Activity dependent development of maps in the visual system

Activity type

- Sensory
  - species
    - mammals
    - non-mammalian vertebrates
    - invertebrates
  - ~~**ignore this Sensory literature for now**-- too much literature for a 2000 word review limit?~~
    - just do very brief overview in intro with statement that here we focus on intrinsic activity patterns in visual system and refer to other recent reviews?
  - When?
    - Before eye opening and experienced visual patterns
      - Melanopsin
    - After eye opening
      - Hubel and Wiesel
- Spontaneous
  - What?
    - species
      - mammals
        - can occur before vision– long gestational timecourse
      - non-mammalian vertebrates
        - does not occur before vision– short gestation
    - described patterns in vitro
      - retinal waves
        - neonate - late postnatal
          - TODO: shatz, Wong, Feller work
          - TODO: J. Zhou work
    - described patterns in vivo
      - early development - before eye opening
        - rat
          - TODO: Konnerth fiber optic calcium imaging
        - mouse

        - before eye opening
            - ferret
                - TODO: Weliky literature in LGN and cortex
        - ~~after eye opening~~
            - **much literature in adult**
                - monkey, cat, ferret, rodent, etc
            - patterned activity
                - TODO: Recent Konnerth peri-eye opening calcium imaging paper
                - intrinsic signal imaging
                    - Stryker work
                    - A. Grinvald work
                - multicell recordings
                - any mutlichannel recordings in newborn monkey (hubel wiesel just did single electrodes?)
        - rodent
        - ferret
        - retinal waves
            - neonate
                - TODO: our paper
                - TODO: Lohmann Curr biolol paper
        - ‘spindle’ bursts
            - neonate - late postnatal *
        - ~~fast traveling waves~~
            - adult
    - Where?
        - retina
            - TODO: our paper
        - LGN
            - TODO: Shatz ex vivo paper
            - TODO: our paper
        - superior colliculus
            - TODO: our paper
        - visual cortex
            - TODO: our paper
            - TODO: Lohmann Curr biolol paper
    - When?
        - Before eye opening and experienced visual patterns
            - Before birth for some species
            - After birth for some species
        - After eye opening

        - experiential pattern replay/dreams
            - analogs to hippocampal - place cell replays for learning and memory?
- Why?
    - activity dependent visual map development
        - anatomical - structural
            - axon sprouting
                - xenopus, zebrafish literature?
                - LGN and SC
                    - rodent
                        - mouse
                            - TODO: beta2 nAchR ko mouse
                            - TODO: N. Spitzer reference on activity-dep Ca2+ growth
            - axon refinement
                - xenopus, zebrafish literature?
                - LGN and SC
                    - rodent
                        - mouse
                            - TODO: beta2 nAchR ko mouse
            - dendrite growth?
                - cortical-tectal recepient cells in SC,
                    - TODO: recent constantine-paton paper
                - Golgi or DiI analysis in ferret, cat, monkey, or rodent cortex?
                - Golgi or DiI analysis in LGN or SC?
            - dendritic refinement
                - spine dynamics?
                    - TODO: xenopus literature?, H. Cline
            - cell migration
                - rodent
                    - cortex
                        - interneurons
                            - TODO: recent Fishell paper
                            - TODO: recent ZJ Huang papers
                            - TODO: Ben-Ari, JB Manent activity dependent interneuron migration in vitro model
                - higher mammals
                    - cortex
                        - TODO: Chalupa monkey retinal wave evidence and ferret in vitro
                        - unknown but gestational times for both excitatory and inhibitory cell migration overlaps significantly with likely

period for retinal waves

- functional - physiological
  - microcircuit
    - direction selectivity
      - TODO: Recent Konnerth peri-eye opening calcium imaging paper
      - TODO: Recent Fitzpatrick work (the reprogramming of selectivity)
    - orientation selectivity
      - TODO: Crair, Stryker
      - TODO: Recent Fitzpatrick work
      - TODO: ongoing J. Cang unpublished work? (look at abstr from SFN, our CSHL conf last year)
  - macrocircuit
    - TODO: A. Huberman ferret epibatidine work on ODCs *