3RD SYNG BIO
Tampa, Florida, USA
May 14-19th, 2017

Acoustic Signatures and Sound Producing Mechanisms in Syngnathid Fishes

Adam Chee Ooi Lim[1], Chong Ving Ching[2], Wong Chiao San[3] & Sithi Muniandy[3]

[1]Institute of Ocean and Earth Science, University of Malaya, 50603 Kuala Lumpur, Malaysia.

[2]Institute of Biological Sciences, Faculty of Science, Universiti Malaya, Kuala Lumpur, Wilayah Persekutuan, Malaysia

[3]Department of Physics, Faculty of Science, Universiti Malaya, Kuala Lumpur, Wilayah Persekutuan, Malaysia

Presenting Author: Adam Chee Ooi Lim

Syngnathid fishes are known to produce acoustic signals in various behavioural contexts. While there are very few bioacoustic studies on seahorses, pipefishes have received even less attention. Such studies are sporadic, and there are no comparative studies within the family. This study reveals that the feeding click of syngnathids is composed of multiple acoustic components whereas the distress growl of the seahorse is of a solitary low-frequency component. The acoustic parameters (frequency and duration) of syngnathid feeding click and seahorse distress growl were found to be species-specific signatures. The feeding click sound is produced by two dorsal cranial bones (posteriorly, the supraoccipital bone and coronet) which is consistent throughout the *Hippocampus* genus whereas pipefishes depict varied sound producing mechanisms. In the pipefish and pipehorse, these mechanisms consist of either three cranial bones (posteriorly, the supraoccipital, 1st postcranial plate and 2nd postcranial plate) or two bones (posteriorly, the supraoccipital and 2nd postcranial plate) in the absence of the 1st postcranial plate or presence of a vestigial 1st postcranial plate. The click sound components of the seahorse can be traced to the sliding movement and forceful knock between the supraorbital bone and coronet bone (=1st postcranial plate). In *Doryichthyes* pipefishes, the click sound components are generated when the supraoccipital slides backwards, striking and pushing the 1st postcranial plate against (and striking) the 2nd postcranial plate, whereas in *Syngnathoides* pipefish, the supraoccipital rubs against the 2nd postcranial plate. The growl is accompanied by intense vibration at the cheek indicating another sound producing mechanism involving possibly the pectoral girdle. The cranial morphology and kinesis of the examined syngnathids produced acoustic signals consistent with the bone strikes that produce sharp energy spikes, or stridulation between bones that produce repeated or multimodal sinusoidal waveforms. It is hypothesized here that the extant syngnathid species either retain the ancestral three-bone mechanism or possess a derived or modified form of this model. The production of species-specific acoustic parameters in seahorses is attributed to the individual shapes and size of the coronet bone despite a common modified two-bone mechanism throughout the *Hippocampus* genus. The different mechanisms in pipefishes (i.e. either three or two participating bones) promote variability in signal acoustic shape and parameters. The variation in cranial bone morphology, cranial kinesis and acoustic signatures among syngnathid fishes reflects the adaptive evolution within the Syngnathidae.