

**A CONTRIBUTION TO THE KNOWLEDGE OF THE GENUS  
*PSALLUS* (HETEROPTERA: MIRIDAE) IN SERBIA**

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Identification and revision of specimens from genus *Psallus* in the Study Collection of Heteroptera at the Natural History Museum in Belgrade revealed presence of 14 species, including five new species for Serbia: *Ps. henschi*, *Ps. anaemicus*, *Ps. lentigo*, *Ps. lucanicus* and *Ps. pardalis*.

**Key words:** Heteroptera, Miridae, Phylinae, *Psallus*, Serbia

INTRODUCTION

Within the Catalogue of the Heteroptera of the Palaearctic Region (Kerzhner & Josifov 1999, Aukema *et al.* 2013), the genus *Psallus* Fieber, 1858 (subfamily Phylinae Douglas & Scott, 1865) is represented by 160 species. It is divided into following subgenera: *Apocreminus* Fieber, 1858, *Hylopsallus* Wagner, 1952, *Mesopsallus* Wagner, 1970, *Phylidea* Reuter, 1899, *Pityopsallus* Wagner, 1952 and *Psallus* Fieber, 1858. They were not systematically collected in Serbia. However, certain representatives of this

genus were included in papers on fauna of Heteroptera in Serbia (Horváth 1903, Csiki 1940, Kormilev 1936, 1938, Živojinović 1950, Janković 1963, Protić 1987, 1993/1994, 1994, 1998, 1999, 2011, 2014, 2018, Protić *et al.* 2017, Šeat 2013, Šeat & Nadaždin 2015).

Their shared characteristic is that they are all arboreal and *Quercus* spp. are host plants for most species, while they also appear less commonly on other deciduous (*Fraxinus*, *Betula*, *Crataegus*, *Fagus*) and coniferous trees (*Picea*, *Abies*, *Larix*) (Heiss & Josifov 1990, Gorczyca 1994, Wachmann *et al.* 2004, Wyniger 2004, Goßner 2008).

They also share the same position in trophic network, as they are all either zoophagous or with combined zoo-phytophagous diet (Kulenbrg 1944, Gorczyca 1990, Wyniger 2004). Young nymphs feed on pollen. The adults are predators, mostly of aphids but also of scale insects, psyllids, caterpillars, eggs of leaf beetles (Wachmann *et al.* 2004, Björkman *et al.* 2009, Jerinić-Podanović & Protić 2013). They are overwintering in stage of egg (Wagner, 1975, Endrestøl & Ødegaard, 2011). Adults mostly appear from May-June to July-August.

The goal of this paper is revision and identification of species of the genus *Psallus* in the Study Collection of Heteroptera at the Natural History Museum in Belgrade.

## MATERIAL AND METHODS

Fieldwork was performed in period 1981-2019 at 30 localities throughout Serbia, most of them in the broader region of Belgrade (Tab. 1). The specimens were caught by means of sweeping net, branch shaking, and in recent years also at night using two Philips TL 8W/10 G5 ultraviolet (UV) lamps positioned in front of a white sheet (dimensions 1.8 x 2.2 m). The total number of processed specimens was 213, including 104 ♂♂ and 109 ♀♀.

In genera such as *Psallus* it is not possible to precisely identify species just by external morphology. This was proven as several species from the Study Collection turned out to be previously misidentified. These species are quite variable in color, while morphometric ratios of certain body parts show only small differences and often overlap. Dissection was performed on 29 individuals from 12 species. In males, this method turned out to be highly reliable in species identification. In the new imagoes immediately after eclosion, elements of vesicae are still undeveloped and insufficiently sclerotized, and therefore cannot be used for positive determination. After the dissection and identification, genital apparatus of each individual was photographed with a digital camera attached to the microscope and then



stored in genitalia micro vials and placed on entomological pins together with the specimens. The dissected individuals are marked as G♂ or G♀.

Following identification keys and scientific papers were used for identification: Stichel (1956-1958), Seidenstucker (1966, 1966a), Josifov (1969, 1969a, 1973, 1974), Zaitzeva (1968), Wagner (1975), Rieger (1972, 1981), Aukema (1981, 1986, 1989), Reichling (1984), Gorczyca (1990, 1991), Wyniger (2004), Heckmann *et al.* (2006), Pagola-Cardé *et al.* (2006), Rieger & Rabitsch (2006).

Tab. 1. List of examined localities with UTM marks (10×10 km).

No.	Locality	UTM coordinates
1	Barajevo, lake	DQ63
2	Belgrade: Košutnjak	DQ55
3	Belgrade: Pinosava	DQ54
4	Belgrade: Resnik	DQ55
5	Belgrade: Slanci: Tapino Brdo	DQ66
6	Belgrade: Topčider	DQ55
7	Belgrade: Veliki Mokri Lug: Stepin Gaj	DQ 65
8	Belgrade: Vinča	DQ65
9	Deliblatska Peščara: Devojački Bunar	DQ99
10	Dukat pl., Crnook – Mečit	FM19
11	Gornjak Monastery	EQ40
12	Grocka: Begaljica	DQ71
13	Grocka: Dražanj	DQ65
14	Grocka: Vrčin	DQ69
15	Kosmaj Mt.	[DQ62]
16	Kostolac	EQ15
17	Lazarevac: Barzilovica, forest	DQ31
18	Lazarevac: village Stubica – Stubički Vis	DQ31
19	Mala Moštanica: Žuto Brdo	DQ44
20	Rudnik Mt: Mali Šturc	[DP68]
21	Rudnik Mt.: village – Cvijićev Vrh	[DP68]
22	Sakule	DQ59
23	Stari Slankamen: Koševac	DR30
24	Stolovi Mt.	DP62
25	Šar-planina: Pavlov Kamen	[DM96]
26	Šar-planina: Suva Reka	[DM96]
27	Vlasinsko Jezero	FN02
28	Vlasinsko Jezero, birch forest	FN03
29	Vlasinsko Jezero, hotel grounds	FN02
30	Zlatar Mt.	DP00

## RESULTS

1. *Psallus (Apocremnus) betuleti betuleti* (Fallén, 1826)

Material examined: Zlatar Mt. 22.07.1987. leg. Lj. Protić, 1♀, on *Betula* sp. (Fig. 37).

A single specimen was collected in birch trees in vicinity of Hotel "Panorama" at Mt. Zlatar. Protić (2011) listed this species from Serbia, but without specified data on locality, date or sex of individuals.

Host plants: Prefers *Betula* spp., but it was also collected on *Alnus* sp. (Kerzhner, 1978, Rieger & Rabitsch, 2006), *Epilobium* sp., *Rhododendron* sp. (Schwartz & Kelton, 1990).

Distribution: Holarctic (Rieger & Rabitsch 2006, Aukema 2008). Henry & Wheeler (1979) published the first record of this species in North America. Widely distributed in Europe (Kerzhner & Josifov 1999). In Balkan Peninsula it is presently known only from Serbia and Slovenia (Gogala & Gogala 1986).

Josifov (1973) described a new subspecies in Bulgaria - *Psallus (Apocremnus) betuleti montanus* Josifov, 1973. Rieger & Rabitsch (2006) raised this subspecies to species rank.

Comments. Kulenberg (1944) cites an interesting observation about the behavior of *Ps. betuleti*. When these heteropterans find a colony of aphids that also attracted some ants, they throw them out in a similar way as species of genus *Pilophorus*.

2. *Psallus (Hylopsallus) assimilis* Stichel, 1956

Material examined: Belgrade: Topčider 20.05.1981. leg. Lj. Protić, 1♂ 1♀; Belgrade: Topčider 21.05.1981. leg. Lj. Protić, 4♂♂ 10♀♀; Belgrade: Topčider 02.06.1981. leg. Lj. Protić, 1♂ 1♀; Vinča: road toward the landfill, 18.05.1997. leg. A. Stojanović, 5♂♂ 5♀♀ on *Acer campestre* (Fig. 39 ♂); Kosmaj 06.06.1998. leg. A. Stojanović, 2♀♀; Kosmaj 27.05.2000. leg. A. Stojanović, 1♂ 1♀; Grocka: Vrčin 05.05.2001. leg. A. Stojanović, 1♂; Grocka: Vrčin 25.05.2002. leg. A. Stojanović, 1♂ (Figs. 1-3; Fig. 38); Barajevo, lake 01.06.2002. leg. A. Stojanović, 1♀ (Fig. 40); Kosmaj 10.05.2003. leg. A. Stojanović, 1♂ 2♀♀.

Total of 38 specimens (15♂♂, 23♀♀).

Host plants: *Acer campestre*, *Fraxinus ornus* (Jerinić-Prodanović & Protić 2013).

Distribution: European species. After the first European record in England (Stichel 1956-1958, Aukema 1981) it was recorded in following countries by 2017: Germany (Rieger 1972), Luxembourg (Reichling 1984), the Netherlands (Aukema 1986), France (Matocq 1989), Poland (Gorczyca

1990), Austria (Melber *et al.* 1991), Italy (Bacchi & Rizzotti Vlach 1994), Serbia (Protić 1999), Belgium and Sweden (Kerzhner & Josifov 1999), Czech Republic (Kment & Bryja 2001), Slovakia (Bryja & Kment 2002), Switzerland (Wyniger & Burckhardt 2003), Spain (Pagola-Carte *et al.* 2006), Norway (Endrestøl & Ødegaard 2011), Denmark (Skipper 2017), Hungary (Korányi *et al.* 2018).

### 3. *Psallus (Hylopsallus) perrisi* (Mulsant & Rey, 1852)

Material examined: Belgrade: Topčider 21.05.1981. leg. Lj. Protić, 1♀; Belgrade: Resnik: Kružni Put 16.05.1998. leg. A. Stojanović, 2♂♂ 3♀♀ (2♀♀ det. B. Aukema); Belgrade: Pinosava 24.05.1998. leg. A. Stojanović, 1♀; Mala Moštanica: Žuto Brdo 29.04.2000. leg. A. Stojanović, 1♀+1♂, ♂ det. B. Aukema; Grocka: Vrčin 05.05.2001. leg. A. Stojanović, 1♂ det. B. Aukema; Grocka: Dražanj 15.06.2002. leg. A. Stojanović, 1♀; Kosmaj 10.05.2003. leg. A. Stojanović, 2♂♂ det. B. Aukema; Belgrade: Resnik, along Kružni Put 31.05.2003. leg. A. Stojanović, 1♀+1♂ (G♂); Grocka: Begaljica 14.05.2005. leg. A. Stojanović, 1♀; Deliblatska Peščara: Devojački Bunar 28.05.2005. leg. A. Stojanović 1♂ det. B. Aukema; Grocka: Begaljica 20.05.2006. leg. A. Stojanović, 1♂; Belgrade: Košutnjak 02.05.2007. leg. A. Stojanović, 1♂, on *Crataegus* sp. (G♂); Belgrade: Slanci: Tapino Brdo 03.05.2008. leg. A. Stojanović 2♂♂ 1♀ (G♂) (Fig. 43♂); Stari Slankamen: Koševac 10.05.2008. leg. A. Stojanović 1♂ (G♂); Mt. Rudnik: village – Cvijićev Vrh 1132 m a.s.l. 09.06.2012. leg. A. Stojanović 1♀ (G♂); Lazarevac: Barzilovica: forest 27/28.04.2018. leg. A. Stojanović, 1♂, light trapping (G♂); Mt. Rudnik: Mali Šturc 1000m a.s.l. 07/08.06.2019. leg. A. Stojanović, 6♂♂ 2♀♀, light trapping (Figs. 4-6 G♂, Figs. 41♀, 42♀).

Total of 32 specimens (19♂♂ 13♀♀) from 15 localities.

Host plants: At the listed sites in Serbia, this species was collected on *Crataegus* sp., just as in Bulgaria (Josifov 1974a). In other European countries it was mostly collected on *Quercus robur*, *Quercus* sp. with some records on: *Fraxinus excelsior*, *Rhododendron* sp., *Tilia platyphylla*, *Betula* sp. (Göllner-Scheiding 1972, Ehanno 1987).

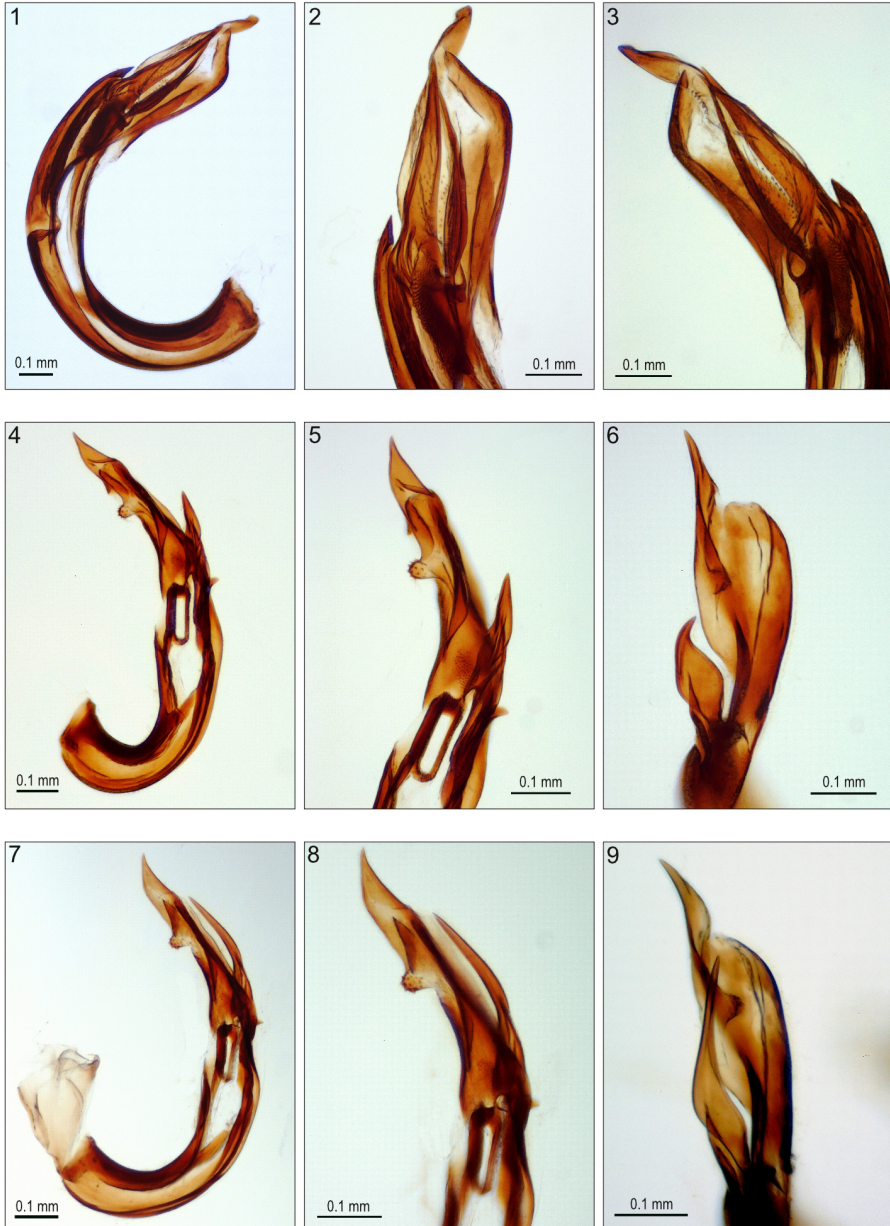
Distribution: Widely distributed in Europe and also spread in Asia (Kerzhner & Josifov, 1999).

Comments. First record for Serbia was published by Protić (2011), followed by Šeat & Nadaždin (2015) and Protić *et al.* (2017).

At localities Mt. Rudnik and Lazarevac this species was collected during the nocturnal trapping, attracted by artificial light. Southwood *et al.* (2003) cited that this is one of the commonest species collected by light trapping in the United Kingdom.

4. *Psallus (Hylopsallus) wagneri* Ossianilsson, 1953

Material examined: Deliblatska Peščara: Devojački Bunar 28.05.2005. leg. A. Stojanović, 1♂, det. B. Aukema; Grocka: Begaljica 20.05. 2006. leg. A. Stojanović 1♂ (Figs. 7-9 G, Fig. 44).



Figs 1-9. – Vesicae of males. 1-3 *Ps. assimilis*, 4-6 *Ps. perrisi*, 7-9 *Ps. wagneri*.



Figs 10-18. – Vesicae of males. 10-12 *Ps. ambiguus*, 13-15 *Ps. quercus*, 16-18 *Ps. anaemicus*.

Total of two specimens (2♂♂).

Host plants: *Quercus* sp., *Crataegus laevigata*.

Habitat at the site Devojački Bunar includes mixed deciduous forest and scrub. Bush vegetation of Deliblato Sands is included in the association

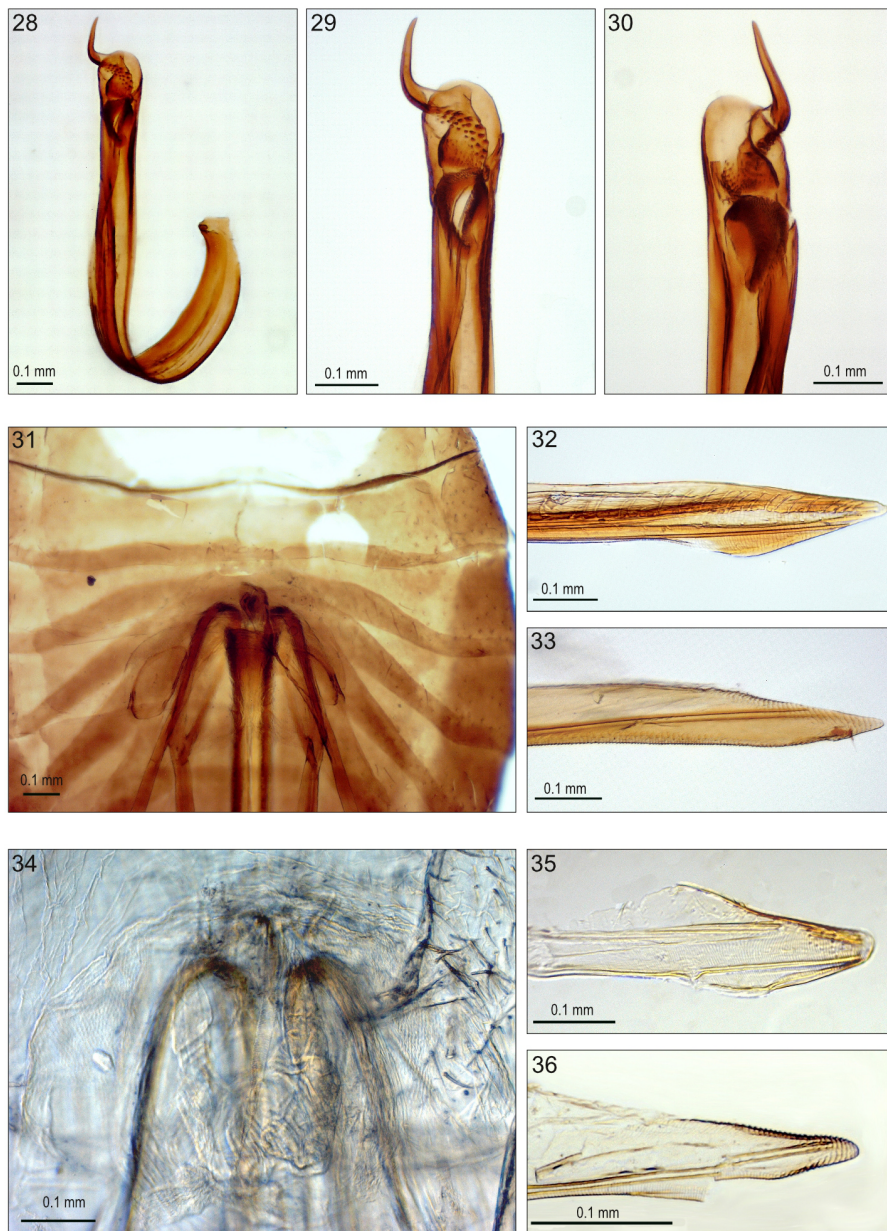


*Pruno spinosae* - *Cratagetum* (Soó 1927) Hueck 1931. Succession of steppe vegetation most commonly includes appearance of species *Crataegus monogyna* Jacq. and *Juniperus communis* L. (Čuk 2019).



Figs 19-27. Vesicae of males. 19-21 *Ps. flavellus*, 22-24 *Ps. lucanicus*, 25-27 *Ps. mollis*.

Distribution: West Palearctic. Widely distributed in Europe. In the Balkan Peninsula it has also been reported from Bulgaria (Josifov 1986), Slovenia (Gogala 2006), Greece (Rieger 2007) and Serbia (Protić 2014).



Figs 28-36. – Vesicae of males. 28-30 *Ps. varians*, female abdomen - dorsal view 31 *Ps. henschi*, 34 *Ps. lentigo*, first valvulae (in profile) 32 *Ps. henschi*, 35 *Ps. lentigo*, second valvulae (in profile) 33 *Ps. henschi*, 36 *Ps. lentigo*.

5. *Psallus (Mesopsallus) ambiguus* (Fallén, 1807)

Material examined: Kosmaj 06.06.1998. leg. A. Stojanović 1♂; Kosmaj 27.05.2000. leg. A. Stojanović 2♂♂ (Figs. 10-12 G; Fig. 45); Kosmaj 18.06.2005. leg. A. Stojanović 2♂♂ 1♀ (Fig. 46 ♀).

Total of 6 specimens (5♂♂ 1♀).

Host plants: Prefers *Betula* spp., but it was also collected in *Alnus* sp. (Kerzhner, 1978; Rieger & Rabitsch, 2006), *Epilobium* sp., *Rhododendron* sp. (Schwartz & Kelton, 1990). The specimens processed in the Collection were collected at Mt. Kosmaj, where mixed forests are predominant.

Distribution: Holarctic. Widely distributed in Europe (Kerzhner & Josifov 1999). In Balkan Peninsula it was recorded in Serbia [first record in 1935 at the locality Majdanpek (Kormilev 1938)], Bulgaria (Josifov 1978, 1986), Slovenia (Gogala & Gogala 1986), Greece (Linnavuori 1999). Henry & Wheeler (1979) have published the first record of this species in North America.

Comments. Data for Serbia has been published in several papers (Kormilev 1938, Živojinović 1950, Janković 1963, Protić 1994).

Kullenberg (1944) has recorded this species in aphid colonies on *Pyrus malus*, *Crataegus*, *Salix*.

6. *Psallus (Phylidea) henschi* Reuter, 1888

Material examined: Kosmaj 27.05.2000. leg. A. Stojanović 1♀ (Figs. 31-33); Kosmaj 10.05.2003. leg. A. Stojanović 1♀ (G♀) (Fig. 47).

Total of two specimens (2♀♀).

New for Serbia.

Host plants: Prefers *Betula* spp., also *Quercus cerris*, *Alnus* sp. (Kerzhner 1978, Rieger & Rabitsch 2006), *Epilobium* sp., *Rhododendron* sp. (Schwartz & Kelton 1990). Kiyak (2019) recorded it on *Achillea* sp.

Distribution: Europe and part of Asia – Turkey (Asian part) and Armenia (Konstantinov & Namyatova 2008). At Balkan Peninsula it has been recorded in Slovenia (Reuter, 1888, Gogala & Gogala 1989, 1994), Bosnia & Herzegovina (Apfelbeck 1891), Croatia (Novak & Wagner 1951), Bulgaria and Greece (Kerzhner & Josifov 1999).

7. *Psallus (Phylidea) quercus* (Kirschbaum, 1856)

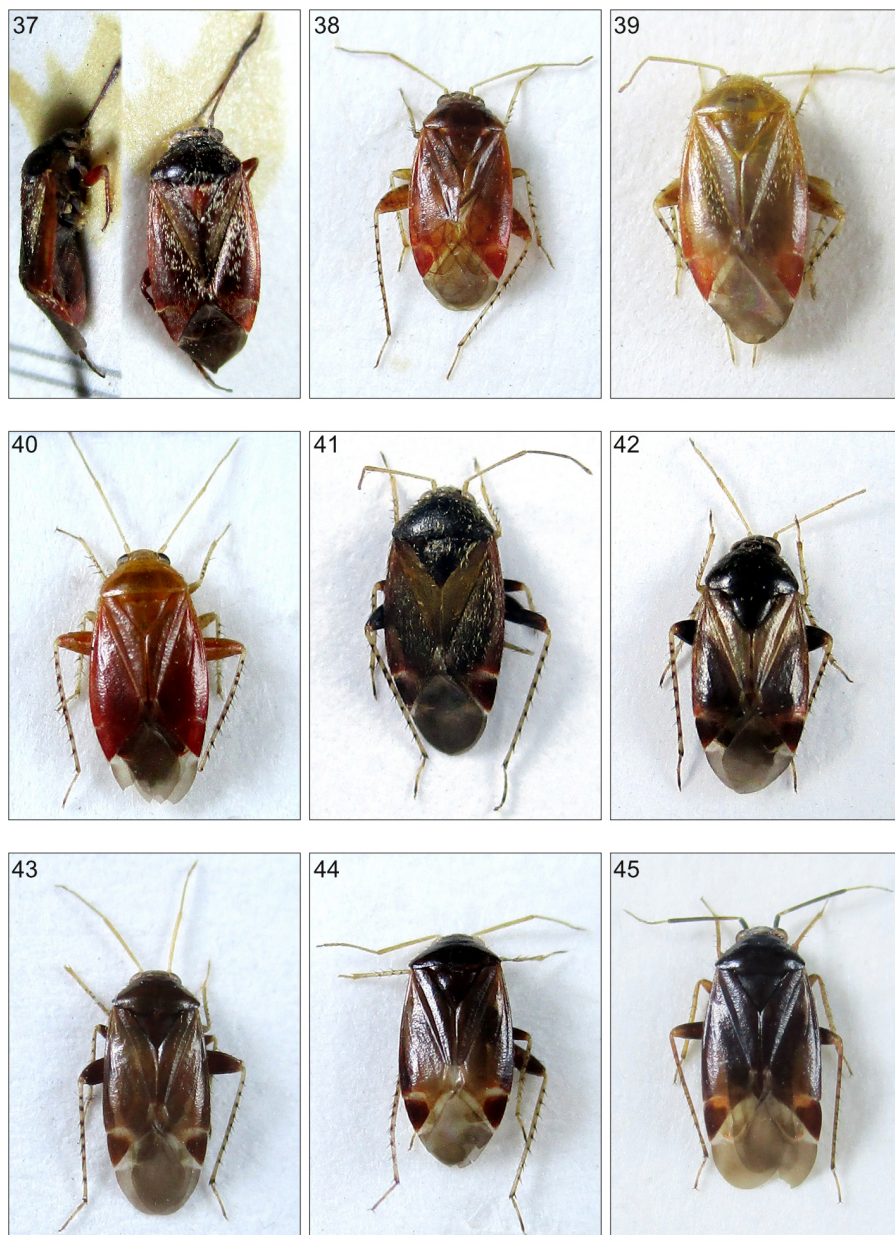
Material examined: Kosmaj 06.06.1998. leg. A. Stojanović, 1♀; Mala Moštanica: Žuto Brdo 29.04.2000. leg. A. Stojanović, 1♀; Kosmaj 10.05.2003. leg. A. Stojanović, 2♂♂ 2♀♀ (Figs. 13-15 G♂, Figs. 48♂, 49♀).

Total of 6 specimens (2♂♂ 4♀♀).

Host plants: *Quercus* sp.

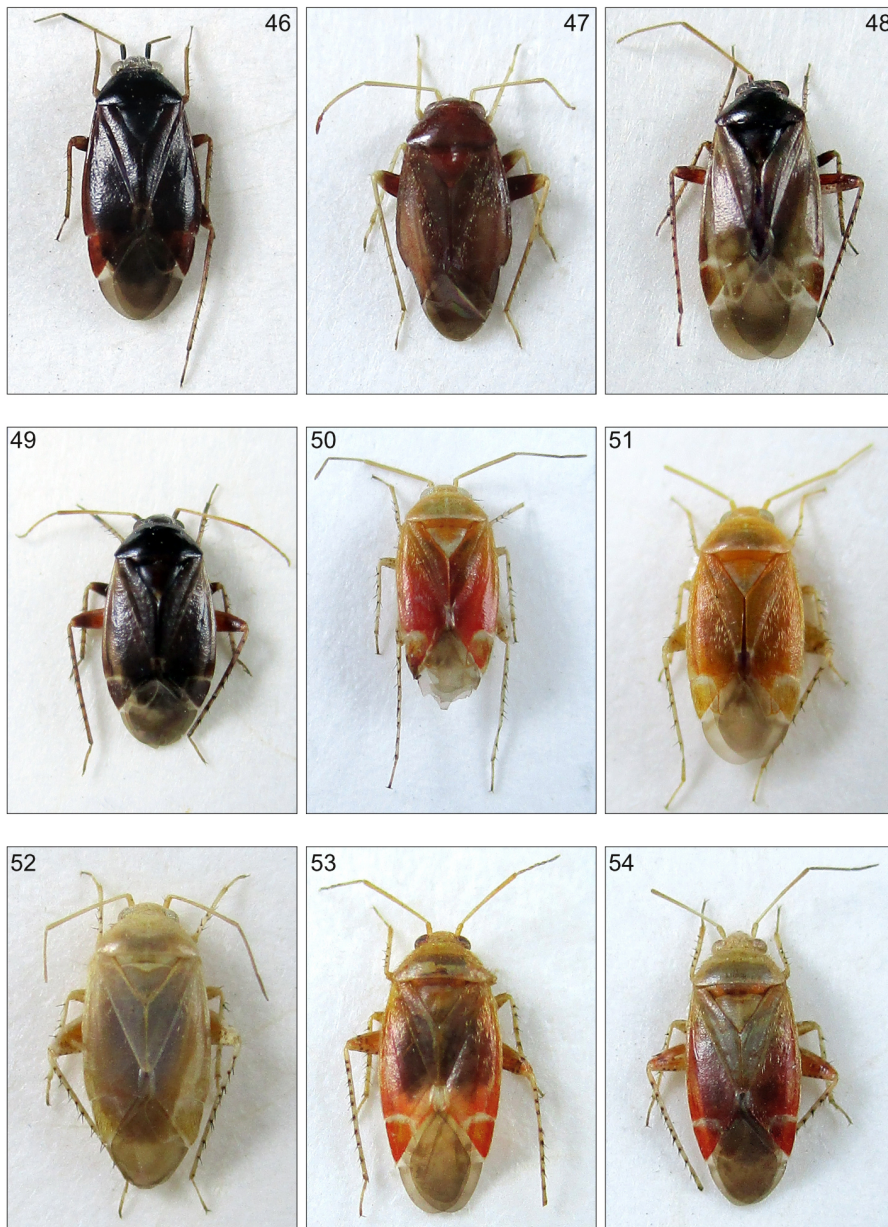


Distribution: Europe and part of Asia: Russia – Dagestan (Zaitzeva 1968), Turkey, Azerbaijan (Drapolyuk 2001) and Georgia (Kerzhner & Josifov 1999).



Figs 37-45. – *Psallus* spp. 37 *Ps. betuleti* ♀, 38 39. *Ps. assimilis* ♂, 40 *Ps. assimilis* ♀, 41, 42 *Ps. perrisi* ♀, 43 *Ps. perrisi* ♂, 44 *Ps. wagneri* ♂, 45 *Ps. ambiguus* ♂.

Comments. Records from Serbia were published in following papers: Frivaldszky (1877), Kormilev (1936, 1938), Živojinović (1950), Protić (1998, 2011), Jerinić-Prodanović & Protić (2013).



Figs 46-54. – *Psallus* spp. 46 *Ps. ambiguus* ♀, 47 *Ps. henschi* ♀, 48 *Ps. quercus* ♂, 49 *Ps. quercus* ♀, 50, 51 *Ps. anemicus* ♂, 53 *Ps. anemicus* ♀, 52 *Ps. flavellus* ♂, 54 *Ps. flavellus* ♀.

### 8. *Psallus (Psallus) anaemicus* Seidenstucker, 1966

Material examined: Belgrade: Resnik: along Kružni Put 18.05.1996. leg. A. Stojanović 2♀♀; Kosmaj 06.06.1998. leg. A. Stojanović 5♂♂ 5♀♀ on *Quercus cerris* (G♀, G♂); Kosmaj 27.05.2000. leg. A. Stojanović 2♂♂ 2♀♀ (Fig. 51); Belgrade: Veliki Mokri Lug: Stepin gaj, 2003.05.17. leg. A. Stojanović 2♂♂ 2♀♀ (G); Kosmaj 10.07.2004. leg. A. Stojanović 2♂♂ 1♀; Grocka: Vrčin 12.06. 2004. leg. A. Stojanović 1♂ (G♂); Kosmaj 18.06.2005. leg. A. Stojanović 2♀♀ (Fig. 52); Lazarevac: village Stubica – Stubički Vis 12.06.2010. leg. A. Stojanović 5♂♂ 2♀♀, on *Quercus cerris* (Figs. 16-18♂, Fig. 50 ♂).

Total of 33 specimens (17♂♂ 16♀♀).

New for Serbia.

Distribution: This species was described by Seidenstucker (1966) based on specimens collected in Asia Minor (Sultan Mountains in Anatolia), as its range expanded in NW direction. Papers on appearance of this species were successively published, starting just a few years after the initial description (1966), first in Bulgaria (Josifov 1974b), and then also in other European countries: Italy - Sicily (Carapezza 1988), Slovakia (Herczek & Halgoš 1991), Italy (Rizzotti Vlach 1995), Hungary (Kondorosy & Földessy 1998), Czech Republic (Kment & Bryja 2001), Austria (Rabitsch 2003), Slovenia (Gogala 2006), Greece (Linnavuor 2010), Serbia (Protić 2020 – this paper). The study of existing material shows that the first record in Serbia was from 1996. The range is also spreading toward SE, to Asia (Iran).

Comments. After the dissection of male genitalia, it was concluded that part of the material in the Study Collection, previously labeled *Psallus (Psallus) mollis* (Mulsant & Rey, 1852), actually belongs to *Ps. anaemicus*.

### 9. *Psallus (Psallus) flavellus* Stichel, 1933

Material examined: Mala Moštanica: Žuto Brdo 10.06.2000. leg. A. Stojanović 2♀♀ (Fig. 55); Grocka: Vrčin 25.05.2002. leg. A. Stojanović 1♂ 2♀♀ (G♂) (Figs. 53 ♂, 54 ♀); Grocka: Vrčin 12.06.2004. leg. A. Stojanović 2♂♂ 3♀♀ (Figs. 19-21 ♂).

Total of 10 specimens (3 ♂♂ 7 ♀♀).

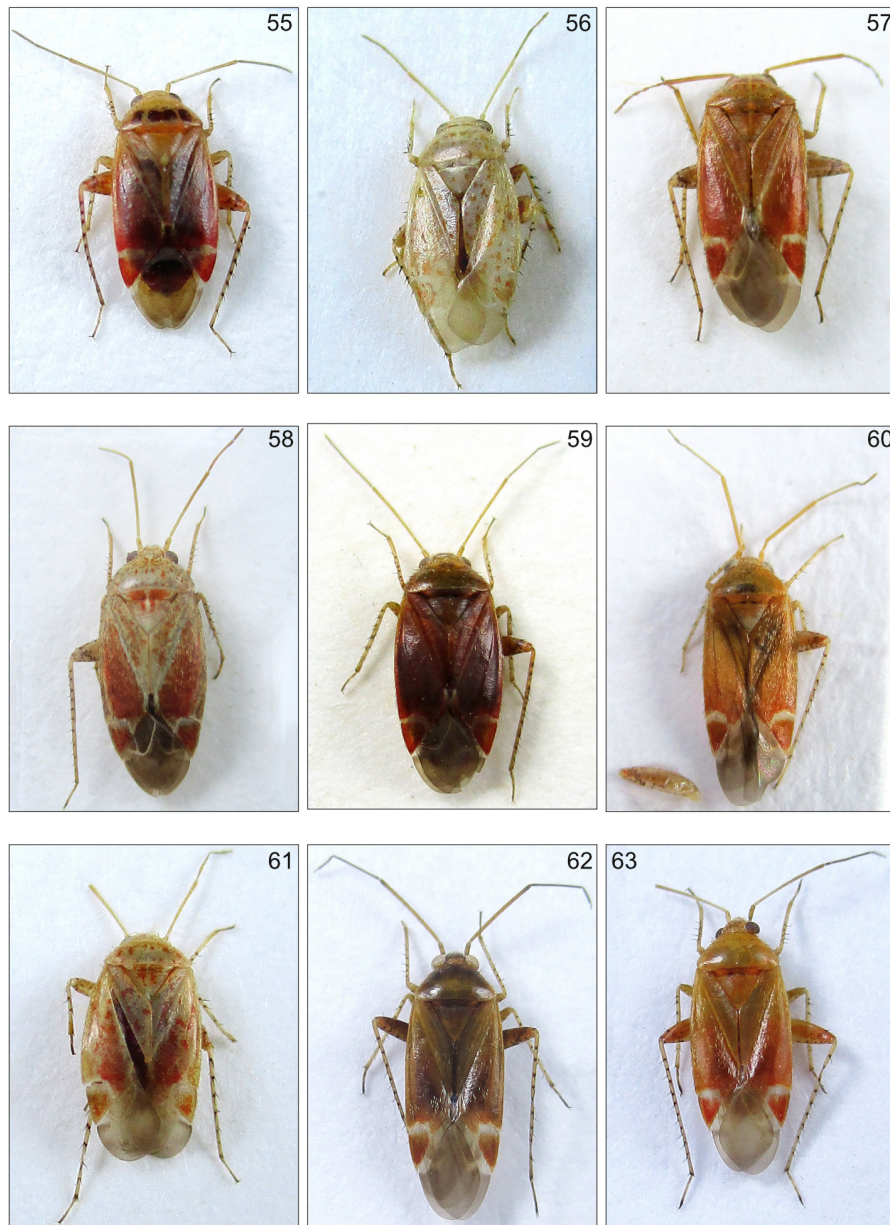
Host plants: *Fraxinus excelsior* (Wyniger & Burckhardt, 2003), *Fraxinus* sp. (Jerinić-Podanović & Protić 2013).

Distribution: Europe. In the neighboring countries it was recorded in Slovenia (Gogala & Gogala 1989) and Hungary (Kondorosy 2005). The records from Serbia are at the southern limit of the range. It was introduced to Canada (Kelton 1983).



10. *Psallus (Psallus) lentigo* Seidenstücker, 1972

Material examined: Kosmaj 10.05.2003. leg. A. Stojanović, 2♀♀ (Figs. 34-36, Fig. 56).



Figs 55-63. – *Psallus* spp. 55 *Ps. flavellus* ♀, 56 *Ps. lentigo* ♀, 57 *Ps. lucanicus* ♂, 58, 59 *Ps. lucanicus* ♀, 60 *Ps. mollis* ♂, 61 *Ps. pardalis* ♀, 62 *Ps. varians* ♂, 63 *Ps. varians* ♀.

Total of two specimens (2♀♀).

New species for Serbia.

Host plant: *Quercus cerris*.

Distribution: Seidenstücker (1972) has described it from Turkey (Sultan Mountains in Anatolia). The first record for Europe was from Bulgaria (Josifov 1974, 1978), followed by record for Slovakia in 1991 (Günther 2000), Czech Republic (Bryja & Kment 2002), Austria (Rabitsch 2003), and since 2003 it has been also known for Serbia. This is another Mediterranean species spreading toward Northwest.

#### 11. *Psallus (Psallus) lucanicus* Wagner, 1968

Material examined: Mala Moštanica: Žuto Brdo 29.04.2000. leg. A. Stojanović, 1♂ (G♂); Belgrade: Veliki Mokri Lug: Stepin Gaj 30.04. 2001. leg. A. Stojanović 1♂ (Fig. 57); Kosmaj 10.05. 2003. leg. A. Stojanović 1♀; Grocka: Vrčin 12.06.2004. leg. A. Stojanović 1♀ (Fig. 59); Grocka: Begaljica 14.05.2005. leg. A. Stojanović 1♀ (G♀); Mala Moštanica: Žuto Brdo 13.05.2006. leg. A. Stojanović 1♀; Belgrade: Košutnjak 02.05.2007. leg. A. Stojanović 1♀, on *Crataegus* (Fig. 58); Lazarevac: Stubica-Stubički Vis 09.05.2009. leg. A. Stojanović 2♀♀ on *Quercus cerris* (G♀); Mt. Rudnik: under peak Mali Šturac 7/8.06.2019. leg. A. Stojanović 1♂ in light traps (Figs. 22-24).

Total of 10 specimens (3♂♂ 7♀♀).

New species for Serbia.

Host plants: *Quercus* sp. In localities in Serbia it was collected on *Quercus* sp. and *Crataegus* sp. At Mt. Rudnik, one male was collected at night during light trapping, at June 7<sup>th</sup>/8<sup>th</sup>.

Distribution. This species was described in Italy (Wagner 1968) with several additional published records (Carapezza 1988, Wyniger 2004). Already next year, Josifov published a new species for Bulgaria, *Psallus balcanicus* Josifov, 1969 which was later synonymized by Carapezza (1988) and confirmed (Kerzhner & Josifov 1999). Records in countries of Central Europe started appearing after 2000: Slovakia (Günther 2000, Wyniger 2004), Austria (Rabitsch 2003), Czech Republic (Bryja and Kment 2002, Wyniger 2004), Hungary (Kondorosy 2005); in Balkan Peninsula: Slovenia (Gogala & Gogala 1986, Gogala 2006), Greece (Rieger 2007); also United Kingdom (Anonymus 2016, Denton 2016); in Asia: Turkey, Anatolia (Carapezza and Kment 2018). The first record in Serbia was from the locality Mala Moštanica in 2000.

Comments. The specimens labeled *Psallus (Psallus) lepidus* Fieber, 1858 in the Study Collection and published as such (Protić 2011) were dissected and proven to be *Ps. lucanicus*.

Horváth (1897) cites *Ps. lepidus* for Serbia. This record needs confirmation.

12. *Psallus (Psallus) mollis* (Mulsant & Rey, 1852)

Material examined: Mt. Rudnik: under peak Mali Šturac 7/8.06.2019. leg. A. Stojanović 1♂ at light traps (Figs. 25-27, Fig. 60).

Earlier records in Serbia: Horváth 1903, Kormilev 1936, Protić 2011.

Host plant: *Quercus* sp. Kormilev (1928-1929) collected it at Leskovac in July.

Distribution. Widely distributed in Europe: Wagner (1958), Rieger (1975), Gorczyca & Herczek (1994), Aukema (1989). Records for Serbia were published by Horváth (1903), Kormilev (1936), Protić (2011). In Asia it is so far known only from Armenia, Turkey, and Georgia (Kerzhner & Josifov 1999).

Comments. Dissection of male genitalia has shown presence of only a single specimen in the Study Collection.

13. *Psallus (Psallus) pardalis* Seidenstucker, 1966

Material examined: Kosmaj 14.07.2004. leg. Lj. Protić 1♀; Lazarevac: village Stubica – Stubički Vis 12.06.2010. leg. A. Stojanović 1♀ on *Quercus cerris* (Fig. 61).

Total of two specimens (2♀).

New species for Serbia.

Host plants: *Quercus cerris*, on *Quercus robur* (Rieger 1977).

Distribution: Europe. It was described from Turkey (Seidenstucker 1966a) and the studies have shown that its range is spreading northward through Europe, first into the Balkan Peninsula (Bulgaria, Greece, Serbia, Slovenia) and then into Hungary, Czech Republic, Italy and Slovakia (Kerzhner & Josifov 1999, Aukema *et al.* 2013).

14. *Psallus (Psallus) varians varians* (Herrich-Schaeffer, 1841)

Material examined: Monastery Gornjak 18.06.1987. leg. M. Živković 1♀; Vlasinsko Jezero: birch forest 02.07.1981. leg. Lj. Protić 4♂♂ 1♀; Vlasinsko Jezero: hotel grounds 02.07.1981. leg. Lj. Protić 1♂ 2♀♀; Vlasinsko Jezero 03.07.1981.07. leg. Lj. Protić 1♂ 1♀; Kostolac 06.06.988. leg. Branka Jovanović 1♀; Šar-planina: Suva Reka 24.06.1988. leg. Lj. Protić 1♀; Šar-planina: Pavlov Kamen 26.06.1988. leg. Lj. Protić 2♂♂ 2♀♀; Šar-planina: Pavlov Kamen 28.06.1988. leg. Lj. Protić 6♂♂ 6♀♀; Banat: Sakule 03.06.2000. leg. A. Stojanović, 1♂ (G♂); Mt. Rudnik: village – Cvijićev Vrh 09.06.2012. leg. A. Stojanović 2♂♂; Mt. Rudnik:

Mali Šturc 23/24.06.2017. leg. A. Stojanović 10♂♂ 10♀♀na svetlo (G♂) (Figs. 62, 63); Mt. Stolovi 5/6.06.2018. legs. A. Stojanović & Miroslav Jovanović 1♀; Dukat pl.: Crnook – Mečit 2/3.07. 2018. legs. A. Stojanović & Miroslav Jovanović 2♂♂ (Figs. 28-30); Lazarevac: forest above village Stubica 17/18.05.2019. leg. A. Stojanović 4♀♀ in light traps; Mt. Rudnik: Mali Šturc 7/8.06.2019. leg. A. Stojanović 6♂♂ 2♀♀ in light trips.

Total of 67 specimens (35♂♂ 32♀♀).

Host plant: Usually on *Quercus*. Goßner (2005) mentioned: *Salix*, *Betula*, *Sorbus*, *Corylus*, *Alnus*, *Fraxinus* and *Fagus*. In Serbia it was collected on *Betula*, *Corylus*, *Fagus*, *Quercus*, as well as on conifers – *Pinus nigra*, *Pinus heldreichii*.

Distribution. It is widely distributed in Europe. In Balkan Peninsula: Albania (Josifov 1986); Bulgaria (Josifov 1963, 1974a, 1986, 1990), Macedonia (Josifov 1986); Montenegro (Protić *et al.* 1990); Croatia (Protić 1998); Greece (Kerzhner & Josifov 1999), Serbia (Protić 2018). In Africa: Tunisia (Linnavuori 2007), Libya (Eckerlein & Wagner 1969); in Asia: Azerbaijan, Iran, Turkey (Asian part), Georgia (Linnavuori 2007); number of records in Asia is steadily increasing (Kerzhner & Josifov 1999, Aukema *et al.* 2013).

Comments. Serbia should be added to the Catalogue of the Heteroptera of the Palearctic Region.

## DISCUSSION AND CONCLUSION

Revision of genus *Psallus* within the Study Collection of Heteroptera in the Natural History Museum in Belgrade has shown presence of 14 species: *Psallus (Apocremnus) betuleti betuleti* (Fallén, 1826); *Psallus (Hylopsallus) assimilis* Stichel, 1956; *Psallus (Hylopsallus) perrisi* (Mulsant & Rey, 1852); *Psallus (Hylopsallus) wagneri* Ossianilsson, 1953; *Psallus (Mesopsallus) ambiguus* (Fallén, 1807); *Psallus (Phylidea) henschi* Reuter, 1888; *Psallus (Phylidea) quercus* (Kirschbaum, 1856); *Psallus (Psallus) anaemicus* Seidenstucker, 1966; *Psallus (Psallus) flavellus* Stichel, 1933; *Psallus (Psallus) lentigo* Seidenstücker, 1972; *Psallus (Psallus) lucanicus* Wagner, 1968; *Psallus (Psallus) mollis* (Mulsant & Rey, 1852); *Psallus (Psallus) pardalis* Seidenstucker, 1966 and *Psallus (Psallus) varians varians* (Herrich-Schaeffer, 1841).

Five new species were identified for fauna of Serbia: *Ps. henschi*, *Ps. anaemicus*, *Ps. lentigo*, *Ps. lucanicus* and *Ps. pardalis*.

This paper presents identification of new and revision of old material pertaining to species of genus *Psallus* in the Study Collection of

Heteroptera. Total number of processed specimens was 214, while dissection of genitalia was performed on 29 specimens. These specimens were collected at 30 localities throughout Serbia, at various altitudes (Sakule at 69 m a.s.l. to Mt. Dukat at 1756 m a.s.l.), in period 1981-2019.

Light trapping was proven as an efficient method for collecting these species. For example, *Ps. perrisi*, *Ps. lucanicus*, *Ps. mollis* and *Ps. varians* were collected in a single night, June 7<sup>th</sup>/8<sup>th</sup> 2019, in light traps set at Mt. Rudnik.

The greatest number of specimens - 67 (35♂♂ and 32♀♀) was collected for species *Ps. varians*. Increase in abundance of this species has been recorded recently in several European countries (Floren & Gogala, 2002). This was also one of the most abundant species of Heteroptera collected by light trapping in Great Britain (Southwood *et al.* 2003). Although the characteristic host plants are deciduous trees, in Serbia it was also collected on conifers: on *Pinus nigra* at Mt. Dukat and on *Picea abies* and *Pinus heldreichii* at Mt. Šar-planina. Bosnian Pine (*Pinus heldreichii*) is a Tertiary relict and subendemic of the Balkan Peninsula. Wachmann *et al.* (2004) believe that conifers are not host trees for *Ps. varians*. Goßner (2005) also considers high abundance of this species on conifers to be mystifying. Although it is known in literature as a high-mountain species, in Serbia it was collected from lowland localities (Sakule, Lazarevac, Kostolac) to high mountains (Vlasinsko Jezero lake, Šar-planina, Rudnik, Stolovi, Dukat). In order to make a correct identification, dissection was performed on genitalia of a male specimen from locality of Sakule at just 69 m a.s.l. and record was validated.

In regard to external morphology and genital armature, *Ps. wagneri* is very similar to *Ps. perrisi* (Figs. 4-6, Figs. 7-9). According to the previous data and analysis of specimens in the Collection, *Ps. wagneri* should be regarded as a rare species for Serbia. So far it was collected only at two localities (Deliblato Sands and Begaljica) while *Ps. perrisi* is a much commoner species (it was collected at numerous localities). The Catalogue of the Heteroptera of the Palearctic Region (Aukema *et al.* 2013) cites this species for Serbia but as information that should be checked. This paper presents evidence of presence of *Ps. wagneri* in Serbia.

Within the Study Collection there were certain specimens labeled as *Psallus (Psallus) falleni* (Reuter, 1883) and published as such (Protić 2011), however results of dissection has proven that they were actually *Ps. flavellus*. *Ps. falleni* was not proven for Serbia. Jerinić-Podanović & Protić (2013) have published information about *Ps. flavellus* as predator on *Psyllopsis discrepans* (Flor), which was collected in Belgrade on *Fraxinus* sp. in May.



Dissection has proved that specimens labeled as *Psallus* (*Psallus*) *lepidus* Fieber, 1858 in the Study Collection and published as such (Protić 2011), were actually *Ps. lucanicus*. Horváth (1897) cited presence of *Ps. lepidus* in Serbia. This needs confirmation. Specimens of *Ps. lucanicus* in the Study Collection were collected from late April to early June at nine localities in the broader region of Belgrade and at Mt. Kosmaj in Šumadija.

We have noticed that the greatest diversity of species from genus *Psallus* was present at Mt. Kosmaj. Out of 14 species included in this study, 9 species were recorded at this mountain in Šumadija, with the highest peak at 625 m a.s.l. The best represented forest type is beech forest (*Fagetum montanum*), occasionally descending to 180 m a.s.l. The oak forests are mostly represented by Italian Oak – Turkey Oak forests (*Quercetum confertae-cerris*). Both beech and oak forests are mostly degraded by logging, and occasionally turned into scrub (Gajić 1954). In the association *Quercetum confertae-cerris* the tree stratum is dominated by *Quercus cerris* and *Q. conferta* while understory stratum is quite reduced and the most common species is *Crataegus monogyna*. Meadows occupy a negligible area in this region. We assume that greater representation of genus *Psallus* at Kosmaj is caused not only by diversity of forests in a relatively small area, which may be covered within a day of fieldwork, but also by easy accessibility of tree crowns, as they are low enough that they may be sampled by sweeping net, and high intensity of fieldwork in period 1998–2005.

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**ПРИЛОГ ПОЗНАВАЊУ РОДА *PSALLUS*  
(HETEROPTERA: MIRIDAE) У СРБИЈИ**

ЉИЉАНА ПРОТИЋ И АЛЕКСАНДАР СТОЈАНОВИЋ

РЕЗИМЕ

Урађена је идентификација новог и ревизија старог материјала рода *Psallus* Fieber у Студијској збирци Природњачког музеја. Утврђено је 14 врста, од којих је пет нових за фауну Србије: *Ps. henschi*, *Ps. anaemicus*, *Ps. lentigo*, *Ps. lucanicus* и *Ps. pardalis*. Да би идентификација била тачна, урађена је дисекција гениталне арматуре код 12 врста (сл. 1–36).