

## The discovery of pallial siphon in Vetigastropoda

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### Abstract

An anal excurrent siphon of pallial origin was discovered in the living vetigastropod *Hemimarginula pumila* (Fissurellidae, Zeidorinae). While siphons of pallial origin are commonly known in apogastropods, only head-foot-origin siphons had been reported in vetigastropods until now. This paper presents the discovery and discusses the potential for this structure to be more widespread within the family.

Keywords: anatomy, organic function, taxonomy, phylogeny, evolution.

### Introduction

The subclass Vetigastropoda, a highly diverse group, is characteristically known for lacking pallial siphons. This structure is more typical of apogastropods Caenogastropoda, particularly within the Siphonogastropoda, a clade whose defining feature, as the name suggests, is the presence of a pallial siphon (Simone, 2011, 2020). Siphons have been observed in vetigastropods, but they originate from the head-foot region (Simone, 2020: fig. 18). For example, some taxa, such as calliostomatids and tegulines, use their nuchal lobes—flaps flanking the head—as incurrent and excurrent siphons. These structures are thus of head-foot origin, differing from the typical gastropod siphons, which are formed from the mantle edge.



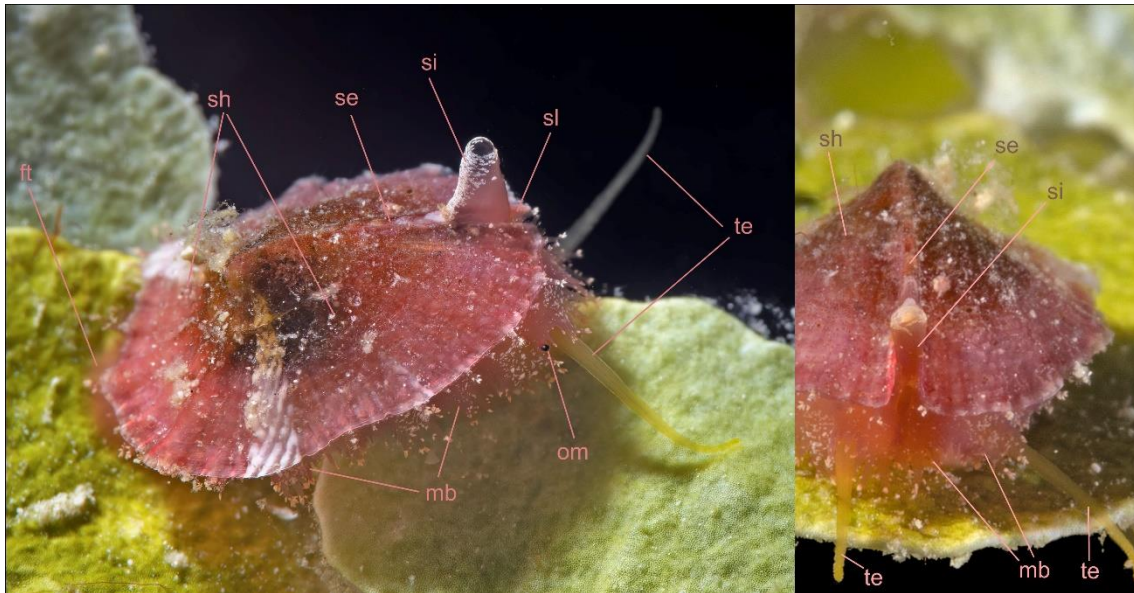
1: *Hemimarginula pumila*, living animal in situ. Local: Roatan, Honduras, on *Halimeda* algae, 4 different views of crawling activities, attention to the siphon in the anterior region (L ~10 mm).

However, during a night dive in Roatán, Honduras, at 12m depth on a sheer wall, the junior author observed a *Hemimarginula pumila*, a small vetigastropod from the family Fissurellidae, which displayed a prominent siphon emerging from its anterior slit (Figs. 1, 2: si). This siphon was identified as an excurrent, anal siphon of pallial origin—a novel discovery for a vetigastropod.

The animal was carefully examined and photographed in the field (Figs. 1, 2: si), but not collected. In this individual, a well-developed siphon (Fig. 2: si) could be observed extending from the shell slit (sl). The siphon is not a fully enclosed tube, as it appears to have edges along its anterior surface. These edges are continuous with the anterior portion of the papillate mantle edge (Fig. 2-right: mb), which is somewhat zigzagged—a distinctive feature of fissurellids.

The siphon detected in *H. pumila*, as mentioned above, is an excurrent, anal siphon that expels water along with feces and urine, hence the term "anal siphon." The incurrent flow of water enters from both lateral sides of the animal, passing through the gills—one on each side. These water streams converge in the median region and, in zeidorine fissurellids, exit through the anterior shell slit. This slit serves as a mechanism to prevent self-pollution by directing waste away from the head. In more derived fissurellids, a separate orifice in the shell, rather than a slit, has evolved for this purpose. Interestingly, *H. pumila*, and possibly other members of its genus, have further adapted by developing an additional siphon to more effectively remove waste from the body's bobblest region.

The taxonomic and phylogenetic implications of this discovery will be analyzed as more zeidorine species become anatomically known. Currently, they are poorly studied, and it is possible that additional genera and species may exhibit this character. A preliminary survey has identified



2: *Hemimarginula pumila* living animal in situ. Two views with some of its anatomical features shown, left – right view, right – anterior view (L ~10 mm). Lettering: ft, foot; mb, mantle border with papillae; om, ommatophore with eye; se, selenizone; sh, shell, si, excurrent siphon; sl, shell slit; te, cephalic tentacle.

at least one other fissurellid with an anal siphon: *Macroschisma cuspidatum* (S. & J. Johnson, 2019), which belongs to the Fissurellinae subfamily, a group characterized by a hole in the shell. This suggests that pallial anal siphons may be more widespread among members of the family, warranting further investigation.

## References

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