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Title: Morphological analysis of the functional design of the connection between the alimentary tract and the gas bladder in air-breathing lepisosteid fish

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Abstract: There is considerable controversy in the literature regarding the existence of a “longitudinal slit” versus a “duct” connecting the respiratory gas bladder with the alimentary tract in various species of garfishes (Lepisosteidae). The aim of the present work has been to address these discrepancies on the basis of our own work on longnose gar *Lepisosteus osseus* in conjunction with a review of the literature. We provide anatomical evidence for a better understanding of the functional advantages of the “longitudinal slit” versus the “duct” in respect to feeding and respiration in juveniles longnose gar. The anterior part of the garfish body cavity, from the oral cavity to the stomach, was used for morphological and histological analysis. It has been observed that the air bladder in the longnose gar is open to the alimentary tract through a longitudinal slit which is present in the glottis on the dorsal side of the oesophagus. The external side of the glottal ridges in the anterior oesophagus, on the side of the opening, consist of stratified squamous epithelium which then turns into the pseudostratified columnar ciliated epithelium in the posterior oesophagus. The glottal ridges are comprised of epithelia and radially arranged striated muscle fibres surrounded by connective tissue. It can be surmised that the tunica muscularis in the anterior oesophagus of garfish aids the glottis in moving air in and out because it supports the dorsal retractor muscle in propelling air through the longitudinal slit from the buccal cavity. When the buccal cavity of the garfish is contracted during holding prey, the muscles of the gas bladder wall and tunica muscularis, located inside and outside the glottal ridge, participate in exhalation.

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