**LEPTOPHYES PUNCTATISSIMA (BOSC, 1792) NEW TO SLOVENIA  
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**Abstract** - The fourth species of the genus *Leptophyes* – *Leptophyes punctatissima* (Bosc, 1792) was finally found also in Slovenia. The finding was expected since the species is known from all the neighbouring countries. Two males of *L. punctatissima* were found on two localities in south-western Slovenia – one on Petrinjski Kras near Petrinje in 2003 and one close to Gornje Vreme near Pivka in the valley of the river Reka in 2006. We describe morphological characteristics and bioacoustics of the newly found species. *L. punctatissima* can be easily distinguished from other *Leptophyes* species living in Slovenia by the thin, curved cerci, long brown stripe on the upper side of the body and longer and characteristically marked tegmina.

KEY WORDS: Orthoptera, Phaneropteridae, new record, fauna, Slovenia

**Izvleček - LEPTOPHYES PUNCTATISSIMA (BOSC, 1792), NOVA NAJDBA V SLOVENIJI (ORTHOPTERA: PHANEROPTERIDAE)**

V Sloveniji smo našli še četrto vrsto rodu *Leptophyes* – vrsto *Leptophyes punctatissima* (Bosc, 1792). Vrsto smo pri nas pričakovali, saj je znana iz vseh sosednjih držav, do njene potrditve pa smo čakali kar nekaj let. Dva samčka vrste *L. punctatissima* smo našli na območju Krasa, enega na Petrinjskem Krasu, julija 2003, drugega pa pri vasi Gornje Vreme pri Pivki, v dolini reke Reke, avgusta 2006. Prispevek predstavlja morfološke značilnosti novo odkrite vrste in razlikovalne znake v primerjavi s sorodnimi vrstami. Predstavljene so tudi značilnosti njenega napeva. Vrsto dokaj enostavno ločimo od njej sorodnih vrst, predvsem po tankih, v sredini lokasto ukrivljenih cerkih, po dolgi rjavi proggi, ki poteka po zgornji strani telesa, od glave do konca zadka, in po sorazmerno dolgih loputicah pokrovk.

KLJUČNE BESEDE: Orthoptera, Phaneropteridae, nova najdba, favna, Slovenija

## Introduction

Recent intensive investigations of the Orthoptera-fauna of Slovenia resulted in quite a number of new species records for Slovenia (Veenvliet, 2004; Bedjanič, 2005; Gomboc & Šegula, 2005, Heller *et al.*, 2004). Some new findings and revisions are still awaiting publication. They will surely raise the number of around 145 species, which according to Gomboc *et al.* (2006) are confirmed to live in Slovenia.

One of the species we were searching for a long time is also *Leptophyes punctatissima* (Bosc, 1792). It has been found in all neighboring countries and is actually present in almost all Europe. It is distributed from the Eastern Spain to the Eastern European countries including all Balkan countries. This species was also introduced into the USA, where it is established in the Massachusetts country (Detzel, 1998). Since females lay eggs in the cracks of the bark of shrubs, international trade with ornamental plants plays also in this case an important role in spreading of *L. punctatissima* to new regions. After a lengthy search, we finally succeeded with two findings within the area of Podgorški Kras and Brkini.

In Slovenia, according to Us (1992), three species of the genus *Leptophyes* have hitherto been known: *L. albovittata* (Kollar, 1833), *L. boscii* Fieber, 1853 and *L. laticauda* (Fivaldsky, 1867). The species the most widespread in Slovenia is *L. albovittata* which may be found in warm areas throughout Slovenia, on meadows, sunny forest edges, along hedges, on succession stages and in ruderal areas. *L. albovittata* is the most frequent species of this genus in the Eastern and Central Slovenia. Regarding its distribution, it is followed by the species *L. boscii* which may be found from Primorska region to the entire Central Slovenia. It can also be found in warm areas of Štajerska, but there is no data for the north-eastern Slovenia. The species may be found along forest edges and near meadows grown with shrubs since it prefers to hide in shrubs or higher vegetation. *L. laticauda* is the most thermophilic species of the genus and may be found only in warm areas of Primorska region – in the Goriška region and in the Karst. The species is also hiding in bushes and in high vegetation, therefore not much data exists on the species.

## Materials and methods

Two adults were tracked in the shrubs and caught with a butterfly net. One male was further observed at home, photographed and additional sound recordings were carried out in the field and in an insect cage covered with a plastic net. After examination, the males were prepared and stored in the entomological collection. The species was identified on the basis of morphological characters (Ramme, 1939; Harz, 1969; Coray & Thorens, 2001; Fontana *et al.*, 2002) and by the sound.

Sounds recordings were carried with a DAT recorder SONY DAT TCD D8 and a microphone AT 845R/RW with a parabolic antenna. The analysis of the sound was made using the computer program Sound Forge 7 and Cool Edit Pro. The oscillogram and spectrogram were produced with the program Raven 1.2 Cornell Lab.

Dry specimens from both localities are kept in the collection of S. Gomboc in Kranj and original sound records are stored by B. Šegula in Ljubljana.

## Results

*L. punctatissima* was found on two localities in Slovenia, both are situated on the Karst plateau in the coastal region of Slovenia, where the climate is moderate continental, mixed with Mediterranean. Winters and springs are rather cold, continental, summers and autumns are dry and more Mediterranean-like.

Localities of *L. punctatissima* in Slovenia:

- Primorska, Petrinjski Kras, Petrinje, 16.07.1996, WGS84: 45,57296692, 13,89969388, 470 m a.s.l., Gomboc S. leg.,
- Primorska, Brkini, Gornje Vreme, 09.08.2006, WGS84: 45,65239292, 14,04426791, 358 m a.s.l., Šegula B. leg.



Fig. 1: Localities of *L. punctatissima* in Slovenia.

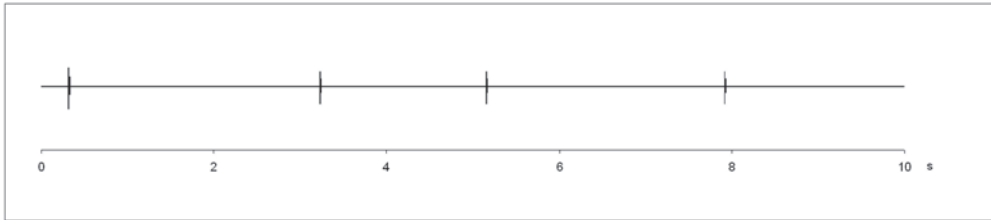
SI. 1: Karta Slovenije z označenima najdiščema vrste *L. punctatissima*.

Both males were found on shrubs close to the forest edge, where shrubs continue into karstic meadows. The specimen from Petrinjski Kras was found in a more dry area, the second one from Gornje Vreme in the valley of river Reka in more humid microclimate. Both findings were a bit of surprise for us as we searched for other gen-

era, like *Platypleis*, *Stenobothrus*, *Chorthippus*, *Euchorthippus*, *Omocestus* and others which are also common and rich in species in this area. Both males were discovered in dense vegetation, hiding on the sunny side of shrubs during the morning hours.

First specimen was identified from the dry collection material. The second one was identified already in the field, and it was collected alive for further observation and sound recordings.

The male calling song of *L. punctatissima* is audible only at a very short distance of up to 1 m. The dominant frequency of the sound is at 15 kHz. The peak frequency spectrum is reached at 30-50 kHz. For an easier finding of *L. punctatissima* in the field, a bat detector is almost indispensable equipment. Males sing in a standing position at the upper parts of stalks or branches. The sound consists of short echemes, which follow after approximately 1-3 s. The duration of each echeme is from 0.045 to 0.05 s. In *L. punctatissima* the sound can be produced by both sexes. Females usually answer to the males calling song. The sound of Slovenian specimens is typical for the species.



**Fig. 2:** Oscillogram of *L. punctatissima* calling song from the locality Gornje Vreme (temp. 24 °C).

**SI. 2:** Oscillogram vabitvenega napeva vrste *L. punctatissima* z lokalitete Gornje Vreme (temp. 24 °C).

The morphological characteristics of both males found in Slovenia were identical to the characteristics described in the literature. Recognition and identification of the specimens was thus very easy. *L. punctatissima* is close to other related species: *L. laticauda*, *L. boscii* and *L. albovittata*. The easiest way to separate it from *L. boscii* and *L. albovittata* is a brown stripe on the upper side of the body which starts at the head and continues to the end of the abdomen. In the other two, this stripe is missing. The second good characteristic is the shape of cerci which are thin, straight at the middle and then slightly curved to the inner part. The cerci of the other two species are thicker, straight, and end with a tiny tooth at the inner tip. Elytras are the longest in comparison to the other two species. As far as the third species, *L. laticauda* is concerned, the shape of its cerci are similar to *L. punctatissima*, but thicker at the basis and thinner at the tip. They are also more angularly curved in the middle. Both species also markedly differ in size - *L. laticauda* is almost twice as big as *L. punctatissima*.

The distinguishing characteristics in the case of females are slightly different. The length of ovipositor is similar to that of *L. boscii* but without the projection at the base. Tegmina in *L. boscii* are usually completely hidden under the pronotum; in *L.*

*punctatissima* they are longer and reach 1.5-2 mm over the pronotum margin, similar to that in *L. laticauda* but in this species ovipositor is much longer and specimens are also almost twice in size.

*L. punctatissima* is a cryptic-like species. This and the silent song are in most cases the main reason for a relatively sparse data from all its territory. *L. punctatissima* prefers a habitat with dense and high vegetation, mixed with shrubs. This could also be sunny forest edges, ruderal places and even gardens. It is mostly lowland species which can be found up to 1.200 m a.s.l. Adults can be found from the end of June until the end of October, with the peak in August.

The species likes to feed on *Rosa* species, *Rubus idaeus*, other *Rubus* species, *Trifolium*, *Genista*, *Urtica*, *Leontodon* and *Lamium* species (Detzel, 1998). It causes hole-like damages on the surface of leaves. Females lay eggs in cracks in the bark, usually up to 30 eggs in a season. For oviposition they usually prefer shrubs and trees.

### Discussion

Adults of *L. punctatissima* are hiding in shrubs and other high vegetation where they are hardly distinguished from their surroundings due to their green color. Due to its hidden life it is among the species whose presence is not easily detected. In addition, its sound is mostly in the ultrasound spectrum and audible to human hearing only at a very short distance of up to 1 m. All these factors result in a relatively small number of findings of the species in the field and its rather late discovery in Slovenia. Considering the biology and distribution of the species in other countries, *L. punctatissima* could be present also in some other areas of Slovenia. In the karstic south-western part it is surely more common than the current data suggest, but its exact distribution in this part of Slovenia can only be revealed by intensive field work in the next years.

Since the species occurs also in cultivated areas such as tree nurseries where it lays eggs on ornamental bushes, it can spread unintentionally into new areas. Eggs are hardly detected under the bark, and their resting stage coincides with the period of the most intensive trade in ornamental plants.

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**Fig. 3:** Adult male of *L. punctatissima*, lateral view, from the locality Gornje Vreme near Divača. Photo: B. Šegula.

**Sl. 3:** Odrasli samček *L. punctatissima*, stranski pogled, z lokalitete Gornje Vreme pri Divači. Foto: B. Šegula.



**Fig. 4:** Same as fig 3, dorsal view. Photo: S. Gomboc.

**Sl. 4:** Isti osebek kot na sliki 3, pogled od zgoraj. Foto: S. Gomboc.