

On some species of the genus *Loxoblemmus* SAUSS. (*Orthoptera: Gryllidae*) from North Korea

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Received: 15 March 1992

Accepted for publication: 15 Oct. 1992

GOROCHOV A. V., KOSTIA D. 1993. On some species of the genus *Loxoblemmus* SAUSS. (*Orthoptera: Gryllidae*) from North Korea. Acta zool. cracov. 35(3): 427-433.

Abstract. Five species of the genus *Loxoblemmus* SAUSS., 1877 from North Korea are reviewed. Two new species are described: *Loxoblemmus coreanus* sp. n. and *L. spectabilis* sp. n. A key to all species is given.

Key words: *Gryllidae*, *Loxoblemmus*, taxonomy, allometry, North Korea.

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Loxoblemmus coreanus GOROCHOV & KOSTIA sp. n.

(Figs 1, 2, 5)

Male (holotype). Size rather large and stout of the genus. Head with broad and relatively short face. Rostrum rather short, clearly convex. Face broadened beneath the eyes, without projecting angles on sides, slightly flattened with two convexities in the central part under median ocellus, and with inclined concavities in the area of median ocellus and on both sides of middle convexities. Concavities in central part with distinct transversal ridges.

Head black with pale pattern on the upper side (as in Fig. 1) and with small brown mark in area of median ocellus. Distal parts of mandibles and labrum brown (as in Fig. 2). Antennae dark-brown with a little more lighter marks on scapus. Second segment of antennae darkish. Scapus without trace of process, but with very feeble projection on the top.

Palpi pale, relatively long (the last segment of maxillary palpi 3.1 mm in length and last segment of labial palpi 2.3 mm). Distal part of last segments of labial and maxillary palpi darkish. Pronotum typical of the genus, its sides slightly diverging anteriorly. Upper half of pronotal lobes black, the lower one pale-brown. Disk of pronotum with blackish and pale-brown marks. Fore wings extending nearly to the tip of abdomen. The venation of tegmina as in Fig. 5. Stridulatory organ with 4 oblique veins. Apical field of elytra relatively long. Dorsal surface of fore wings brownish. Upper half of lateral field blackish,

the lower part nearly transparent with whitish veins. Legs typical of the genus, brownish with dark marks. Hind femora with black apices. Abdomen dark dorsally and pale ventrally. Distal half of genital plate dark. Cerci greyish-brown. Genitalia with clearly produced and deeply incised middle part of posterior margin of epiphallus. Generally genitalia very similar to those in most species of the genus.

V a r i a t i o n . An allometric variation is shown by the size of rostrum. The distance between the median ocellus and the top of the rostrum is longer in larger specimens than in smaller ones. 3 oblique veins can be developed in the fore wings.

Female. Very similar to many other species of the genus. Coloration similar to male. Tegmina nearly reaching apex of abdomen. Ovipositor little longer than hind femur.

Length. Body of male 15-18 mm, female 16 mm; pronotum of male 2.5-2.9 mm, female 3-3.2 mm; tegmina of male 9.5-10 mm, female 9.4-9.6 mm; hind femur of male 9.3-10.5 mm, female 10.3-10.9 mm; ovipositor 13 mm.

M a t e r i a l . **North Korea:** Chagang-do prov., Huichon (40°11'126°17') 24-27 VIII 1990, 3 ♂ (including holotype), 2 ♀, coll. D. KOSTIA, A. NADACHOWSKA & E. WARCHAŁOWSKA. All materials are deposited in the Institute of Systematics and Evolution of Animals, Polish Academy of Sciences, Cracow (holotype ♂ and 2 paratypes – ♂ and ♀) and in the Zoological Institute of the Academy of Sciences, St. Petersburg (paratypes – 1 ♂ and 1 ♀).

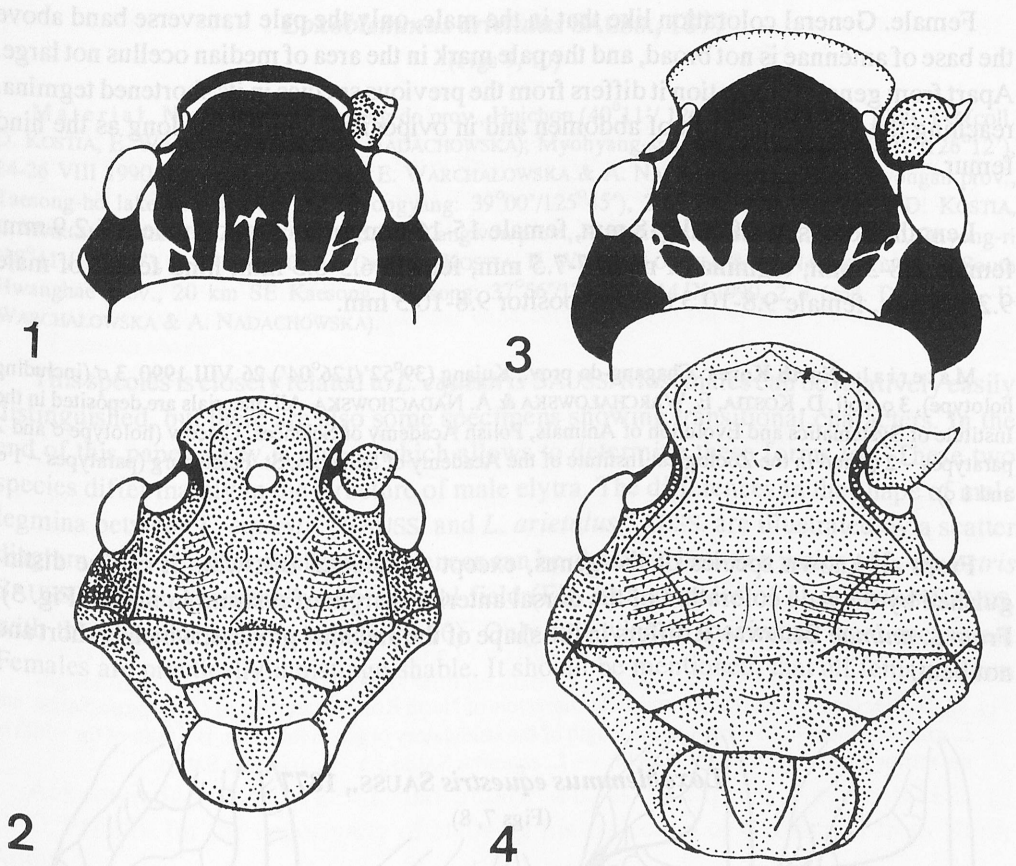
Among the species of the genus *Loxoblemmus* SAUSS., which can be found sympatric with the new species, *L. coreanus* sp. n. is closely related to *L. equestris* and *L. arietulus* (see remarks about the last two species further in the text).

Although the differences in the shape of rostrum in males between these species are very small (in the new species it is a little larger), *L. coreanus* sp. n. can be easily recognized by having the scapus practically without a trace of the process (even in larger specimens). In the largest males of *L. equestris* and *L. arietulus* this process is well developed, although in the smallest ones it may be lacking. The new species differs from *L. equestris* also in having 3-4 oblique veins in the stridulatory organ and a broader dorsal part of the male tegmina (Fig. 7). From *L. arietulus* it can be distinguished by the longer apical field of the male tegmina (Fig. 9). In comparison with other members of the genus it clearly differs in labial palpi of normal length, in the form of the male face, shape of the median part of the posterior epiphallic margin, ovipositor length and general coloration.

Loxoblemmus spectabilis GOROCHOV & KOSTIA, sp. n.

(Figs 3, 4, 6)

Male (holotype). Size as in previous species. Head with broad, but not short face, distinctly broadened beneath the eyes. Rostrum relatively large and convex. Morphological details of the surface of face similar to *L. coreanus*. Head dark-brown with pale pattern on the upper side (as in Fig. 3) and with large mark in area of median ocellus and marks on mandibles and labrum (as in Fig. 4). Antennae brownish with pale marks on scapus. Scapus with small, but distinct process at the apex. Palpi as in previous species (length of last segment of maxillary and labial palpi respectively 2.8 mm and 1.8 mm). Pronotum



Figs 1-4. Male head: 1,3 – dorsal view, 2,4 – frontal view. Dark parts are shown in black and dotted. 1, 2 – *Loxoblemmus coreanus* GOROCHOV & KOSTIA, sp. n.; 3, 4 – *L. spectabilis* GOROCHOV & KOSTIA, sp. n.

typical of the genus, its sides distinctly diverging anteriorly, with dark-brown lateral lobes (only their anterior part along lower edge with very small, pale longitudinal mark). Disk of pronotum covered with dark-brown and lighter marks. Tegmina visibly shorter than abdomen. Venation of tegmina as in Fig. 6. Stridulatory organ with 4 oblique veins. Apical field relatively short. Coloration of dorsal surface of tegmina like that in previous species. Lateral field dark-brown in upper half and nearly transparent with pale greyish veins in lower half. Legs and abdomen as in previous species. Median part of posterior margin of epiphallus weakly produced and not deeply incised.

Variation. Allometric variation the same type as observed in *L. coreanus*. However, the variation in the shape of the anterior margin of rostrum is also remarkable. The anterior margin can be slightly curved and even with small excision in the middle. Stridulatory organ sometimes with 3 oblique veins.

Female. General coloration like that in the male, only the pale transverse band above the base of antennae is not broad, and the pale mark in the area of median ocellus not large. Apart from general coloration it differs from the previous species in its shortened tegmina, reaching the 5th or 6th tergite of abdomen and in ovipositor, which is as long as the hind femur.

Length. Body size of male 18 mm, female 15-16 mm; pronotum of male 2.7-2.9 mm, female 2.8-3 mm; tegmina of male 7-7.5 mm, female 6.3-6.5 mm; hind femur of male 9.2-9.5 mm, female 9.8-10.3 mm; ovipositor 9.8-10.3 mm.

Material. North Korea: Chagang-do prov., Kujang (39°52'/126°04') 26 VIII 1990, 3 ♂ (including holotype), 3 ♀, coll. D. KOSTIA, E. WARCHAŁOWSKA & A. NADACHOWSKA. All materials are deposited in the Institute of Systematics and Evolution of Animals, Polish Academy of Sciences, Cracow (holotype ♂ and 2 paratypes – 2 ♀) and in the Zoological Institute of the Academy of Sciences, St. Petersburg (paratypes – 1 ♂ and 1 ♀).

From all known species of the genus, except *L. animae* BHOWM., it can be distinguished by the pale coloration of the dorsal anterior margin of rostrum in males (Fig. 3). From *L. animae* BHOWM. it differs in the shape of the antennal process, which is short and not bent.

Loxoblemmus equestris SAUSS., 1877

(Figs 7, 8)

Material. North Korea: Chagang-do prov., Huichon (40°11'/126°17') 24-27 VIII 1990, 2 ♂ (coll. D. KOSTIA, E. WARCHAŁOWSKA & A. NADACHOWSKA); Myohyang-san Mts., Hyangsan (40°01'/126°12'), 24-26 VIII 1990, 1 ♂ (coll. D. KOSTIA, E. WARCHAŁOWSKA & A. NADACHOWSKA); South Pyongan prov., Taesong-ho lake near Pyongyang (Pyongyang: 39°00'/125°45'), 20 VIII 1990, 1 ♂ (coll. D. KOSTIA, E. WARCHAŁOWSKA & A. NADACHOWSKA); South Hwanghae prov., King Kongmin's Tomb near Kaesong (Kaesong: 37°56'/126°33'), 14 IX 1990, 4 ♂ (coll. D. KOSTIA, E. WARCHAŁOWSKA & A. NADACHOWSKA); 20 km SE Kaesong 14-16.IX.1990, 2 ♂, (coll. D. KOSTIA, E. WARCHAŁOWSKA & A. NADACHOWSKA).

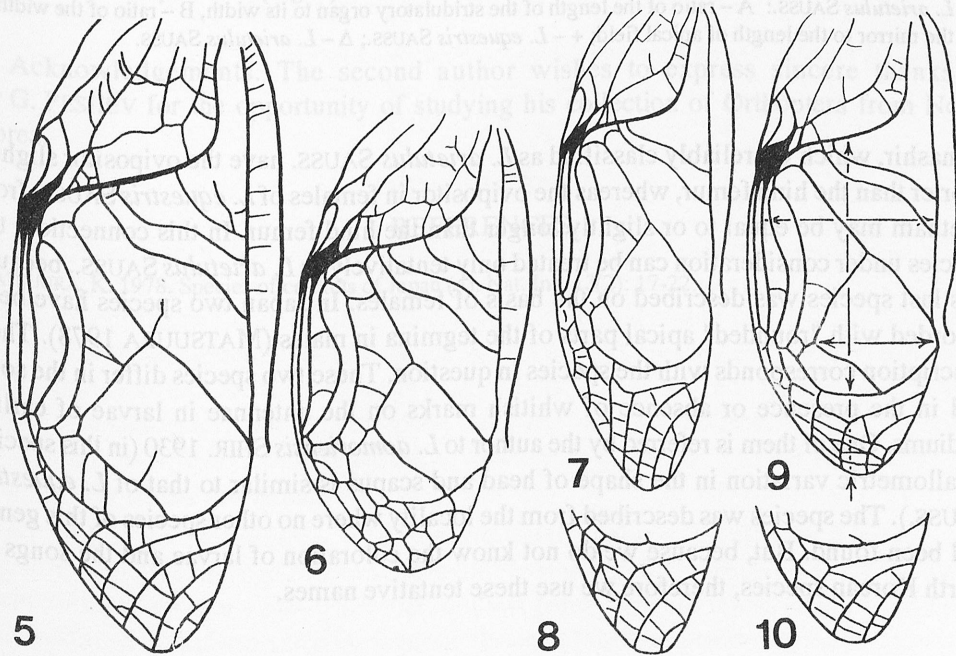
This species was described on the basis of material from Sulawesi. The type specimens have been studied by the first author. They hardly differ from small specimens of North Korea. As it was mentioned above, in small specimens the antennal process may be absent and they have rather narrow face. In larger specimens the face is broadened (allometry) and the antennal process is developed to a various degree, in shape it resembles *L. spectabilis* sp. n. In his paper concerning the biology of Japanese species of the genus *Loxoblemmus* SAUSS., MATSUURA (1978) pointed out the presence of two species with tegmina "pointed" at the apex in males. Their description agrees with that of *L. equestris* SAUSS. One of these species occurs in south-eastern Asia (including Ryukyu Island), the second farther to the north. Both differ only in the presence or absence of the diapause, which occurs exclusively in the second species. It seems, that the two forms should be treated at least as subspecies.

Loxoblemmus arietulus SAUSS., 1877

(Figs 9, 10)

Material. North Korea: Chagang-do prov., Huichon ($40^{\circ}11'/126^{\circ}17'$) 24-27 VIII 1990, 1 σ (coll. D. KOSTIA, E. WARCHAŁOWSKA & A. NADACHOWSKA); Myohyang-san Mts., Hyangsan ($40^{\circ}01'/126^{\circ}12'$), 24-26 VIII 1990, 2 σ (coll. D. KOSTIA, E. WARCHAŁOWSKA & A. NADACHOWSKA); South Pyongan prov., Taesong-ho lake near Pyongyang (Pyongyang: $39^{\circ}00'/125^{\circ}45'$), 20 VIII 1990, 2 σ (coll. D. KOSTIA, E. WARCHAŁOWSKA & A. NADACHOWSKA); Kangwon prov., Kumgang-san Mts., Kosong distr., Onyong-ri ($38^{\circ}41'/128^{\circ}12'$), 8-12.09.1990, 4 σ (coll. D. KOSTIA, E. WARCHAŁOWSKA & A. NADACHOWSKA); South Hwanghae prov., 20 km SE Kaesong (Kaesong: $37^{\circ}56'/126^{\circ}33'$), 14.IX.1990, 2 σ (coll. D. KOSTIA, E. WARCHAŁOWSKA & A. NADACHOWSKA).

This species is closely related to *L. equestris* SAUSS. Most males can be relatively easily distinguished, but there are also some specimens showing transitional characters. In the end of this paper a key is given, which allows to determine these forms too. These two species differ mainly in the structure of male elytra. The differences in the shape of male tegmina between *L. equestris* SAUSS. and *L. arietulus* SAUSS. are illustrated by a scatter diagram (Fig. 11). The smallest differences can be observed between males of *L. equestris* SAUSS. with an abnormally short apical field (Fig. 8) and males of *L. arietulus* SAUSS. with the abnormally long one (Fig. 10). Only full-winged specimens were measured. Females are practically indistinguishable. It should be mentioned, that all females from



Figs 5-10. Male forewings (5-7, 9) and their apical field (8, 10); arrows in Fig. 9 show the way of measuring the length and width of stridulatory field and the length of apical field and width of mirror; 5 - *L. coreanus* GOROCHOV & KOSTIA, sp. n.; 6 - *L. spectabilis* GOROCHOV & KOSTIA, sp. n.; 7, 8 - *L. equestris* SAUSS.; 9, 10 - *L. arietulus* SAUSS.

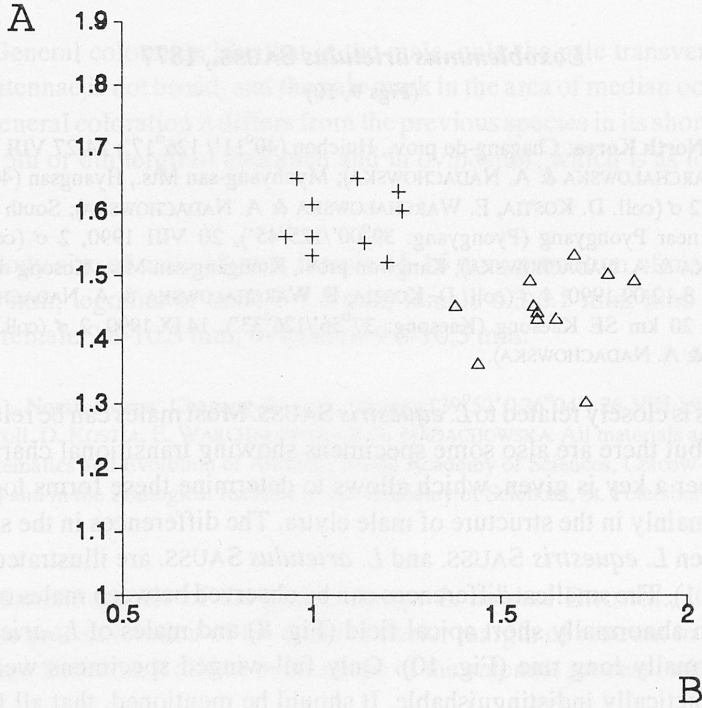


Fig. 11. Scatter diagram showing some male characters of North Korean members of *L. equestris* SAUSS. and *L. arietulus* SAUSS.: A – ratio of the length of the stridulatory organ to its width, B – ratio of the width of the mirror to the length of apical field; + – *L. equestris* SAUSS.; Δ – *L. arietulus* SAUSS.

Kunashir, which we reliably classified as *L. arietulus* SAUSS. have the ovipositor slightly shorter than the hind femur, whereas the ovipositor in females of *L. equestris* SAUSS. from Vietnam may be equal to or slightly longer than the hind femur. In this connection, the species under consideration can be treated only tentatively as *L. arietulus* SAUSS., because this last species was described on the basis of females. In Japan two species have been recorded with "rounded" apical parts of the tegmina in males (MATSUURA 1978). Their description corresponds with the species in question. These two species differ in the song and in the presence or absence of whitish marks on the antennae in larvae of earlier stadiums. One of them is referred by the author to *L. aomoriensis* SHIR. 1930 (in this species an allometric variation in the shape of head and scapus is similar to that of *L. equestris* SAUSS.). The species was described from the locality where no other species of this genus had been found. But, because we do not know the coloration of larvae and the songs of North Korean species, therefore we use these tentative names.

Loxoblemmus doenitzi STEIN, 1881

Material. North Korea: South Pyongan prov., Pyongyang, 24 VIII 1970, 1 ♂ (coll. G. PESHEV); South Hwanghae prov., 20 km SE Kaesong, 15-16 IX 1990, 2 ♀ (coll. D. KOSTIA, E. WARCHAŁOWSKA & A. NADACHOWSKA).

Key to the North Korean species of the genus *Loxoblemmus* SAUSS.

Males

1. Frontal shield of head under the eyes broadening upwardly, on sides forming various size projections directed horizontally. Scapus without distinct process. *L. doenitzi* STEIN
- Frontal shield of head under the eyes broadening downwardly or with nearly parallel side margins, without projections (Figs 2, 4). Scapus of various shape 2
2. Rostrum rather big, with broad, pale transverse band above, extending from ocelli to the front margin of rostrum. Scapus with distinct pointed process (Fig. 3) *L. spectabilis* sp. n.
- Rostrum smaller, with narrow transverse band between ocelli above (Fig. 1). Scapus of various shape 3
3. Scapus without distinct process (Fig. 1). Larger species (length of hind femur more than 9 mm) *L. coreanus* sp. n.
- Scapus in larger specimens with distinct, pointed process, in smaller ones the process may be absent. Smaller species (length of hind femur less than 9 mm) 4
4. Dorsal surface of male tegmina narrow (ratio of length of stridulatory part to its width, measured as in Fig. 9, higher than 1,5); apical field long (ratio of width of mirror to length of apical field, measured as in Fig. 9, lower than 1,3). Stridulatory fields with distinct greyish shade. Stridulatory organ with 2 oblique veins (Fig. 7) *L. equestris* SAUSS.
- Dorsal surface of male tegmina broad (ratio of length of the stridulatory part to its width lower than 1,5); apical field short (ratio of width of mirror to length of apical field higher than 1,3). Stridulatory fields without distinct greyish shade. Stridulatory organ with 2-4 oblique veins (Fig. 9) *L. arietulus* SAUSS.

Acknowledgements. The second author wishes to express sincere thanks to Dr G. PESHEV for the opportunity of studying his collection of Orthoptera from North Korea.

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