Minireview: Ciliary filter feeding and bio-fluid mechanics[present understanding and unsolved problems

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ABSTRACT: The energy cost for various ciliary filter feeders shows that useful pump work constitutes 0.3-1.1% of the total metabolic expenditure. The []water processing potential[] (liters of water pumped per milliliter O_2 consumed by the animal) is a useful tool for characterizing filter feeding and adaptation to the environment. The six types of ciliary-capture mechanisms (collar sieving, cirral trapping, ciliary sieving, ciliary downstream collecting, ciliary upstream collecting, mucus-net sieving) are reviewed as well as the aerosol/hydrosol filtration theory. A brief overview of fluid mechanical principles and tools for studying ciliary functions is given.