Gut Turnover: An Evolutionary Adaptation to Mouthbrooding in *Astatotilapia burtoni*

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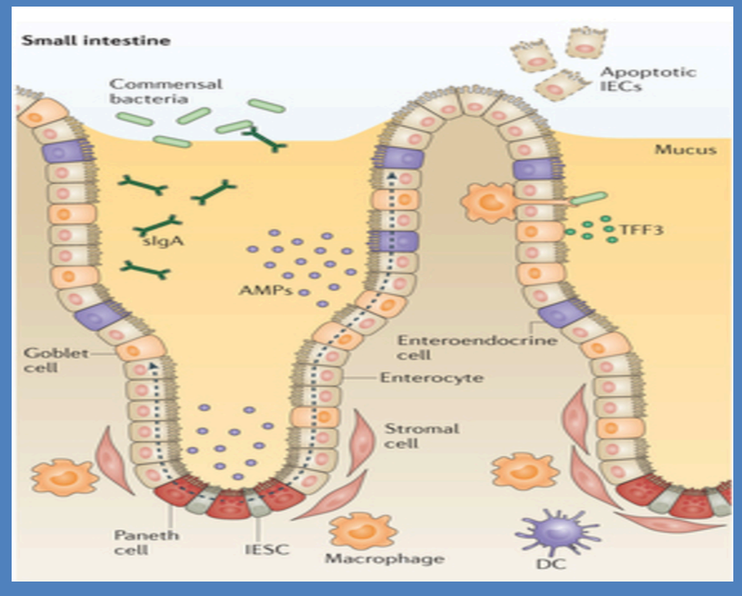
- Female *Astatotilapia burtoni* (mouthbrooding cichlid) voluntarily starve themselves for two weeks while their young develop.
- **There are physiological mechanisms that have evolved to allow mouthbrooding**
- Intestinal epithelial cell (IEC) turnover ensures integrity of the intestine,
- IEC turnover is **energetically expensive**
- An important tools for measuring IEC turnover is the detection of DNA fragmentation that comes from apoptotic signaling cascades **(TUNEL)**



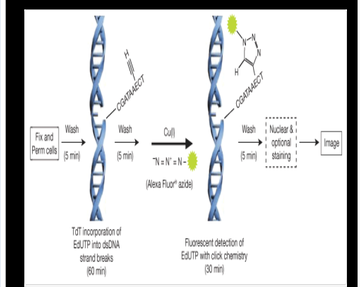
If mouthbrooding females conserve energy by down regulating intestinal epithelial turnover, then there will be fewer apoptotic cells in brooding fish compared to fasted or fed females.

TUNEL STAINING: IMMUNOHISTOCHEMISTRY

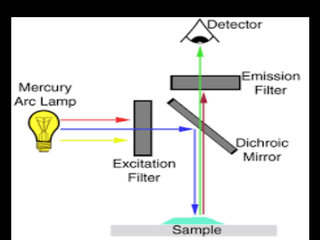
Dissection:
brooding, starved, and fed female intestines

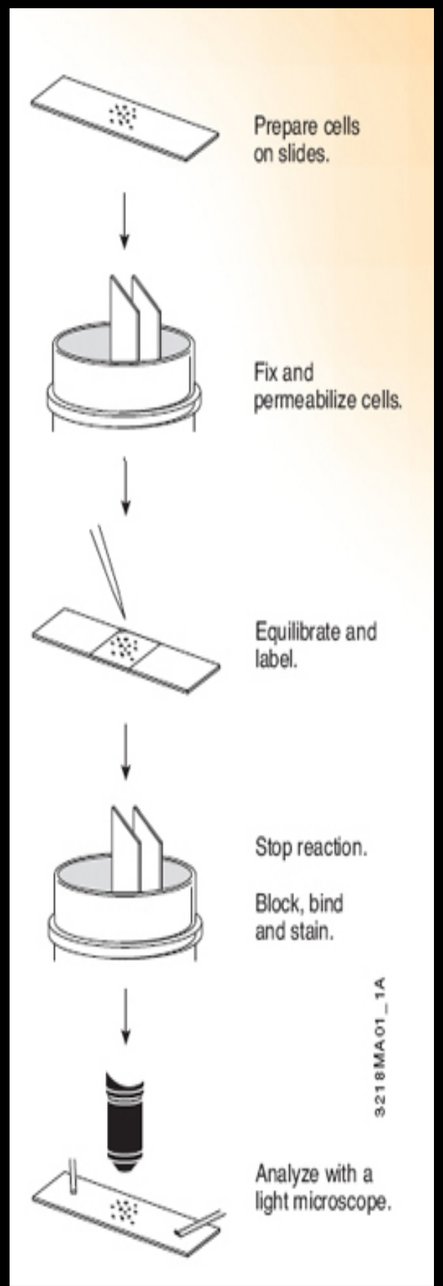
Cryostat:
Mounted and sectioned tissue (17 µm slices)

Immunohistochemistry:
TUNEL assay detects DNA fragmentation by labeling the terminal end of nucleic acids

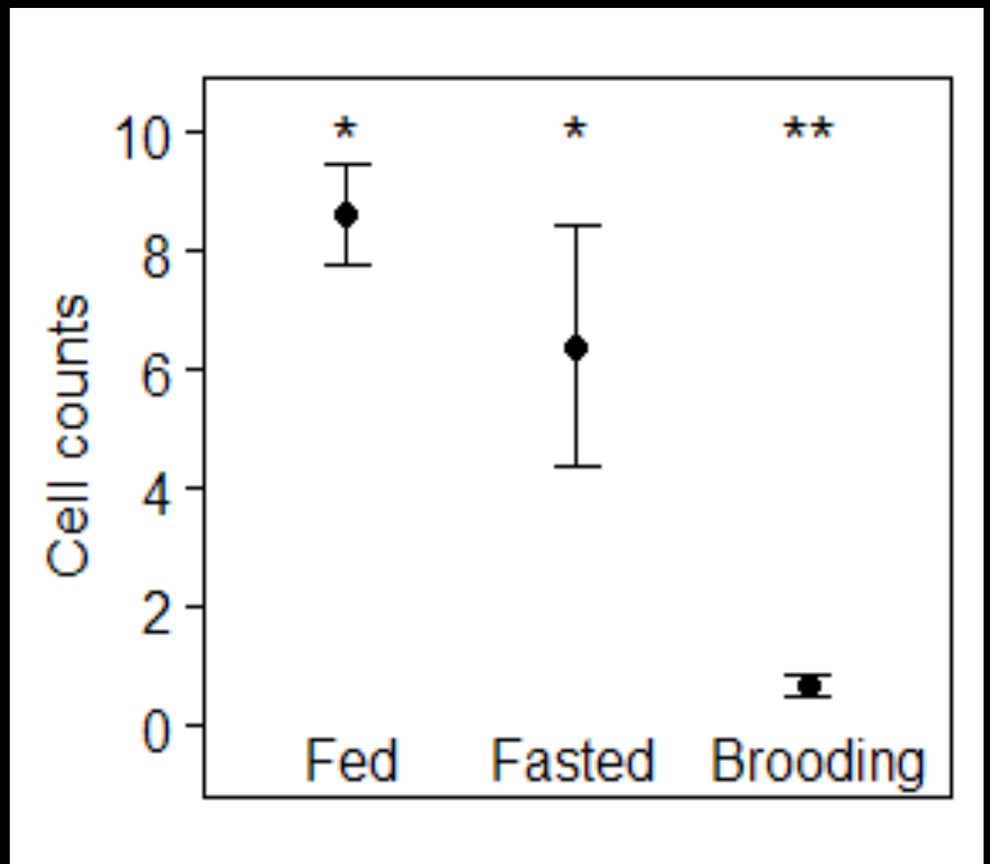


Analyzed using fluorescent microscopy

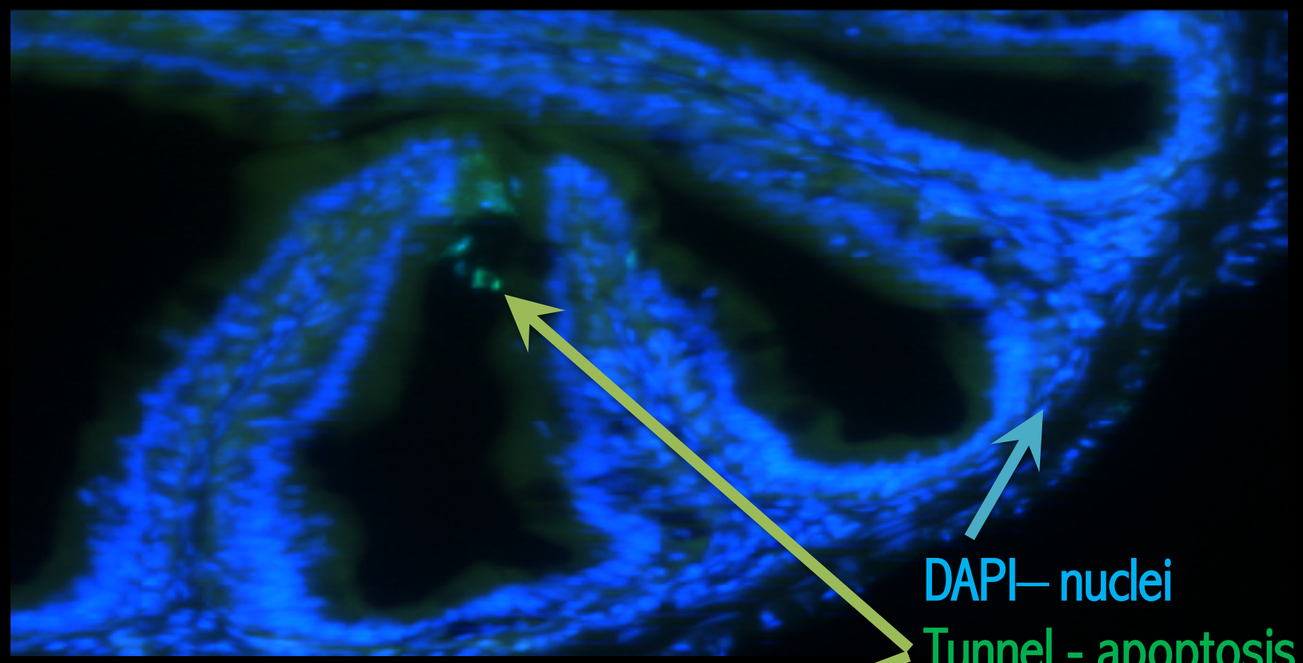


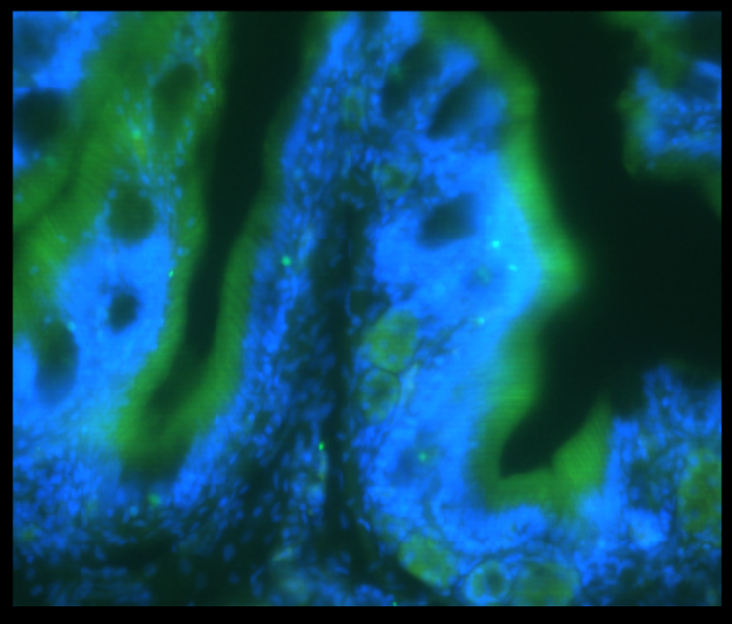


Fewer Apoptotic cells in Brooding Cichlids Compared to Fasted and Fed Female Cichlids:

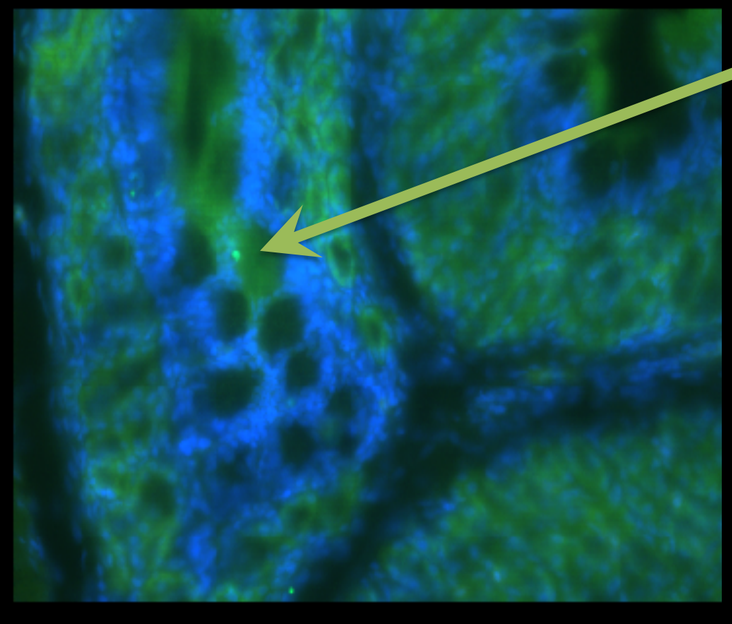


TUNEL stained Apoptotic Cells in Intestinal Epithelium

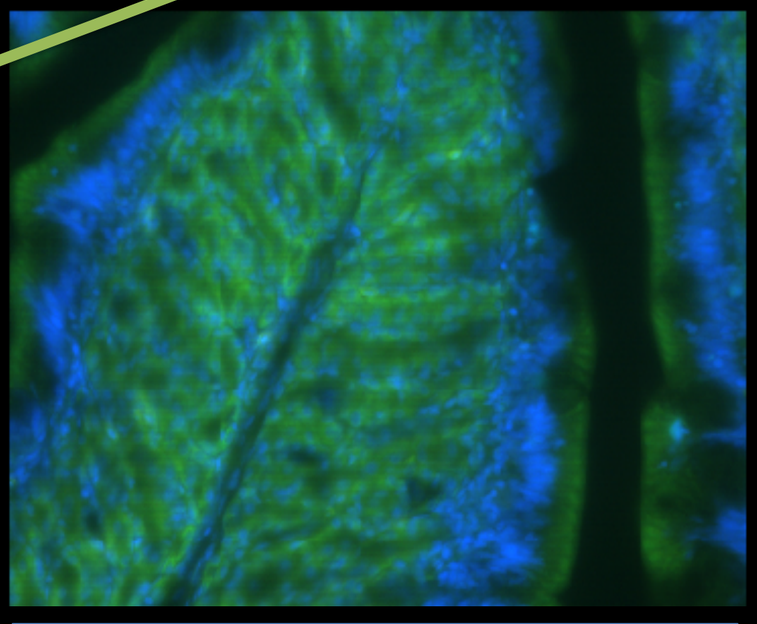




Fed



Fasted



Brooding

Data suggests that mouthbrooding females conserve energy by down regulating intestinal epithelial turnover

Future Directions:

- **5-bromo-2'-deoxyuridine (**BrdU) will stain for proliferating cells
- Examine the difference in cell turnover throughout the brooding cycle and in different locations in the intestine
- Investigate peripheral adaptations and changes that occur during the brooding period

References & Acknowledgements

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