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The Development and Structure of Feeding Arms in Antarctic Species of Pterobranchs

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Poster Presentation P39

**THE DEVELOPMENT AND STRUCTURE OF FEEDING ARMS IN
ANTARCTIC SPECIES OF PTEROBRANCHS**

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Pterobranchs are small colonial animals that live in tubes attached to hard substrata on the sea floor. They are members of the phylum Hemichordata, which shares characteristics with vertebrate animals and other chordates. The focus of the research presented here is to examine the development, structure, and function of the feeding arms in several species of pterobranchs collected from depths greater than 300m from waters surrounding Antarctica. Pterobranch zooids in the genus *Cephalodiscus* feed a crown of arms held over the body to filter particles from the water. Larvae released from adult tubes are ciliated, but lack feeding arms and are thought to derive energy from internal yolk stores. However, we have observed larvae of at least one species respond to the presence of particulate food. A swimming larva bathed in a cloud of particulate food will begin to swim in vertical circles through the cloud; some have secreted mucus and dragged particles of food out of the cloud. One possible explanation is that the larvae feed using structures other than the feeding arms prior to arm development, including pretentacle structures or endocytosis. The larva may also be reacting to the particulate matter as a nuisance and avoid fouling in much the same way. Pterobranch larvae begin development of the feeding arms at the end of the free-swimming larval stage, though larvae remain mobile. The arms develop on the dorsal side of the animal, often beginning with a pair near the central axis followed by pairs of arms to the left and right. Each arm develops from a trilobed bud. At some point in development, the arm grows to its full length and has numerous lateral extensions, called pinnules. These pinnules are ciliated and are involved in capturing food particles. The adult feeding apparatus consists of up to twelve arms held in a sphere on the dorsal side of the animal. Each arm has multiple pinnules, which are paired along the length of the arm until the apicalmost tip. Scanning electron microscopy reveals that a single pinnule has two tracts of cilia along its outer face which may beat to draw water across the tentacular net or capture food particles. Food particles, including bacteria and single-celled algae, may then be conveyed down the pinnule to a deep, thickly ciliated groove on the outer face of the arm central to the paired pinnules, and eventually to the mouth. Scanning electron and light microscopy have elucidated the structures associated with feeding, as well as unusual refractive spheres at the tip of each arm in some species. The function of these spheres is unknown.