Worms grown at 15 °C

chemotaxis

thermotaxis

tracking

biased random walk

Abbreviations:

EDWARD L. HEDGECOCK, AND YASUO OHSHIMA
Department of Biology, Faculty of Science, Kyushu University,
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AFD neuron physiology

overlapping circuits for chemotaxis and thermotaxis

panneuronal imaging in roaming animals

panneuronal imaging in roaming animals
high speed whole brain imaging

brain dynamics is low dimensional

automated tracking

sensory to motor representation
worm atlas

sparse sensory representation
broad motor representation

Drosophila larva

Ev Yemini & Oliver Hobert
**decision-making**

Luo et al., 2010

**sensorimotor transformations**

Bias run length

Bias turn size

Bias turn direction

**Janelia Farm**

multiple animal gait and trajectory analyzer

Gershow et al., 2012
thermotaxis hits

thermosensory neurons and chemosensory neurons

Then find the hits in the connectome

Drosophila “AFD” neurons
Drosophila “AFD” neurons
Novel thermosensory neurons

First relay reconstruction reveals 5 classes of PNs

the first relay

- Sensory neurons
- Interneurons
  - Ls
  - O
  - H
  - S
PN L responds to cold

partial sensorimotor inversion

how do chemotaxis and thermotaxis circuits generate behavior?

larval antennal lobe connectome

Vosshall & Stocker, 2007

Matthew Berck, Avinash Khandewal, Matthieu Louis, Albert Cardona
Optical neurophysiology accesses the entire circuit with single cell resolution

- ORNs
- LNs
- PNs

Two overlapping circuits with distinct wiring patterns

Panglomerular local neurons interconnectivity

mPNs perform interesting segmentations of odor space

- Aromatic
- Aliphatic
cognate odors

record activity in dorsal organ and antennal lobe

Microfluidics

dose response curves across olfactory periphery
clustering of ORN properties

LN models

transfer functions

satisfactory predictions
systematically unravel the logic of the antennal lobe