Farmers and ranchers: how thyasirid bivalves associate with chemosynthetic bacteria

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Thyasirid bivalves are poorly known but widely distributed inhabitants of soft sediments in cold waters. Some thyasirids harbour chemoautotrophic, sulphur oxidizing bacterial symbionts on the surface of their gills, and evidence suggests that these symbionts are periodically endocytosed and digested by the bivalves, forming part of their mixotrophic diet. Other thyasirids lack such symbionts; these include some species that are very closely related to symbiotic species, such as documented in the cryptic Thyasira cf. gouldi complex in the fjord of Bonne Bay, Newfoundland. Here, I discuss the alternative trophic strategies used by symbiotic and asymbiotic thyasirids from this fjord and relate them with host burrowing and bioirrigation behaviours. Several lines of evidence suggest that both symbiotic and asymbiotic thyasirids may derive nutrients from chemosynthetic, sulfur-oxidizing bacteria. The two groups of bivalves differ in the location of the symbionts that they cultivate, as asymbiotic thyasirids ‘farm’ bacteria on the lining of their extensive burrow network, while symbiotic thyasirids ‘ranch’ symbionts among gill epithelial cell microvilli. The relative benefits and drawbacks of these two alternative strategies are discussed.