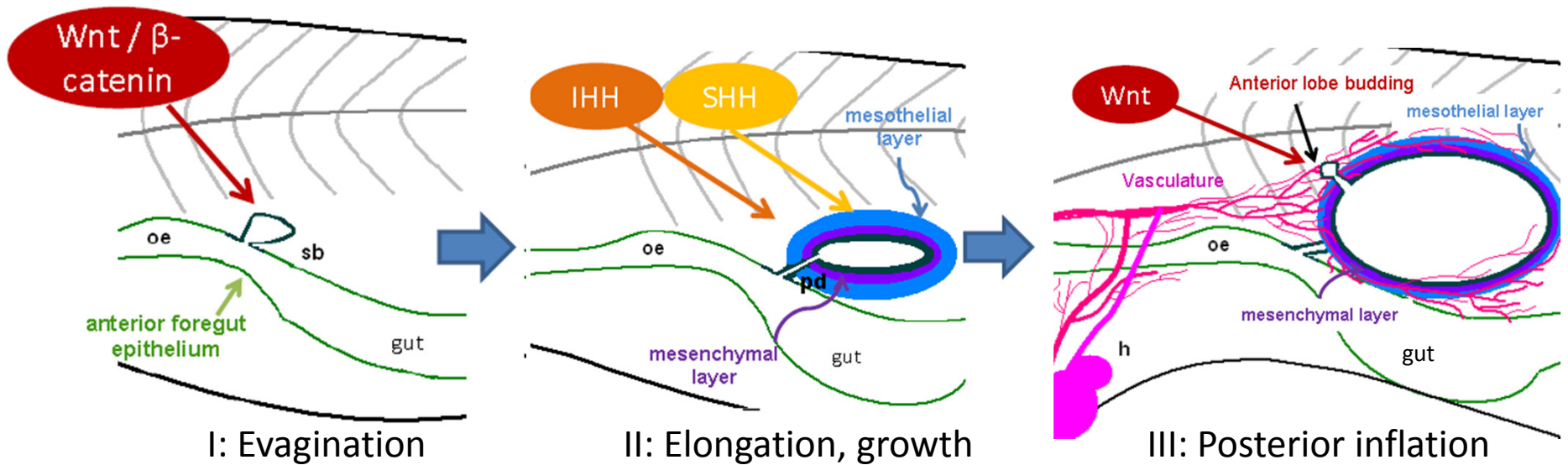


Supplementary Figure S1. Conceptual model of swimbladder development.



Adapted based on Winata et al. 2009.

oe = esophagus; sb = swimbladder; pd=pneumatic duct; h=heart; IHH=Indian hedgehog; SHH = sonic hedgehog.

Supplementary Figure S2. Conceptual model of key aspects of swimbladder function.

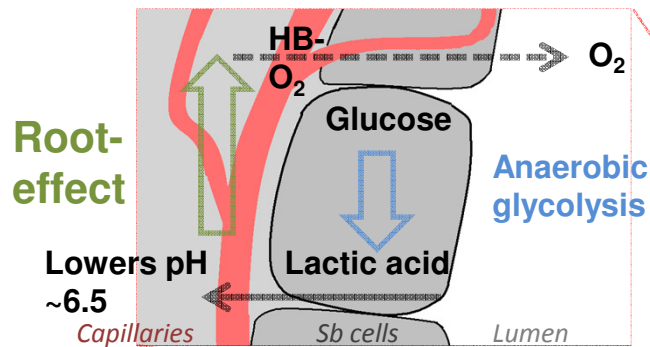
Inflation

- Parasympathetic acetylcholine-mediated neurotransmission

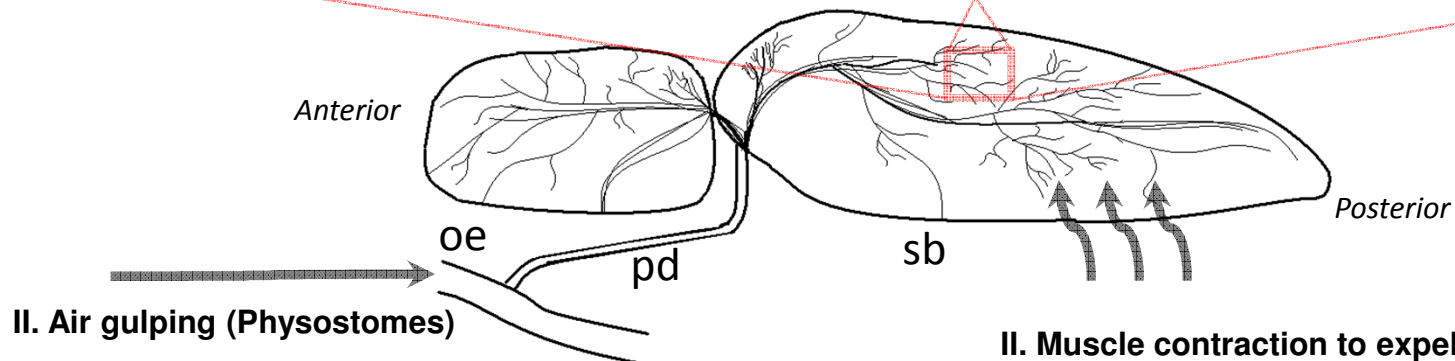
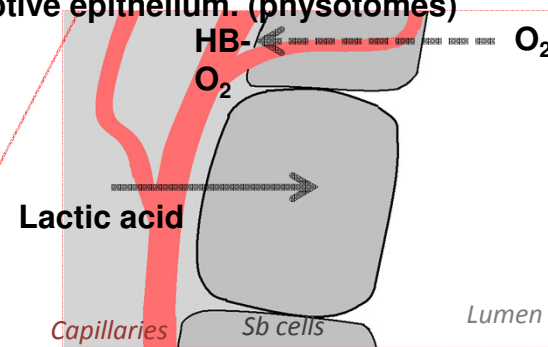
Deflation

- β -adrenergic receptor mediated neurotransmission

I. Passive diffusion (physotomes and physoclists)



I. Relaxation of smooth muscle, increased exposure of resorptive epithelium. (physotomes)



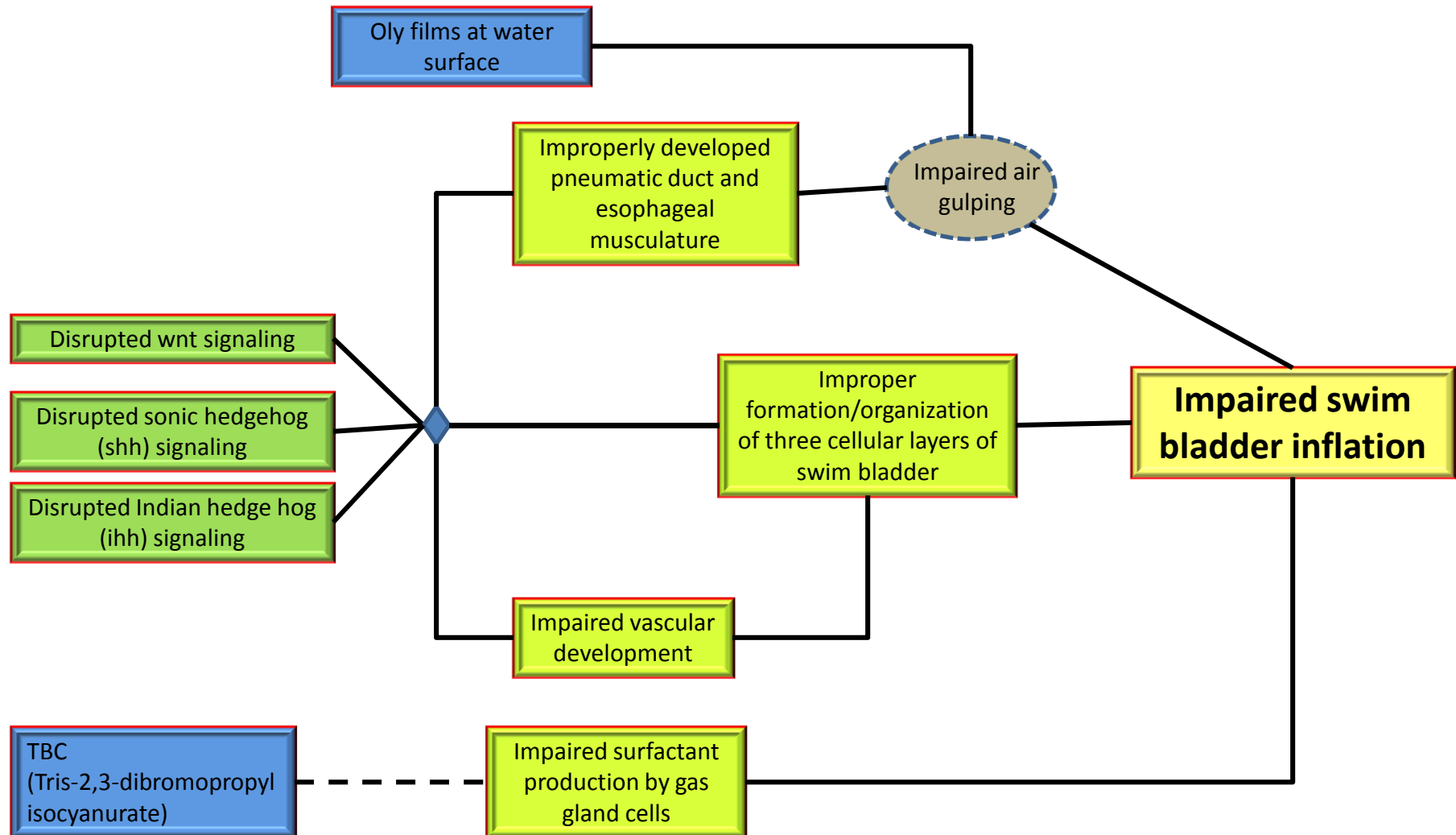
II. Air gulping (Physostomes)

II. Muscle contraction to expel gas (physostomes)

Adapted based on Dumbarton et al. 2010.

oe = esophagus; sb = swimbladder; pd=pneumatic duct

Supplementary Figure S3. Upstream biological perturbations during swimbladder formation plausibly linked to the key event of impaired swimbladder inflation.



Supplementary Figure S4. Upstream biological perturbations plausibly linked to the key event of impaired swimbladder inflation.

