZMM/Sco-2017:2).

*Derivatio nominis.* The specific epithet refers to the ancient civilization of Sumer (4000–2350 BC) the earliest known civilization in southern Mesopotamia, including the sampling region.

*Diagnosis* (♂♀). Medium-sized scorpions. Male 77.5–86.7 mm long, females 84.5–100.3 mm long. Body dark brown, fingers dark yellow distally. Tarsi brownish yellow. Pectines are yellow. Carapace carinae with large and rounded granules, intercarinal area densely covered with small granules, smaller in males, the anterior area has larger and flattened granules in both sexes. Pectines with 30–33 teeth in males (n=5), and 25–29 in females (n=9). Chela surface smooth, but the internal surface of manus densely covered with fine granules. Movable fingers with 14–15, fixed 13–14 (n=14) principal rows of



Table 1. Comparative measurements of types of *Androctonus sumericus* sp. nov. L = length; W = width (for carapace, it corresponds to posterior width); D = depth; HT = holotype; PT = paratype.

		♂ - HT	♂ - PT	♀ - PT	♀ - PT	♀ - PT
Carapace	L / W	10.24 / 10.27	9.03/9.12	11.49/12.35	11.76/12.95	12.83/13.61
Mesosoma	L	23.41	21.16	25.58	24.35	23.95
Tergite VII	L / W	5.79/10.12	5.29/9.03	7.44/12.79	7.01/11.59	6.83/12.64
Metas.+telson	L	53.04	48.60	58.36	53.61	58.25
Segment I	L / W / D	6.76/6.86/6.50	6.24/6.37/5.55	7.28/8.03/6.94	6.69/7.40/6.28	7.67/7.70/6.69
Segment II	L / W / D	7.49/7.82/6.73	7.07/7.14/6.34	8.63/8.71/7.92	8.37/8.03/7.36	8.80/8.56/7.72
Segment III	L / W / D	8.40/8.53/6.84	7.17/7.76/7.02	8.84/8.94/8.38	8.51/8.55/7.90	9.08/9.14/8.25
Segment IV	L / W / D	9.57/8.31/7.09	8.87/7.56/6.92	10.54/8.87/8.17	10.16/8.09/7.61	11.01/8.75/8.27
Segment V	L / W / D	10.44/7.54/5.48	10.06/6.97/5.36	11.72/8.46/5.30	11.02/7.27/6.20	11.68/7.91/6.53
Telson	L / W / D	9.72/3.80/3.09	9.19/3.61/2.78	11.35/4.85/4.30	8.86/4.53/3.42	10.01/4.91/3.32
Vesicle	L	6.22	5.27	7.31	6.43	7.00
Aculeus	L	4.24	3.70	4.99	2.82	4.05
Pedipalp	L	34.81	33.46	36.54	36.73	38.92
Femur	L / W	8.24/2.95	8.13/2.65	8.84/3.25	8.60/2.96	8.89/3.03
Patella	L / W	9.66/4.16	9.19/3.80	10.34/4.36	9.86/4.28	10.31/4.67
Chela	L	16.91	16.14	17.36	18.27	19.72
Manus	L / W / D	6.17 / 4.78 / 5.14	6.14/4.82/4.28	6.05/4.47/5.17	7.00/5.25/4.74	7.43/5.99/4.96
Movable finger	L	10.39	10.15	11.97	12.06	12.41
<b>Total</b>	<b>L</b>	<b>86.69</b>	<b>78.83</b>	<b>100.34</b>	<b>89.72</b>	<b>95.03</b>

denticles. Tergit carinae with large, rounded granules. Posttergites moderately covered with rounded and moderate-sized granules on tergites I-VI except between the lateral carinae; all tergites covered with fine granules, denser between the lateral carinae. The granules are flattened, smaller and denser in females, the fine granules larger and denser in females. Ventrolateral carinae strong with large, rounded granules on metasomal segments I-IV and strong with gradually increased granules posteriorly on segment V, three of the granules pointed, spaced and larger than other granules.

*Affinities.* *Androctonus sumericus* sp. n. can be distinguished from the other species of *Androctonus* in the Middle East by the following characters: *A. sumericus* has a stocky chela whereas *A. bicolor* has an elongate chela and *A. kunti* has a relatively thin chela. The ventrolateral carinae of the fifth segment of *A. sumericus* bear somewhat large denticles whereas *A. amoreuxi*, *A. australis*, *A. crassicauda*, and *A. tihamicus* do not bear large granules, and *A. turkiyensis* has larger denticles. Overall colouration of *A. sumericus* is brown, whereas it is light brown to reddish brown in *A. tihamicus*, yellow in *A. australis* and *A. amoreuxi*, and black in *A. crassicauda* and *A. kunti*. The colouration of legs of *A. sumericus* is brown, whereas it is yellow in *A. tihamicus*, *A. australis* and *A. amoreuxi*. Dorsolateral carinae are rounded anteriorly on segment V in *A. sumericus*, whereas they are serrated anteriorly and have pointed granules in *A. crassicauda*. Trichobothrium *et* is proximal to *dt* in *A. sumericus*, whereas it is nearly opposite to trichobothrium *dt* in *A. turkiyensis*. The internal surface of the manus is densely covered with fine granules in *A. sumericus*, whereas only a few fine granules are present in *A. turkiyensis*, *A. kunti* and *A. tihamicus*.

*Description.* Description is based on the male holotype and the female paratypes. Total length 78.83–86.69 mm in males and 89.72–100.34 mm in females. Measurements are given in Table 1).

*Colouration.* Body dark brown, chela reddish brown, manus with darker reticulation, fingers dark yellow distally and dark reddish brown proximally; tarsi brownish yellow, basitarsus and pretarsus yellowish brown, reticulate; pectines yellow; sternum, genital

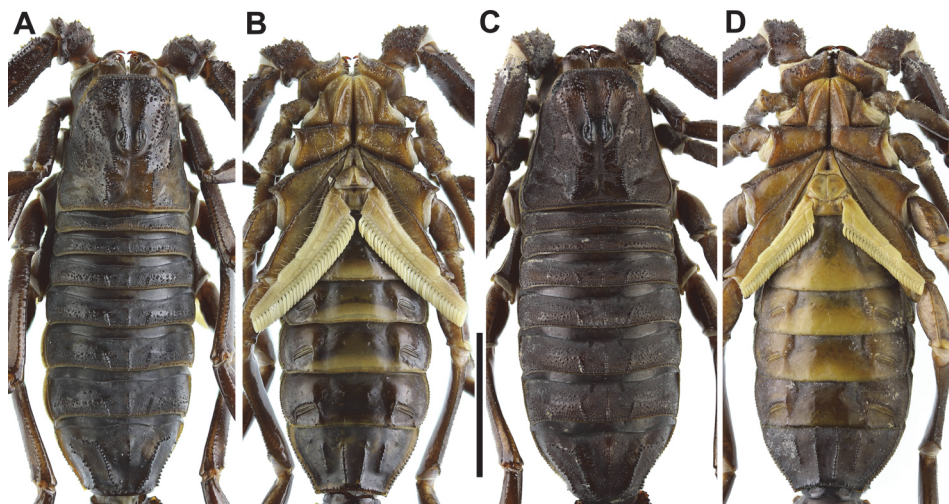


Figure 2. *Androctonus sumericus* sp. nov., A-B. Male holotype. C-D. Female paratype. A, C. Carapace and mesosoma B, D. Sternopetinal area and ventral of mesosoma (Scale bar: 10 mm).

operculum, and basal plate brown; coxae yellowish brown; poststernites III-V dark yellow (Figures 1A–1B). Manus of chelicerae brown and reticulate, fingers darker, teeth red (Figures S6A–S6B).

**Structure. Carapace.** Trapezoidal, slightly wider than long. Carapace carinae with large and rounded granules; intercarinal area densely covered with small granules; granules larger and denser in females; anterior area with larger and flattened granules. Anterior margin straight, with some stout microsetae and macrosetae; median eyes separated by nearly two ocular diameters; five pairs of lateral eyes (three large and two small); anterior margin with a coarse and rounded granule row; posterior margin with fine irregular granule rows in the margin between posteriomedian carinae, with small granules resting on the rest of the margin (Figures 3A, 3B, S2A, S2B). Sternum triangular and narrow, type 1, longer than wide. Pectines long (passing leg IV coxa/trochanter joint), narrow and densely setose; tooth count 32–33; basal plate heavily sclerotized and wider than long, anterior margin with strong median indentation, posterior margin widely convex (Figures 3C, 3D, S2C, S2D). – **Chelicerae.** Dentition of chelicerae is typical for the genus, with smooth surface and fine granules arranged in longitudinal rows (Figures S6A, S6B). – **Pedipalps.** Pedipalps stocky and moderately long, sparsely setose without carinae. Trichobothrial pattern of Type A, orthobothriotaxic. Dorsal trichobothria of the femur arranged in a beta-configuration with  $d_2$  situated on the dorsal surface. Femur pentacarinat; moderately slender; dorsointernal, dorsoexternal and ventrointernal carinae strong with coarse rounded granules; ventroexternal carinae weak, with a few medium-sized granules; internal median carinae weak, with spaced distinct conical granules; intercarinal surface finely granular with a few coarse granules dorsally; dorsal face of patella with somewhat microgranules; chela surface smooth, but internal surface of manus densely covered with fine granules, moderately covered with fine granules in females. Chela manus wider than patella (ratio chela width/patella width = 1.20 in males, 1.18 in females); fingers moderately elongated (movable finger length/manus length ratio=1.66 in males, 1.73 in females and chela length/manus width ratio=3.44 in males, 3.52 in females), evenly curved. Movable finger with indistinct scalloping but

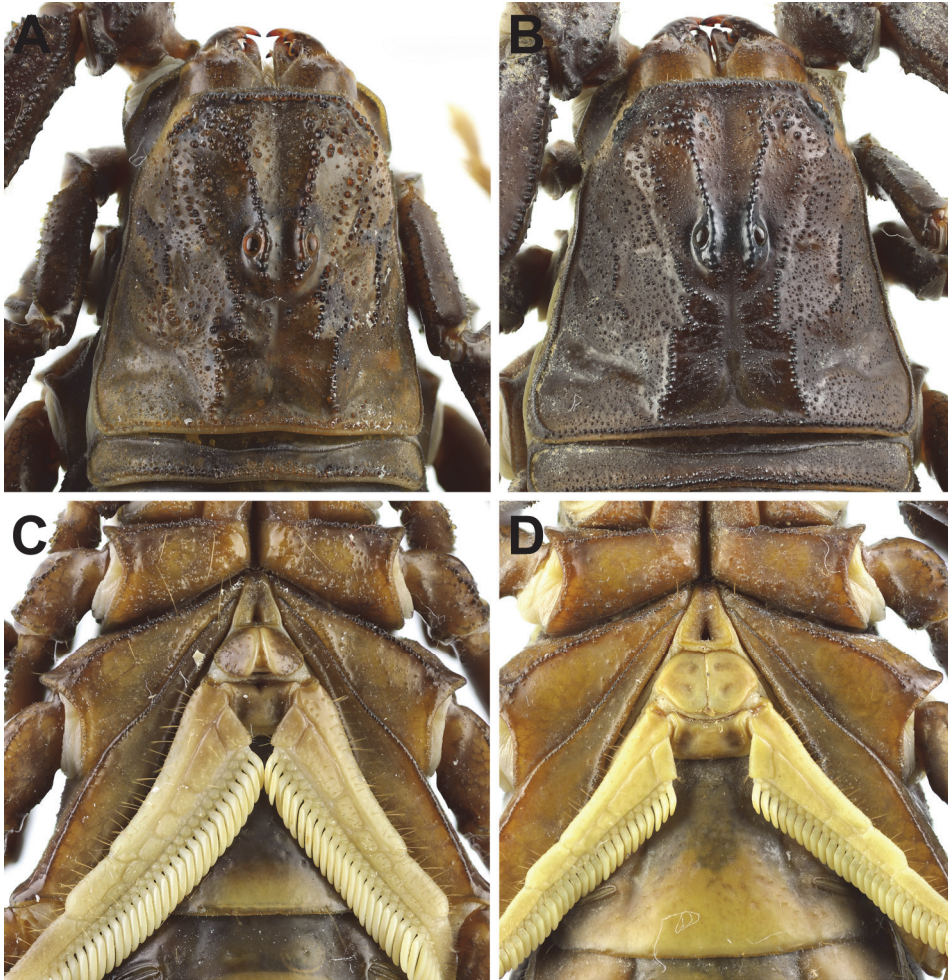


Figure 3. *Androctonus sumericus* sp. nov., A-C: Male holotype. B-D: Female paratype. A, B: Carapace. C, D: Sternonectinal area.

chela with conspicuous gap. Movable fingers with 15, fixed 14 principal rows of denticles, external and internal accessory granules and three distal granules. Trichobothrium *et* located between *est* and *dt*, and proximal to *dt*; trichobothrium *est* proximal to *db* (Figure 4, S3). – *Mesosoma*. Tergites I–VI with three distinct carinae (median and submedians) that bear large, rounded granules; not projecting beyond posterior margin; tergites I–VI covered with fine granules, denser in the area between submedian carinae; granules slightly larger in females. Posttergites moderately covered with rounded and moderate-sized granules on tergites I–VI but absent in the area between submedian carinae; granules larger in females. Tergit VII pentacarinat (median, submedians and laterals), submedian carinae strong and with coarse rounded granules; lateral carinae moderate-sized and serrate; lateral pairs of carinae not fused; median carina present on the proximal half; moderate-sized and with a few granules; surface of tergit VII covered with fine granules but smooth around the lateral pairs; granules slightly larger in





Figure 4. *Androctonus sumericus* sp. nov., male holotype. A. Ventral view of chela. B. Dorsal view of chela. C. Internal view of chela. D. External view of chela. E. Fixed finger dentition. F. Ventral view of pedipalp. G. Dorsal view of pedipalp. H. Movable finger dentition (trichobothrial pattern is indicated by red circles) (Scale bar: 10 mm).

females; sternites sparsely setose; sternites III–VI smooth and lustrous with scattered little number, medium-sized granules and microgranule patches. Sternit VII with four moderate, granular carinae; surface of sternit VII rough with somewhat microgranules, finely granular in females (Figures 2, S1). – *Legs*. Legs long, slender, and covered by dense macrosetae; basitarsus of legs I to III with bristlecombs; basitarsus of legs IV without bristlecombs; proventral and retroventral basitarsal (pedal) spurs present and distinct on legs I and IV but tibial spurs on legs III and IV. Tarsus and basitarsus of legs I–IV ventrally with spine-like setae arranged in two rows (Figures 7, S9). – *Metasoma and telson*. Metasoma very sparsely setose, with all segments robust. Segments I–II slightly wider than long; segments III–V longer than wide; all segments wider than deep. Widths of segments I–IV gradually increasing posteriorly. Dorsal surface smooth and without granulation, lateral surface smooth with densely fine granules, ventral surface rough with densely fine granules and scattered medium granules on segments I–V. Dorsal furrow moderately wide and deep on segments I–V. Segments I–II with ten carinae, segments III–IV with eight, and segment V with five carinae. Lateral inframedian carinae complete and strong on segment I, reduced to one coarse granule on segments II–III. Ventrolateral carinae strong with large, rounded granules on metasomal segments I–IV, strong with gradually increased granules posteriorly on segment V, three of the granules are pointed, spaced and larger than other granules, the larger granules more rounded in females; dorsolateral carinae strong with spinoid granules on segments I–II; strong and crenulate with large, pointed granules, gradually increase posteriorly on segments III–IV; size of the granules increasing from segment I to segment IV. Dorsolateral carinae of metasomal segment V strong with rounded granules anteriorly, without granules posteriorly; lateral supramedian carinae strong on segments I–IV; granules medium-sized and spinoid on segment I, coarse and rounded on segments II–IV. Ventral

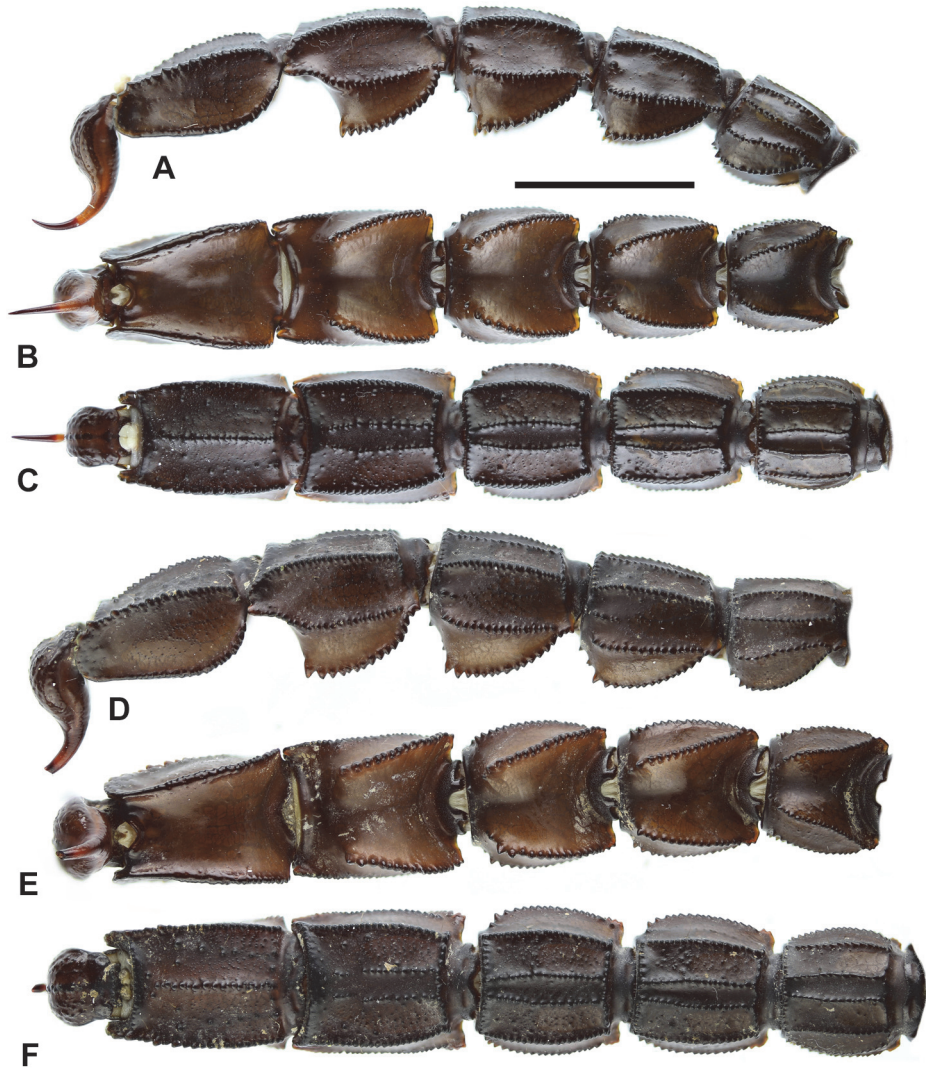


Figure 5. *Androctonus sumericus* sp. nov., metasoma and telson of male holotype and female paratype. A–C. Male holotype. D–F Female paratype. A, D. Lateral view. B, E. Dorsal view. C, F. Ventral view (Scale bar: 10 mm).

submedian carinae moderate with moderate and rounded granules on segments I–IV (Figures 5, S7). Ventromedian carina moderate with moderate and rounded granules on segment V (Figures 6A–B, S8A–B). Anal arch with two large round lobes on the distal-lateral, the inferior one twice as large, and apex pointed. Telson slender and not setose (telson length/width: 2.55, telson width/depth: 1.22); vesicle small and somewhat elongated and narrower than segment V; surface glossy and rough; aculeus long and thick but shorter than vesicle (vesicle length/aculeus length: 1.46) and evenly curved (Figures 6A–B).

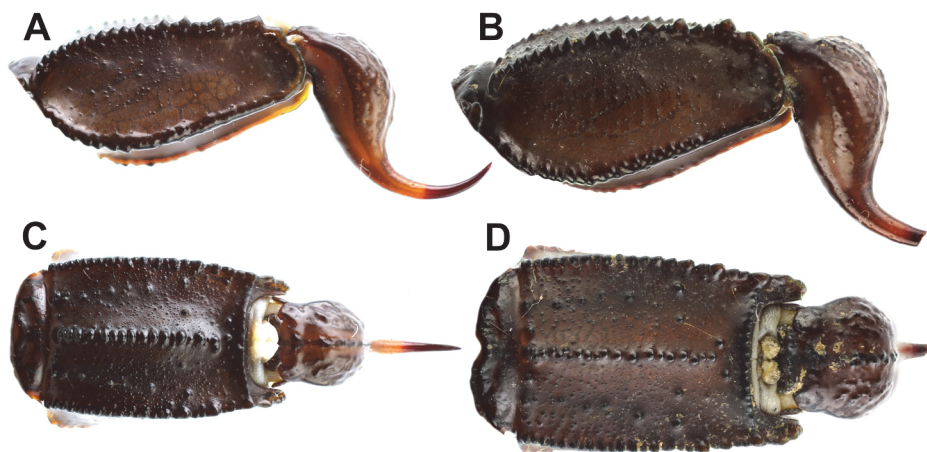


Figure 6. *Androctonus sumericus* sp. n., segment V of metasoma and telson. A, C. Male holotype. B, D. Female paratype. A, B. Lateral view. C, D. Dorsal view.



Figure 7. *Androctonus sumericus* sp. n., male holotype, right legs I-IV.

*Habitat.* Al-Kar region, where the new species was collected, is a semi-desert area with mixed soil located 45 km west of Al-Nasr, specifically between the administrative borders of the two governorates of Dhi Qar and Al-Muthanna. This region is characterized by seasonal agricultural lands, where wheat and barley is cultivated, and which serves

as grazing area for livestock such as sheep, goats, and camels. The plant communities are dominated by *Alhagi* sp. and *Zygophyllum* sp. The climate is humid due to the Euphrates and Tigris rivers as well as irrigation. During a field trip in August, scorpions were collected at night under the *Zygophyllum* sp. and in the small piles of dry mud close to a human settlement. The species was also observed in buildings.

## Discussion

Stewart (2006) made some observations on the prey-capture behaviour of “*A. crassicauda*”. Specimens used in his observations were collected from the town of Samarra in the Salah al-Din Province in the central part of Iraq. The illustrated specimen (figure 2) is brown and has wide chela and stocky metasoma segments. It should be considered that this population belongs to the newly described species. Al-Azawi (2017) reported some “*A. crassicauda*” records from Middle Iraq. She illustrated the specimen (figure 1) which also resembles the new species described here. Other records of “*A. crassicauda*” were reported from central and southern Iraq (Al-Qādisiyyah, Babil, Basra, Dhi Qar, Karbala, Najaf, Salah ad Din, Wasit Provinces) (Kachel et al., 2021). Some of these records many belong to the new species described here. Kachel (2020) recently reported an *A. crassicauda* record from northern Iraq; however, a large denticle is visible in the figure, more resembling *A. turkiyensis*, a species recently described from southeastern Turkey (Yağmur, 2021).

## Supplementary Material

Supplementary Figures S1-S9 are given as a Supplementary Annex, which is available via the “Supplementary” tab on the article’s online page.

## Acknowledgements

We would like to thank the brothers Hussein Mohammed and Adel Mohammed for their assistance in the collecting efforts and for bearing the trouble and danger of the field trip during the night, as it is an area of great nocturnal activity for wolves. Dr. Victor Fet (West Virginia, USA) is acknowledged for his valuable comments on a draft of this paper.

## Disclosure Statement

No potential conflict of interest was reported by the authors.

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