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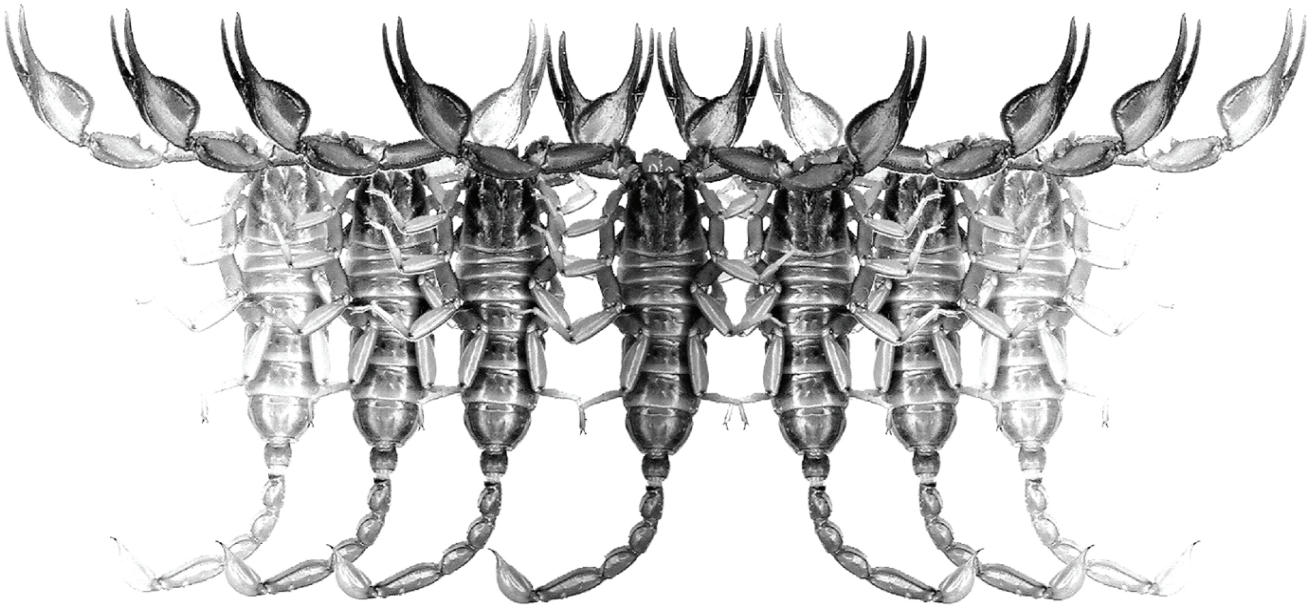

A new *"vorhiesi"* group species of *Vaejovis* from the Galiuro Mountains, southern Arizona (Scorpiones: Vaejovidae)

Richard F. Ayrey & Brandon Myers

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Euscorpius — Occasional Publications in Scorpiology. 2019, No. 284

A new *"vorhiesi"* group species of *Vaejovis* from the Galiuro Mountains, southern Arizona (Scorpiones: Vaejovidae)

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http://zoobank.org/urn:lsid:zoobank.org:pub:582778D3-11B6-4EB5-90B9-91E815A0BE21

Summary

A new scorpion species, *Vaejovis stetsoni* **sp. n.** is described from Galiuro Mountains, Graham County, Arizona. This is the smallest species of the "*vorhiesi*" group discovered so far, most similar to *V. brysoni* Ayrey & Webber. The pedipalp fixed finger has five ID denticles and the movable finger has six, like in most other southern Arizona *Vaejovis*. The most unique characteristics of this species are its small size (18.35 mm) and a large subaculear tubercle.

Introduction

Including the new species described in this paper from the Galiuro Mountains, Arizona, there are now 21 "*vorhiesi*" group species in the genus *Vaejovis* in Arizona, western New Mexico & northern Sonora. This species lives under rocks and nearby washes in an area of mixed evergreen oak woodland, in the Galiuro Mountains of southern Arizona.

The new species is the smallest "*vorhiesi*" group species yet described (18.35 mm). It is also found at one of the lowest elevations for the group, 1,337 m a. s. l. Based on the elevation and vegetation type (mixed evergreen oak woodland), the habitat of *Vaejovis stetsoni* **sp. n.** is presumed to be one of the driest for the group. All three of these characteristics; small size, low elevation and dry habitat, make this species even more vulnerable to climate change than any of the other 20 species in the "*vorhiesi*" group. Fortunately for this species, its habitat is within an area with very poor access via poorly maintained and infrequently used dirt roads. It should therefore suffer very little impact from human activities.

In the "*vorhiesi*" group of *Vaejovis*, the presence of a subaculear tubercle appears to be of importance. The authors have confirmed that it is found in all described species. It ranges from obsolete in *V. feti* to strong in *V. stetsoni* **sp. n.** Hughes, 2011 classified the subaculear tubercles of the "*vorhiesi*" group in three groups: single poorly-developed tubercle, well-developed tubercle, and multiple tubercle; with bifurcated tubercles assigned to the multiple tubercles group. Females of *V. stetsoni* **sp. n.** were compared to females from the four most closely related species (Fig. 11). We measured the height of the subaculear tubercle from the distal base to the point. Our results show that the subaculear tubercle of *V. stetsoni* **sp. n.** is the most prominent, with a height of 0.05 mm, 0.06 mm and 0.07 mm of the females studied. *V. brysoni* was found to have the smallest subaculear tubercle of the species compared with a height of 0.03 mm. *V. cashi* shows multiple small tubercles with a height of 0.03mm. *V. deboerae* also shows the presence of multiple tubercles with a broad subaculear tubercle base and a height of 0.04 mm. *V. electrum* has a prominent subaculear tubercle with a downward curve on the distal edge and a height of 0.03 mm. The base of the subaculear tubercle in *V. electrum* is very broad. Hughes, 2011 noted in the description of *V. electrum* that 77% of the specimens studied from the Pinaleno Mountains were found to have multiple tubercles, with well-developed and poorly-developed tubercles represented in 20% and 3% of the specimens, respectively. The specimens studied in the present paper of *V. stetsoni* **sp. n.** from the Gailuro Mountains were all found to have well-developed subaculear tubercles.

Materials and Methods

Terminology and conventions

The measurements adhered to in this paper follow Stahnke (1971), trichobothrial patterns are as in Vachon (1974), and pedipalp finger dentition follows Soleglad & Sissom (2001).

Abbreviations

RFA, personal collection of Richard F. Ayrey, Flagstaff, Arizona, USA; MES, personal collection of Michael E. Soleglad, Winchester, California, USA; CNAN, Colección Nacional de Arácnidos, Instituto de Biologia, Universidad Nacional Autónoma de México, México, D.F.; UANL, Universidad Autónoma de Nuevo León, San Nicolas de los Garza, Nuevo León, Mexico; and USNM, United States National Museum, Smithsonian Institution, Washington, DC, USA.

Figures 1-3: *Vaejovis stetsoni* **sp**. **n**. **Figure 1**. Paratype female in natural habitat. **Figure 2**. Paratype male in natural habitat. **Figure 3**. Paratype gravid female.

Dimensions (MM)		*V. stetsoni* sp. n. ♀ holotype, RA2077	*V. stetsoni* sp. n. ♀ paratype, RA2085	*V. stetsoni* sp. n. ♀ paratype, RA2075	*V. stetsoni* sp. n. ♂ paratype, RA2081
Carapace	L	2.68	2.56	2.48	2.60
Mesosoma	L	5.56	6.30	5.27	3.47
Metasoma	L	10.11	10.20	9.86	9.10
Segment I	L / W	1.04 / 1.41	1.03 / 1.40	0.99 / 1.29	0.98 / 1.12
Segment II	L / W	1.20 / 1.38	1.23 / 1.39	1.13 / 1.27	1.07 / 1.07
Segment III	L / W	1.26 / 1.30	1.31 / 1.34	1.25 / 1.27	1.16 / 1.05
Segment IV	L / W	1.74 / 1.23	1.76 / 1.23	1.69 / 1.16	1.59 / 1.03
Segment V	L / W	2.52 / 1.22	2.53 / 1.20	2.47 / 1.19	2.24 / 1.01
Telson	L / W / D	2.35 / 0.81 / 0.68	2.34 / 0.76 / 0.64	2.33 / 0.79 / 0.63	2.60 / 0.68 /0.53
Vesicle	L	1.59	1.56	1.53	1.33
Pedipalp	L	7.87	7.55	7.63	6.14
Femur	L / W	2.03 / 0.64	2.01 / 0.64	2.07 / 0.66	1.69 / 0.61
Patella	L / W	2.25 / 0.78	2.18 / 0.76	2.21 / 0.75	1.74 / 0.57
Chela	L	3.59	3.36	3.35	2.71
Manus	L / W / D	1.71 / 0.82 / 0.84	1.68 / 0.78 / 0.82	1.66 / 0.77 / 0.75	1.24 / 0.60 / 0.61
Fixed finger	L	1.88	1.68	1.69	1.47
Movable finger	L	2.20	1.91	1.80	1.57
Pectinal teeth		11 : 11	11 : 12	11 : 11	13 : 13
Total	**L**	**18.35**	**18.79**	**17.61**	**14.63**

Table 1. Morphometrics (mm) of *Vaejovis stetsoni* **sp**. **n**.

Additional Material Studied

Besides type material listed below under new species description, the following additional specimens were examined:

Vaejovis bandido Graham, Ayrey & Bryson, 2012. Mexico: Sonora: Sierra de los Ajos Mountains. 12–13 October 2010, R.W. Bryson, Jr., 3 ♂ (1 CNAN, 2 UANL), 3 ♀ (1 CNAN, 2 UANL).

Vaejovis brysoni Ayrey & Webber, 2013. USA: Arizona: Pima Co.: above Molino Basin on Catalina Highway near Seven Cataracts Vista, Santa Catalina Mountains. 16 March 2012. R.W. Bryson Jr. 1 ♂, 7 ♀ (RFA). Same locality. 5 April 2012. R.W. Bryson Jr. & D. Hartman 8 ♀ (RFA). Same locality. 18 August 2012. R. F. Ayrey & M. DeBoer-Ayrey. 8 ♀ (RFA).

Vaejovis cashi Graham, 2007. USA: Arizona: Cochise Co.: Cave Creek Canyon, Chiricahua Mountains. 2 August 2008. R. F. Ayrey & M. M. DeBoer-Ayrey 4 ♂, 4 ♀ (RFA). Same locality. 23 August 2011. R. F. Ayrey & M. M. DeBoer-Ayrey 3 ♂, 4 ♀ (RFA).

Vaejovis sp. cf. *cashi* "Dragoon". USA: Arizona: Cochise Co.: Dragoon Mountains, 07 November, 2009. R. F. Ayrey & M. M. DeBoer-Ayrey 3 ♀ (RFA).

Vaejovis crumpi Ayrey & Soleglad, 2011. USA: Arizona: Yavapai Co.: by Lynx Lake, Prescott. 14 August 2008. R. F. Ayrey & M. M. DeBoer-Ayrey 3 ♂, 5 ♀ topotypes (RFA). Same locality. 14 September 2009. R. F. Ayrey & M. M. DeBoer-Ayrey 4 ♂, 4 ♀ (RFA). Same locality. 8 August 2010. R. F. Ayrey & M. M. DeBoer-Ayrey 3 ♂, 5 ♀ (RFA).

Vaejovis deboerae Ayrey, 2009. USA: Arizona: Pima Co.: Rose Canyon Campground, Santa Catalina Mountains. 28 August 2011. R. F. Ayrey & M. M. DeBoer-Ayrey 3 ♂, 5 ♀ (RFA). Same locality. 29 August 2011. R. F. Ayrey & M. M. DeBoer-Ayrey 4 ♂, 4 ♀ (RFA).

Vaejovis electrum Hughes, 2011. USA: Arizona: Graham Co.: Upper Arcadia Campground, Mount Graham. 17 July 2009. R. F. Ayrey & M. M. DeBoer-Ayrey 2 ♂, 6 ♀ topotypes (RFA). USA: Arizona: Graham Co.: 9415 feet a. s. l., Mt Graham Hwy., Mt. Graham. 18 July 2009. R. F. Ayrey & M. M. DeBoer-Ayrey 1 ♂, 4 ♀ topotypes (RFA).

Vaejovi feti Graham, 2007. USA: New Mexico: Meadow Creek, Black Mountains. 6 July 1978. M. H. Muma 4 ♂, 3 ♀ (MES).

Vaejovis grahami Ayrey et Soleglad, 2014. USA: Arizona: Pima Co.: Madera Canyon, Santa Rita Mountains. 12 May 2013. R. F. Ayrey & M. M. DeBoer-Ayrey 3 ♂, 5 ♀ (RFA). Same locality. 22 June 2009. R. F. Ayrey & M. M. DeBoer-Ayrey 4 ♂, 4 ♀ (RFA). Same locality. 3 October 2010. R. F. Ayrey & M. M. DeBoer-Ayrey 1 ♂ (RFA). USA: Pima Co.: Mt. Hopkins, Santa Rita Mountains. 2 August 2010. R. F. Ayrey & M. M. DeBoer-Ayrey 2 ♂, 4 ♀ (RFA).

Vaejovis grayae Ayrey, 2014. USA: Arizona: Yavapai Co.: Yarnell. 16 June 2012. R. F. Ayrey & M. M. DeBoer-Ayrey 1 ♂, 1 ♀ (USNM). Same locality. 16 June 2012. R. F. Ayrey & M. M. DeBoer-Ayrey 2 ♂, 2 ♀ (RFA).

Vaejovis halli Ayrey, 2012. USA: Arizona: Gila Co.: Mount Ord. 11 September 2010. R. F. Ayrey & M. M. DeBoer-Ayrey 2 ♂, 6 ♀, paratypes (RFA). Same locality. 2 May 2011.

R. F. Ayrey & M. M. DeBoer-Ayrey 3 ♂, 5 ♀, paratypes (RFA).

Vaejovis jonesi Stahnke, 1940. USA: Arizona: Coconino County: near Wupatki National Monument. 1 April 2011. R. F. Ayrey. 1 ♀ topotype (RFA).

Vaejovis lapidicola Stahnke, 1940. USA: Arizona: Coconino County: Red Sandstone Quarry, Flagstaff. 1 June 2011. R. F. Ayrey & M. M. DeBoer-Ayrey 1 ♂, 7 ♀ topotypes (RFA).

Vaejovis patagonia Ayrey, 2018. USA: Arizona: Santa Cruz County: Patagonia Mountains. 06 November, 2012. R. F. Ayrey & M. M. DeBoer-Ayrey 1 ♀ holotype (USNM), 7 ♀ paratypes (RFA).

Vaejovis paysonensis Soleglad, 1973. USA: Arizona: Coconino County: Control Road, 25 miles East of Payson. 5 July 2011. R. F. Ayrey & M. M. DeBoer-Ayrey 1 ♂, 7 ♀ topotypes (RFA). Same locality. 6 July 2011. R. F. Ayrey & M. M. DeBoer-Ayrey 2 ♂, 6 ♀ (RFA).

Vaejovis tenuipalpus Sissom et al., 2012. USA: Arizona: Mojave Co.: Getz Peak, Hualapai Mountains. 9 August 2009. R. F. Ayrey & M. M. DeBoer-Ayrey 1 ♂, 7 ♀ paratopotypes (RFA).

Vaejovis trinityae Ayrey, 2013. USA: Arizona: Coconino County: along the Mogollon Rim. 31 August 2008. R.F. Ayrey 1 ♂, 4 ♀ (RFA). Same locality. 31 May 2009. R. F. Ayrey & M. DeBoer-Ayrey 8 ♀ (RFA). Same locality. 14 August 2010. R. F. Ayrey & M. DeBoer-Ayrey. 8 ♀ (RFA). Same locality. 16 September 2011. R. F. Ayrey & M. DeBoer-Ayrey. 2 ♂, 6 ♀ (RFA). Same locality. 17 October 2011. R. F. Ayrey & M. DeBoer-Ayrey. 1 ♀ (RFA). Same locality. 18 May 2012. R. F. Ayrey & M. DeBoer-Ayrey. 2 ♂, 2 ♀ (RFA).

Vaejovis troupi Ayrey et Soleglad, 2015. USA: Arizona: Cochise Co.: Whetstone Mountains. 14 October 2009. R. Troup. 1 ♀ (USNM).

Vaejovis vorhiesi Stahnke, 1940. USA: Arizona: Cochise Co.: Miller Canyon, Huachuca Mountains. 24 May 2011. R. F. Ayrey & M. M. DeBoer-Ayrey 1 ♂, 7 ♀ topotypes (RFA). Garden Canyon, Huachuca Mountains. 26 August 2011. R. F. Ayrey & M. M. DeBoer-Ayrey 4 ♂, 6 ♀ (RFA). Lutz Canyon, Huachuca Mountains. 27 March 2011. R. F. Ayrey & M. M. DeBoer-Ayrey 2 ♂, 2 ♀ (RFA).

Systematics

Order Scorpiones C. L. Koch, 1850
Superfamily Chactoidea Pocock, 1893
Family Vaejovidae Thorell, 1876
Subfamily Vaejovinae Thorell, 1876

Vaejovis stetsoni Ayrey et Myers, sp. n.

(Figs. 1–17; Tables 1–2)

http://zoobank.org/urn:lsid:zoobank.org:act:ADB75D58-424B-41D3-AEBB-406E7D5C1E89

Type material. Holotype female, Galiuro Mountains, Graham County, Arizona, USA, 32.46248°N, 110.29403°W, 10 August 2015 (E.R. Stetson), specimen #RA2077 (USNM). Paratype females, Galiuro Mountains, Graham County, Arizona, USA, 10 August 2015 (E.R. Stetson), specimen #RA2075 & RA2085, (RFA). Paratype female, Galiuro Mountains, Graham County, Arizona, USA, 12 May 2013 (R.F. Ayrey), specimen #RA835, (RFA). Paratype male, Galiuro Mountains, Graham County, Arizona, USA, 10 August 2015 (E.R. Stetson), specimen #RA2081 (USNM).

Distribution. Known only from the type locality, Galiuro Mountains, Graham County, Arizona, USA.

Etymology. This species is named in honor of Eric Stetson who collected most of the type specimens.

Diagnosis. Small (18.35 mm) scorpions. Color is dark brown, lighter on the legs, with underlying mottling on carapace and mesosoma. (see Figure 1). Pedipalp movable finger with 6 ID denticles and fixed finger with 5. Carapace of female is longer than the fifth metasomal segment. Pectinal tooth count for females 11.25 [n=12], males 13.20 [n=10]. Large, well developed subaculear tubercle.

Description. Based on holotype female, unless otherwise noted, see Figure 4 for dorsal and ventral views.

Color. Color is dark brown, lighter on the legs, telson reddish. Faint underlying mottling on carapace, mesosoma, metasoma, telson, pedipalps and legs.

Carapace. Anterior margin of carapace moderately emarginated, posterior margin slightly emarginated. Carapace finely granular. Three lateral eyes on each side. Median furrow moderate and traverses entire length of carapace. Ratio of median eyes location from anterior edge/carapace length 0.35; carapace length/width at median eyes 1.06. Anterior edge to median eyes 0.93. Six macrosetae are situated on anterior edge of carapace. Carapace of female is longer than metasomal segment V.

Mesosoma. Tergites moderately granular on posterior half of Tergites I-VI. Tergite VII with strong crenulated dorsal lateral and lateral supramedian carinae. Sternites III-VI smooth. Sternite VII with weakly granular ventral lateral carinae on posterior half. Presternites smooth.

Spiracles ovoid with median side rotated 35° from posterior sternite margin. Sternites with variable number of microsetae.

Sternum (Figs. 2, 8). Sternum is Type 2.

Genital Operculum (Figs. 2, 8). Sclerites separated on posterior one-fifth.

Pectines. Pectinal tooth counts 11/11 [n=3], 11/12 [n=1] and 12/11[n=2], with a mean of 11.25 [n=12], standard deviation 0.4522 for females and 13/13 [4] and 14-14 [1] with a mean of 13.2 [n=10], standard deviation 0.4216 for males. All pectinal teeth have exterodistal angling with large sensorial area. Middle lamellae 7/7. Fulcra are present. Each fulcra with 1-3 central setae.

Metasoma. Carapace of female is longer than the fifth metasomal segment. Ratio of segment I length/width 0.74; of segment II length/width 0.87; of segment III length/width 0.97; of segment IV length/width 1.41; of segment V length/

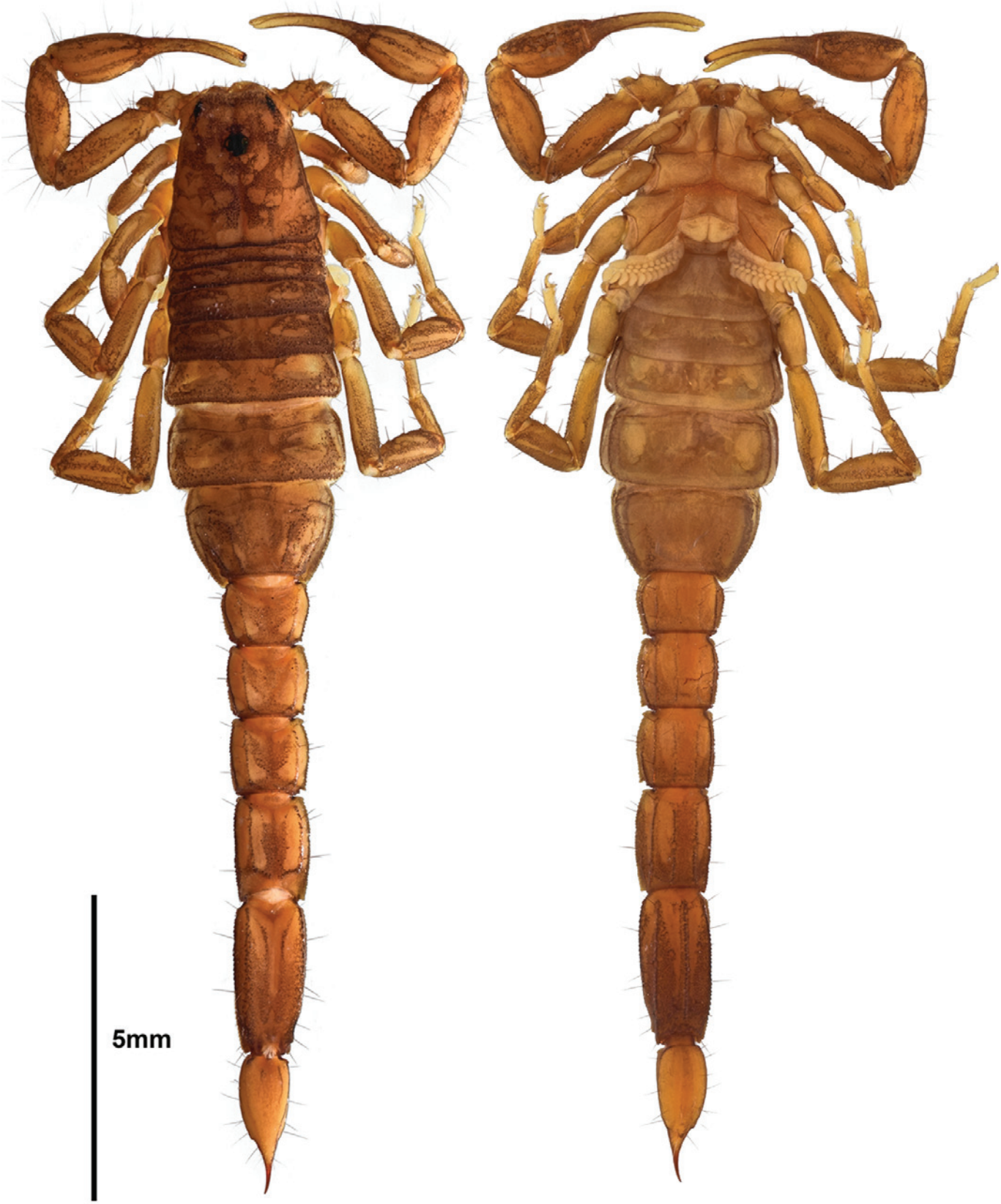


Figure 4. *Vaejovis stetsoni* **sp**. **n**. paratype female, dorsal and ventral views. Scale bar: 5 mm.

	V. stetsoni **sp. n.**	*V. brysoni*	*V. cashi*	*V. deboerae*	*V. electrum*
	N = 3	N = 8	N = 3	N = 3	N = 3
Total Length	17.61–18.79	22.88–27.50	20.90–22.10	29.64–33.14	24.48–25.38
Cara_L	2.48–2.68	2.88–3.75	2.86–3.11	3.79–4.38	3.48–3.60
Cara_L/M5_L	1.00–1.06	0.88–1.03	0.96–1.14	0.89–0.97	1.02–1.13
M1_L/M1_W	0.74–0.77	0.93–1.00	0.61–0.66	0.72–0.79	0.65–0.68
M2_L/M2_W	0.87–0.89	0.90–1.03	0.74–0.80	0.98–1.03	0.68–0.89
M3_L/M3_W	0.97–0.98	1.00–1.09	0.89–0.92	1.02–1.14	0.93–0.98
M4_L/MI4_W	1.41–1.46	1.34–1.61	1.28–1.39	1.48–1.60	1.33–1.46
M5_L/M5_W	2.07–2.11	2.15–2.82	2.05–2.15	2.10–2.32	1.81–1.91
Ves_L/Ves_W	1.94–2.05	1.60–2.06	1.56–1.71	2.22–2.43	1.45–1.62
Fem_L/Fem_W	3.14–3.17	2.87–3.22	2.74–3.02	2.74–2.90	2.78–3.19
Pat_L/Pat_W	2.87–2.95	2.47–3.29	2.86–3.03	2.91–3.16	2.86–2.94
Che_L/Che_W	4.31–4.38	3.71–4.55	3.84–4.52	4.17–4.53	3.74–4.19
FF_L/Cara_L	0.66–0.70	0.68–0.83	0.68–0.73	0.71–0.77	0.68–0.69
FF_L/Che_L	0.50–0.52	0.51–0.56	0.47–0.49	0.48–0.52	0.47–0.51
Pectinal Teeth	11–12 (11.17) [6]	11–12 (11.50) [16]	10–12 (11.20)[6]	12–13 (12.17) [6]	11–12 (11.33) [6]

T**able 2**. Morphometrics (mm) of female *V. stetsoni* **sp**. **n**. as compared to females of *Vaejovis brysoni, V. cashi, V. deboerae*, and *V. electrum*.

width 2.07. Segments I-IV: dorsolateral carinae strong and granular with distal denticle of I-IV enlarged and spinoid. Lateral supramedian carinae I-IV strong and granular with enlarged spinoid distal denticle. Lateral inframedian carinae moderately granular on posterior 3/5 of segment I, moderately granular on posterior 1/2 of segments II-III, weakly granular on posterior 2/5 of segment IV. Ventrolateral carinae weakly granular on posterior 3/5 of segment I, weakly granular on posterior 1/5 of segment II, moderately granular on posterior 4/5 of segment III, strongly granular on segment IV. Ventral submedian carinae weakly granular on segment I-II, moderately granular on segment III-IV. Dorsal and lateral intercarinal spaces very finely granular. Segment I-IV ventral submedian setae 3/3. Segment V: Dorsolateral carinae strong, distally crenulate, basally granular. Lateromedian carinae weak and granular on basal 3/5, obsolete on distal 2/5. Ventrolateral and ventromedian carinae strong. Intercarinal spaces finely granular. Segment V ventrolateral setae 4/4.

Telson. Smooth with 4 pairs of large setae on the ventral surface, 3 large setae along both lateral edges of the vesicle and numerous smaller setae. Large, prominent subaculear tubercle present (see illustration above). Lateral aculear serrations (LAS) are present. Female teeth number 3-4 (n=3), male paratype with 6 teeth.

Chelicerae. Dorsal edge of movable cheliceral finger with two subdistal (sd) denticles. Ventral edge is smooth, with well developed serrula on distal half. Fixed cheliceral finger with four denticles: basal, median, subdistal and distal. Basal and median denticles forked. Typical for genus.

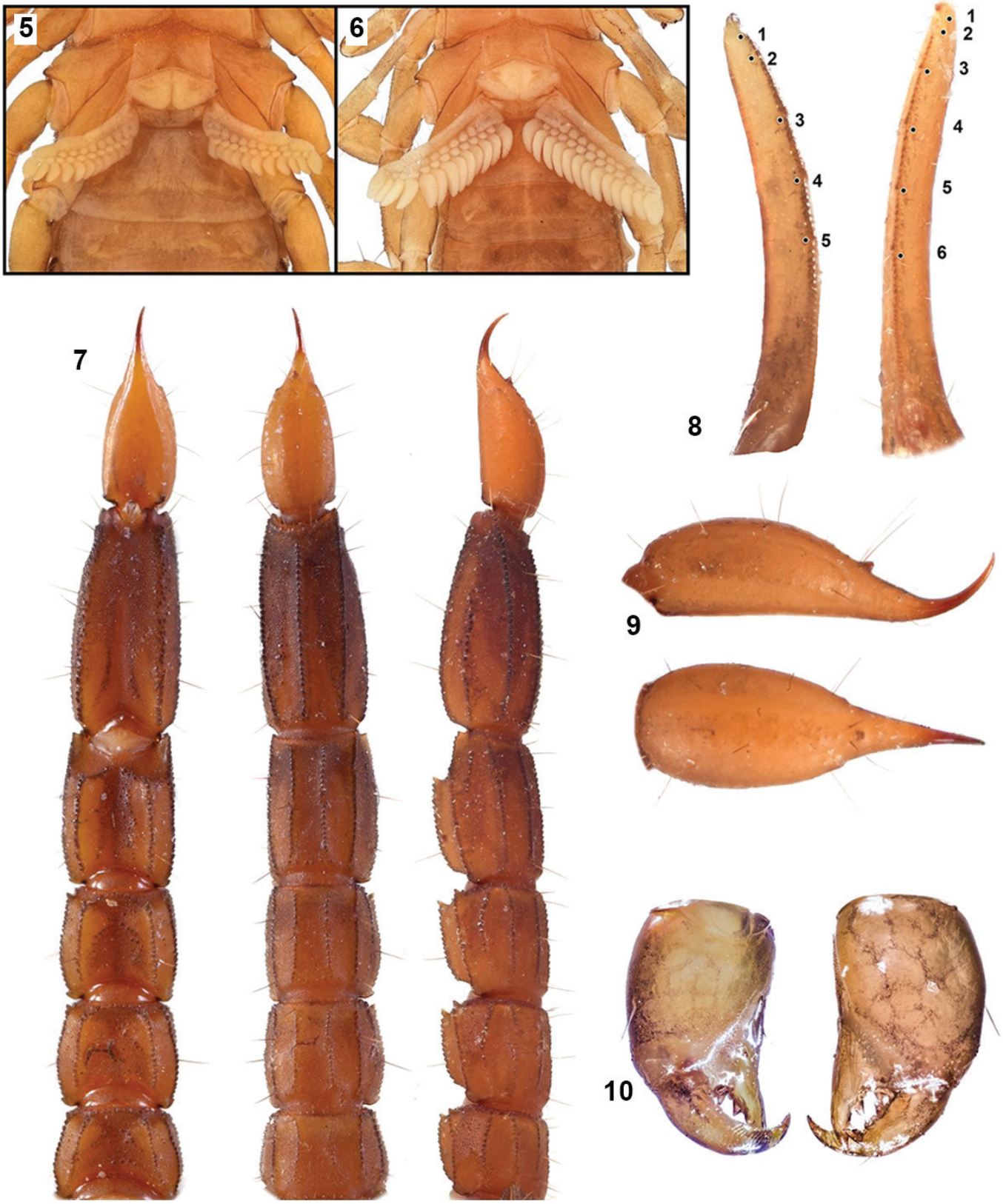
Pedipalps. Trichobothrial pattern type C (Vachon, 1974) (see Fig. 6). Trichobothria *ib* and *it* at the base of fixed finger. Pedipalp ratios: chela length/width 4.02; femur length/width 3.02; patella length/width 2.73; fixed finger length/carapace length 0.61. *Chela.* Carinae moderate. Fixed finger median (MD) denticles aligned and divided into 6 subrows by 5 outer (OD) denticles and 5 inner (ID) denticles. Movable finger with 6 subrows, 5 OD denticles and 6 ID denticles (Soleglad & Sissom, 2001). *Femur.* Carinae moderate. *Patella.* Carinae strong, internal surface with very large granules on the *DPSc* carina.

Legs. Ventral surface of tarsomere II with single median row of spinules terminating distally with one spinule pair.

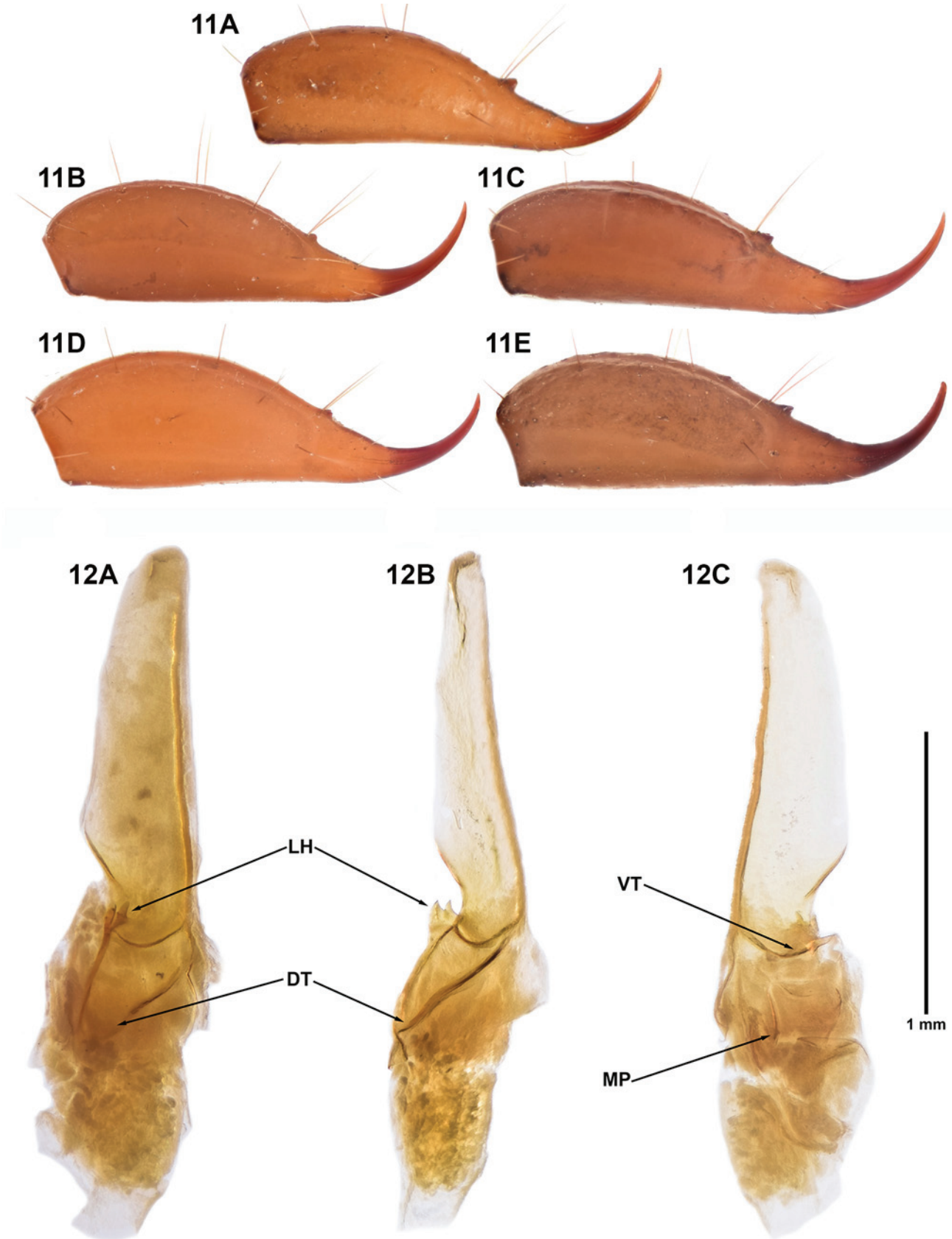
Hemispermatophore. All descriptions based on left hemispermatophore. Wide hemispermatophore trunk. Lamellar hook sclerotized, strongly bifurcated at distal tip, and relatively short with a ratio of its length to the lamina length of 0.28. Trough difference also provides an indication of relative shortness of lamellar hook when comparing the two with a ratio 0.67. Modest distal crest is present on the inner distal aspect of the lamella, which is also visible from the ventral surface.

Measurements (mm) are as follows: trough difference, 0.33; lamellar hook length, 0.49; lamina length, 1.74; trunk width, 0.53; lamina width, 0.39; ratio of lamellar hook length to lamina length, 0.28; ratio of trunk difference to lamellar hook length, 0.67.

Variability. Pectinal tooth count 11/11 [n=3], 11/12 [n=1] and 12/11[n=2], with a mean of 11.25 [n=12], standard deviation 0.452267 for females and 13/13 [4] and 14-14 [1] with a mean of 13.2 [n=10], standard deviation 0.421637 for males. The size and shape of the pectines show sexual dimorphism in males and females. The pectinal teeth are longer and more numerous in males (see Figure 6). No variability of fixed finger ID denticle count was noted in *Vaejovis stetsoni*, while variability is seen in many other species in the "*vorhiesi"* group (Ayrey, 2012; Ayrey, 2013b; Ayrey & Webber, 2013).



Figures 5-10: **Figure 5**. *Vaejovis stetsoni* **sp**. **n**., holotype female. Sternopectinal area showing sternum, pectines, and genital operculum. **Figures 6-10**: *Vaejovis stetsoni* **sp**. **n**,. paratype male. **Figure 6**. Sternopectinal area showing sternum, pectines, and genital operculum. **Figure 7**. Metasoma, dorsal, ventral and lateral views. **Figure 8**. Chelal fixed and movable fingers showing dentition. **Figure 9**. Telson, showing subaculear tubercle, lateral and ventral views. **Figure 10**. Left chelicera,ventral and dorsal views.



Figures 11-12: **Figure 11**. Telson and subaculear tubercle, *Vaejovis stetsoni* **sp**. **n**. (11A), *V. brysoni* (11B), *V. cashi* (11C), *V. deboerae* (11D), and *V. electrum* (11E). **Figure 12**. *Vaejovis stetsoni* **sp**. **n**. left hemispermatophore, paratype male, dorsal view with sheath still attached (12A), internodorsal view (12B), ventral view showing embedded mating plug (12C). Note: abbreviations are as follows: LH (lamellar hook), DT (dorsal trough), VT (ventral trough), MP (embedded mating plug). Scale bar: 1 mm (12A–12C).

Figures 13-14: *Vaejovis stetsoni* **sp**. **n**., habitat (13) and microhabitat under rocks (14).

Figures 15-16: *Vaejovis stetsoni* **sp**. **n**. **Figure 15**. Paratype female, specimen **RA 2076**, giving birth. One first instar juvenile can be seen exiting the genital operculum and several others can be seen in the process of climbing up from the ventral surface of the female to her dorsal surface. Clearly visible is the lining up of the early instars in the classic position on the female's dorsum (Ayrey, 2012). **Figure 16**: Paratype female, specimen **RA 2075** with 1st instar juveniles.

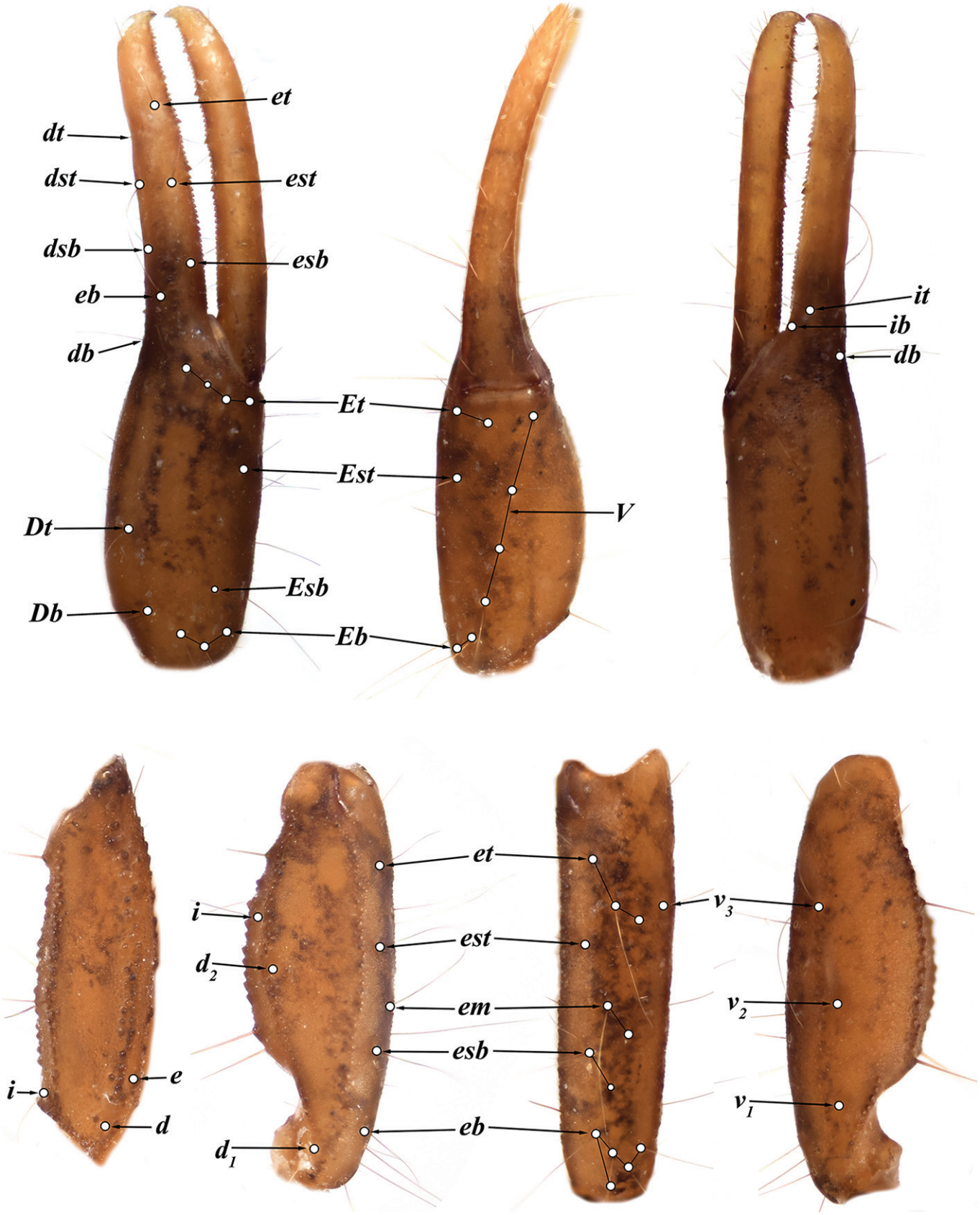


Figure 17. *Vaejovis stetsoni* **sp**. **n**. trichobothrial pattern.

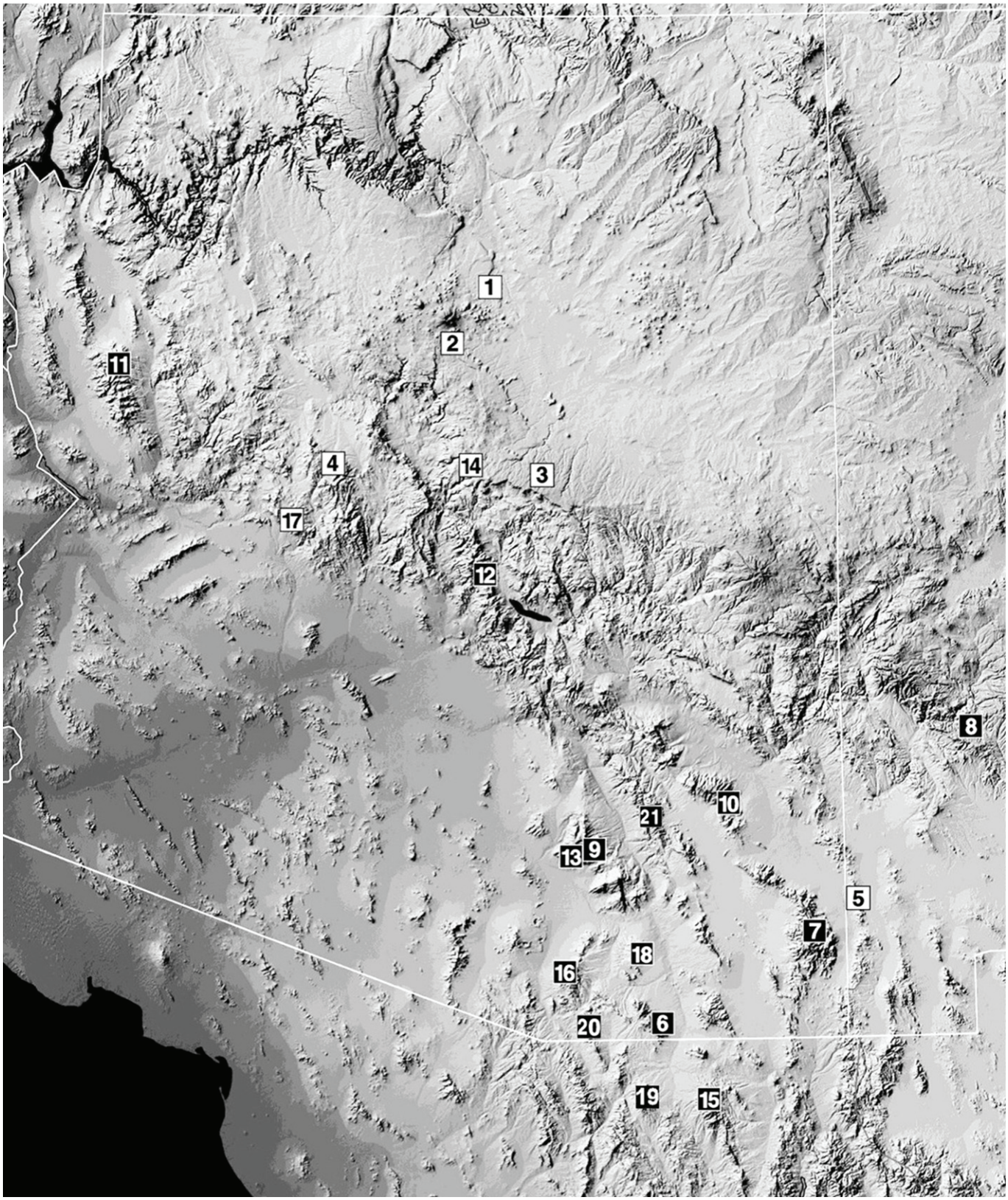


Figure 18. Map of Arizona, extreme western New Mexico and northern Sonora Mexico showing the type locality of all 21 *Vaejovis* "vorhiesi" group species, including new species *Vaejovis stetsoni* **sp**. **n**. Localities are divided into those species exhibiting seven inner denticles (*ID*) on the chelal movable finger (white rectangles with black lettering) and those with primarily six, or five *ID* denticles (black rectangles with white lettering). **Seven *ID*s**: **1** = *V. jonesi*, **2** = *V. lapidicola*, **3** = *V. paysonensis*, **4** = *V. crumpi*, **5** = *V. bigelowi,* **14** = *V. trinityae,* **17** = *V. grayae.* **Six *ID*s**: **6** = *V. vorhiesi*, **7** = *V. cashi*, **8** = *V. feti*, **9 =** *V. deboerae,* **10** = *V. electrum*, **11** = *V. tenuipalpus* **12 =** *V. halli,* **13** = *V. brysoni*, **15 =** *V. bandido,* **16 =** *V. grahami,* **18 =** *V. troupi,* **19 =** *V. islaserrano,* **20 =** *V. patagonia* and **21** = *V. stetsoni* **sp**. **n**.

Affinities. Map in Fig. 18 shows the type localities of the 20 currently described species of *Vaejovis* from Arizona, western New Mexico and Sonora, Mexico, as well as *Vaejovis stetsoni* **sp**. **n**.

Vaejovis jonesi, V. lapidicola, V. paysonensis, V. crumpi, V. bigelowi, V. trinityae, and V. grayae: all exhibit seven inner denticles (*ID*) on the chelal movable finger while *V. stetsoni* exhibits 6. All seven species are also widely allopatric with *V. stetsoni*.

Vaejovis tenuipalpus: has 6 *ID* denticles on both the fixed and movable fingers while *V. stetsoni* has 5 ID denticles on the fixed finger. *V. tenuipalpus* is also widely allopatric with *V. stetsoni*.

Of the 12 described species with 6 inner denticles (*ID*) on the chela movable finger, nine species were found to be widely allopatric with *V. stetsoni*. They are *V. vorhiesi, V. feti, V. halli, V. bandido, V. grahami, V. troupi, V. islaserrano* and *V. patagonia*; see map in Fig. 13.

Morphometric comparisons were made to the four closest species, *V. brysoni, V. cashi, V. deboerae,* and *V. electrum*. Each of these species exhibited some morphometric ratios, which do not overlap with *V. stetsoni* **sp**. **n**. (*Vaejovis brysoni* exhibits four such morphometric ratios; *V. cashi*, seven; *V. deboerae*, six; and *V. electrum*, four)

Comments on locality and life strategy. The type specimens were found under rocks or using a blacklight at night in the Galiuro Mountains, Graham County, Arizona (32.46248°N 110.29403°W) at an elevation of 1337 m a. s. l. The vegetation type is mesic, mixed evergreen oak woodland, see Figures 13 and 14. *Hoffmannius spinigerus, Centruroides sculpturatus,* and *Pseudouroctonus apacheanus* were found syntopically with *V. stetsoni* during four field trips to the Galiuro Mountains. This species lives in oak leaf litter and under rocks that are embedded in the ground in oak leaf litter. Several adult females were kept alive to determine 1st instar behavior. Of those, 5 gave birth with the average number of 1st instars being 12.60 (5), standard deviation 2.70. The 1st instar behavior was as previously described (Hjelle, 1974; Ayrey, 2012; Ayrey, 2013; Ayrey & Soleglad, 2014).

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