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Vibrational signals were recorded and analyzed from males and females of 13 species from 17 localities in South Africa and Namibia. Several call parameters were measured and used to calculate variability of the vibrational signals (coefficient of variation) on an individual, population and species level.

Female calls consist of single pulses whereas male calls comprise repeated pulse trains (groups of pulses). Calls of different species are of similar general structure but differ in temporal characteristics. Variability of signal traits was positively correlated with trait duration and most traits exhibited similar intraindividual and intraspecific variability.

Vibrational signals of Mantophasmatodea are species- and gender-specific. Behavioral playback experiments suggest that they are of great importance for species recognition and mate localization for these wingless insects (Eberhard & Picker 2008).

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Hyalesthes obsoletus – new species on a new host plant, or just intraspecific acoustic variation?

S. Grube

The cixiid *Hyalesthes obsoletus*, primarily known in Europe for being a vector of a stolbur causing phytoplasma, mostly feeds on one of the two main host plants, *Urtica dioica* and *Convolvulus arvensis*. Populations from these host plants differ in morphometric and genetic characteristics as well as in their acoustic signal patterns. In Serbia, there recently has been found a population feeding on a new host plant, *Crepis foetida*. Males feeding on *Crepis* exhibit a unique signal pattern and also differ in morphometric characteristics from those feeding on *U. dioica* or *C. arvensis*. Two possible explanations are discussed: the *Crepis foetida* feeding population being a new (recently emerged?) species or just showing an extraordinary degree of intraspecific variation.

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Silent songs from the dwarf woods – vibrational signalling in Peloridiidae (Hemiptera: Coleorrhyncha)

V. Hartung

Peloridiidae, the only extant family of the suborder Coleorrhyncha, use intraspecific vibrational communication. Until recently, these signals were only described for the Australian species *Hackeriella veitchi*. Here, we report the calls of one species from New Zealand and two from South America, indicating that vibrational signalling can be considered as a characteristic trait of of this family. Also, data on several species are presented that were examined but did not produce any calls in our study, along with possible explanations for the failure. Vibrational signalling can also be useful in differentiating closely related sympatric species in Peloridiidae, as shown for the two representatives from South America. An overview of the different types of signals is given; their role and mechanisms of their production are discussed.

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Pair formation mediated by substrate-borne vibrations: how signal spectral properties can drive the mating behaviour in small insects

V. Mazzoni, J. Polajna, A. Eriksson, G. Anfora, A. Lucchi & M. Virant-Doberlet

The ability to identify and locate conspecifics depends on reliable transfer of information between emitter and receiver. Vibrational signals are known to encode information about identity in their temporal pattern and can also enable localization of a partner. Much less is known about mechanisms of decision making in the context of mating behaviour. In Auchenorrhyncha pair formation is commonly accompanied with the emission of calling and courtship signals and constant exchange of information between sexes in a duet. Different signals appear to be behaviourally specific; however, what elicits the shift from one signal type to another one in a certain context is still unknown.

Here we present our studies about pair formation in two model species, the leafhopper *Scaphoideus titanus* and the planthopper *Hyalesthes obsoletus*. We investigated how individuals responded to different mating signals played back in plant tissues after manipulation of spectral components (intensity and frequency pattern). We showed that even minor changes in the signal spectral composition

could radically modify the behavioural response of individuals and, consequently, that decision making was related to the signal partner perception.

Our conclusion is that, in Auchenorrhyncha, different phases of pair formation, from the establishment of a duet to the partner location, can be regulated by emission/perception of substrate-borne signals and that mating success depends on the quality of these signals.

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The preabdominal cyclopean vibration-receptor in leafhoppers: a re-discovery, and its evolutionary implications (Hemiptera: Tymbalia: Cicadellidae)

R. Mühlethaler, A. Wessel & I. Malenovský

Vibrational signals in leafhoppers play a crucial role in their intraspecific communication. For some decades this fact is well known and documented but still little is known about the mechanism in producing and, especially, receiving vibrational signals. The Swedish entomologist Frej Ossiannilsson published in 1949 the fundamental work 'Insect Drummers' describing not only songs but also anatomical details of the sound producing organ of several Auchenorrhyncha (Hemiptera) species. Not aware of each others work until publication the Czech hemipterist Karel Vondráček was publishing in the same year an article on the sound producing apparatus in a leafhopper. Unfortunately Vondráček's excellent work was written in Czech and has obviously never been noticed by other specialist until now.

Most notably is the fact that Vondráček was not only describing the sound producing apparatus, but also identifying a 'hearing organ' in the abdomen. Regrettably, this was his only publication on this topic, although he was announcing further studies. Posthumous, we are going to present his findings and try a functional interpretation in the frame of up to date morphological methods such as microCT imaging and 3D reconstructions. Additionally, we will discuss the implications for the understanding of vibration reception (and 'hearing') and its evolution in the Tymbalia.

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The complex tibial organ in the New Zealand ground weta, *Hemiandrus pallitarsis*: Sensory adaptations for vibrational drumming signalling?

J. Strauß & L.H. Field

Ensifera (Orthoptera) have a complex mechanosensory organ in the foreleg tibia which detects sound and/or vibration signals. Within Anostostomatidae, this complex tibial organ (CTO) forms a tympanal hearing organ in New Zealand tree wetas (*Hemideina* spp), which have been studied in detail. The related New Zealand ground wetas lack the tibial tympana and acoustic signalling found in tree wetas; instead they produce signals for mate attraction by substrate drumming.

Here, we investigate the CTO in the ground weta *Hemiandrus pallitarsis* using axonal tracing to reveal sensory organs. The focus was on possible differences from the tree weta CTO which might relate to the vibrational communication. We document the structure of the CTO and its serial organisation in all three leg pairs. We also document the relationship of sensory structures to possible resonant structures like the tracheal system.

In *H. pallitarsis*, elaborate complex tibial organs are present, and the innervation and organisation is similar to that found in tree wetas. However, there are clear anatomical differences in the tracheal system. These sugggest that the CTO is better adapted to detecting cuticular vibratory stimuli rather than acoustic stimuli. While it appears that tree weta and ground wetas have evolved sensory adaptations relating to different signalling modes, some aspects of the ground weta morphology suggest preadaptation to the functional morphology found in the tree weta hearing system.

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Tremulation signalling and sensory neuroanatomy of cave crickets are consistent with ancestral vibrational communication in Ensifera

N. Stritih, J. Strauß, A. Stumpner, R. Lakes-Harlan & A. Okl

Due to contradicting phylogenies of the Ensifera it is unclear whereas terminal taxa, like crickets and katydids, developed singing and hearing independently or they have ancestrally shared hearing organs. Yet, an increasing line of evidence from non-hearing taxa of Ensifera supports the first possibility, as their