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5.1

Keynote Lecture

Mechanics of hearing in other species

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Insects are marvelous. They are organisms that have diversified into a multiplicity of shapes and functions. It may not be all too surprising that their sensory systems, conveying a sense of boundless creativity, display a commensurately rich structural and functional diversity. The ears of insects are no different; they come in all shapes and forms. Audition in insects serves three basic functions: the detection and localisation of mates in the context of intraspecific communication, the detection and sometimes localisation, of aerial echolocating bats, and the detection and localisation of prey. Much research has addressed the structure, function and physiology involved in insect hearing (for a recent collection of reviews see *Micr Res Tech, Topical Issue, 63, vol 6, 2004*). Because of their diminutive size, insects are endowed with small ears forcibly set close together. This size limitation is the source of challenging constraints to achieve adequate audition, constraints that are exacerbated by the biophysics of sound propagation in the environment. Yet, small does not necessarily mean simple and inefficient; insect ears can be sharply adapted to the task and exhibit sophisticated processing capacities and mechanisms similar to those of the highly complex ears of mammals (Robert D, Göpfert MC 2002 *Curr Opin Neurobiol* 12:715–720). Using sensory ecological tenets wherever possible, several aspects will be addressed: 1. the peripheral mechanisms of frequency selectivity in locusts, 2. nanometer scale auditory sensitivity in mosquitoes and moths and (3) active and adaptive processes in insect hearing.