



Two new species of cave crickets of the genus *Eremogrylodes* (Orthoptera: Myrmecophilidae: Bothriophylacinae) from Iran

Два новых вида пещерных сверчков рода *Eremogrylodes* (Orthoptera: Myrmecophilidae: Bothriophylacinae) из Ирана

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Abstract. Two new species, *Eremogrylodes spinulatus* sp. nov. and *E. balouchi* sp. nov., are described from the south of Iran. These crickets were collected in caves located in Fars and Sistan & Balouchestan Provinces. They differ from other Iranian congeners mainly in some distinct characters of ventral ectoparameres in the male genitalia, namely structure of distal and proximal sclerites of ventral ectoparamere, and shape of dorsal ectoparamere and rachis.

Резюме. С юга Ирана описаны два новых вида: *Eremogrylodes spinulatus* sp. nov. и *E. balouchi* sp. nov. Эти сверчковые были собраны в пещерах, расположенных в провинции Фарс и в провинции Систан и Белуджистан. Они отличаются от других иранских видов того же рода главным образом некоторыми заметными признаками вентральных эктопарамеров в гениталиях самца, а именно строением дистального и проксимального склеритов вентрального эктопарамера, а также формой дорзального эктопарамера и рахиса.

Key words: taxonomy, Iran, Orthoptera, crickets, Myrmecophilidae, Bothriophylacinae, *Eremogrylodes*, new species

Ключевые слова: таксономия, Иран, сверчковые, Orthoptera, Myrmecophilidae, Bothriophylacinae, *Eremogrylodes*, новые виды

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Introduction

Recently, a new stage in the study of the subfamily Bothriophylacinae in Iran and nearest countries started (Gorochov, 2017; Tahami et al., 2017). In these papers, four new species and three new subspecies of the genus *Eremogrylodes* Chopard, 1929 were discovered in numerous caves

from different provinces of Iran, one new subspecies of this genus from Turkey and three new species of the genus *Bothriophylax* Miram, 1934 (usually living in burrows of rodents and reptiles) from Iran, Armenia and United Arab Emirates were described, and three older species [*E. major* Chopard, 1960 from Afghanistan, *E. monodi* Chopard, 1929 from North Africa, and *B.? richteri*

(Chopard, 1959) from Iran] were redescribed on the base of their type material.

In the present paper, two additional new species of *Eremogrylodes* are described from two caves located in the south of Iran:

1) Chah Doozakhi Cave is a natural karst cave of almost 150 meters in the length, located in the south of Fars Province. The cave entrance is a 15 m pit that opens into the small first hall; there are also two large halls located on opposite sides of the first hall; the biggest hall has a small water pond at the end. Crickets were mostly seen and collected from the first hall and the large hall without water. The cave was visited in winter; temperature and humidity were measured as 25°C and 42.5% near the entrance, and 20.7°C and 44.3% in the middle zone (where crickets were seen and collected).

2) Sedaki Cave is also a natural karst cave located in the south-east of Sistan & Balouchestan Province. The cave is much bigger than first one (more than three times), and with a number of pits inside. Crickets were seen only in the first hall with a dead end. In the depth of this cave, the observation of crickets is less likely. This cave was also visited in winter; temperature and humidity were measured as 24°C and 43.5% near the entrance, and 23.7°C and 41% in the first hall (where crickets were seen and collected).

All the material on these new species are deposited in the following institutions: Zoological Museum, Collection of Biology Department, Shiraz University, Shiraz, Iran (ZM-CBSU); Zoological Institute, Russian Academy of Sciences, St Petersburg (ZIN).

Taxonomic part

Tribe **Bothriophylacini** Miram, 1934

Genus *Eremogrylodes* Chopard, 1929

Eremogrylodes spinulatus

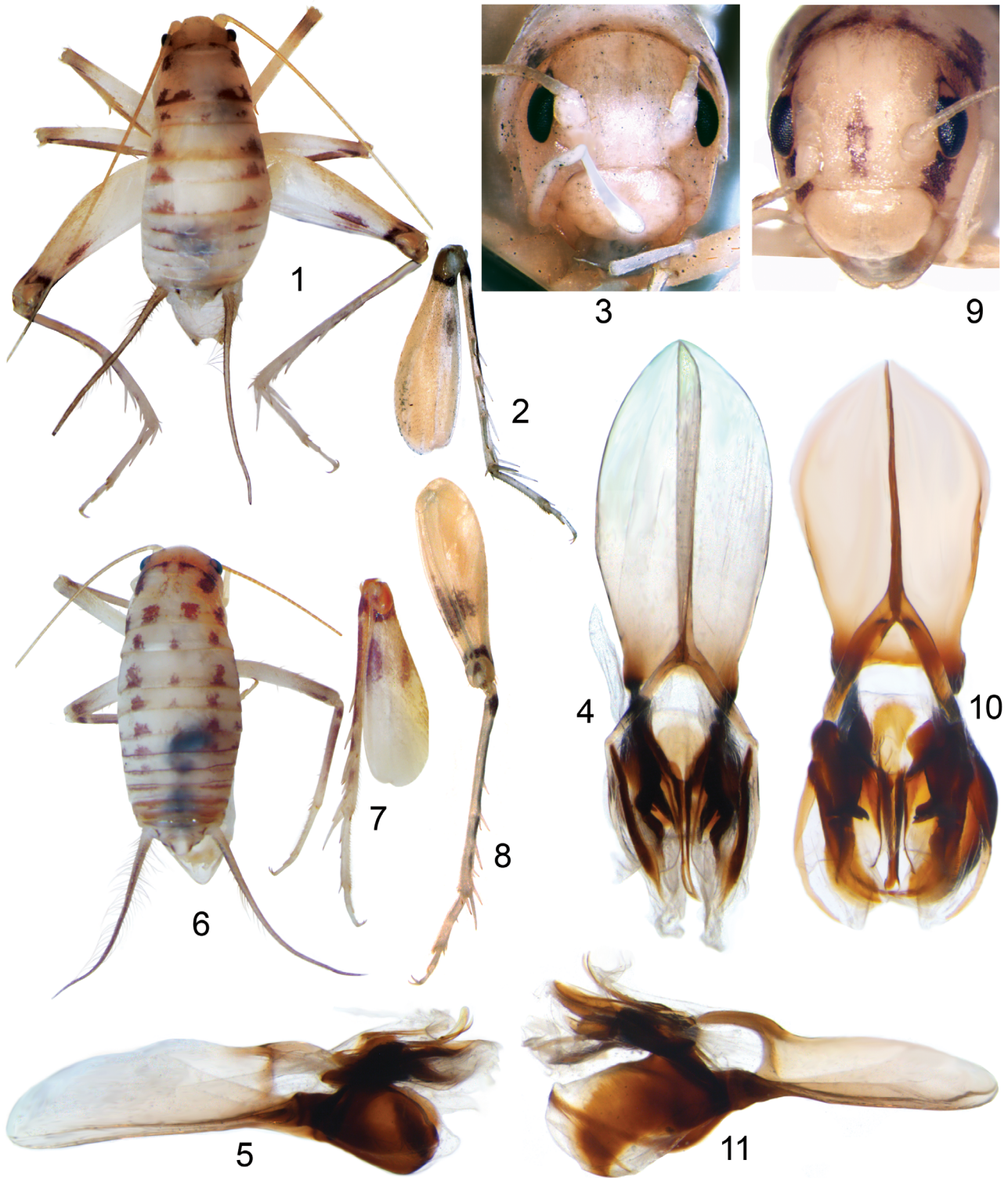
Tahami et Gorochov, **sp. nov.**

(Figs 1–5, 12–17)

Holotype. Male, **Iran**, *Fars Prov.*, Darab County, Zarin Dasht Vill., 28°02'N, 54°44'E, Chah Doozakhi Cave, 16.I.2018, M. Tahami, S. Sadeghi (ZM-CBSU).

Paratypes: 2 males and 1 female, same data as for holotype (ZIN and ZM-CBSU).

Description. Male (holotype). Habitus and body structure typical of other *Eremogrylodes* congeners. Body colouration (Fig. 1) with pattern similar to that of *E. persicus* Tahami et Gorochov, 2017: head whitish pale with a few very small light brownish marks between antennal cavities, with dark brown most part of eyes and with light brown upper (lacking facets) third of eyes; pronotum with two brown spots (a pair of rather large lateral spots and a pair of small medial ones) along anterior edge, and with two pairs of rather large brown spots along posterior edge; each lateral of these anterior and posterior spots connected with nearest medial spot by narrow brown stripe along anterior and posterior pronotal edges, respectively; mesonotum with three small brownish spots (but median one light brownish and poorly distinct); metanotum and two anterior abdominal tergites with a pair of rather large brownish spots; other abdominal tergites with brownish short transverse stripes (instead of latter spots), but these stripes poorly distinct to indistinct on last tergites, and tenth abdominal tergite with a pair of distinct brown spots located near medial parts of cercal bases; legs with a pair of small brownish grey subapical spots (outer and inner) on each femur (these spots lighter on fore and middle femora), with additional light brownish to greyish area on apical part of hind femur and on middle part of its outer and inner surfaces, with brown small area on dorsal half of each tibia near its base, and with brownish grey longitudinal dorsal stripe on rest part of each tibia (but this stripe on fore and middle tibiae clearly lighter); other body parts uniformly light, but each cercus with a pair of longitudinal greyish stripes (on inner and outer surfaces). Hind legs with right tibia having four outer and five inner dorsal (non-apical) spines, and with left tibia having four outer and six inner dorsal spines; genital plate somewhat longer than tenth abdominal tergite and epiproct together, with apex obliquely truncated in profile and having more or less acute-angled dorsoapical lobules (their apices almost in contact with each other); cerci long, two-thirds of body length. Genitalia similar to those of *E. persicus* and *E. iranicus* Tahami et Gorochov, 2017 in development of long posteromedial hook of ventral ectoparamere, but distinguished by following features: distal sclerite of this ectoparamere more S-shaped dorsally;



Figs 1–11. *Eremogryllodes* Chop., male. 1–5, *E. spinulatus* sp. nov., holotype (1) and paratype (2–5); 6–11, *E. balouchi* sp. nov., holotype (6, 7, 9, 10) and paratype (8, 11). Body from above (1); same but without some legs (6); left (2) and right (7, 8) hind legs, outer (2, 7) and inner (8) views; head in front (3, 9); genitalia from above (4, 10) and from side (5, 11).

proximal sclerite of this ectoparamere with additional spinule between above-mentioned hook and base of distal sclerite (Figs 14, 15) (latter sclerite somewhat resembling that of *E. bifurcatus* Tahami et Gorochov, 2017, but in *E. bifurcatus*, its spinule and hook short, rather thick, located on one base and almost equal to each other in size); V-shaped endoparameral sclerite slightly similar to that of *E. major* Chopard, 1960 but having somewhat wider basal part and more lateral position of its anterior projection (Fig. 12); dorsal ectoparamere almost as in other Iranian congeners but having medial branch visible only in posterior part (Fig. 13); sacculus and endoparameral apodeme also similar to those of other congeners with male genitalia studied (Figs 4, 5); rachis with both apical lobules long and narrow, arcuately curved upwards, semisclerotized but having apices membranous and hooked, and with right apical lobule somewhat widened in distal half (Figs 16, 17).

Variations. Sometimes head (except for eyes) and mesonotum uniformly light (Fig. 3), darkened spots on pronotum poorly distinct, and such spots on other tergites smaller and light brownish; tibiae slightly lighter or slightly darker (dorsal darkened stripe almost indistinct on fore and middle tibiae in one paratype and more distinct on hind tibia in other paratype; Fig. 2); number of dorsal spines on hind tibia varied from three/five (outer/inner) to four/four and four/five.

Female. Colouration and external structure of body as in males. Shape and structure of ovipositor and genital plate as in female of *E. persicus*. Number of spines on each hind tibiae three/five (outer/inner).

Length in mm. Body: male 8.1–8.6, female 7.3; pronotum: male 1.4–2.0, female 1.8; fore femora: male 3.2–3.8, female 2.4; fore tibiae: male 3–3.5, female 2.8; middle femora: male 3.2–3.8, female 2.5; middle tibiae: male 3.1–3.6, female 2.8; hind femora: male 5–6, female 5; hind tibiae: male 6–6.9, female 5; hind basitarsus: male 1.8–2.4, female 1.6; ovipositor 3.6.

Comparison. The new species is distinguished from most similar *E. iranicus* and *E. persicus* in the above-mentioned characters of male genitalia, in particular by the presence of an additional spinule on the ventral ectoparamere between its posteromedial hook and distal sclerite (from *E. p. torangae* Tahami et Gorochov, 2017 and *E. p. lari* Tahami et

Gorochov, 2017 having a similar spinule on medial surface of the above-mentioned hook, by another location of this spinule and its presence on the both ectoparameres, but in these subspecies, it is developed only on right ectoparamere or only on left ectoparamere, respectively). From *E. bifurcatus*, the new species differs in this spinule thicker, the posteromedial hook of ventral ectoparamere distinctly shorter, and these spinule and hook located not on the same base; and from the other congeners, in this spinule absent, and this hook clearly shorter or absent.

Etymology. The new species name originates from the Latin word “spinula” (spinule, small spine).

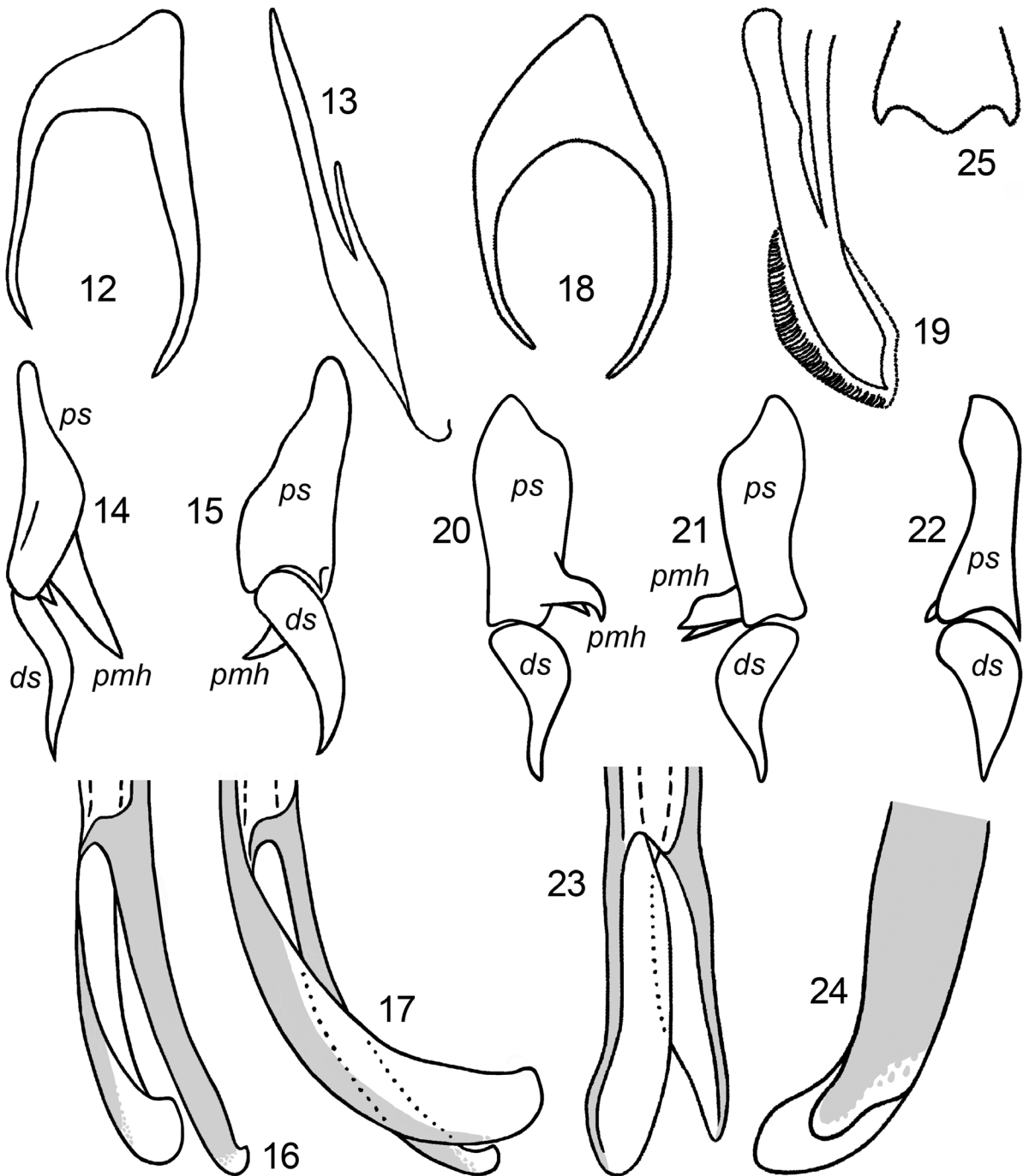
Eremogrylodes balouchi

Tahami et Gorochov, **sp. nov.**

Holotype. Male, Iran, Sistan & Baluchestan Prov., Khash County, Irandegan Vill., 27°46'N, 61°08'E, Sedaki Cave, 7.XII.2017, M. Tahami, S. Sadeghi (ZM-CBSU).

Paratypes. 1 male, 1 female and 1 nymph of female, same data as for holotype (ZIN and ZM-CBSU).

Description. Male (holotype). General appearance more or less similar to that of *E. spinulatus* **sp. nov.** but with following differences: head with more distinct light brown vertical spot between antennal cavities, with brown vertical band on epicranium under each eye, with light greyish brown area near posterodorsal part of eye, and with eyes as in this species (Fig. 9); pronotum with brownish grey spots near anterior edge similar to those of *E. spinulatus* and with four rather large spots of same colour near posterior edge (latter spots not connected with each other by darkened stripes; Fig. 6); meso- and metanotum with five spots of same colour (a pair of lateral spots rather large, but others somewhat smaller; Fig. 6); three anterior abdominal tergites with similar spots, but lateral spots very small, and median spot almost indistinct; other abdominal tergites (except for last one) with a pair of light brownish transverse stripes on each tergite (these stripes on eighth and ninth tergites fused with each other dorsally; Fig. 6); last tergite with a pair of short greyish brown stripes near medial parts of cercal bases only; epiproct and paraprocts with lateral sides also greyish brown (Fig. 6); legs similar in coloura-



Figs 12–25. *Eremogrylloides* Chop. **12–17,** *E. spinulatus* sp. nov., paratype; **18–25,** *E. balouchi* sp. nov., holotype (18–22) and paratypes (23, 24, 25). Male genitalia: right V-shaped endoparameral sclerite from above (12, 18); left dorsal ectoparamere from above (13, 19); left (14, 20) and right (15, 21, 22) ventral ectoparameres from above (14, 20, 21) and from side (15, 22); distal part of rachis from above (16, 23) and from side (17, 24). Female genital plate without base from below (25). Abbreviations: *ds*, distal sclerite; *pmh*, posteromedial hook; *ps*, proximal sclerite.

tion to those of *E. spinulatus*, but dorsal surface of fore tibia without darkened stripe in middle part, middle tibia with slightly darkened stripe running along most part of dorsal surface, and hind leg

with two light brown areas on middle part of outer femoral surface (Fig. 7); cercus with darkened longitudinal outer and inner stripes. Hind tibia with four outer and four inner dorsal (non-apical)

spines; genital plate similar to that of *E. spinulatus*, but its dorsoapical lobules somewhat shorter and obtuse-angled in profile as well as not in contact with each other. Genitalia clearly distinguished from those of other congeners: endoparameral apodeme somewhat shorter, and sacculus larger (Figs 10, 11); each V-shaped endoparameral sclerite as in Fig. 18; dorsal ectoparamere with widened distal half having numerous transverse wrinkles on its semimembranous lateral part (Fig. 19); ventral ectoparamere dorsally with proximal sclerite wider near basal part, with posteromedial hook bifurcated and directed more medially than posteriorly (both spinules of this hook rather short: dorsal spinule directed upwards and medially; ventral spinule, downwards and medially as well as slightly posteriorly), and with distal sclerite moderately short and strongly widened in proximal half (Figs 20–22); apical lobules of rachis not long and not very narrow, laterally sclerotised, and with apices more or less rounded and somewhat curved upwards (these lobules different in length, and in width of their apices; Figs 23, 24).

Variations. Paratype male with pronotum almost lacking both medial spots along anterior edge; number of dorsal spines on its hind tibia four/five (outer/inner); colouration of dorsal surface of hind tibia varied as in *E. spinulatus* sp. nov.; genitalia in this male with right ventral ectoparamere deformed and probably reversed (twisted?): posteromedial hook single and located almost laterally; shallow anterior notch of proximal sclerite situated also laterally but not medially (i.e. not as in holotype).

Female. Colouration and structure of body as in males, but all medial spots on pronotum strongly reduced to vanished, and number of dorsal spines on hind tibia three/five; genital plate with sinuate posterior edge having median lobe rather wide and almost triangular (Fig. 25); ovipositor practically indistinguishable from that of *E. spinulatus* sp. nov.

Length in mm. Body: male 8.5, female 6.3; pronotum: male 1.8–2, female 1.8; fore femora: male 2.8–3, female 2.4; fore tibiae: male 3–3.2, female 2.7; middle femora: male 3.1, female 2.7; middle tibiae: male 3–3.2, female 2.8; hind femora: male

5.3–5.5, female 3.9; hind tibiae: male 5.5–5.8, female 3.9; hind basitarsus: male 1.8–1.9, female 1.6; ovipositor 3.

Comparison. The new species is most similar to *E. bifurcatus* in the posteromedial hook of ventral ectoparamere bifurcated, but it is distinguished from the latter species by the dorsal ectoparamere distinctly wider in the distal half, different shape of proximal and distal sclerites in the ventral ectoparamere, posteromedial hook of this ectoparamere with longer spinules which are also directed less posteriorly, and rachis with the apical lobules less arcuate in the profile. From all the other congeners with the male genitalia studied, the new species differs in the dorsal ectoparamere of characteristic structure, posteromedial hook of ventral ectoparamere bifurcated or clearly shorter and less directed backwards, and peculiar shape of proximal and distal sclerites in the latter ectoparamere.

Etymology. The new species is named after a people tribe living in Balouchestan, where this species was collected. These people are called Balouchi in spoken language.

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References

- Gorochov A.V. 2017. Order Orthoptera, superfamily Grylloidea. In: van Harten A. (Ed.). *Arthropod fauna of the United Arab Emirates*, 6: 21–35. Abu Dhabi: Department of the President's Affairs.
- Tahami M.S., Gorochov A.V. & Sadeghi S. 2017. Cave and burrow crickets of the subfamily Bothriophylacinae (Orthoptera: Myrmecophilidae) in Iran and adjacent countries. *Zoosystematica Rossica*, 26(2): 241–275.