Physiology 1

- send answer to iClicker Question 21A now.
- Nervous Systems
  - in general & demo (reaction time)
  - in different animals
  - cell-types
  - neurons
  - signalling & processing (example)
- iClicker Question 21B

Biology Honors Society
Bio lab tour
+ meet & greet
Tues 4/6
2-5 pm
M-3-308

Prevets?
meet in lobby after class
or e-mail marissa.junkins001@umb.edu

Due in lab ~~this~~ next week:
⇒ Animal Diversity Pre-lab (Lab manual page 103 & on-line)
⇒ Plant Diversity Lab report

Final Exam Wednesday May 19 11:30 - 2:30

Nervous systems (animals only)

In general: information processing

information flow →

input → processing (& transmission) → output

computer: keyboard, mouse, internet } → CPU → { display, speakers, internet

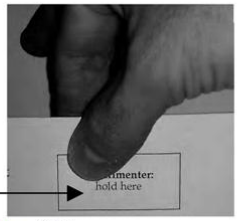
animals: senses (sight, smell, taste, hearing, touch) → some nerves & sometimes brain → { muscles, hormone release

Reaction Time Measurement

Experimenter:
hold here

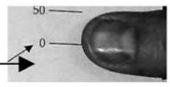
How to measure the Subject's Reaction Time:

You will measure the time it takes the **Subject** to catch the paper after it has been dropped by the **Experimenter**.



1) **Experimenter** holds the paper by the spot indicated. Let the paper hang down freely.

2) **Subject** holds her finger and thumb right near the "0" as close to the paper as she can *without touching it*. Line up the middle of your thumb nail with the "0":

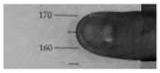


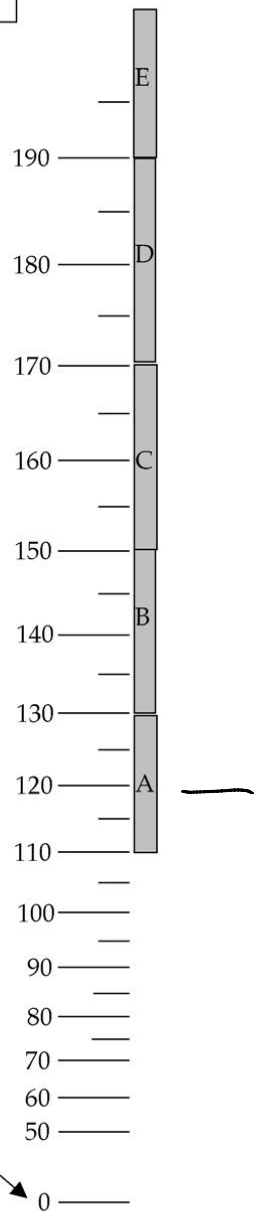
3) *Without telling the Subject*, the **Experimenter** drops the paper.

4) As soon as the **Subject** sees the paper start to drop, she closes her finger and thumb to catch the paper as it falls.

5) The longer it takes for the **Subject** to catch the paper, the farther it falls*.

6) You can then read the **Subject**'s reaction time by looking at the position of their thumb on the scale to the right. The example shown indicates a reaction time of about 165 ms (in between the 160 and 170 marks).





Subject:
- Start here (finger and thumb close to, *but not touching*, the paper).
- Line up the middle of your thumb nail with the "0" line.
- Catch it when the experimenter drops it.

* Acceleration due to gravity is 32 feet per second per second. Therefore, the distance fallen (in inches) = 192 x (time in seconds)^2.

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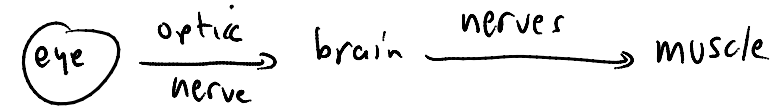
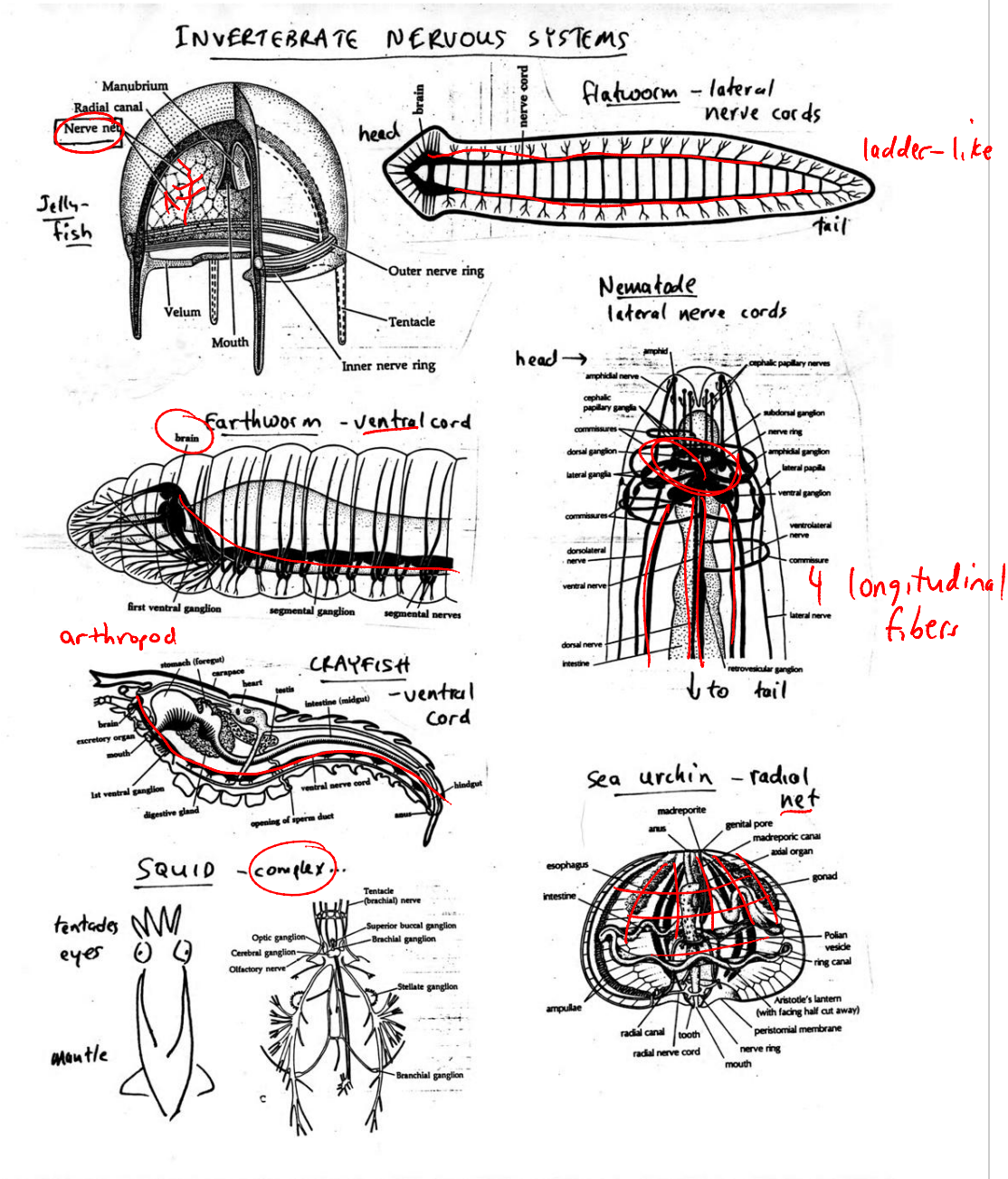
Reaction time ~ 150 msec 0.150 seconds

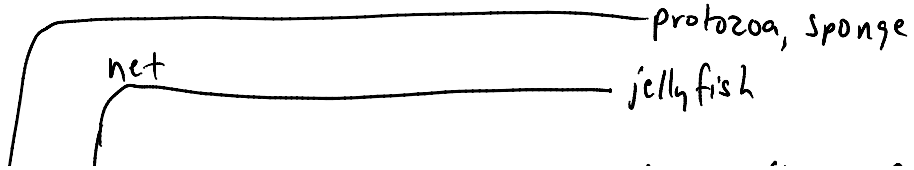
input

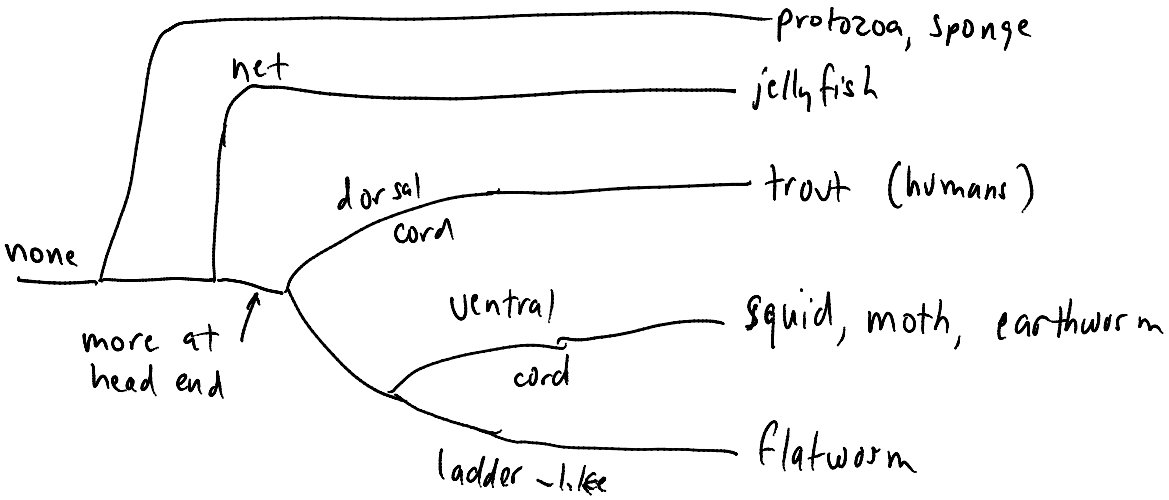


~8 ms ∴ 80 ms ~60 ms



Phylogeny of nervous systems

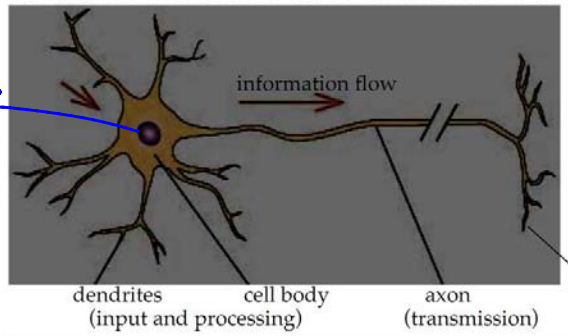




Cells of the nervous system - 2 major types

① glial cells - passive support cells (mostly)

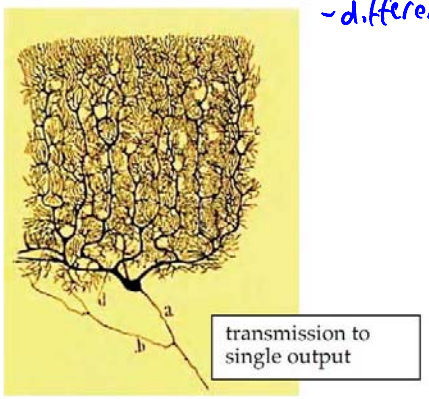
② Neurons: the active cells in the nervous system = "nerve cells"



nucleus

* same general structure in all animals
* same processing & transmission mechanism
* different input/output mechanisms

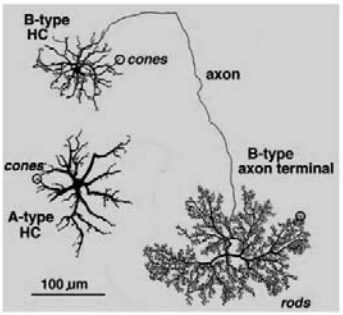
Purkinje cell (from cerebellum: feedback for motor tasks)



- different functions require different specific structures

Horizontal Cells (from retina)

many inputs and outputs

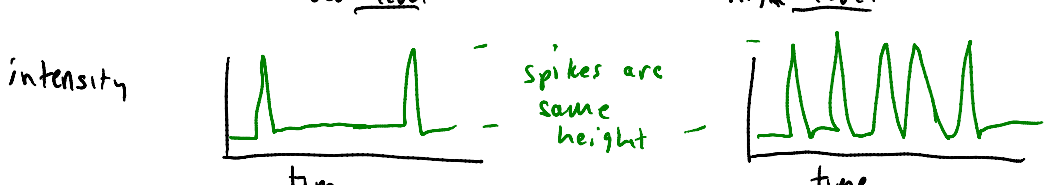


Physiology 1 - 3

In what form is the information transmitted?

- impulses: only rate & pattern vary - not strength

(more details & exceptions later)



time

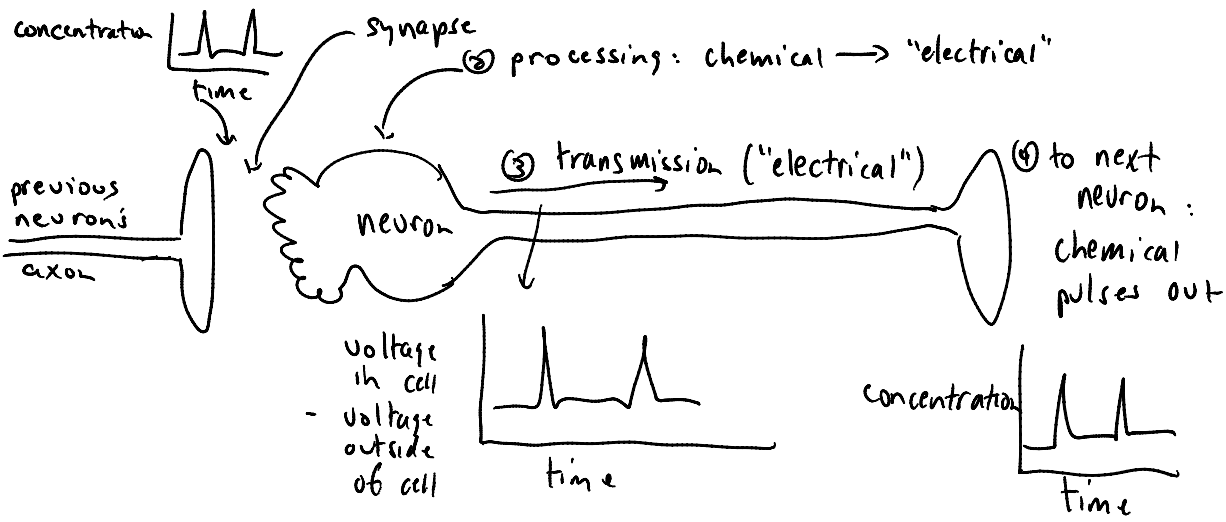
ex low light
move slowly

time

bright light
move fast

How? chemical ⟶ "electrical" ⟶ chemical
(really electro-chemical)

① chemical pulses of concentration of neurotransmitter molecule

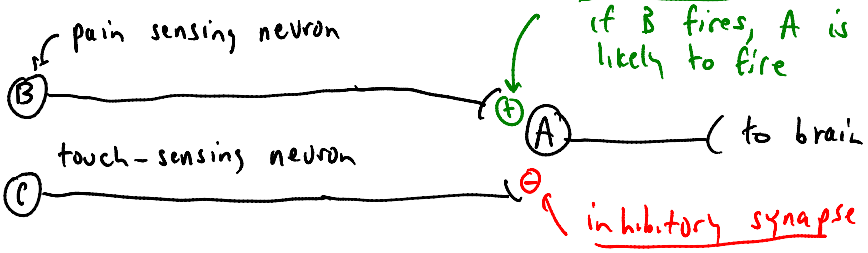


symbol: input output

What can you do with neurons? simple processing example

ex if you bump your knee, it hurts; but if you then rub it, it hurts less.

How?



Therefore

- bump knee · B fires a lot → A fires a lot ⇒ strong pain sensation

- rub your knee afterwards
  B fires a lot, C fires a lot } ⇒ A fires sometimes ⇒ weaker pain sensation