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Article

Sex-Specific Control and Tuning of the Pattern Generator for Courtship Song in *Drosophila*

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Summary

The differentially spliced transcription factors encoded by the *fruitless* (*fru*) gene are key determinants of sexual behavior in *Drosophila*. They are expressed in a minority of neurons with limited dimorphisms and regulate neural processes that remain largely unknown. Here, we use light-activated ion channels to stimulate *fru*-expressing neurons in the thoracic-abdominal ganglia, enabling direct functional comparisons of homologous circuitry between sexes. Optical stimulation of males or females initiates the unilateral wing vibrations that normally generate the male courtship song. The pattern-generating circuit operates differently in the two sexes, producing wing movement and sound in both but authentic songs only in males and in females expressing male *fru* product. A song-like motor program is thus present in females but lies dormant because the neural commands required for song initiation are absent. Supplying such commands artificially reveals *fru*-specific differences in the internal dynamics of the song generator and sets the stage for exploring their physiological basis.

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Article Outline

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