Vibrational songs in three sympatric species of *Tritomegas*

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ABSTRACT Vibrational songs in three close related and sympatric species of bugs, *Tritomegas bicolor*, *T. rotundipennis* and *T. sexmaculatus* were recorded and analysed. The courtship songs of all three species are clearly distinct (especially the 1st courtship song of males MS-2 and the rivalry song MS-R) but show similarities in their structure. The songs of *T rotundipennis* (only recently found in Slovenia) are published for the first time.

IZVLEČEK VIBRACIJSKI NAPEVI TREH SIMPATRIČNIH VRST RODU *TRITOMEGAS* Posneli in analizirali smo vibracijske napeve treh ozko sorodnih in simpatričnih vrst stenic *Tritomegas bicolor*, *T. sexmaculatus* in *T. rotundipennis*. Predparitveni napevi vseh treh vrst so različni in vrstno specifični (predvsem prvi napevi dvorjenja MS-2 in rivalni napev MS-R - vseh treh vrst) čeprav imajo podobno strukturo. Napevi vrste *T. rotundipennis*, ki smo jo šele pred kratkim ugotovili v Sloveniji, so tukaj prvič objavljeni.

During the previous meeting on Rhynchota of Balkan and adjacent regions in Mikrolimni, Doris KAMMERSCHEN contributed a paper on morphological differences and distribution of the little known cydnide species *Tritomegas rotundipennis* (KAMMERSCHEN, 1986 b). During the last years this species was also found in Slovenia (GOGALA & GOGALA, 1989), giving us a chance to record and analyse the vibrational songs of three local *Tritomegas* species, *T. bicolor*, *T. rotundipennis* and *T. sexmaculatus*.

At least the former two are sympatric, living together even on a tiny scale, and they occur in the same habitats. In central Slovenia, they court and mate in the early spring (March, April) and the third species, *T. sexmaculatus*, usually a month later, depending on climatic conditions.

We studied the vibrational signals of these bugs, recorded them with a contact dynamic microphone (Electro Acoustic Laboratory, Ljubljana) on a tape or cassette recorder (UHER Report 4200, SONY WM-D6C). Oscillograms were produced by a special program written in OMIKRON.BASIC from digitized samples on an ATARI MEGA ST-4 computer using the 16 bit sampler (AS Sound Sampler III, G-Data Bochum) and the laser printer ATARI SLM 804.

The premating vibrational songs are clearly distinct in all three species. Typical examples of the first courtship songs of males are shown in Fig. 1. The basic pattern of this song (MS-2) is more or less regularly repeated during courtship, followed by a pause in which the female usually answers with its own song (FS-2), and after this delay there typically is a sequence of a second male courtship song (MS-3).

A slowly increasing amplitude is characteristic for the first part of a basic MS-2 pattern in all three species, and the second part consists of pulses of decreasing amplitude. In the first two species (Fig. 1 a, b) the basic pattern of MS-2 song is of similar duration, but in the third species (c) it is much longer, even 2 3 times. In contrast to the continuous vibration in the first part of the MS-2 songs of *T. bicolor* and *T. sexmaculatus*, the MS-2 song of the *T. rotundipennis* species is composed of distinct low frequency transients. In *T. bicolor* the second part of this basic pattern is composed of 3 to 4 short pulses (Fig. 1.a s)of higher carrier frequency (stridulation!), while in *T. rotundipennis* a similar stridulatory pulse (Fig. 1.b s) precedes the last transient, followed by a series of clicks (c). In the third species the second part of this song is composed of series of longer complex pulses (Fig. 1.c s+t).

The second courtship song of the male (MS-3) is in many species of Sehirinae very intense , usually constituted of a long series of a repetitive, complex vibrational signal which resembles in playback through the loudspeaker a running motor. Oscillograms of such songs are represented in Fig. 2. In the first species (*T. bicolor*, Fig. 2a), a very short sequence was selected for presentation. In *T. rotundipennis* the average length of such a sequence is shorter and is also a complex broad band signal (Fig 2b). Long sequences of basic vibrational patterns are typical for the third species, *T. sexmaculatus* (Fig. 2c).

The rivalry songs were recorded in all three species and are emitted by males during male to male contacts in the mating period. These calls were emitted as a typical alternation in sequences as a,b,a,b,... or aa,bbb,aa,bb,...etc. These calls are closely related to the MS-2 songs but nevertheless clearly distinct. They are also species specific (Fig. 3.a-c).

The vibrational song of females during the premating period is called the acceptance song (FS-2, see also GOGALA, 1985) which is emitted by virgin, sexually mature females in response to the courtship behaviour of conspecific males. Fig. 4 presents the oscillograms of these irregularly repeated, mainly stridulatory pulses. The differences are not pronounced and in practice can not be used as a character for discrimination of these species. The same is true for distress and disturbance signals of both males and females of Cydnidae (GOGALA, 1985).

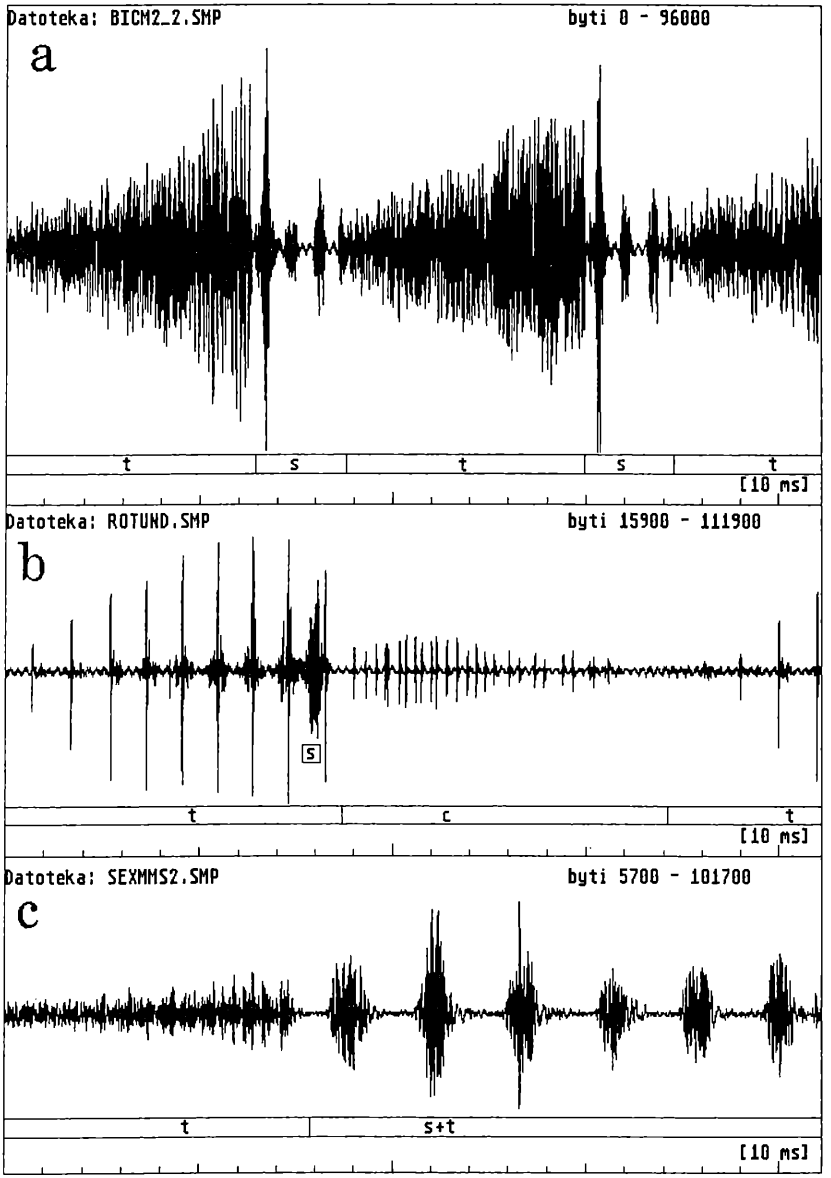

Fig. 1. Oscillograms of the first courtship songs of males (MS-2) of *Tritomegas bicolor* (a), *T. rotundipennis* (b) and *T. sexmaculatus* (c) in the same time scale. t low frequency "tymbal" parts of songs, s stridulatory, higher pitched parts of songs, c clicks

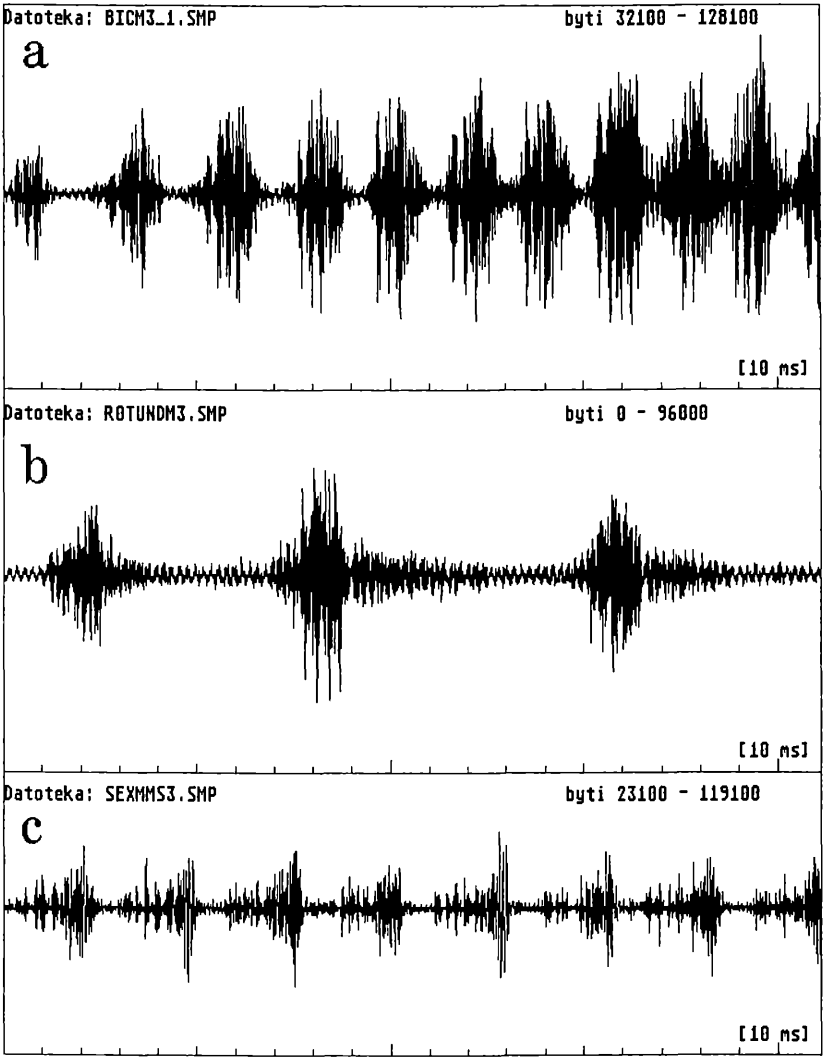

Fig. 2. Oscillograms of the second courtship songs (MS-3) of males of the three *Tritomegas* species (see Fig. 1.). On the chosen time scale only parts of the whole songs can be shown.

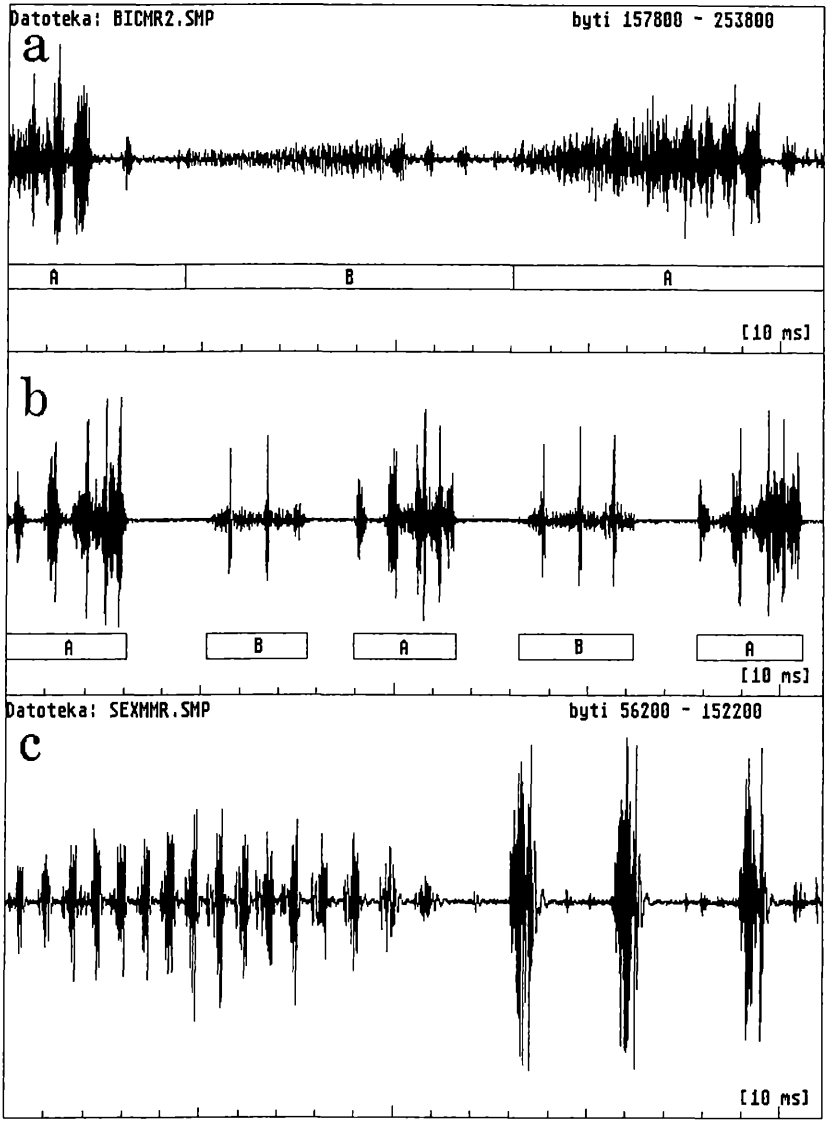

Fig. 3. Rivalry songs in three species of *Tritomegas* (see fig. 1). Alternation between two animals (A, B) is shown with the exception of *T. sexmaculatus* (below), where single strophe is shown.

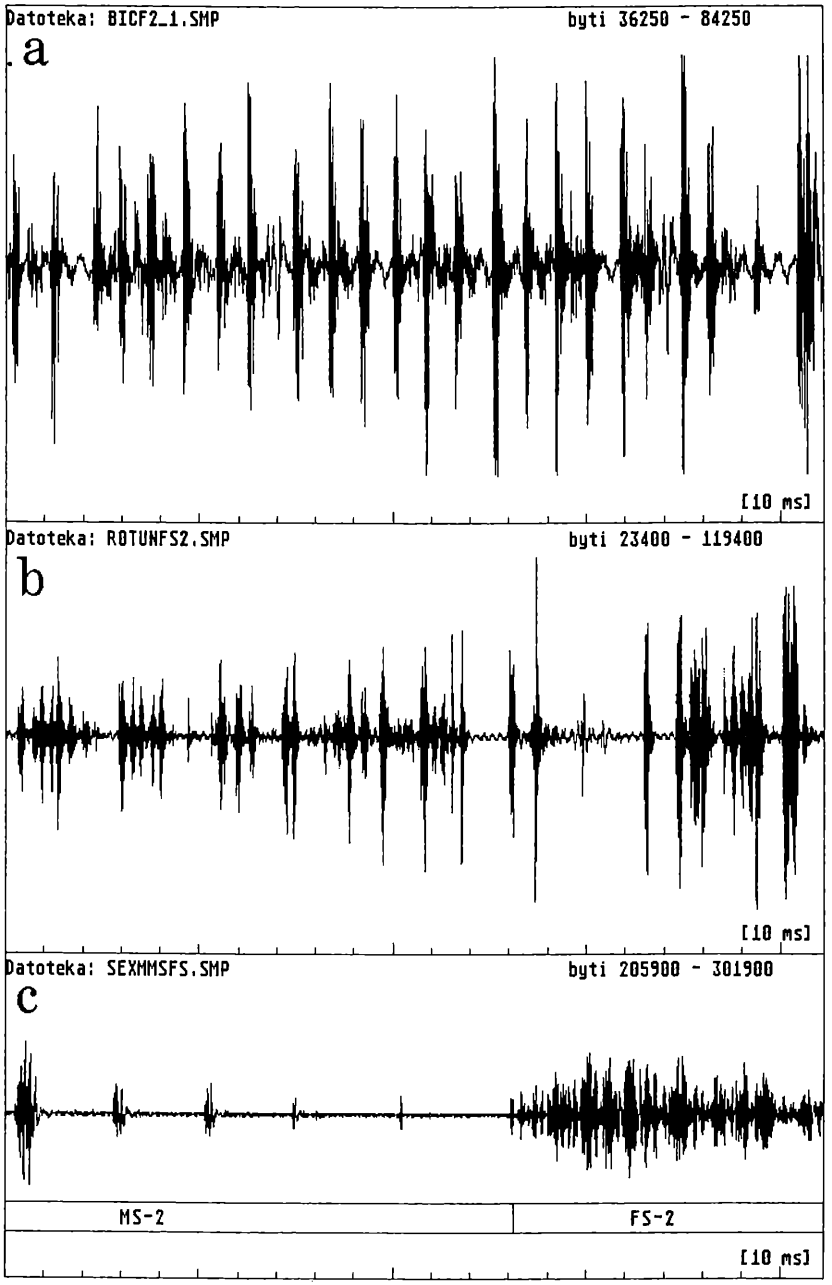

Fig. 4. Female acceptance song FS-2 in three species of *Tritomegas* (see Fig. 1). Oscillogram of *T. sexmaculatus* (below) beginns with the MS-2 song.

If there is any doubt about the taxonomic value of *Tritomegas rotundipennis*, our comparative bioacoustic study strongly supports the conclusions of KAMMERSCHEN (1986) that *Tritomegas rotundipennis* is closely related to *T. bicolor* but is doubtlessly a distinct sympatric species. It would be interesting to test experimentally the extent to which the vibrational songs of these species prevent cross-mating between them.

References:

KAMMERSCHEN D., (1986 a): *Tritomegas rotundipennis* (Dohrn 1862) im Elsaß ein zoogeographisch bemerkenswertes Vorkommen. Mit einer ergänzenden Beschreibung dieser und der beiden anderen mitteleuropäischen *Tritomegas* Taxa (Het.: Cydnidae). Marburger Entomologische Publikationen 2(3): 1-38.

KAMMERSCHEN D., (1986 b): Species-discrimination and geographic distribution in the cydnid genus *Tritomegas* (Heteroptera, Cydnidae). Proc. 2nd Int. Congr. Rhynchota Balkan, Mikrolimni Greece: 33-34

GOGALA A., GOGALA M., (1989): True bugs of Slovenia (Insecta: Heteroptera). Biol. vestn. (Ljubljana) 37: 11-44

GOGALA M., (1985): Vibrational songs of land bugs and their production. In: Kalmring K., Elsner N. (eds.): Acoustic and vibrational communication in insects (Proc. XVII. Intern. Congress Entomol. Hamburg 1984), 143-150. Paul Parey; Berlin, Hamburg