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ACOUSTIC WEBSITE ON EUROPEAN SINGING CICADAS

AKUSTIČNE SPLETNE STRANI O EVROPSKIH POJOČIH ŠKRŽADIH

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ABSTRACT

Acoustic website on European singing cicadas

The song pattern and other song parameters like frequency and/or intensity modulation are in most cases the best characters for recognition and determination of singing cicada species. Very useful comparative papers and book chapters with descriptions of song patterns were published, but many times researchers working on faunistics and systematics of Cicadoidea would like to have also an auditory impression of song characteristics in addition to the oscillograms and spectrograms published elswhere. This is the reason that we started to construct the web site where interested persons can play back or even download typical song samples of various species of singing cicadas. Till now we restricted our selection to the European species of singing cicadas. Every species is represented with the picture of live animal, a specimen from the collection, and habitat if available, oscillograms and spectrograms of the calling song and other acoustic signals. The references (partly also with downloadable PDF files) describing their song characteristics are listed as well. Song samples are playable as QuickTime movies and can be also downloaded. Till now 36 species are represented, in the coverpage also the contributors are introduced and in the English index page one can find a list of species and some general explanations about the graphs used to represent the songs.

The following colleagues, working on bioacoustics of singing cicadas agreed to offer their recordings, illustrations and references: Michel Boulard, Matija Gogala, Andrej V. Popov, Stéphane Puissant, Jerôme Sueur, José Quartau with his team and Tomi Trilar.

Key words: Acoustic website, singing cicadas, Europe.

IZVLEČEK

Akustične spletne strani o evropskih pojočih škržadih

Zvočni vzorci in drugi parametri zvočnih signalov, kot sta frekvenčna in/ali intenzitetna modulacija so v večini primerov najboljši znaki za prepoznavanje in razlikovanje vrst pojočih škržadov. Mnogi zelo koristni članki in knjige z opisi in primerjavami napevov so bili dosedaj že objavljeni. Toda raziskovalci, ki se ukvarjajo s to skupino žuželk, bi poleg publiciranih prikazov zvočnih značilnosti signalov v obliki oscilogramov in spektrogramov radi tudi slišali njihove napeve. To je vzrok, da smo začeli pripravljati spletne strani, na katerih bi zainteresirani lahko predvajali zvočne posnetke škržadjih napevov in jih tudi kopirali na svoj računalnik. Zaenkrat smo se omejili na evropske vrste škržadov. Vsaka vrsta je praviloma predstavljena s sliko žive živali, prepariranega osebka iz zbirke, ponekod tudi značilnega habitata in z oscilogrami ter spektrogrami (sonagrami) njihovih napevov. Zvočne vzorce lahko predvajamo in jih po želji kopiramo na svoj računalnik. Navedene so tudi publikacije, kjer so bili opisani zvočni signali posameznih vrst, nekatere lahko tudi kopiramo s spletnih strani v formatu PDF. Dosedaj je na spletu predstavljenih 36 vrst, na začetni strani so predstavljeni sodelavci, če izberemo povezavo s slovenskimi stranmi, lahko izbiramo le med vrstami, ki so prisotne v Sloveniji, povezava z mednarodnimi stranmi pa nas vodi na začetno angleško stran s kazalom vseh vrst, in tam so poleg splošnega uvoda razloženi tudi načini prikaza zvočnih signalov.

Gradivo, zvočne posnetke, ilustracije in reference so prispevali naslednji kolegi: Michel Boulard, Matija Gogala, Andrej V. Popov, Stéphane Puissant, Jerôme Sueur, José Quartau s svojimi sodelavci in Tomi Trilar.

Ključne besede: akustične spletne strani, škržadi, Evropa.

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INTRODUCTION

The song patterns and other song parameters like frequency and/or intensity are beside morphology in most cases the best characters for recognition and determination of singing cicadas as has been shown by different authors (e.g. BOULARD 1995, 2006, MOORE 1993, GOGALA 2002, GOGALA & TRILAR 2004). Some very useful comparative papers and book chapters were published, but many times biologists working on faunistics and systematics of Cicadoidea would like to have also an auditory impression of song characteristics in addition to the oscillograms and spectrograms published elswhere. This is the reason that we started to construct web pages, where interested persons can not only see oscillograms and spectrograms of songs but also play back or download typical song samples of different European species of singing cicadas.

MATERIAL AND METHODS

Song recordings, illustrations and references for this purpose were provided by the following colleagues, working on bioacoustics of singing cicadas: Michel Boulard - Paris, Matija Gogala - Ljubljana, Andrej V. Popov - StPetersburg, Stephane Puissant - Perpignan, Jerôme Sueur - Paris, José Quartau with his team - Lisabon and Tomi Trilar - Ljubljana.

Oscillograms and spectrograms were produced with the software Canary 1.2.4 on an iMac G4 (800 MHz) in the Classic mode and recorded as a QuickTime movie with the SnapzPro X utility (Ambrosia Software). Settings for movies were 10 video frames per second, audio sampling rate 44.1 kS (kilosamples per second) and 16 Bit resolution. The sound file was in some longer movies replaced by a compressed MP3 file. Acoustic samples of some high frequency songs are also presented as files with carrier frequencies transposed to 50 or 60% of the original range.

RESULTS

Till now we restricted our selection to the European species. In the cover page (Fig. 1) we offer the choice between Slovenian pages with acess only to the pages of cicada species present in Slovenia and another link to international index page (in English). In this cover page also contributors to this web site are introduced (presented). In the international index page (Fig. 2) there is a list of scientific names of cicadas with links to pages of single species. There are also links to the free downloadable QuickTime (QT) player required to play back the sound samples. In another frame a general explanations about these web pages with explanation of graphs (oscillograms, spectrograms and spectra) used to represent the songs is presented.

Every species is represented with a picture of a prepared specimen and a picture of a live animal (Fig. 3a). In some cases also a picture of a typical habitat is shown.

Oscillograms and spectrograms (sonagrams) of the calling song(s) or other acoustic signals of single species are presented as playable QT movie(s) (Fig. 3b). References describing song characteristics of single species are presented at the bottom of each species page. All song samples can also be downloaded. Till now 36 species are represented, and pages with further 6 species are already prepared but not yet published since the original papers are still in press or in preparation. All together represent probably more than 80% of all European species.

Web pages are open to other contributors as well.

The URL of this site is: http://www2.pms-lj.si/european-cicadas/

DISCUSSION

We used in preparation of pages older software for sound analysis (Canary 1.2.4) but alternative software for song analysis and presentation, e.g. AVES, RAVEN, AMADEUS for Mac or AVISOFT, SOUND FORGE etc. for Windows is available by now. We will have to check in the future, which of alternative programs would be most suitable to use. Especially longer song samples are problematic in this connection and we already made experiments with some of these (e.g. *Tettigetta argentata, T. dimissa*).

For playback of high frequency songs of some cicadas we used various methods to transpose songs to audible range (also for older people). We still have to find the best method and degree for this operation – not to make the impression of song samples to far away of originals.

One of the problems not yet tackled in our web pages are synonims. We do not want to present on the web the whole synonymy but at least the synonyms present in recent literature like e.g. *Tettigetta brullei* used by SCHEDL (1986, 2000) or POPOV et al. (1997) and *T. pygmea* used for the same species by BOULARD (1973, 1995) and other French specialists (e.g. PUISSANT 2006). Another similar case is the use of generic names *Cicadetta* and *Cicadivetta* for *C. tibialis* (GOGALA et al. 1996). In the future we will include these alternative names with different font in the list with the aproproate links without discussion about the priorities or arguments for certain scientific names.

Geographic distribution is certainly interesting information, which is listed in various catalogues of cicadas (e.g. NAST 1972 or DUFFELS & VAN DER LAAN 1985) as well as in a specialized literature. It would make sense to add it also to the web pages in a certain form in the future. Nevertheless, there are many dubious data in the published literature and to avoid wrong conclusions we should probably mention just recently proven data or localities where the recordings and photos of the animals were made. There is off course also a problematic issue of the eastern border of Europe, which is not well defined. If we consider northern Caucasus as a part of Europe a lot of species should be added. Till now we did not yet mention in the pages how far to the East we will go in our overview of cicada species. Since we can at the moment due to the lack of active specialists not expect new data from this part of the Europe we leave this problem to the future contributors.

Our web pages would certainly need a professional touch in design. But to hire professionals to do this job, one should have at least a modest grant, which is at present not available. Nevertheless, we are convinced that even in this form web pages on European cicadas are useful for professional and amateur specialists and other people interested in bioacoustics, cicadas and their songs.

ACKNOWLEDGEMENTS

We have to thank in the first place to the Management and the Technical Board of the Academic and Research NEtwork of Slovenia (ARNES) for the generous support with the charge free space on their servers. The site could not cover so many different species without cooperation and contributions of all colleagues listed in the index pages and in the Introduction of this paper. I am grateful also to the friend and composer Boštjan Perovšek for some important advices. Last but not least I am indebted to my family for patience and tolerance during many hours of my work at the computer...

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Figure 1: Initial coverpage http://www2.pms-lj.si/european-cicadas/

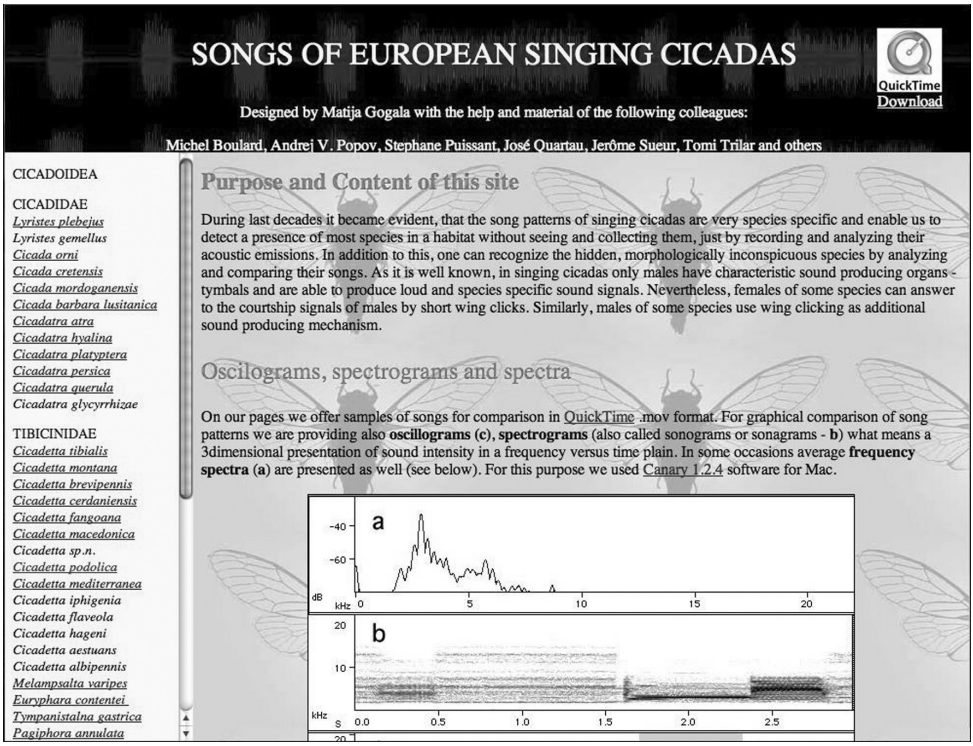

Figure 2: International index page with the list of species included in the web pages on European singing cicadas (http://www2.arnes.si/~ljprirodm3/EuCicada_Frameset-41.htm).

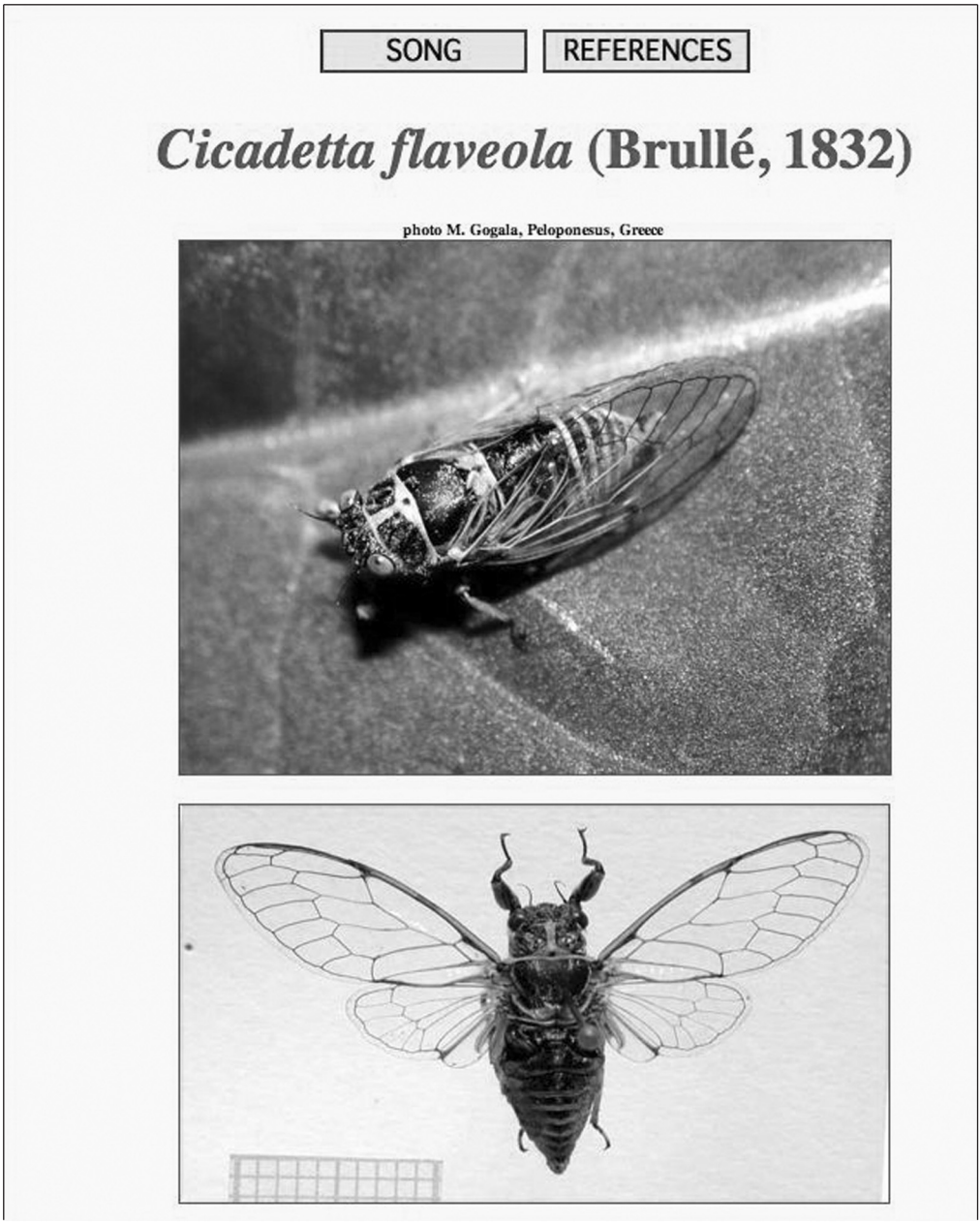

Figure 3: Example of the page with the habitus (a, this page) and acoustic data with references (b, next page) of a single species (in this case *Cicadetta flaveola* (BRULLÉ 1832)).

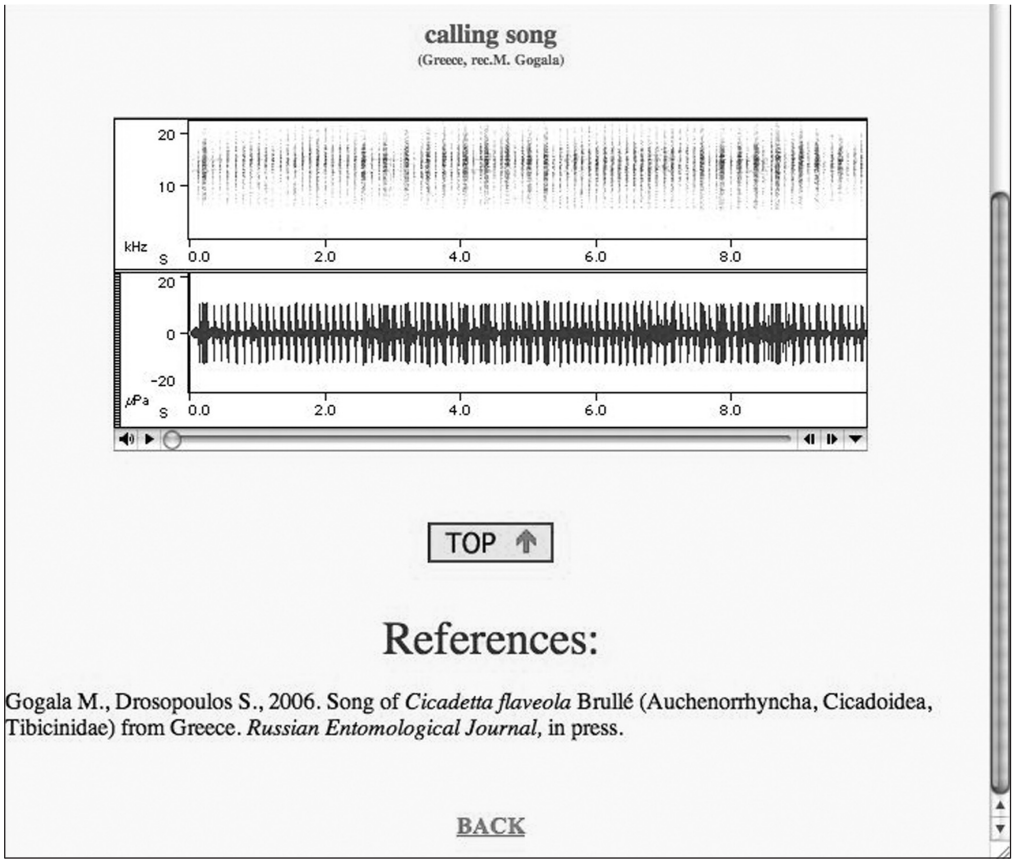
calling song
(Greece, rec.M. Gogala)
20
10
kHz
s
0.0
2.0
4.0
6.0
8.0
20
0
-20
µPa
s
0.0
2.0
4.0
6.0
8.0
TOP
References:
Gogala M., Drosopoulos S., 2006. Song of Cicadetta flaveola Brullé (Auchenorrhyncha, Cicadoidea, Tibicinidae) from Greece. Russian Entomological Journal, in press.
BACK

Figure 3b.