

# World of Knowledge

## Can squid and octopus hear the sound?

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A research team lead by Dr. Hong Young Yan, a senior research fellow of the Marine Research Station, recently discovered that both squid and octopus could respond to underwater sound via their statocysts. Their work was published in the May 2009 issue of *Comparative Biochemistry and Physiology, Part A* (153:278-283) which solved a question that puzzled scientists for almost a century. It was discovered in 1910 that blind octopus could locate the direction of a sound source. However, it was not known how these cephalopods could perceive the sound. By using the auditory brainstem response (ABR) recording technique which was developed in Dr. Yan's lab in 1998, they recorded evoked brain waves of both squid and octopus when they were exposed to various kinds of acoustic stimuli. They found that squid has a hearing frequency range of 400 to 1500 Hz while octopus has a narrower range of 400-1000 Hz, and has a higher sound perception threshold. By injecting neomycin, a known drug that could damage sensory hair cells of the inner ear, into the statocysts of both animals led to ablation of acoustically evoked brainwaves which confirmed that statocysts of both squid and octopus play a role in sound perception.

The new findings showcased an amazing case of parallel evolution, indicating cephalopod molluscs developed a vestibular system with remarkable resemblance to that of vertebrates. In this, there is an otolith analogue, the statolith, which overlies a macular sensory area containing sensory cells most likely homologous to vertebrate hair cells. The case has a similar range to that of unspecialized fish species. Since cephalopods lack any gas bladders, thresholds were expectedly quite high. Thus, the anatomical analogies result in very similar response patterns to some fish. One wonders what sounds these animals are listening to.

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