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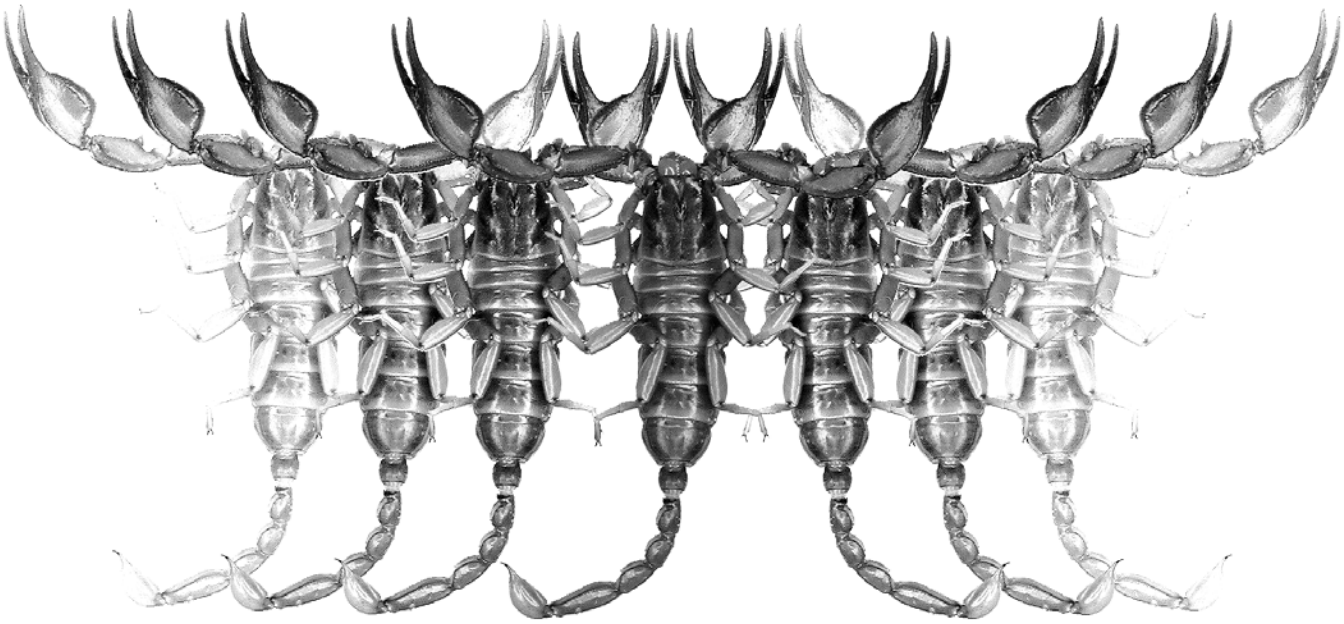

Redescription and Lectotype Designation of *Vaejovis lapidicola* Stahnke, 1940 (Scorpiones: Vaejovidae)

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Summary

The original description of the Arizona scorpion species *Vaejovis lapidicola* Stahnke, 1940 consists of a single paragraph. Furthermore, a holotype for this species was never designated. To remedy this, two syntypes of *V. lapidicola* were obtained for study. A male syntype is redescribed and designated the lectotype, and a female is assigned as a paralectotype. The taxonomic status of *V. lapidicola* is also confirmed.

Introduction

In 1939, Herbert Stahnke completed a doctoral dissertation on the scorpions of Arizona. His aim was to find as many scorpion species in Arizona as he could, thus filling a void in scorpion literature and learning more about scorpion life history, habits, and habitats. During his doctoral work, Stahnke conducted extensive surveys of Arizona that lead to his description of nine new species; two have since been synonymized (Sissom & Francke, 1981; Stahnke, 1971) and one moved to a new genus (Stahnke, 1974). All nine species were thoroughly described in the 1939 dissertation. These descriptions, however, were published only in a much abbreviated form in an abstract of this dissertation (Stahnke, 1940). This three-page work unfortunately included only brief descriptions of the new species. As a result, the nine species are sometimes referred to as "the Stahnke inscrutables" (Soleglad & Fet, 2006).

One of these "inscrutables" was discovered in a rock quarry and thus named *Vaejovis lapidicola*, the specific name meaning "stone-dwelling" in Latin. Until now the only published description of *V. lapidicola* is in his short 1940 abstract as follows:

> "*Vaejovis lapidicola*. Foundation color yellow to orange-brown. Trunk somewhat variegated with dark brown. Anterio-median border quite deeply emarginated. Fifth caudal segment more than twice as long as wide. Intercarinal spaces of inferior keels on this segment smooth to finely granular. Carapace longer than fifth caudal segment and as long as segment one plus two. Movable finger of the pedipalps shorter than fifth caudal segment. Middle lamellae vary from five to seven, very definite and subcircular. The specimens were taken one mile east of Flagstaff."

Stahnke's collection is currently held at the California Academy of Sciences where two of the three syntypes of *V. lapidicola* were available for study. It is my purpose here to redescribe this species and to designate a lectotype and paralectotype from these syntypes. I also confirm its validity as a species and taxonomic placement in the "mexicanus" group of the genus *Vaejovis* C. L. Koch (Sissom, 2001).

Methods

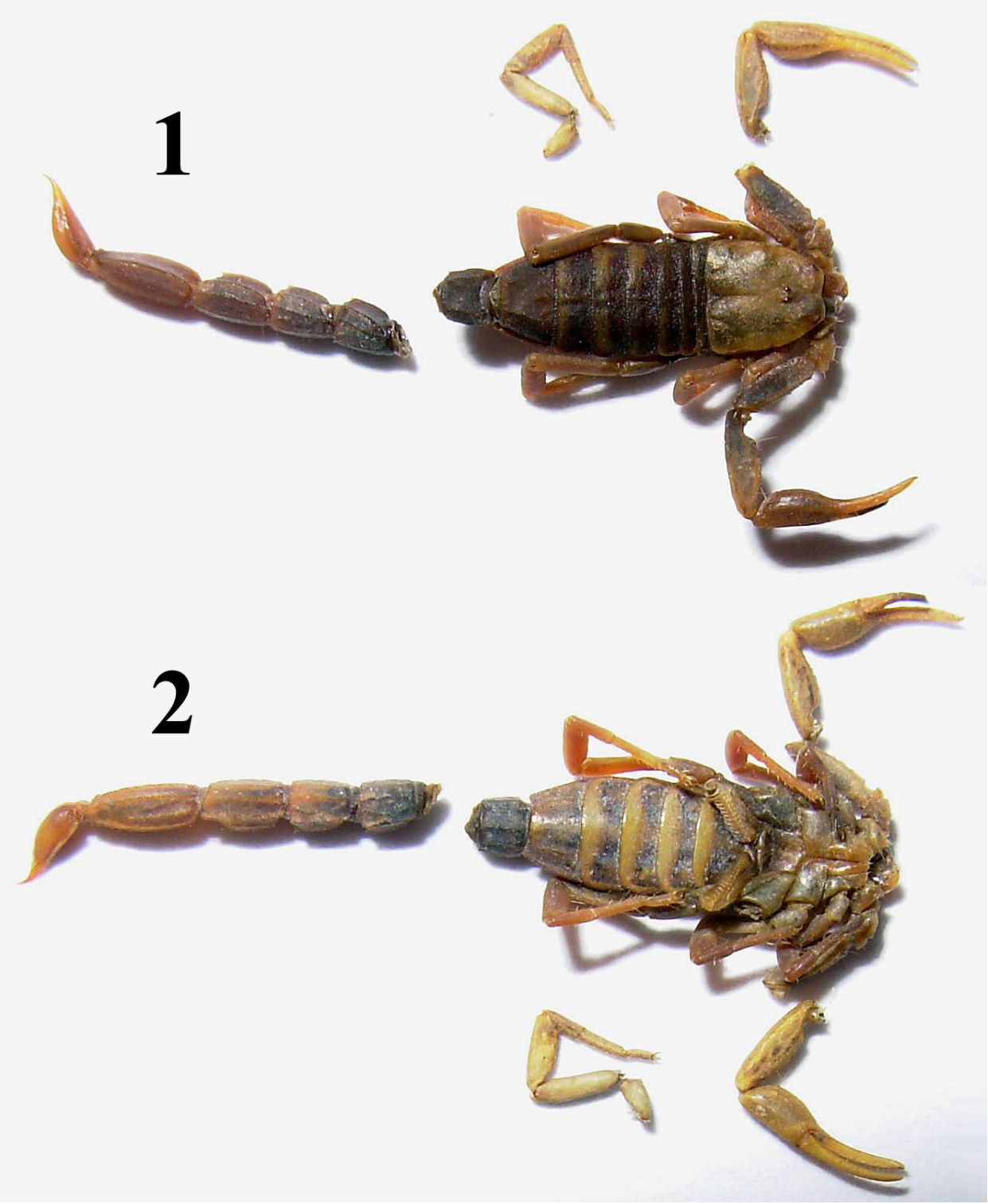
Measurements are as described by Stahnke (1970), trichobothrial patterns are as in Vachon (1974), and pedipalp finger dentition follows Soleglad & Sissom (2001). Some descriptions, especially color, are modified from the original description by Stahnke (1939). Laterobasal Aculear Serrations (LAS) denticles are after Fet et al. (2006).

Systematics

Vaejovis lapidicola Stahnke, 1940

(Figs. 1–12)

Type Data (designated here). Lectotype: male, 1 mi. E. of Flagstaff in a red sandstone quarry, Coconino County, Arizona, USA, 6 August 1938 (H.L. Stahnke) [missing half of right movable pedipalp finger; left and right pedipalp detached; right leg III detached; meta-



Figures 1–2: *Vaejovis lapidicola* Stahnke lectotype. **1.** Dorsal aspect. **2.** Ventral aspect.

soma detached at segment II; missing most setae]. Paralectotype: female, 1 mi. E. of Flagstaff in a red sandstone quarry, Coconino County, Arizona, USA, 6 August 1938 (H.L. Stahnke) [missing metasomal segment V, telson, right pedipalp movable finger, and most setae; pedipalps and many legs detached].

Distribution. Known only from the type locality; a red sandstone quarry one mile east of Flagstaff, AZ.

Diagnosis. *Vaejovis lapidicola* is a small yellow to orange-brown scorpion with slight brown marbling on the carapace, mesosoma and metasoma. The fifth metasomal segment is more than twice as long as wide. Carapace planate and longer than fifth metasomal segment and as long as segment one plus two. Median eyes and tubercle, which are quite small, are located on anterior one-third of carapace (Fig. 12). Fifth metasomal segment longer than movable pedipalp finger. Chelal fingers with six and seven inner (ID) denticles on fixed and movable fingers (Fig. 11), respectively. Five to seven middle lamellae. Pectinal tooth counts 14 in males and 11–13 in females.

With the exception of total length/pectinal tooth count ratios, the *V. lapidicola* lectotype fits all the criteria outlined for the "mexicanus" group (Soleglad, 1973). However, this inconsistency may just mean that the specimen is not an adult. With 14 pectine teeth per comb, a male individual would have to be between 26.7 and 41.3 mm in length to meet the requirement. This, plus the fact that the female paralectotype is much larger (see Measurements section), indicates that the lectotype is probably immature. More importantly, however, the lectotype possesses six rows of denticles on the chela fixed finger and has slender pedipalps with trichobothria *ib* and *it* located proximally on the fixed finger. Furthermore, the genital operculum of the female is separated on the posterior fifth and likely fits the total length/pectinal tooth count ratios for the group. *Vaejovis lapidicola* should therefore remain in the "mexicanus" group of the genus *Vaejovis*.

Of the Arizona scorpion fauna, *V. lapidicola* seems most closely related to *V. paysonensis*. Both species possess seven ID denticles on the pedipalp movable fingers and have a carapace longer than metasomal segment V and longer than metasomal segment I plus II. *Vaejovis lapidicola* can be easily distinguished, however, by a carapace that is much more planate and wider at the median eyes. Ratios of carapace length/width at median eye are 1.25 and 1.44, for *V. lapidicola* and *V. paysonensis* respectively.

Two other species of the "mexicanus" group also occur in Arizona, *V. jonesi* Stahnke, reported from northern Arizona, and *V. vorhiesi* Stahnke, reported from southeastern Arizona (both "Stahnke inscrutables"). These species have a shorter carapace than *V. ladipicola*. In *V. jonesi* the carapace is shorter than the fifth metasomal segment and in *V. vorhiesi*, it is less than or equal to the fifth metasomal segment, unlike *V. lapidicola* whose carapace is longer.

Redescription based on lectotype

Color. Carapace, tergites, legs, and metasoma yellow to orange-brown with slight dark brown variegations. Ocular tubercle colored black and lightly traversed by the median furrow. Telson yellow-orange with two brown stripes running longitudinally along ventral surface.

Carapace (Fig. 12). Ratio of median eyes location (from anterior edge)/carapace length 0.32; median eyes and tubercle width/carapace width at that point 0.18. Anterior edge emarginate. Carapace covered with scattered coarse granules with a few interspersed larger granules. Posterior median furrow deep and conspicuous, ending about one third the length of the carapace from the anterior margin.

Mesosoma. Median carina on tergites I–II obsolete, and strong on tergites III–VI. Tergite VII with strong median carina on anterior half and strong dorsal lateral and lateral supramedian granular carinae.

Genital Operculum. Genital papillae protruding from posterior edge of sclerites of male lectotype; sclerites separated on posterior one-fifth of female paralectotype.

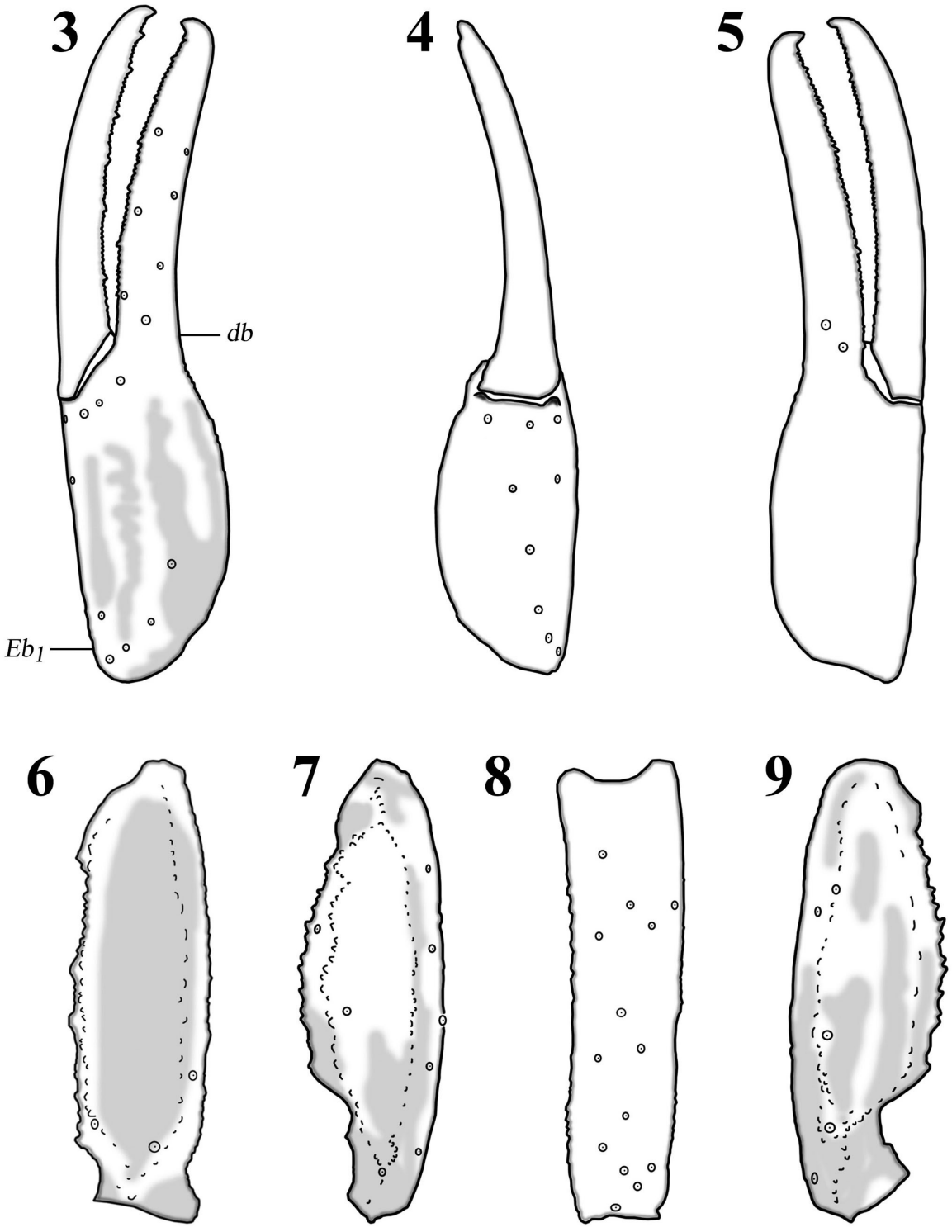
Chelicerae. Dorsal edge of movable finger with two subdistal (*sd*) denticles; ventral edge of movable finger smooth with well developed serrula on distal half.

Pectines. Pectinal tooth count 14/14. Middle lamellae 5/6.

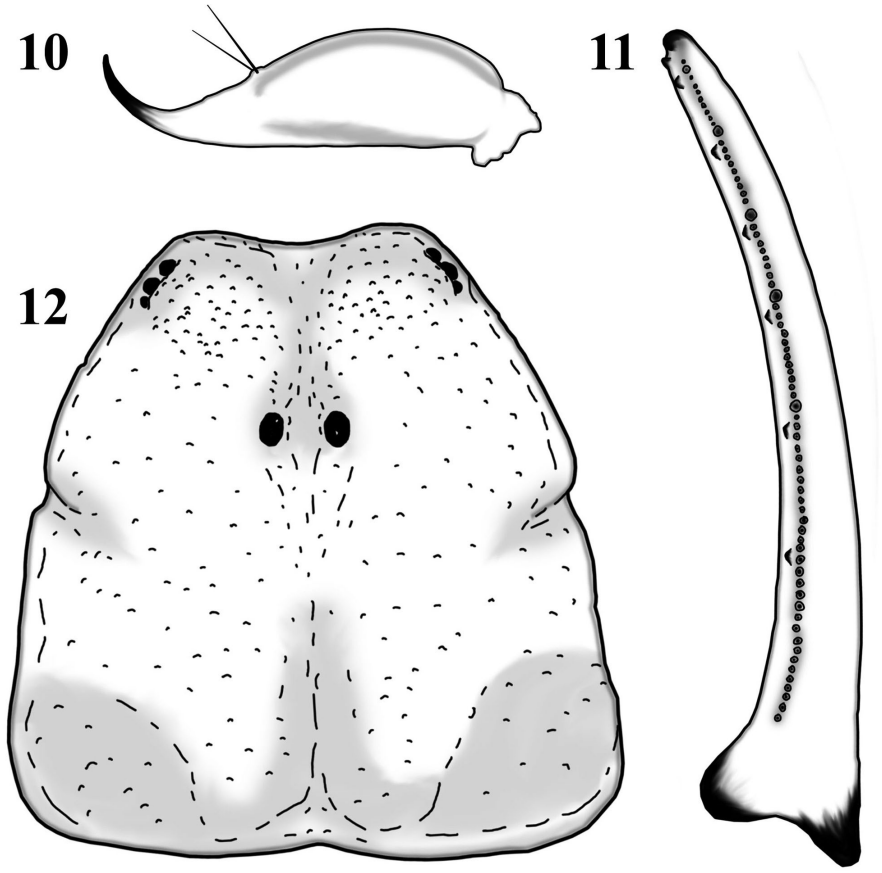
Metasoma. Ratio of segment I length/width 0.79; segment II length/width 1.00; segment III length/width 1.09; of segment IV length/width 1.59; of segment V length/width 2.23. Segments I–IV: Dorsolateral and lateral median carinae strong and subtly serrate with enlarged pointed granule distally; lateral inframedian carinae I–III weakly granular and absent on segment IV; ventral lateral and ventral medial carinae smooth to finely serrate or granular. Segment V: Dorsolateral carinae smooth to finely granular; lateral median carinae weak and finely granular on basal three-fourths, obsolete on distal fourth; ventral lateral and ventral median carinae moderate, serrate; median carina continuous distally, not bifurcated. Intercarinal spaces smooth. Setal counts indiscernible.

Telson (Fig. 10). Smooth to weakly granular with minute rounded subacular tubercle flanked by two large setae. Vesicle moderately setose. Aculeus base with 8/8 LAS denticles.

Pedipalps. Trichobothrial pattern type C (see patterns in Figs. 3–9). Pedipalp ratios: chela length/palm width 4.51; femur length/width 3.03; patella length/



Figures 3–9: Trichobothrial patterns of *Vaejovis lapidicola* Stahnke, based on lectotype. **3.** Left pedipalp chela, external. **4.** Left pedipalp chela, ventral. **5.** Left pedipalp chela, internal. **6.** Right pedipalp femur, dorsal. **7.** Right pedipalp patella, dorsal. **8.** Right pedipalp patella, external. **9.** Right pedipalp patella, ventral.



Figures 10–12: *Vaejovis lapidicola* Stahnke **10.** Telson, lateral view. **11.** Pedipalp chelal finger dentition, right movable finger. **12.** Carapace, dorsal view.

width 3.42; fixed finger length/carapace length 0.90. Femur: carinae moderate and weakly granulose. Internal aspect with a few large scattered granules. Patella: dorsointernal and ventrointernal carinae smooth to feebly granular; external carinae completely smooth. Internal aspect with an oblique, slightly crenulate carina. Chela: all carinae weak and smooth except for a few granules on the inner surface of palm. Median (MD) denticles of fixed finger aligned and divided into six subrows by five outer (OD) denticles; denticle subrows flanked medially by six inner (ID) denticles. Movable finger (Fig. 11) with six subrows, five OD denticles and seven ID denticles. Movable fingers shorter than both the carapace and metasomal segment V.

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

Measurements (in mm). Lectotype: total length 14.64; carapace length 2.21; mesosoma length 3.86; metasoma length 6.64; Metasoma: segment I length/width 0.85/1.08; segment II length/width 1.04/1.04; segment III length/width 1.08/0.99; segment IV length/width 1.53/0.96; segment V length/width 2.14/0.96. Telson: length 1.93; vesicle length/width/depth 1.20/0.75/0.75; aculeus length 0.73. Pedipalps: total length 7.08; femur length/width 1.79/0.59; patella length/width 2.09/0.61; chela length 3.20; palm length/width/depth 1.32/0.71/0.71; movable finger length 1.55; fixed finger length 2.00. Paralectotype (some parts missing, see "Type Data"): carapace length 4.00; mesosoma length 7.48; Metasoma: segment I length/width 1.79/2.07; segment II length/width 2.00/1.86; segment III length/width 2.09/1.79; segment IV length/width 2.92/1.81; Pedipalps: femur length/width 3.51/1.06; patella length/width 3.67/1.15; chela length 6.24; palm length/width/depth 2.56/1.32/ 1.48; movable finger length 3.67; fixed finger length 3.08.

Variation. The male lectotype is much smaller than the paralectotype but is otherwise similar in color and structure. The male lectotype has one more pectinal tooth per comb (14/14) than the female paralectotype (13/13). The specimens also differ in the following morphometrics ratios (in mm): pedipalp femur length/width 3.03 in male, 3.31 in female metasomal segments I–III length/width 0.79/1.00/1.09 in male, 0.86/1.08/1.17 in female; carapace length/pedipalp movable finger length 1.43 in male, 1.09 in female.

Material Examined (other than types). *Vaejovis vorhiesi* Stahnke, 1940, Miller's Canyon, Huachuca Mountains, Cochise County, Arizona, USA (type locality), female, 23 July 1958 (M. Soleglad, D. Douglass). *Vaejovis paysonensis* Soleglad, 1973, USA, Payson, Gila County, Arizona, USA (type locality), female, 2001 (D. Vernier).

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References

FET V., M. E. SOLEGLAD & M. S. BREWER. 2006. Laterobasal aculear serrations (LAS) in scorpion family Vaejovidae (Scorpiones: Chactoidea). *Euscorpius,* 45: 1–19.

SISSOM, W. D. 2000. Family Vaejovidae Thorell, 1876. Pp. 503–553 *in* Fet, V., W.D. Sissom, G. Lowe & M.E. Braunwalder. *Catalog of the Scorpions of the World* (1758-1998). New York, NY: New York Entomological Society, 690 pp.

SISSOM, W. D. & O. F. FRANCKE. 1981. Scorpions of the genus *Paruroctonus* from New Mexico and Texas (Scorpiones, Vaejovidae). *Journal of Arachnology*, 9(1): 93–108.

STAHNKE, H. L. 1939. *The Scorpions of Arizona* (Ph.D. Thesis, unpublished). Iowa State College, 184 pp.

STAHNKE, H. L. 1940. The scorpions of Arizona. *Iowa State College Journal of Science*, 15(1): 101–103 (Thesis Abstract).

STAHNKE, H. L. 1970. Scorpion nomenclature and mensuration. *Entomological News*, 81: 297–316.

STAHNKE, H. L. 1971. Some observations of the genus *Centruroides* Marx (Buthidae, Scorpionida) and *C. sculpturatus* Ewing. *Entomological News*, 82: 281–307.

STAHNKE, H. L. 1974. Revision and keys to the higher categories of Vejovidae. *Journal of Arachnology*, 1(2): 107–141.

SOLEGLAD, M. E. 1973. Scorpions of the Mexicanus group of the genus *Vejovis*. *Wasmann Journal of Biology*, 31(2): 351–372.

SOLEGLAD, M. E. & V. FET. 2006. Contributions to scorpion systematics. II. Stahnkeini, a new tribe in scorpion family Vaejovidae (Scorpiones: Chactoidea). *Euscorpius*, 40: 1–32.

SOLEGLAD, M. E. & W. D. SISSOM. 2001. Phylogeny of the family Euscorpiidae Laurie, 1896: a major revision. Pp. 25–111 *in* Fet, V. & P. A. Selden (eds.) *Scorpions 2001. In Memoriam Gary A. Polis*. British Arachnological Society, Burnham Beeches, Bucks.

VACHON, M. 1974. Étude des caractères utilizés pour classer les vamilies et les genres de Scorpiones (Arachnida). I, Les trichobothriaux et types de trichobothriotaxie chez les scorpions. *Bulletin du Muséum National d'Histoire Naturelle (Paris),* ser. 3, 104: 857–958.