

Regulation of stem cell self-renewal and differentiation

Nghi Nguyen

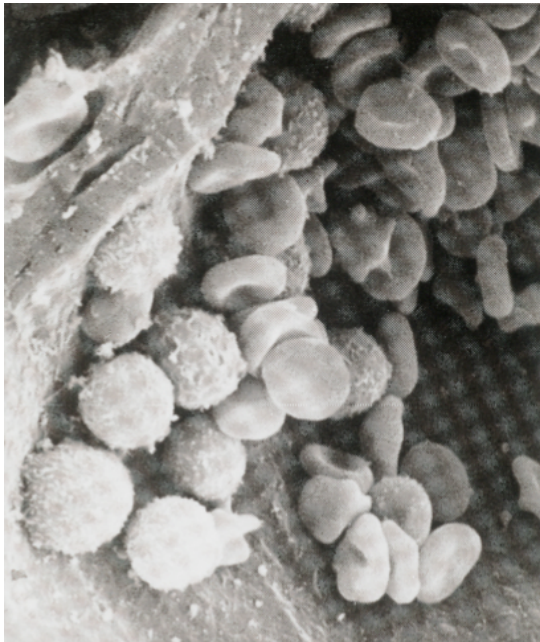
Biochemistry 118Q

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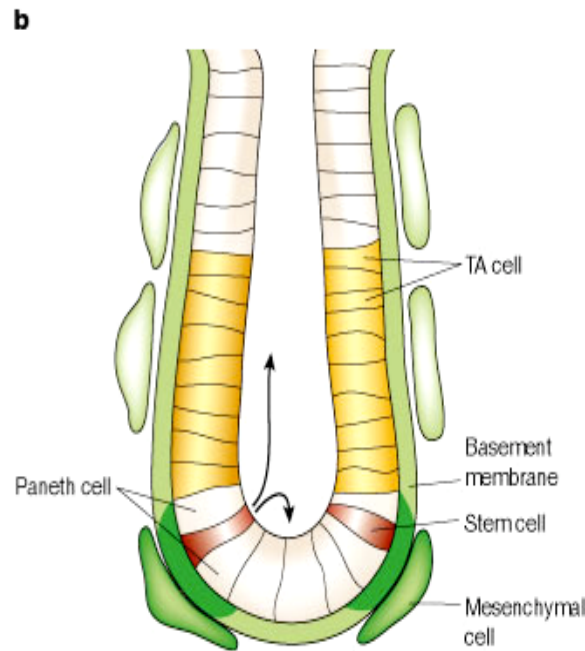
Outline

- Adult Stem Cells & Maintenance
- Asymmetric Cell Division
- Stem Cell Niche
- GSC, Dpp, Bam
- Cancer

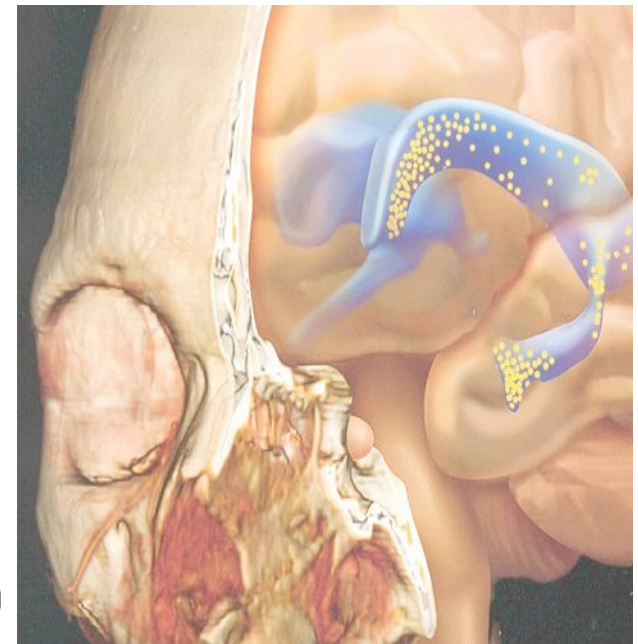
Adult Stem Cells: Maintenance & Repair



Blood

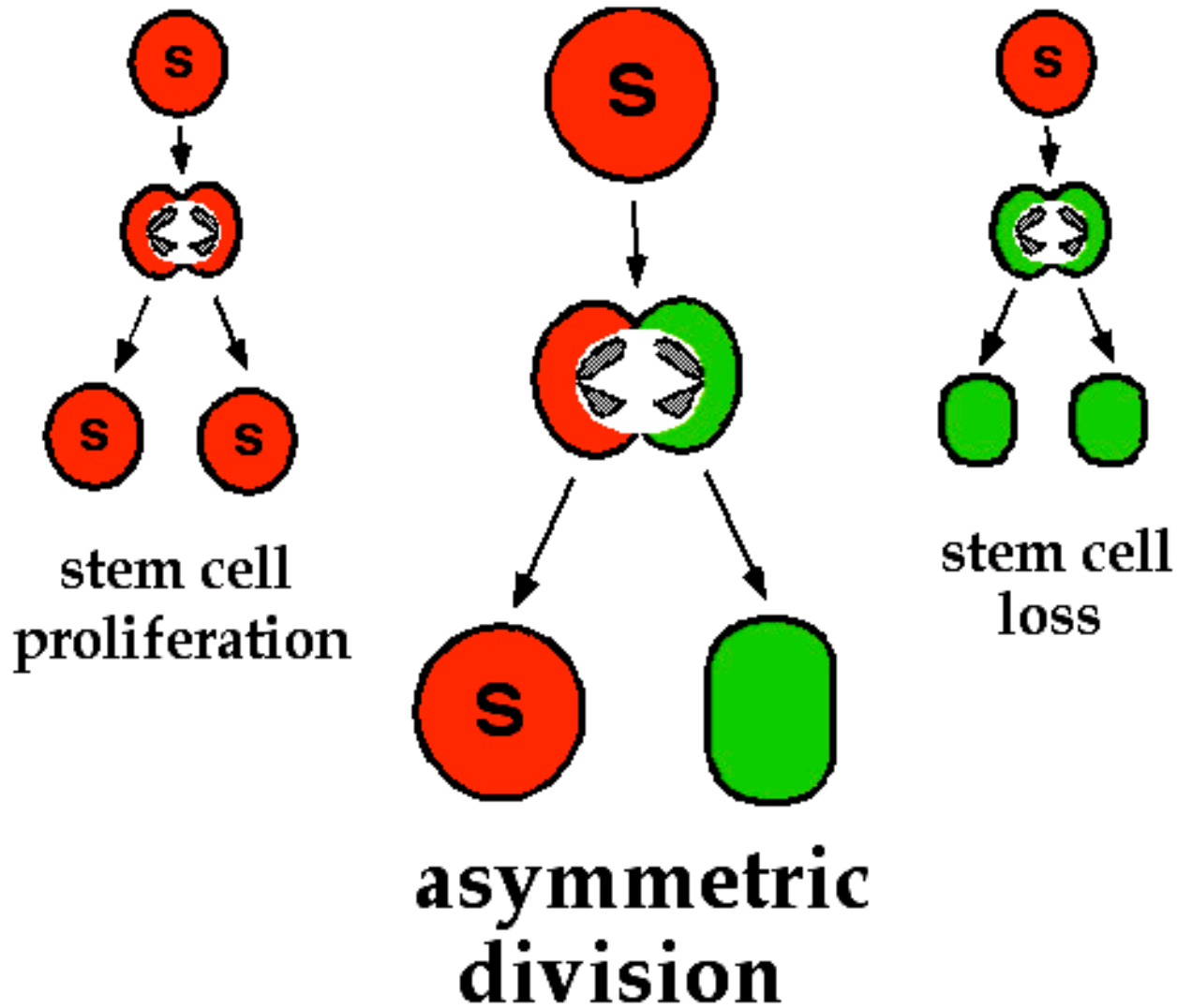


Skin



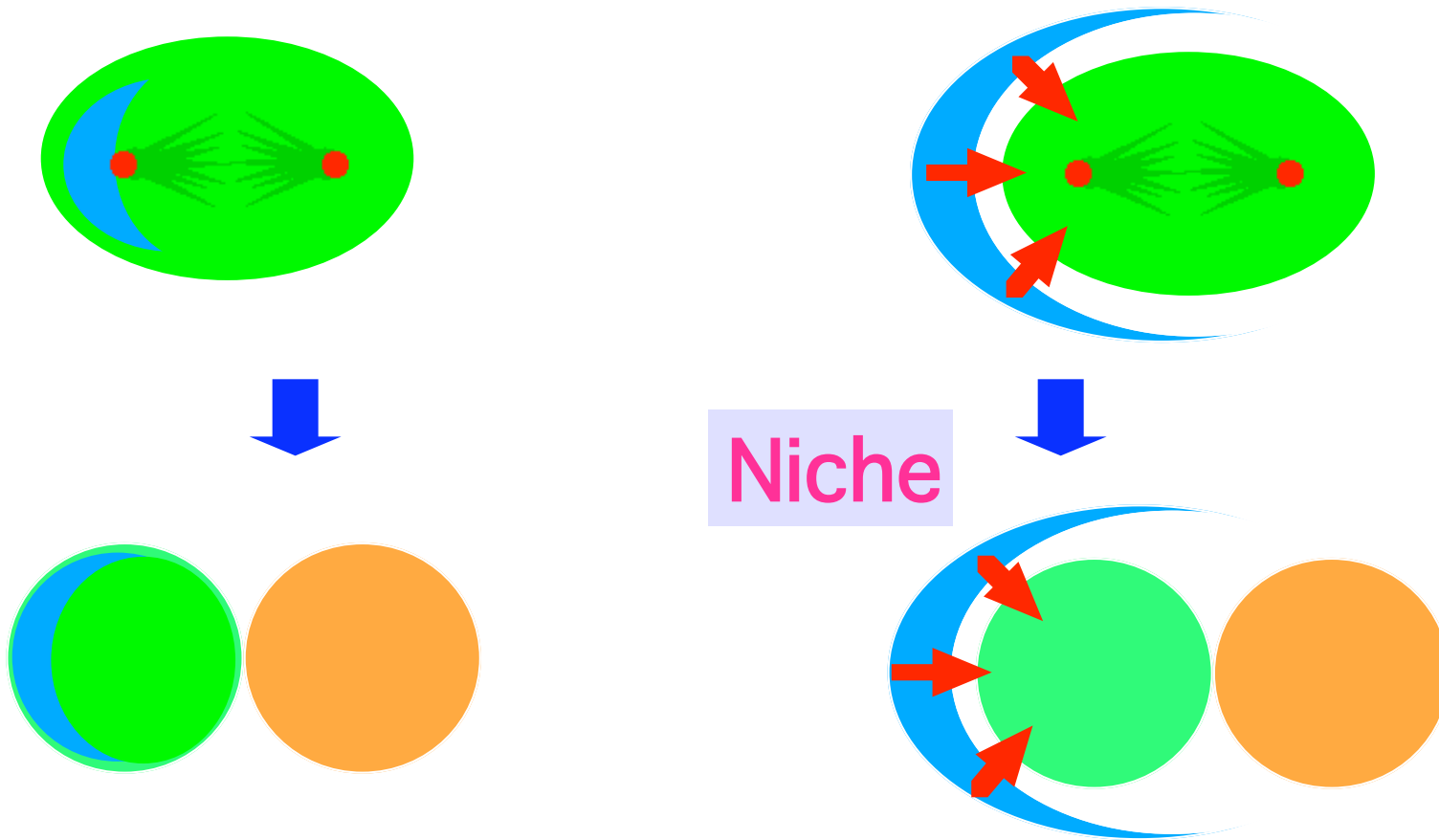
Neurons

Alternate Cell Fates



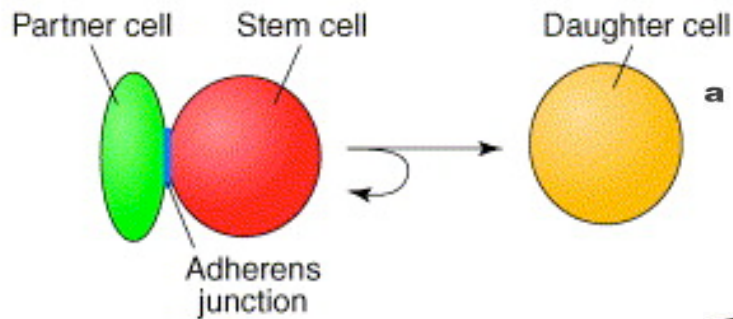
Asymmetric Cell Division

Intrinsic
factor(s) and/or Extrinsic
factor(s)

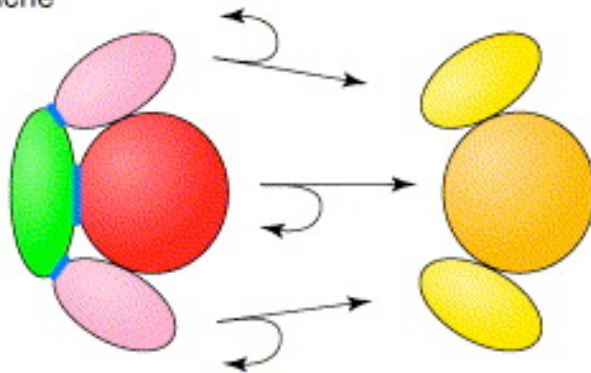


Stem Cell Niche

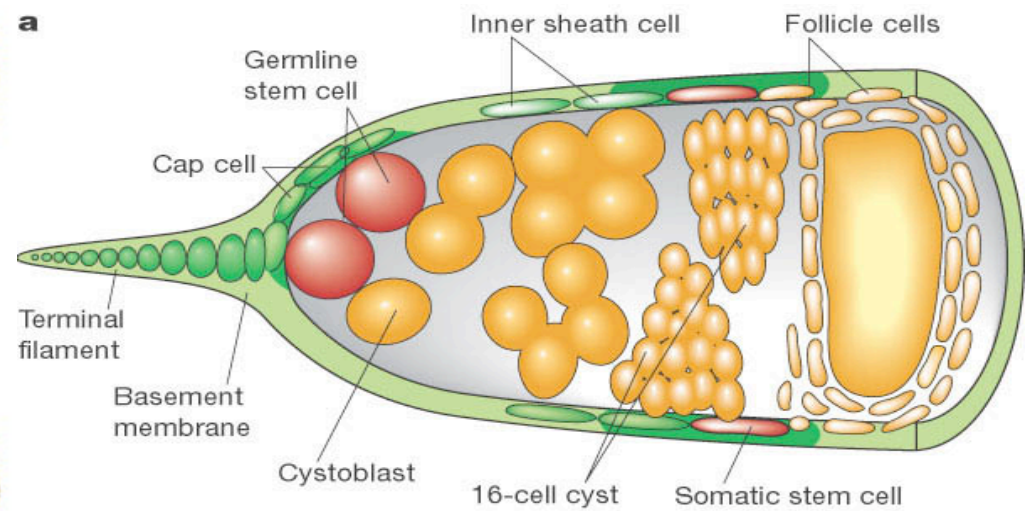
(a) Simple niche



(b) Complex niche

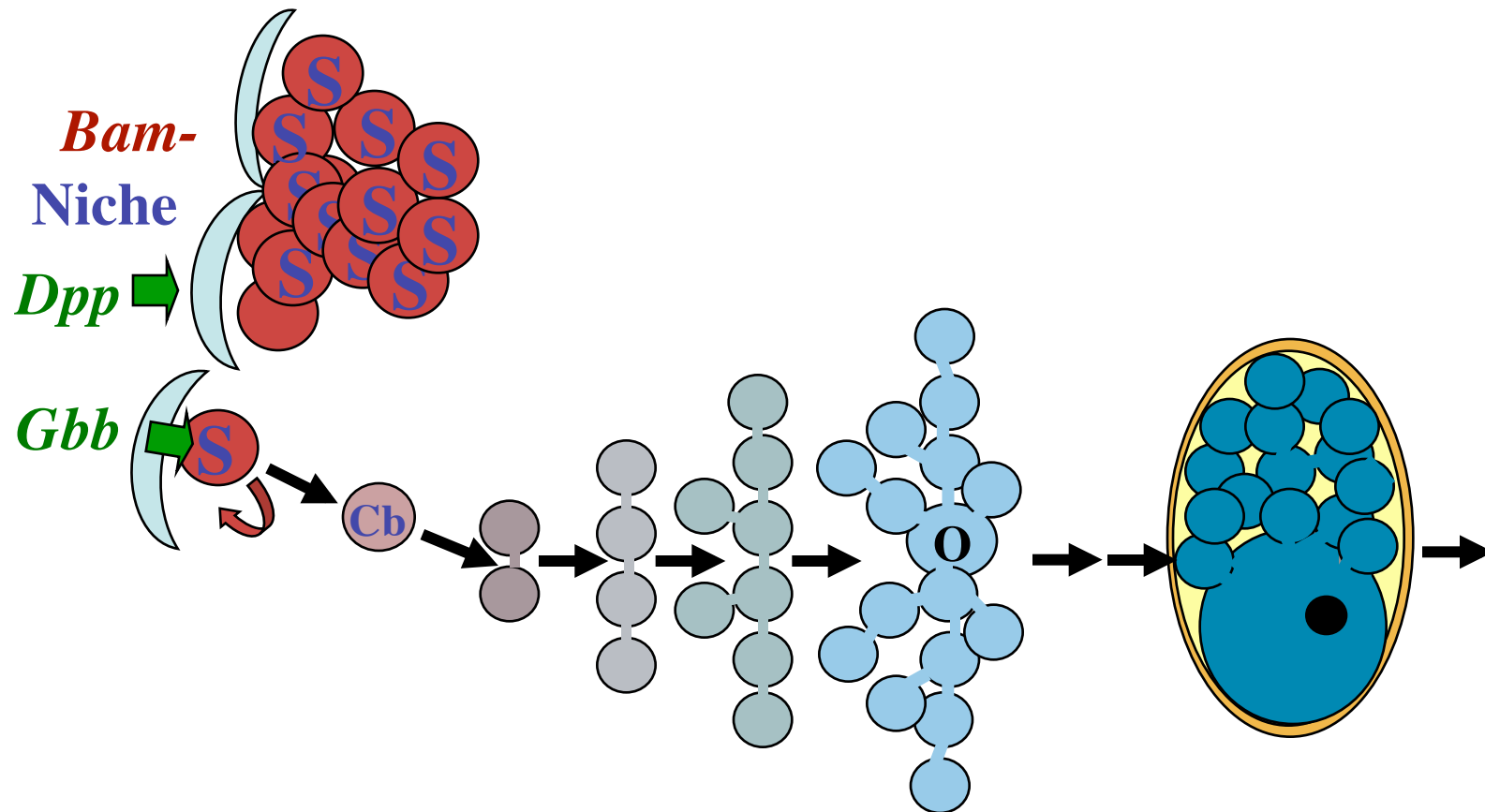


Science 290.5490(328-330)

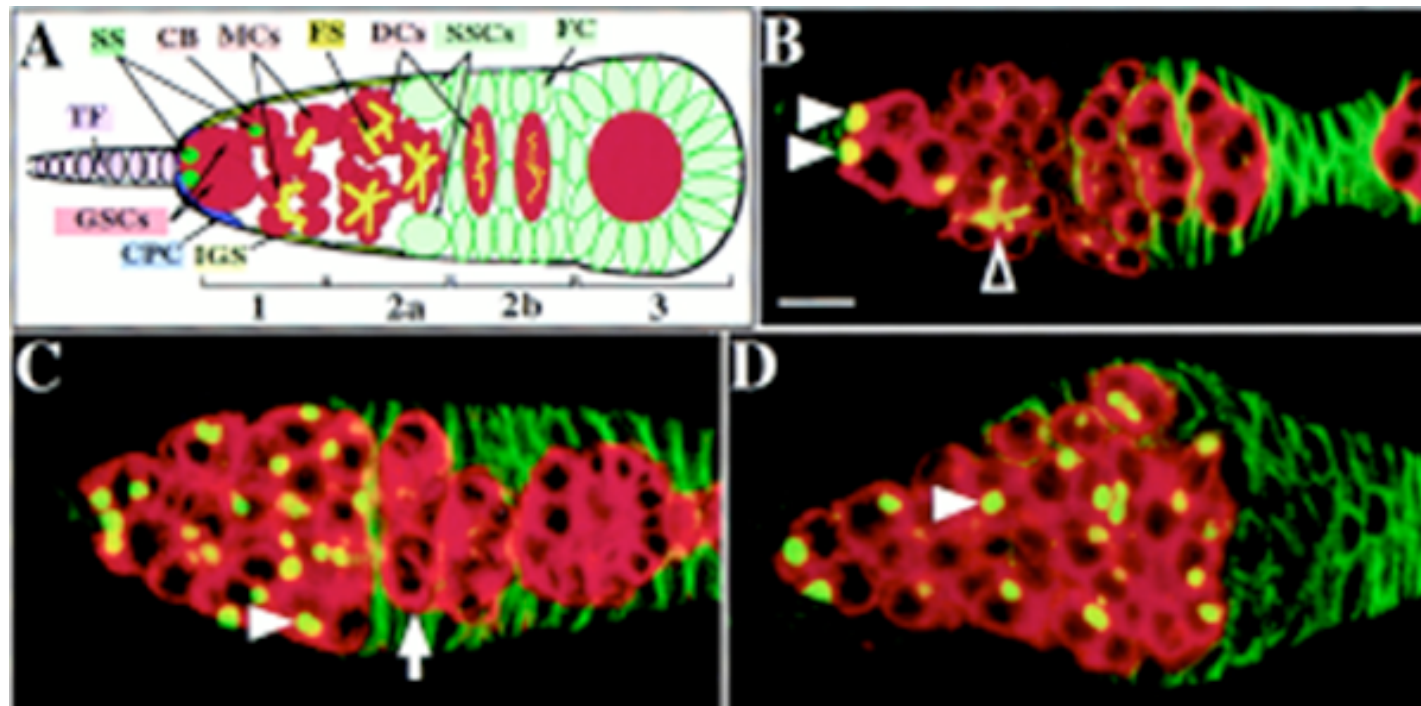


Female *Drosophila* Germanium
(GSC)

Niche secretes TGFβ; Differentiation requires Bam

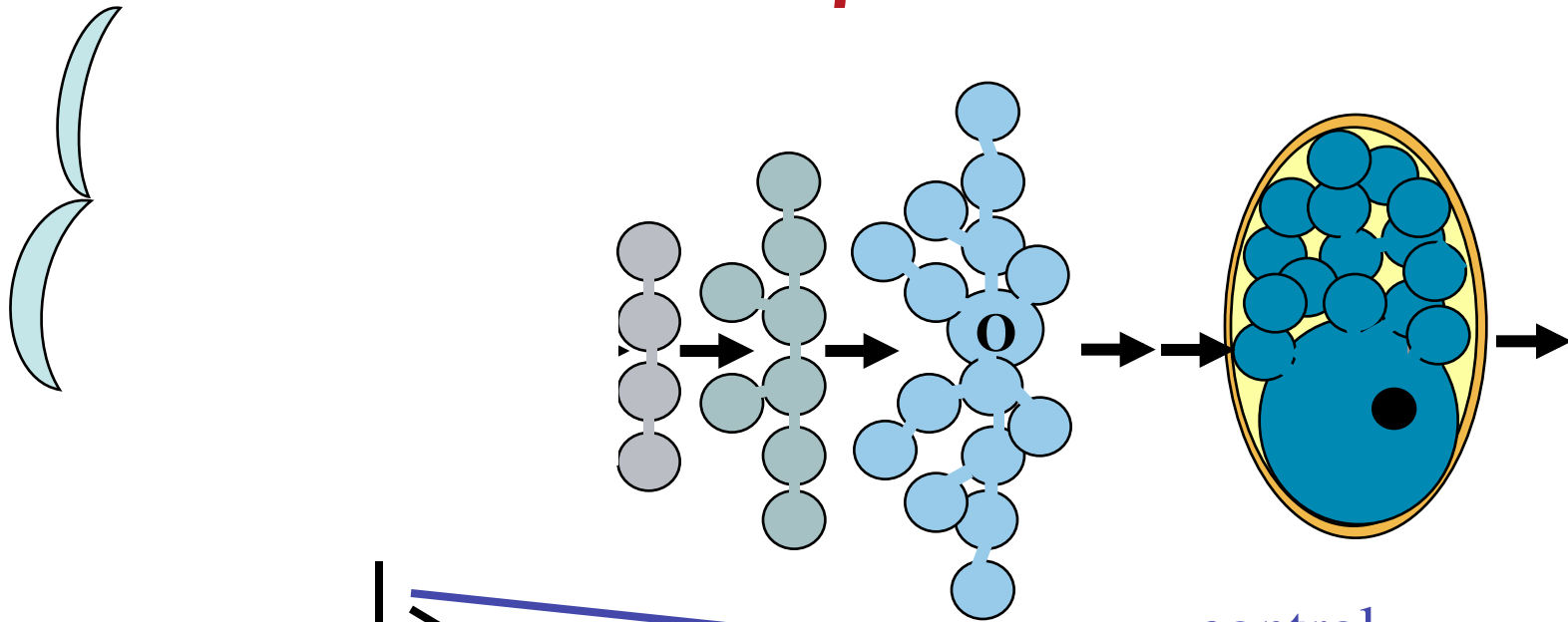


Dpp prevents differentiation

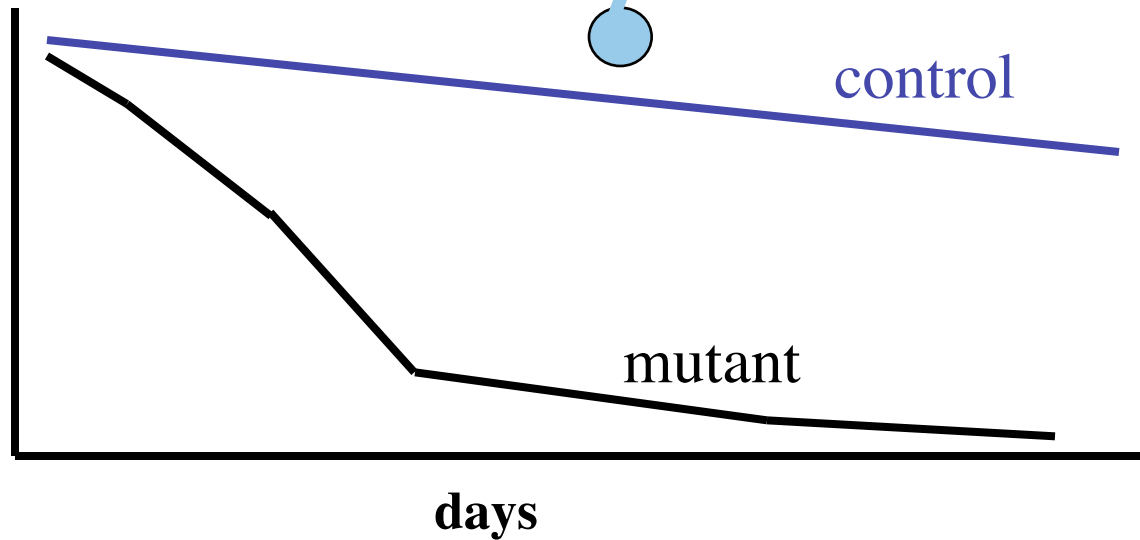


Cell 94: 251–260 (1998)

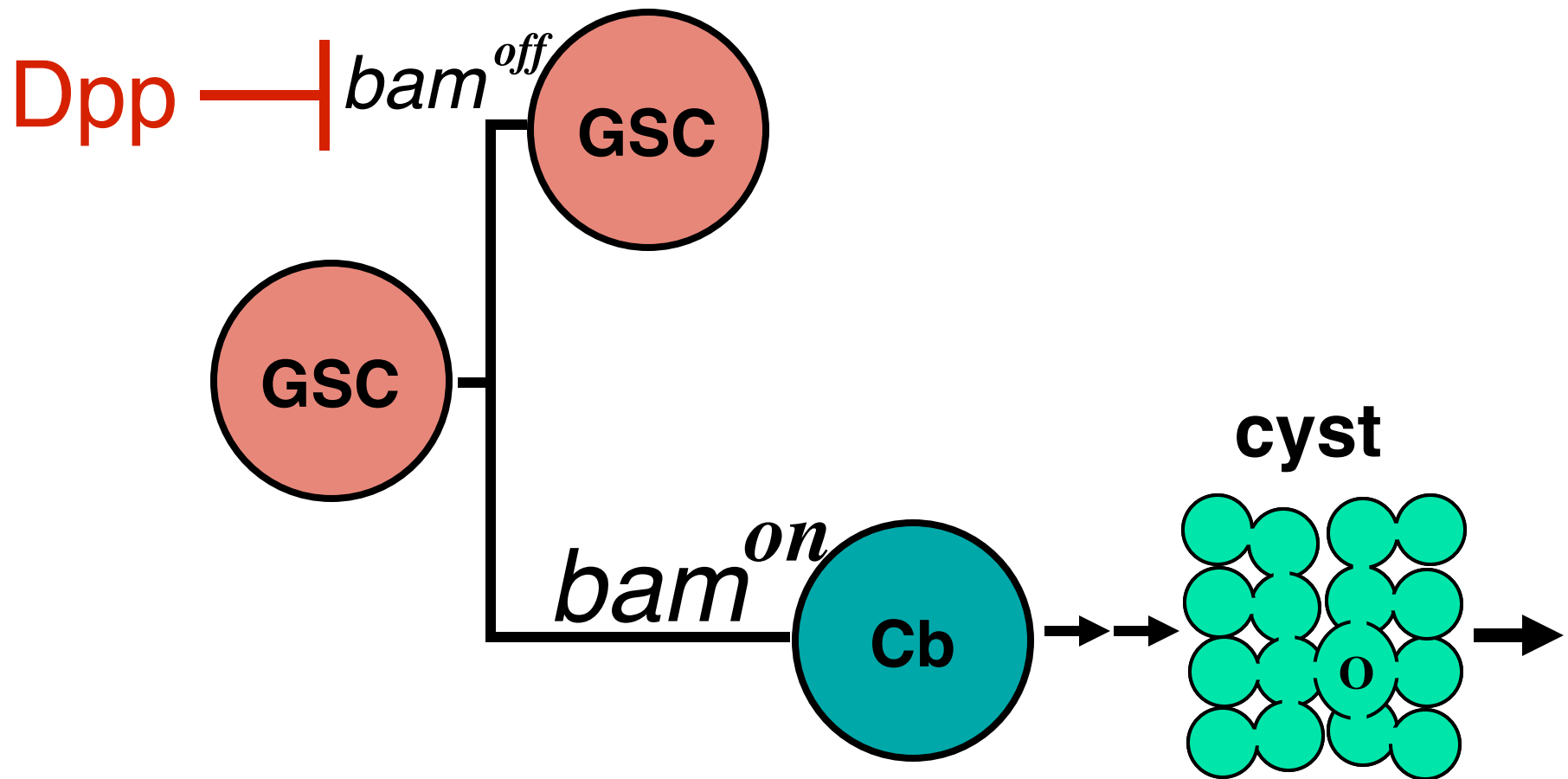
Loss of TGF β in niche



% Germaria
with a marked
stem cell

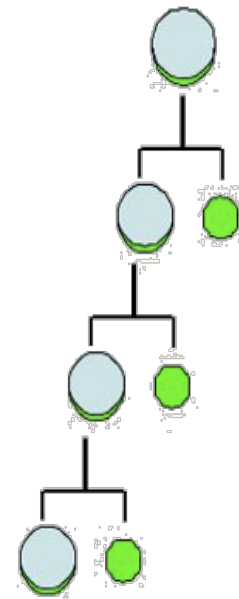
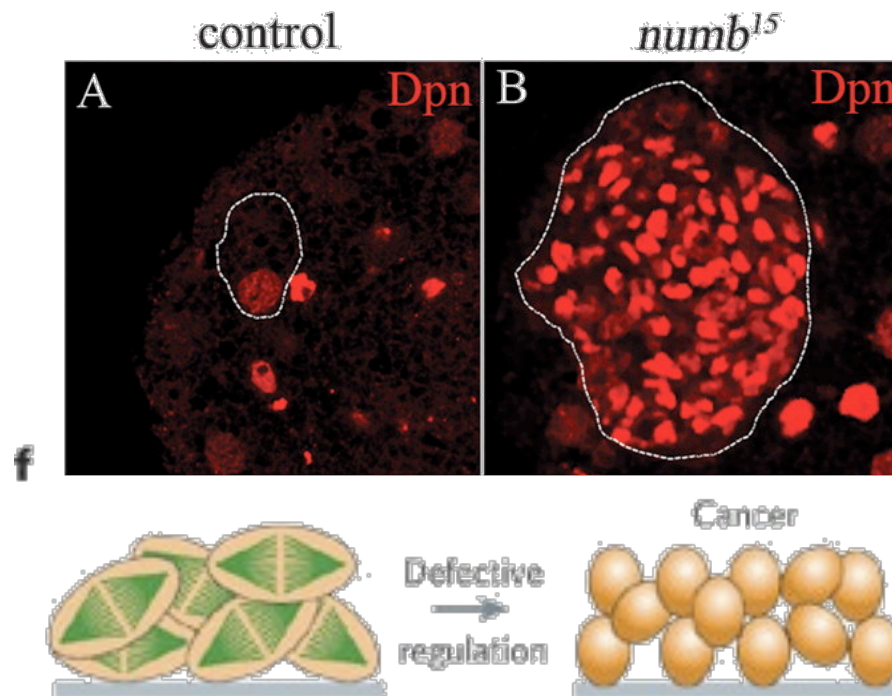


TGF β signaling promotes self-renewal by modulating differentiation

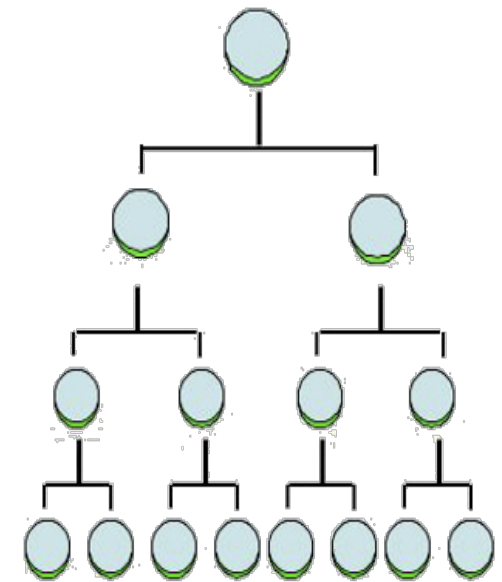


A Bad Environment: Cancer Stem Cells

- Uncontrolled symmetrical division



Asymmetric NB division



Symmetric NB division