Vocal neurons encode evolution of frog calls

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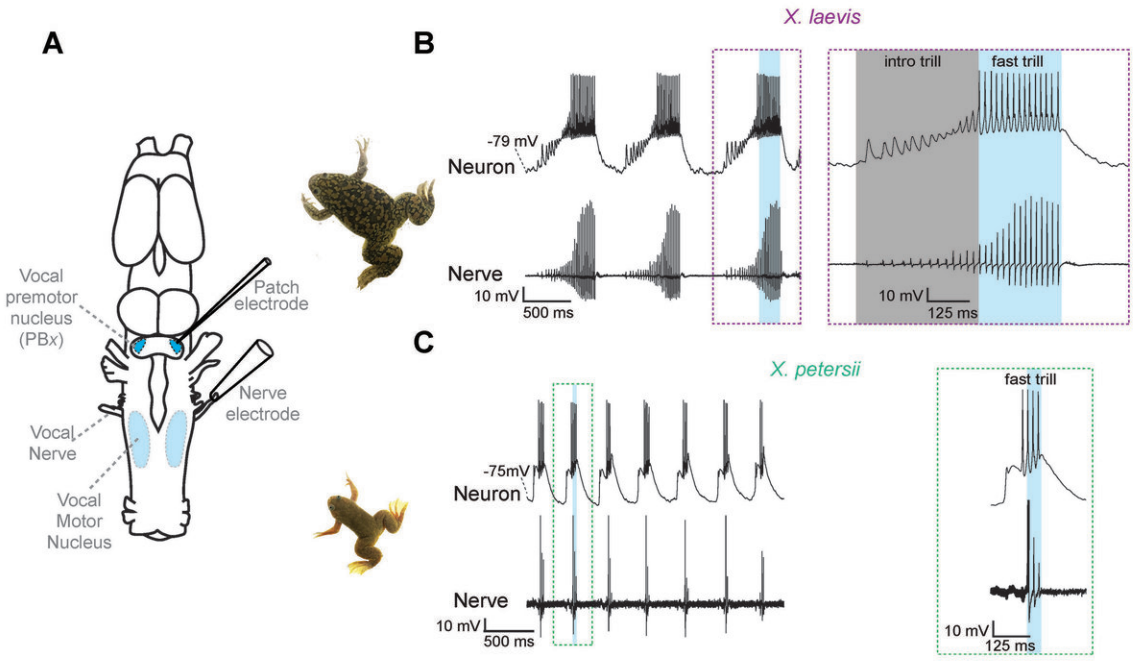

A vocal CPG underlies divergent vocalizations in X. laevis and X. petersii(A) Schematic representation of the known hindbrain vocal central pattern generator nuclei. The vocal motor nucleus (n.) IX-X contains vocal motor neurons. These neurons send their axons via the vocal (laryngeal) nerve to the larynx, the vocal effector organ. Fictive calling can be recorded from the vocal nerve using a suction electrode. Premotor neurons in the Xenopus parabrachial area (PBX) project monosynaptically to the vocal motor nucleus. In PBX, whole cell electrodes can record activity associated with fictive calling.(B) Representative example of X. laevis fictive calling, consisting of a series of long, fast rate CAP trills (~60 Hz; blue box, Nerve) and a simultaneously recorded premotor vocal neuron (Neuron). Temporally expanded recording (dashed box) of a single X. laevis call with introductory trill (grey box) and fast trill (blue box) and

corresponding premotor neuron activity (right). Credit: Barkan et al., *JNeurosci* (2018)

A study of two closely-related frog species reveals a population of neurons that give rise to the unique mating calls of each species. Published in *JNeurosci*, the findings suggest that changes in the properties of these cells over the course of evolution may have shaped vocal patterns in vertebrates including bats and primates.

Clawed frog (*Xenopus*) species are distinguished by the vocalizations that males use to attract females. To investigate what contributes to these differences, Erik Zornik and colleagues compared the activity of premotor vocal neurons in dissected brains from two species, *X. laevis* and *X. petersii*, which diverged from a common ancestor about 8.5 million years ago.

Applying the neurotransmitter serotonin to the premotor parabrachial area of the isolated brains to produce fictive calls, the researchers identified two groups of cells in these closely-related species that are active during calls. They found that while the properties of Early Vocal Neurons were similar between the species, those of Fast Trill Neurons were unique and corresponded to the calls characteristic of each species. The parabrachial area is involved in the control of breathing across vertebrates, suggesting that these ancient circuits may have enabled the evolution of vocal patterns.

More information: Premotor neuron divergence reflects vocal evolution, *JNeurosci* (2018). DOI: 10.1523/JNEUROSCI.0089-18.2018

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