1155-92-619 **Max R. Mikel-Stites*** (mmikelst@vt.edu) and **Anne E. Staples**. *Small asymmetries produce big gains: tympanal asymmetry in a parasitoid fly.* Preliminary report.

Ormia ochracea is parasitoid fly famous for its ability to localize its hosts phonotactically with a precision of 2° in the azimuthal plane, a level of precision equal to that of humans. This is despite their small size, which should prohibit this degree of accuracy due to fundamental constraints imposed by the physics of sound propagation (Mason *et al., Nature*, 2001). The enhanced precision is due to the mechanical coupling of the fly's tympanal membranes. This coupling allows *O. ochracea* to resolve nanosecond time differences in incoming sound waves by increasing the interaural time delay (ITD) and interaural amplitude difference (IAD) between the fly's two ears. The tympanal system can be approximated by a simple mechanical model whose physics are well represented by two coupled ODEs (Miles *et al., J Acoust Soc Am*, 1995). Here, we modify this mathematical model by introducing an asymmetry in tympanal surface area between the two membranes. We also measured 38 *O. ochracea* tympanal membranes and found an average tympanal area asymmetry of approximately 5.6%. We show that, in the modified model, an asymmetry of just 5% between the left and right tympanal areas can result in more than a 22-fold gain in ITD and IAD. (Received January 21, 2020)