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A CHECKLIST AND PROVISIONAL ATLAS OF THE CICAIDOIDEA FAUNA OF SLOVENIA (HOMOPTERA: AUCHENORRHYNCHA)

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Abstract - 9 species of singing cicadas are listed for the territory of Slovenia, two of them for the first time: *Cicadatra atra* Olivier and *Tettigetta dimissa* (Hagen). Published records are cited; new records are based on collected specimens and recorded or heard songs. Distributional maps of all species are added.

KEY WORDS: Hemiptera, Homoptera, Auchenorrhyncha, Cicadoidea, fauna, Slovenia

Izvleček - SEZNAM IN PROVIZORIČNI ATLAS FAVNE POJOČIH ŠKRŽATOV SLOVENIJE (HOMOPTERA: AUCHENORRHYNCHA)

9 vrst pojočih škržatov je ugotovljenih na ozemlju Slovenije, dve od njih prvič: *Cicadatra atra* Olivier in *Tettigetta dimissa* (Hagen). Citirani so objavljeni podatki, novi podatki pa temeljijo na zbranih primerkih in posnetih ali slišanih napevih. Dodane so karte razširjenosti vseh vrst.

KLJUČNE BESEDE: Hemiptera, Homoptera, Auchenorrhyncha, Cicadoidea, favna, Slovenija

Introduction

The first data about singing cicadas from the Slovenian territory were published by I. A. SCOPOLI in his famous book *Entomologia carniolica* in 1763 and in his later publication from 1772. He described the following species from Carniolia: *Lyristes plebeius* (Scopoli 1763), *Tibicina haematodes* (Scopoli 1763) and *Cicadetta montana* (Scopoli 1772). He also reported of Linné's species *Cicada orni* Linné 1758 in his *Entomologia carniolica*.

After this early beginning there were very few faunistic works published for Slovenia for many years. One of the exceptions was GRAEFFE (1903) who reported in his work of 4 species from the region. JANKOVIĆ (1978) pointed out in his review on the Homoptera Auchenorrhyncha fauna of Yugoslavia that Slovenia was the least investigated part of former Yugoslavia concerning this insect group. He counted only 30 species known from Slovenia in contrast to 501 listed for Serbia.

The only recent paper including data from Slovenia was published by SCHEDL (1986). In this paper he mentions 7 species of singing cicadas from Slovenia: *Lyristes plebejus*, *Cicada orni*, *Tibicina haematodes*, *Tettigetia argentata*, *T. brullei*, *Cicadetta montana* and *C. tibialis*.

Since 1993 we began to study the bioacoustics of singing cicadas in Slovenia together with A.V. Popov (St. Petersburg, Russia) and published a series of papers with some other colleagues from our country (GOGALA et al. 1996, GOGALA & POPOV 1997, POPOV et al. 1997, GOGALA & TRILAR 1999). During this period we also gathered the faunistic data on singing cicadas in Slovenia published in this contribution.

Some of the faunistic data presented in this paper are based on specimens collected (C) and deposited in the collection of PMSL, the rest on recorded (R) or just heard (H) songs of cicadas. In some cases songs of smaller singing cicadas were detected with the aid of an ultrasonic detector using the method described by POPOV et al. (1997). Acoustic equipment used in this study had been described in our previous papers (e.g. GOGALA et al. 1996, POPOV et al. 1997).

There is no doubt that song patterns in our country are sufficient for the identification of species since all European species investigated till now show distinct and easily recognizable song characteristics (e.g. POPOV 1975, BOULARD & MONDON 1995).

We follow the nomenclature used by SCHEDL (1986), with the exception of the genus *Cicadivetta* which we include in the *Cicadetta* as in our previous paper (GOGALA et al. 1996).

Checklist

Lyristes plebejus (Scopoli 1763)

Mediterranean-west Asian species (SCHEDL 1986). Terra typica of this species is the Submediterranean region of Slovenia and adjacent parts of Italy. Common and widespread species in the Submediterranean region of Slovenia. Imagos appear in the second half of June and are present till the middle of August.

Publ. rec.: SCOPOLI 1763: "In agro Vipacensi, Goritiensi, Tergestino & frequentissima,

notissimaque" (Vipava, Gorica, Trst); GRAEFFE 1903: Istria, Soča valley, Kanal; SCHEDL 1986: Gorica, Portorož

New rec.: Brje pri Komnu 24. 6. 1996, 10. 7. 1999 (C); 26.+27. 6. 1993, 4. 7. 1993, 4. 8. 1995 (R); 21. 6. 1998, 6. 7. 1999, 12. 7. 1998, 2. 8. 1998 (H); Veliki Dol 26. 7. 1997 (H); Temnica 2. 8. 1998 (H); Vojščica 2. 8. 1998 (H); Gorjansko 2. 8. 1998 (H); Famlje, castle Školj 31. 7. 1998 (H); Škocjan 14. 7. 1999 (H); Portorož, Lucan 27. 7. 1994, 28. 7. 1999, 3. 8. 1996, 15. 8. 1995, A. Kapla leg. (C); Črni Kal 5. 8. 99 (H); Sočerga, Badin 10. 7. 1994, 5. 8. 99 (R); Strunjan, Belvedere 22. 6. 1994 (R); Dragonja 22. 7. 1997 (R); Dragonja, Stena 22. 6. 1994 (R); Koper, Padna 22. 7. 1997 (H); Solkan 15. 8. 1997 (H); Ajdovščina, Zavetniki 31. 7. 1998 (H)

Cicada orni Linné 1758

Ponto-Mediterranean species (SCHEDL 1986). Most abundant species, present mainly in the Submediterranean region of Slovenia but isolated populations appear also in the Subpannonian, Prealpine and Predinaric regions. Animals from the vicinity of the railway station in Ljubljana were probably passively transported to this location. Cicadas of this species sing from the second half of June till the end of August or the first week of September.

Publ. rec.: GRAEFFE 1903: Soča valley, Tolmin; SCHEDL 1986: Vipava, Črni Kal, Šmarje
New rec.: Brje pri Komnu 26. 6. 1998, 8. 7. 1999, 14. 7. 1996, 16. 7. 1994, 5. 8. 1990 (C); 20. 6. 1993, 22. 6. 1997, 26. 6. 1993, 27. 6. 1998, 1. 7. 1993, 4. 7. 1993, 17.+18. 7. 1991, 27. 7. 1998, 1. 8. 1998, 4. 8. 1995, 18. 8. 1991 (R); 21. 6. 1998, 6. 7. 1999, 12. 7. 1998, 26. 7. 1997, 26. 7. 1998, 2. 8. 1998, 11. 8. 1997 (H); Brestovica, Vale 8. 8. 1999 (R); Famlje, castle Školj 31. 7. 1998 (H); Temnica 2. 8. 1998 (H); Vojščica 2. 8. 1998 (H); Gorjansko 2. 8. 1998 (H); Manče 8. 7. 1997 (H); Goče 7.-12. 7. 1997 (H); Kolomban, Čampore 25. 6. 1999 (H); Ankaran, Kavarjola 26. 6. 1999 (H); Portorož, Lucan 7. 8. 1993, A. Kapla leg. (C); Sočerga, Badin 10. 7. 1994 (C, R), 5. 8. 1999 (R); Strunjan, Belvedere 22. 6. 1994 (R); Ajdovščina, Zavetniki 31. 7. 1998 (H); Črni Kal 22. 7. 1997, 5. 8. 1999 (H); Dragonja 22. 7. 1997 (H); Kozina 22. 7. 1997 (H); Koper 22. 7. 1997 (H); Padna 22. 7. 1997 (H); Movraž, Smokvica 5. 8. 1999 (R); Štorje 1. 7. 1993 (R); 26. 7. 1997 (H); Komen 15. 8. 1997 (H); Solkan 15. 8. 1997 (H); Ravnica 15. 8. 1997 (H); Mt. Sabotin 22. 6. 1994 (R); Črni Kal, Podpeč 24. 8. 1991 (R); Brestanica, Sv. Mohor 6. 8. 1996 (R); Ljubljana, near the railway station, summer 1998, 1999 (H); Žužemberk (H)

Cicadatra atra Olivier 1790

Ponto-Mediterranean species (SCHEDL 1986). It is present in two locations on the Slovenian coast of Istria.

First records from Slovenia: Dragonja, Sv. Štefan 27. 6. 1999 (C, R); 16. 7. 1997 (H); Strunjan, Rtič Ronek 21. 7. 1999 (C)

Tibicina haematodes (Scopoli 1763)

Ponto-Mediterranean species (SCHEDL 1986). Terra typica of this species is the Submediterranean region of Slovenia and adjacent parts of Italy. Adults are present in June and July.

Publ. rec.: SCOPOLI 1763: "Habitat cum prioribus" (i.e. Vipava, Gorica, Trst); GRAEFFE 1903: Istria; SCHEDL 1986: Vipava, Komen, Črni Kal

New rec.: Brje pri Komnu 10. 6. 1994, 8. 7. 1999, 14. 7. 1991 (C); 1. 6. 1998, 7. 6. 1997, 16. 6. 1992, 19. 6. 1994, 22. 6. 1991, 26. 6. 1993, 27. 6. 1997, 27. 6. 1998 (R); 21. 6. 1998, 6. 7. 1999, 12. 7. 1998, 26. 7. 1998 (H); Goče 7.-12. 7. 1997 (H); Strunjan, Belvedere 18. 6. 1995 (R); Mt. Sabotin 22. 6. 1994 (R); Škocjan 14. 7. 1999 (H)

Tettigetia argentata (Olivier 1790)

West Mediterranean species (SCHEDL 1986), present in the westernmost part of Slovenian Submediterranean region near Gorica and Komen. It can be found from the last week of June till the first week of August.

Publ. rec.: SCHEDL 1986: Gorica

New rec.: Brje pri Komnu 1. 7. 1993, 9. 7. 1994, 16. 7. 1994 (C); 22. 6. 1994, 1. 7. 1993, 4. 7. 1993, 18. 7. 1993, 22. 7. 1994, 26. 7. 1992, 26. 7. 1994, 4. 8. 1995 (R); 6. 7. 1999 (H); Mt. Sabotin 22. 6. 1994 (R)

Tettigetia brullei (Fieber 1876)

This small Mediterranean species (SCHEDL 1986) is much more abundant in the investigated area than previously thought since acoustic detection of this species without ultrasonic detectors is very difficult. Adults are present from the second half of June till the first week of August.

Publ. rec.: GRAEFFE 1903: Karst; SCHEDL 1986: Vipava, Gorica, Portorož

New rec.: Brje pri Komnu 24. 6. 1994, 26. 6. 1993, 28. 6. 1997, 8. 7. 1999, 22. 7. 1994 (C); 19. 6. 1994, 28. 6. 1997 (R); 21. 6. 1998, 6. 7. 1999, 26. 7. 1997, 26. 7. 1998 (H); Sočerga, Badin 10. 7. 1994 (C, R); Portorož, Lucan, A. Kapla leg. (C); Strunjan, Belvedere 18. 6. 1995, 22. 6. 1994, 27. 6. 1995 (R); Brestovica 19. 6. 1994 (R); Zagrajec 2. 8. 1998 (H); Dragonja 22. 7. 1997 (R); Sečoveljske Soline 22. 7. 1997 (R); Dragonja, Stena 22. 6. 1994 (R); Seča 18. 6. 1995 (R); Mt. Sabotin 22. 6. 1994 (R); Plave 22. 6. 1994 (R)

Tettigetia dimissa (Hagen 1856)

East Mediterranean-west Asian species (SCHEDL 1986). This species was frequently overlooked due to the soft high-pitched sound masked by the noise of louder cicadas. It is most frequent in the Submediterranean region of Slovenia but there are also some records from the central parts of the country. It appears from the middle of May till the end of July.

First records from Slovenia: Hrastnik 17. 5. 1996, A. Kapla leg. (C); Portorož, Lucan 25. 7. 1998, A. Kapla leg. (C); Sočerga, Badin 10. 7. 1994 (R); Movraž 10. 7. 1994 (R); Ankarani, Kavarijola 26. 6. 1999 (H); Strunjan, Belvedere 18. 6. 1995, 22. 6. 1994 (R); Brje pri Komnu 22. 6. 1997 (R); 21. 6. 1998, 6. 7. 1999 (H); Manče 8. 7. 1997 (H); Dragonja 31. 5. 1997, 22. 7. 1997 (R); Dragonja, Lončan 21. 5. 1997 (R); Sečovelje 31. 5. 1998 (H); Sečoveljske Soline 22. 7. 1997 (R); Mt. Sabotin 22. 6. 1994 (R)

***Cicadetta montana* (Scopoli 1772)**

Eurasian species (SCHEDL 1986). The mountain cicada is probably a complex of closely related taxa (GOGALA & TRILAR 1999). In Slovenia we heard and recorded animals with long song phrases and short song phrases. Animals from collections cannot be distinguished with certainty. Therefore, we first list here such animals from collections, then records of both acoustic "forms" where they were heard or recorded, and in some cases also collected. Mountain cicadas are found throughout Slovenia with exception of the Submediterranean region. Apparently animals with short phrases are found more frequently at low elevations (250 - 900 m) while animals singing long phrases prevail at higher elevations (800 m and above). The adults are present from the middle of May till the end of June, at higher elevations in the Alps till August.

Publ. rec.: SCOPOLI 1772: "In montibus Carnioliae circa Idriam" (mountains around Idrija)

New rec.: Gornji Ig 16. 6. 1974, V Furlan leg. (C); Bohinj, Krstenica (-1650 m) 8. 1929, M. Hafner leg. (C); Pokojišče 26. 6. 1932, J. Staudacher leg. (C); Ljubljana, Utik, beginning of July 1879, J. Stussiner leg. (C); Hrastnik 30. 5. 1994, 27. 5. 1994, A. Kapla leg. (C); Maribor, Kamnica, Hudičeve skale 16. 6. 1981, D. Devetak leg. (C); Dol pri Hrastniku 26. 5. 1997, 4. 6. 1999, 13. 6. 1999, A. Kapla leg. (C)

- long phrases:

Hrastnik 23. 6. 1999, A. Kapla leg. (C); 29. 5. 1997 (R); Dol pri Hrastniku 17. 6. 1999, A. Kapla leg. (C); Bloke: Zavrh 27. 6. 1997 (H); Mokrec 27. 5. 1999 (H); Ig, Škrilje, Mt. Stražar 16. 6. 1999, 19. 6. 1999 (R), 28. 5. 1999 (H); Rakitna 6. 1998 (H); Bohinj, Komna (-1200 m) (H)

- short phrases:

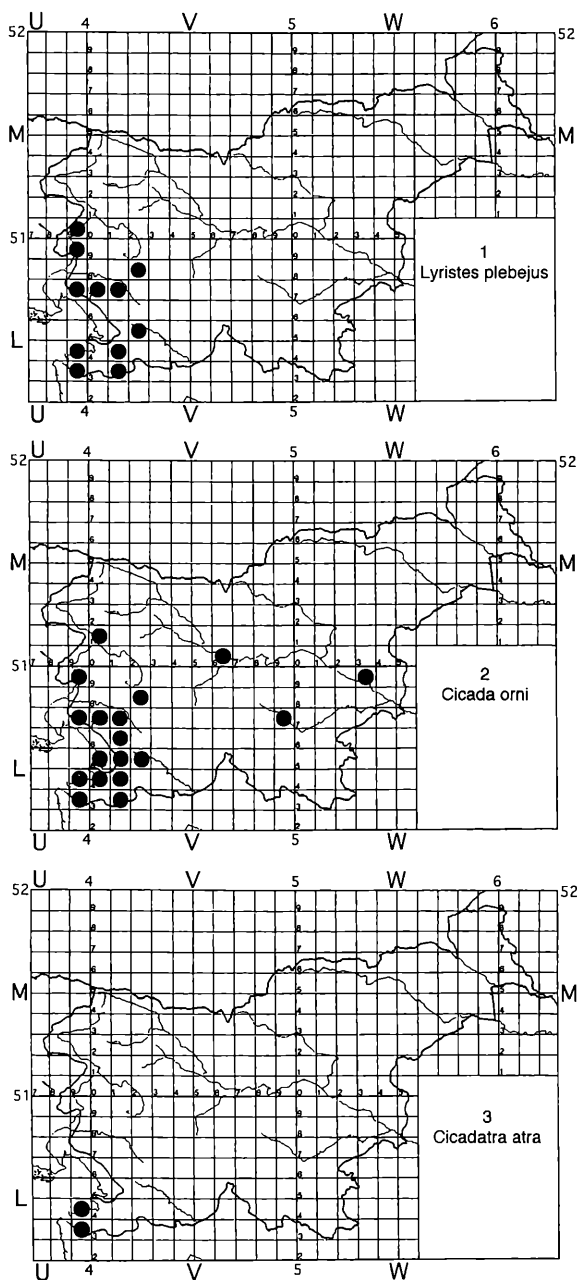
Lukovica pri Brezovici 21. 5. 1990, 27. 5. 1998, 14. 6. 1997 (C); 21. 5. 1998, 21. 5. 1999, 29. 5. 1997 (R); 17. 5. 1999, 21. 5. 1999 (H); Maribor, Kamnica, Hudičeve skale 28. 6. 1997 (R); Dol pri Hrastniku 6. 6. 1999 (C); 8. 6. 1999, A. Kapla leg. (C); Hrastnik, Krnice 29. 5. 1997 (R); Ig, Škrilje, Mt. Stražar 15. 6. 1999 (R); 28. 5. 1999 (H)

***Cicadetta tibialis* (Panzer 1798)**

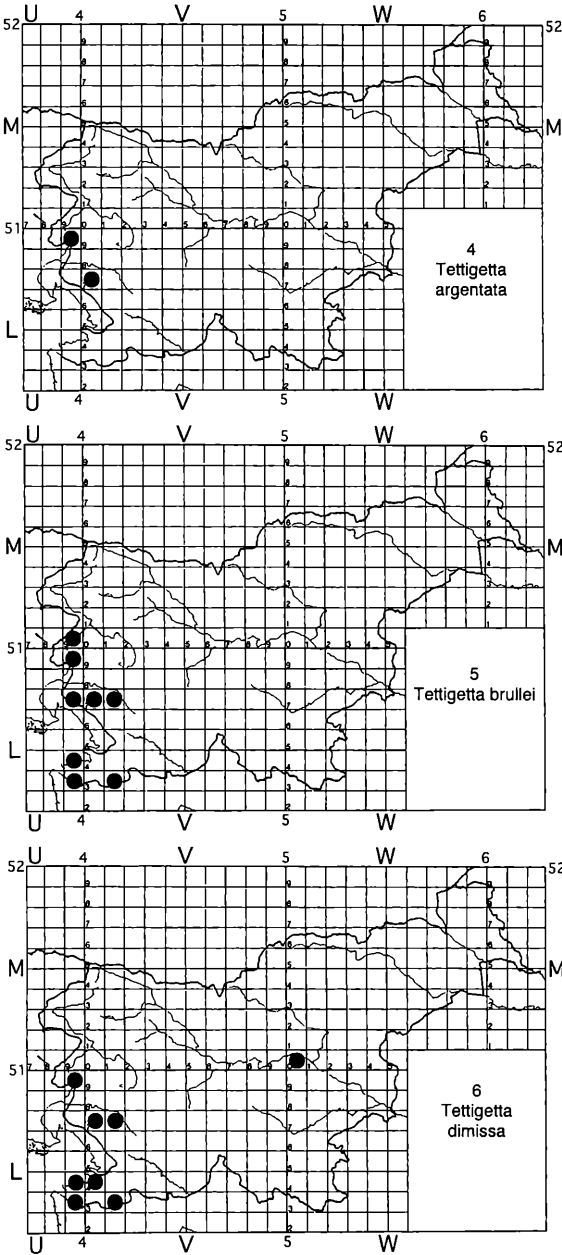
Ponto-Mediterranean species (SCHEDL 1986). It is very common and widely spread in the Submediterranean region and we found it also in the sunny slopes above the Sava river in southeastern Slovenia. First adults appear at the end of May and are present till the second half of August.

Publ. rec.: SCHEDL 1986: Gorica, Portorož

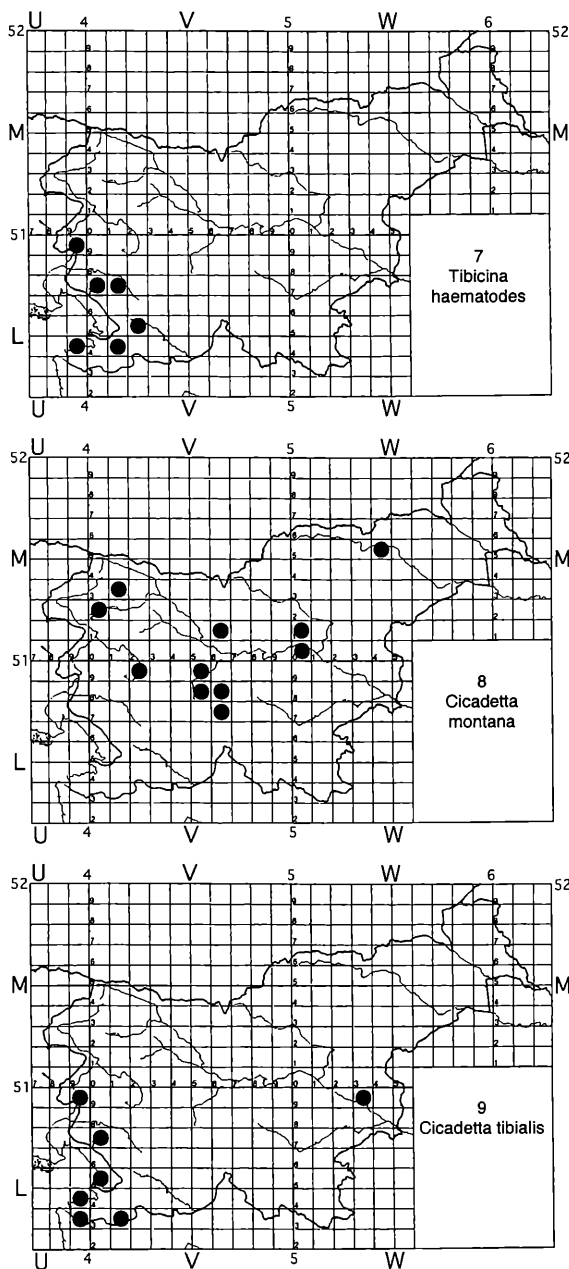
New rec.: Brje pri Komnu 26. 6. 1993, 26. 6. 1998, 29. 6. 1996, 17. 7. 1991, 22. 7. 1994, (C); 26. 6. 1993, 3. 7. 1993, 18. 7. 1993, 27. 7. 1997 (R); 21. 6. 1998, 6. 7. 1999, 26. 7. 1998 (H); Strunjan, Belvedere 22. 6. 1994 (C); Strunjan 27. 6. 1995 (C); Kolomban 25. 6. 1999, T. Trilar leg. (C); Dragonja 31. 5. 1997 (C); Dragonja, Sv. Štefan 27. 6. 1999 (C); Portorož, Lucan 2. 8. 1998, 17. 8. 1998 (C); Sočerga, Badin 10. 7. 1994 (R); Movraž 10. 7. 1994 (R); Strunjan, Belvedere 18. 6. 1995, 22. 6. 1994 (R); Brestanica, Sv. Mohor 6. 8. 1996 (R); Dragonja, Sv. Štefan 31. 5. 1997 (H); Dragonja 31. 5. 1997, 21. 7. 1997 (R); 22. 7. 1997 (H); Dragonja, Stena 22. 6. 1994 (R); Sečoveljske Soline 21. 7. 1997 (R); 22. 7. 1997 (H)



Figs. 1-3: Distributional maps of the Cicadoidea species in Slovenia with the UTM-grid.



Figs. 4-6: Distributional maps of the Cicadoidea species in Slovenia with the UTM-grid.



Figs. 7-9: Distributional maps of the Cicadoidea species in Slovenia with the UTM-grid.

Discussion

The most recent faunistic paper on singing cicadas which covers the coastal sub-mediterranean part of Slovenia was published by SCHEDL (1986). He reports seven species of Cicadoidea in this part of Slovenia. During our investigations we confirmed the presence of these and found two more species, *Tettigetta dimissa* and *Cicadatra atra*. More records from many new localities extended our knowledge of their distributional areas.

In Slovenia we can also possibly expect *Cicadetta mediterranea*, a species which occurs only a few tens of kilometers away from Slovenian border at the coast of the Croatian Istria. An unsolved question is still the systematics of *Cicadetta montana* with the possibility that in central Europe there are two closely related sympatric species (compare GOGALA & TRILAR 1999). We must search for topotypes in the mountains around Idrija to have a better idea of what SCOPOLI (1772) described under this name. In addition, we have to make sure that a single specimen of mountain cicada can sing only one type of song. In such a case we really deal with two different partly sympatric taxa of mountain cicadas emitting each its own type of song. We hope to confirm or deny this in the near future.

In comparison with the lists of species of adjacent countries, i.e. Northern Italy probably 10 (SERVADEI 1967), ex-Yugoslavia 11 (JANKOVIĆ 1978), Macedonia -14 (GOGALA et al., in preparation), we cannot expect to find many more species in Slovenia. Nevertheless, there is a possibility that we may find in the Pannonic region of Slovenia *Cicadetta podolica* or in some other parts *Pagiphora annulata*, which is quite common in Macedonia (GOGALA et al., in preparation). Some *Cicadatra* species present in Macedonia and in some warmer regions of the Balkans, i.e. *C. hyalina*, *C. hyalinata* or even *C. persica* (GOGALA & TRILAR 1998), are less likely to be found in Slovenia. Nevertheless, the recent discovery of *Cicadatra atra* shows that our knowledge of even such small groups of insects is never complete.

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References

- Boulard M., Mondon B., 1995: Vies & Mémoires de Cigales. Provence Languedoc Méditerranée. Équinoxe, Barbantane.
- Gogala M, Popov A.V., Ribarič D., 1996: Bioacoustics of singing cicadas of the western Palaearctic: *Cicadetta tibialis* (Panzer) (Cicadoidea: Tibicinidae). *Acta entomologica slovenica*, 4 (2): 45-62.
- Gogala M, Popov A.V., 1997: Bioacoustics of singing cicadas of the western Palaearctic: *Cicadetta mediterranea* (Panzer) (Cicadoidea: Tibicinidae). *Acta entomologica*

- slovenica*, 5 (1): 11-24.
- Gogala M., Trilar T.**, 1998: First record of *Cicadatra persica* Kirkaldy, 1909 from Macedonia, with description of its song. *Acta entomologica slovenica*, 6 (1): 5-15.
- Gogala M., Trilar T.**, 1999: The song structure of *Cicadetta montana macedonica* Schedl with remarks on songs of related singing cicadas (Hemiptera: Auchenorrhyncha: Cicadomorpha: Tibicinidae). *Reichenbachia, Mus. Tierkd. Dresden*, 33 (11): 91-97.
- Gogala M., Trilar T., Krpač V.**, in preparation: Classical and bioacoustic survey of singing cicadas (Homoptera: Cicadoidea) from Macedonia.
- Graeffe E.**, 1903: Beiträge zur Cicadinenfauna des Österr. Küstenlandes. *Bollettino della Societa Adriatica di Scienze Naturali in Trieste*, 21: 41-63.
- Janković Lj.**, 1978: Pregled stanja istražnosti faune cikada (Homoptera: Auchenorrhyncha) Jugoslavije. *Biosistematika*, 4 (2): 305-314.
- Popov, A.V.**, 1975: The structure of timbals and characteristic of sound signals of singing cicadas (Homoptera, Cicadidae) from the southern regions of the USSR. *Entom. Rev. (Entom. obozrenie)*, 54: 258-290.
- Popov, A. V., Beganović, A., Gogala, M.**, 1997: Bioacoustics of singing cicadas of the western Palaearctic: *Tettigetia brullei* (Fieber 1876) (Cicadoidea: Tibicinidae). *Acta entomologica slovenica*, 5 (2): 89 - 101.
- Scopoli I.A.**, 1763: Entomologia carniolica. J.T. Trattner, Wien
- Scopoli I.A.**, 1772: Observationes zoologicae. *Annus Historico Naturalis*, V (5): 109.
- Schedl, W.**, 1986: Zur Verbreitung, Biologie und Ökologie der Singzikaden von Istrien und dem angrenzenden Küstenland (Homoptera: Cicadidae und Tibicinidae). *Zool. Jb. Syst.*, 113: 1-27.
- Servadei, A.**, 1967: Rhynchota (Heteroptera, Homoptera, Auchenorrhyncha). Catalogo topografico e sinonimico. *Fauna d'Italia*, 9: 1-851.

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