



Sound production in amphibious Gobiidae : from water to land

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The conquest of terrestrial environments required substantial morphological and physiological modifications for all lineages that undertook this transition to adapt to the new challenges posed by terrestrial life. While research has predominantly focused on Sarcopterygians, various species of Actinopterygians have also more or less successfully adapted to terrestrial habitats. To explore the modifications associated with environmental transitions, the Gobiidae family serves as an excellent model because some of its extant representatives, called mudskippers (Oxudercinae) inhabit both aquatic and terrestrial environments. This study aims to understand the evolution of acoustic communication during terrestrialization. We first recorded the sounds emitted by mudskippers underwater and on land. Simultaneously, the use of a camera allowed the analysis of movements during sound production and the identification of structures that are involved in acoustic communication. We identified different types of sounds that are produced both on land and underwater, with the pectoral girdle being the central structure involved in sound production. Through 3D reconstructions and histological observations, we gained detailed insights into the characteristics of the musculoskeletal system involved in the acoustic communication of these species. Studying exclusively aquatic gobies was required to make comparisons. Our results are a first step towards understanding the adaptations necessary for the persistence of acoustic communication following the transition to terrestrial environments.

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