



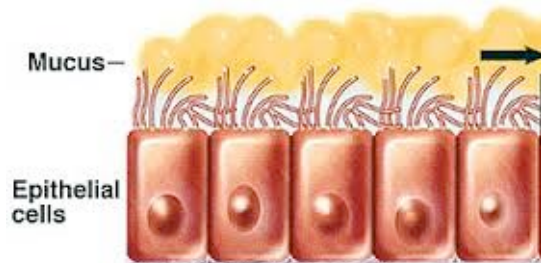
CENTURI
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Call for a 2-years Postdoc position

Long-range collective dynamics of cilia, mucus transport and tissue polarity in bronchial epithelium

Keywords : active matter – collective motion - Lattice Boltzmann simulations - Mucociliary transport – optical microscopy



Airway epithelium is protected by the **active transport** at its surface of a layer of a complex fluid, the mucus. It is powered by the **coordinated beats** of billions of microscopic cilia carried by epithelial cells. Recently, we experimentally showed that, during ciliogenesis, large milling patterns of ciliary beats leading to mucus vortex flows spontaneously emerged on reconstituted epitheliums and that removal of mucus and further addition of model fluids could

destroy and reconstitute this order.

The postdoctoral project is to understand the emergence and the maintain of the collective dynamic order of ciliary beats. The postdoc will combine an **in-vitro** experimental approach on cell cultures at Air Liquid Interface and an **in-silico** approach based on Lattice Boltzmann simulations.

The objectives of this postdoctoral project project are to understand:

- how microscopic active cilia self-organize and coordinate their beating to generate deterministic and periodic fluid flow patterns and a nematic order at the tissue level.
- the role of long-range hydrodynamic interactions on the emergence of a collective dynamics of ciliary beats and how the mechanical feedback of mucus on cilia impacts the epithelium organization?

Depending on the background of the candidate, the project will be more focused on numerical simulation, on experiments or on both

Experimental: advanced optical microscopy techniques on human bronchial cultures at Air Liquid Interface, image processing techniques.

Numerical: In-house lattice Boltzmann solver combined with the immersed boundary method.

Candidates must have an experience in interdisciplinarity where Physics or Mechanics meets Biology

Contacts

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Deadline November, 30th 2018

Applications on line: <http://centuri-livingsystems.org/recruitment/>