

Syngnathid feeding apparatus morphology: long vs short snouts

Leysen H. Roos G. Van Wassenbergh S. Adriaens D.

Ghent University, Belgium
University of Antwerp, Belgium
University of Antwerp, Belgium
Ghent University, Belgium

The family Syngnathidae (Gasterosteiformes) encompasses pipefishes and seahorses, which are characterized by an elongated snout with small terminal jaws. They are extremely fast suction feeders, with a feeding strike consisting of a rapid neurocranial elevation accompanied by an equally rapid retraction of the hyoid. Within the family, there is a large diversity in snout morphology, with variation in both snout length and diameter. A long and narrow snout is thought to increase the flow rate of the incoming water and allows prey to be captured from a greater distance. However, it also limits prey size, increases the moment of inertia during snout rotation and probably results in higher friction because of viscous forces becoming more important. So, is there an advantage of having a long snout? Are long snouted syngnathids really faster compared to short snouted ones? Kinematical analyses show that the snout of long snouted pipefishes travels a longer distance and so more elusive prey can be caught, but velocity and acceleration was lower in the long snouted syngnathids compared to the shorter snouted ones. The aim of this study is to investigate whether these observed kinematical differences can be explained by morphological variation in lever systems involved in suction feeding. A detailed morphological description of the cranium of a long and short snouted seahorse and of a long and short snouted pipefish is given, based on cleared and stained specimens, dissections, histological serial sections, CT scans and graphical 3D reconstructions. Special attention is paid to the anatomy of the ligament/tendon attachments and articulations between the moveable units (lower jaw, hyoid, suspensorium, neurocranium).