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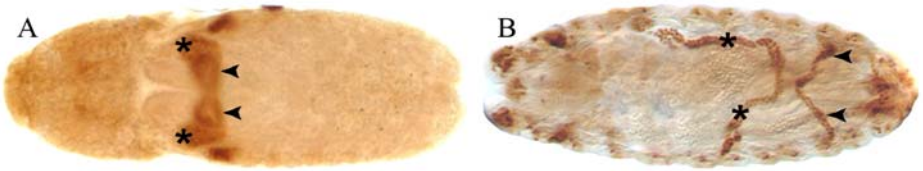
Sushama obtained Integrated PhD from TIFR under the guidance of Prof. K. VijayRaghavan at NCBS Bangalore working in collaboration with Dr. Helen Skaer, University of Cambridge, UK. After a year of postdoctoral work at TIFR Mumbai, she joined CBS in 2009.

Research Interest:

Analysing the genetic networks underlying branching morphogenesis in epithelial tubules.

Several important organs of animals contain tubular parts. Many such tubes begin developing as a bud, branching out from an epithelium. Much as the identity of intercellular signalling pathways and transcription factors required at this step is known for various organs - how these molecular instructions are executed to form specific shapes, by monitoring collective behaviour of cells to perform specific functions, is unclear.

The insect renal system presents a relatively simple scenario to study this phenomenon. In the fruitfly *Drosophila*, the renal system consists of a longer, anteriorly projecting pair and a shorter, posteriorly projecting pair of tubes called the Malpighian tubules (MTs). The difference between the MT pairs makes this a valuable system to address differential epithelial budding, and the fly model offers powerful genetic and molecular tools to examine tissue development.



Morphology of embryonic *Drosophila* renal system. Wild type embryos labelled with an antibody to Cut, which labels all MT cells. (A) everted primordia, (B) differentiated MTs. * Anterior MT, ► posterior MT.

Allocation of cells to *Drosophila* MTs occurs early in embryogenesis from the hindgut. By the time germband extension is complete, MTs become apparent as four little outpouchings at the boundary between the midgut and the hindgut. Among the four primordia, the anterior pair needs high levels of TGFβ signalling whereas the posterior pair requires the absence of TGFβ activity. Several other factors and molecular interactions also contribute to formation of MT primordia. The aim now is to elucidate the mechanism of differential tube eversion in detail.

Anteroposterior patterning of MTs bears molecular similarity to branching of the ureteric bud in developing vertebrate kidneys too, providing yet another instance of evolutionary conservation of developmental themes across diverse organisms.

Research Publication:

Hatton-Ellis E., Ainsworth C., **Sushama Y.**, Wan S., VijayRaghavan K., and Skaer H. (2007) Genetic regulation of patterned tubular branching in *Drosophila*. PNAS USA **104**: 169-174.