MATING BEHAVIOUR IN SPOTTED WING SPECIES SUGGESTS A MODULAR MODEL OF VIBRATORY COMMUNICATION IN *DROSOPHILA*

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Like in many other insects, Drosophila males produce acoustic signals to facilitate female's mating acceptance: some of these signals are clearly substrate-borne and are produced by abdominal vibrations. Compared to *D. melanoagster*, individuals from the *suzukii* subgroup are further characterised by the emission of a specific signal, called "toot", which is characterized by harmonic frequency structure and is associated with wing movements. We tested whether the "toot" signal is a specific characteristic of the D. suzukii group and if it co-evolved with the presence of spots on wings, by studying the courtship strategy and associated acoustic signals in spotted (*D. suzukii*, *D. subpulchrella*, *D. biarmipes*, *D. elegans*) and unspotted wings species (*D. takahashi*, *D. melanogaster*, *D.ananassae*).

We show that only spotted wings species, including *D. elegans* which does not belong to the *suzukii* subgroup, are capable of producing a toot or tool-like signal: with the exception of *D. biarmipes*, spotted wing males combine wing exposure with sound emission so that visual and acoustic cues work together to increase female acceptance. We also show that the "quivering" signal is a recent acquisition of the melanogaster group, while other type of signals such as "sine" and "pulsed" are scattered along the *Drosophila* phylogeny.

Our results advance our understanding of *Drosophila* signalling and make us hypothesize that some signals including the "toot" might be ancient characters that have been secondary lost in some lineages; alternatively these signals could peculiar cases of convergent evolution. We propose a modular model of *Drosophila* vibratory signal based on the recruitment of a species-specific set of signals taken from a collection of at least 5 main signals.