Analysis of courtship behavior in flight muscle mutants of *Drosophila melanogaster*

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As part of the mating ritual, males of Drosophila species produce a species-specific courtship song through wing vibrations. While previous studies have shown that indirect flight muscles (IFM), the major power producing muscles for flight, are neurally activated during song, the precise role of the flight musculature in courtship has not been investigated. It is also understood that courtship song plays a role in the species recognition during courtship rituals and that some elements of the mating song are subject to sexual selection. This research aims to determine if Drosophila courtship behaviors are integrally connected to courtship song. We studied transgenic *Drosophila melanogaster* strains expressing mutant myosin regulatory light chain (MLC2) proteins missing the N-terminal region ($MLC2^{\Delta 2-46}$), two key phosphorylation sites ($MLC2^{S66,67A}$), or both ($MLC2^{S66,67A;\ \Delta 2-46}$). Analysis of mating song parameters revealed that the courtship song in these strains is altered in ways not predicted from information about the mutations' effect on flight mechanics. These results suggest that the contractile mechanism underlying flight and courtship song are different. Given these data, and the understanding that each observed courtship behavior is important, we examined the transgenic strains' courtship behavior for compensatory behavioral changes in these mating song defective MLC2 mutants. Preliminary results suggest that the $MLC2^{+}$ control transgenic strain performs normal courtship behavior whereas the three transgenic mutant strains ($MLC2^{\Delta 2-46}$, $MLC2^{S66,67A}$, and $MLC2^{S66,67A;\ \Delta 2-46}$) move more slowly throughout the courtship rituals, while still achieving mating success. We propose that MLC2 plays an essential role in the courtship song distinct from its role in flight. MLC2 may also play a role, albeit a less significant one, in other courtship behaviors.