

Flow patterns in the dendroid graptolite *Dictyonema*: implications for feeding currents and the origin of the planktonic mode of life

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It has been proposed that the origin of the planktonic mode of graptolites evolved from downward-directed ciliary feeding of conical dendroids, such as *Dictyonema*. It was suggested that these currents provided the lift necessary to enter the planktonic mode of life. In order to test this hypothesis, life-sized wire mesh models of *Dictyonema* were tested in a flow tank at low velocities. In each case, unidirectional fluid movement through the models produced the same effect--weak exhalant currents out of the top of the cone. If the sessile dendroids did have downward ciliary feeding currents, as proposed, then these would have had to evolve struggling against the naturally induced passive flow. It is, therefore, unlikely that they produced these currents, so the adaption to the planktonic mode of life must have been achieved by some other means.

The presence of dissepiments has a dual purpose: (1) they provide structural support to the branching stipes of the cone; and (2) by making the rhabdosomal mesh more dense, upward currents are increased. Tests done on a model having only half the dissepiments, thus resembling the earliest planktonic graptolites which required less structural support and probably did not utilize passive flow, produced very little exhalant flow. Greatest upward exhalant currents were suited for maximizing feeding current flow in relatively quiet water. This agrees with the observation that these types of rhabdosomes are normally found in muddy sediments that were deposited in quiet water.