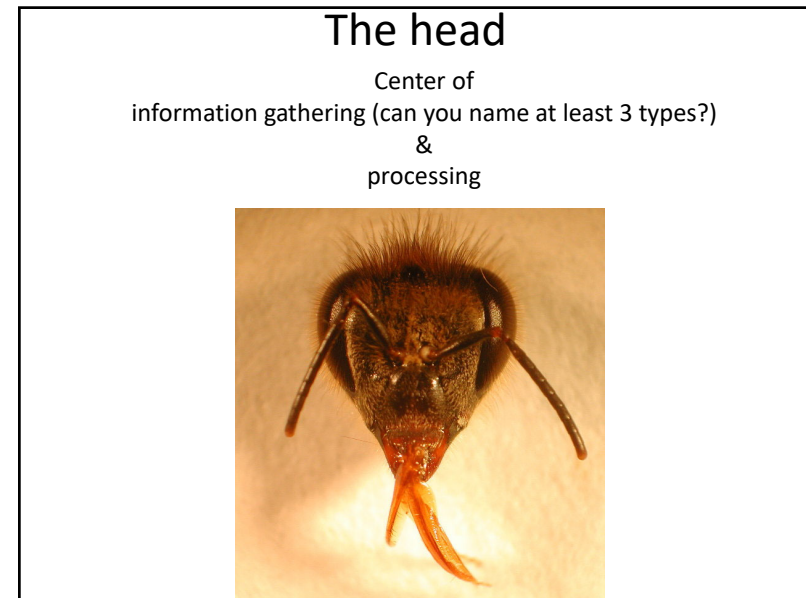
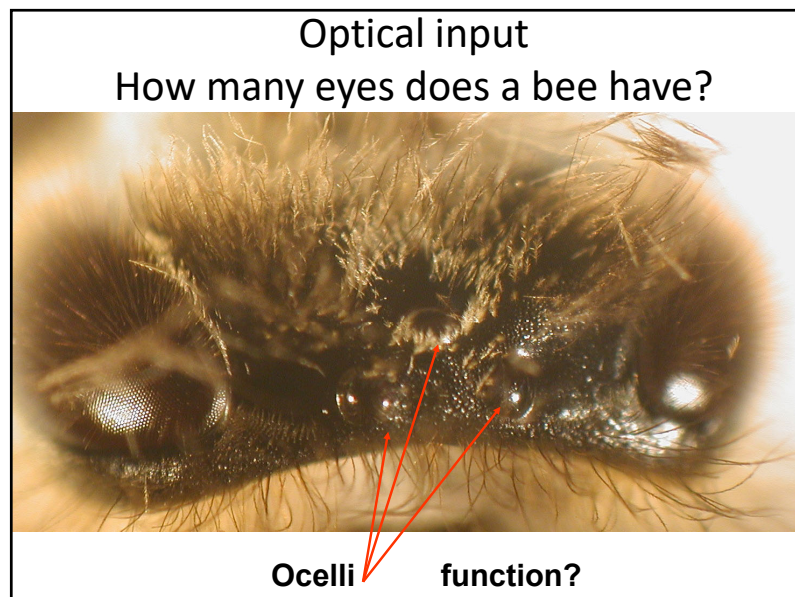




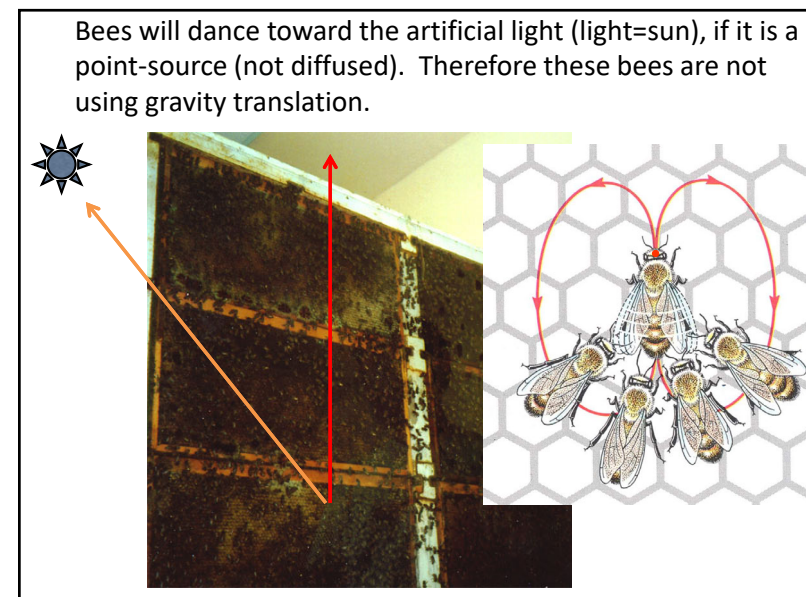
1



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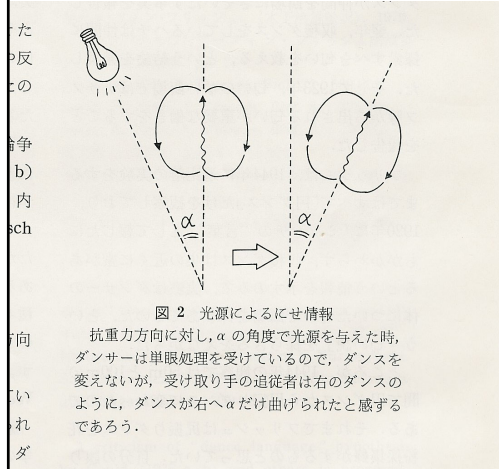


3



4

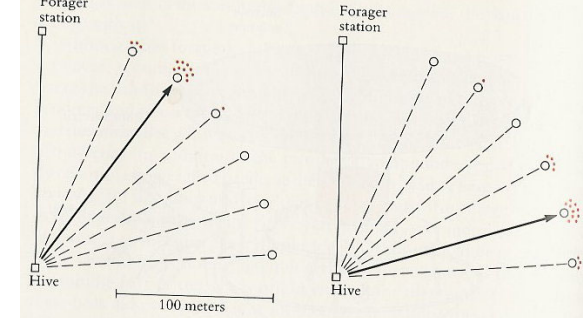
Therefore, one can create miscommunication in bees by painting either the dancers or the receivers (but not both).



e.g. the dance by an ocelli covered bee (straight to the sun) will be misinterpreted as 30 to the right of the sun, by normal bees.

5

This is what Gould did in 1975



Ocelli-painted foragers were trained to a feeder to the north of their hive, and an array of recruit-capturing stations was set out. Left, a light was used to aim the dances at one station in the array (heavy arrow); recruits arrived predominantly in that direction. Right, when the light was shifted, subsequent recruitment favored the new direction.

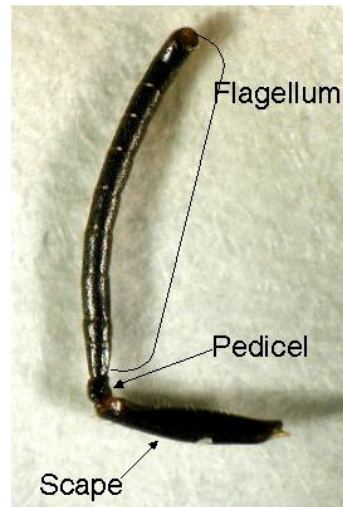
Could therefore prove that bees do use the information encoded in the dance language

6

6

Antennae have many functions:

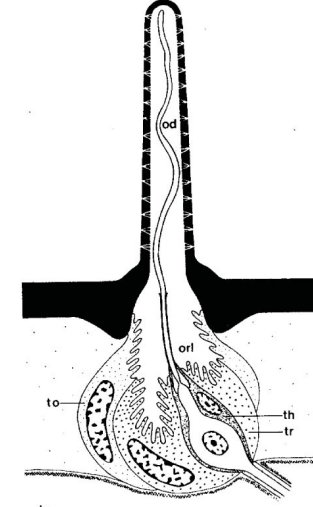
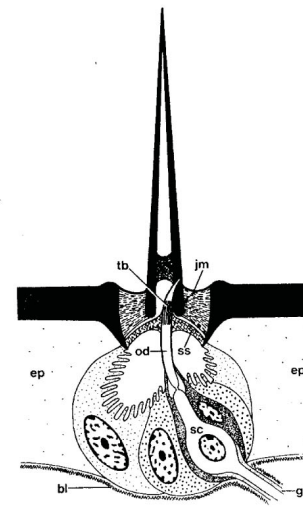
- Mechanical perception
 - walkingsticks (deadend?)
 - Wind speed
 - Cell-size measurement
 - Hearing (Johnston's organ)
- Olfaction
- Tasting



7

Mechanoreceptor

olfactory

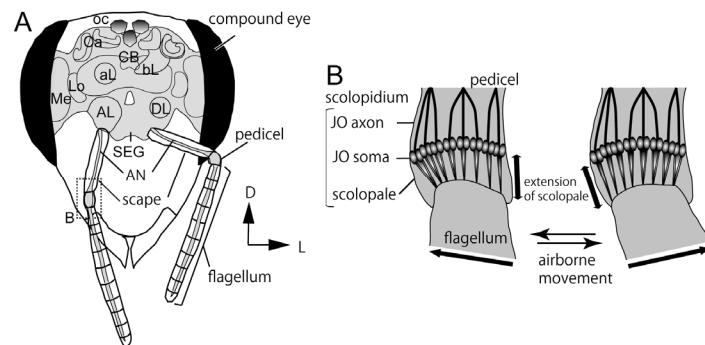


8

Johnston's organ

Bees can hear! But not via pressure changes

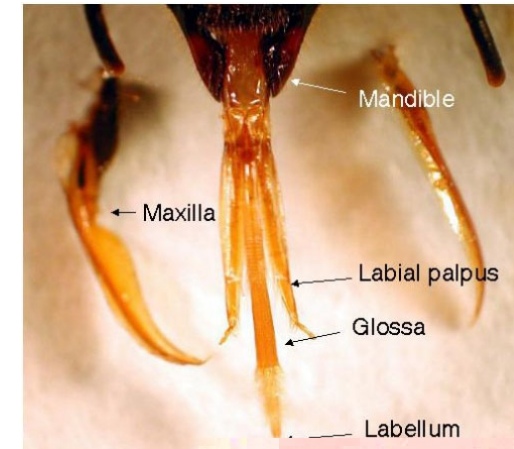
At close range (a few mm), air particle movement will shake the sensory hairs, vibrations then get amplified by stretch receptors (scolopidia)



9

Food input

Most insects have:
either chewing: grasshoppers,
Or sucking mouthparts:
But bees have both!



10

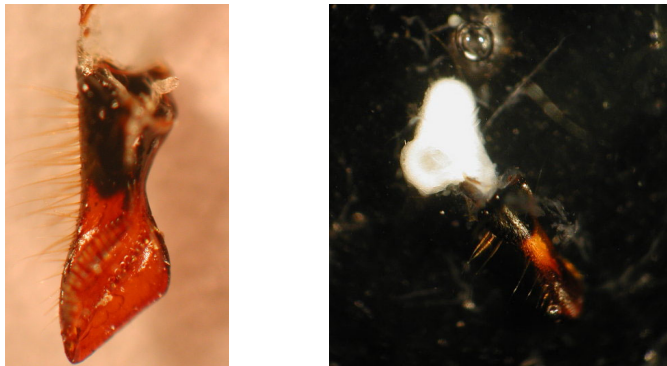
Mandibular glands

Also changes function with age:

Young bees: lipids for royal jelly

Old bees: alarm pheromone (2-haptanone)

What is the other one? Isopentyl acetate

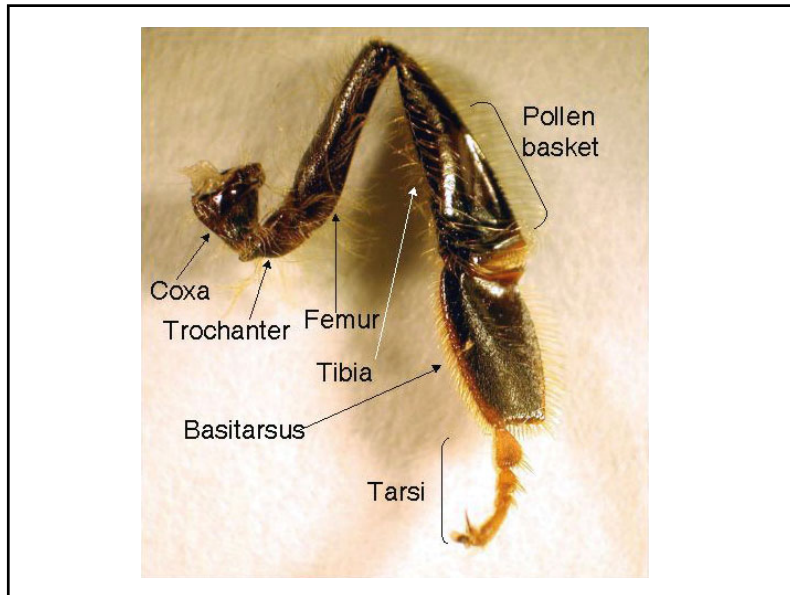


11

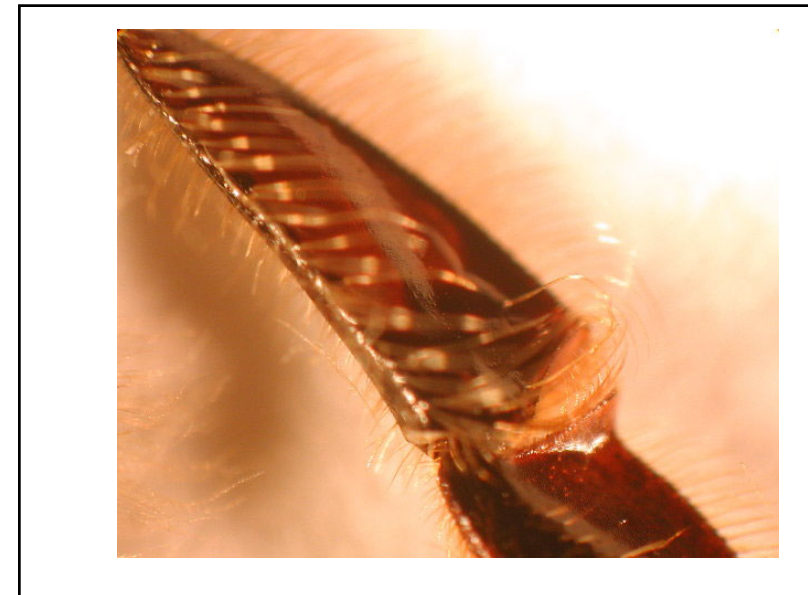
Thorax: flying, walking, pollen collection !(branched hairs)



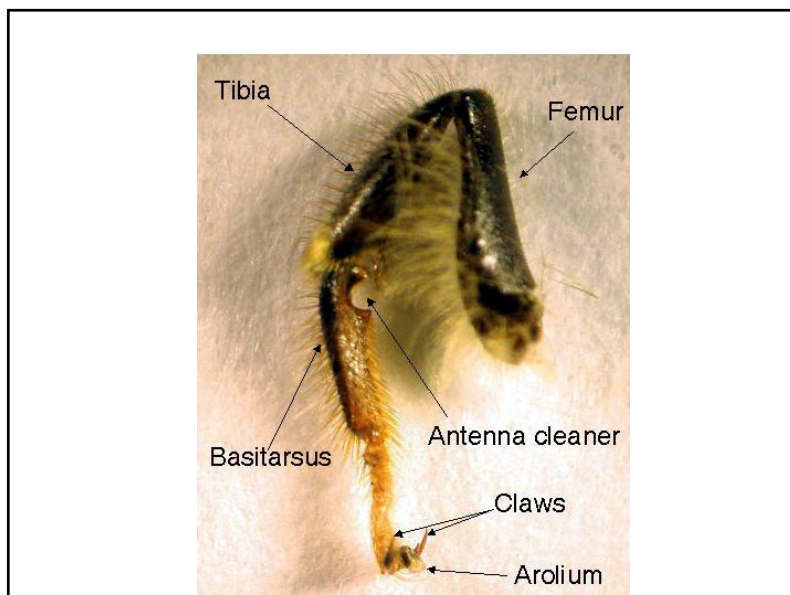
12



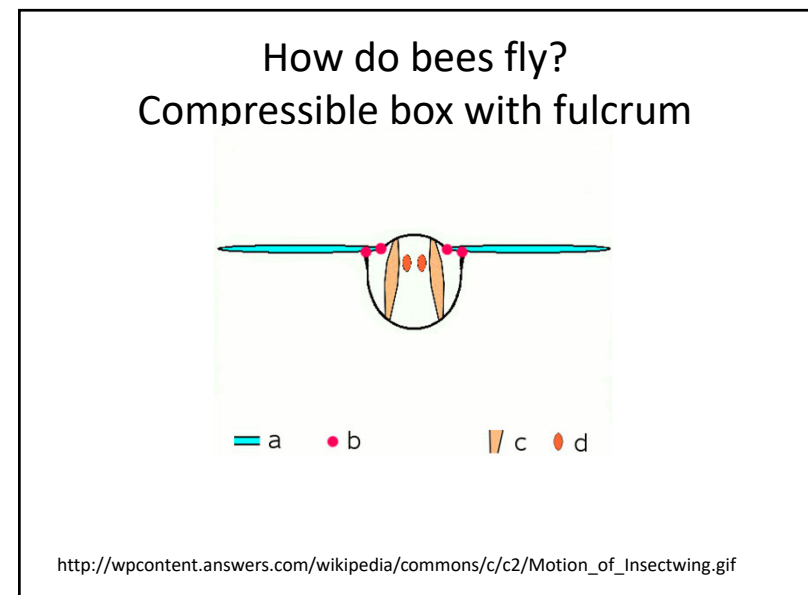
13



14

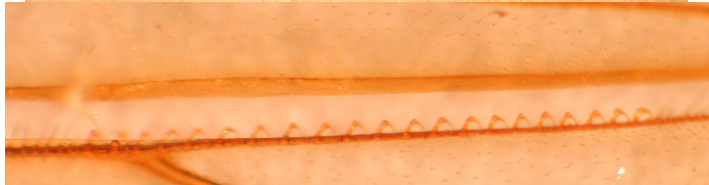


15



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Hamuli (wing hooks)



17

Abdomen
(digestion, defense and wax production)
Wax glands

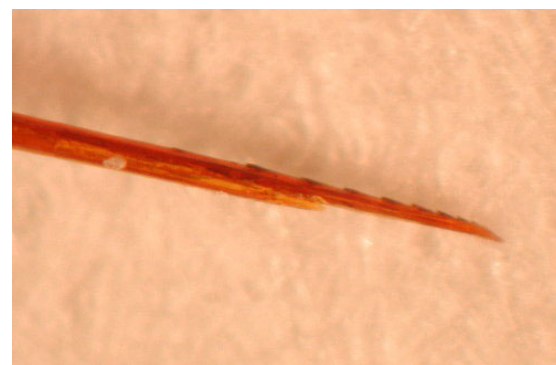


18

Stinger with venom

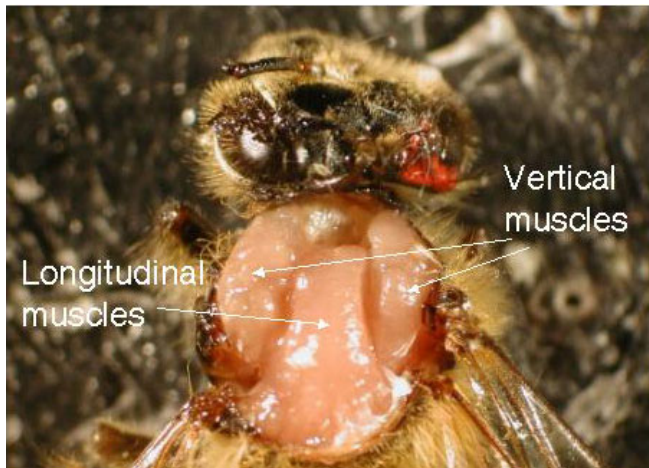


19



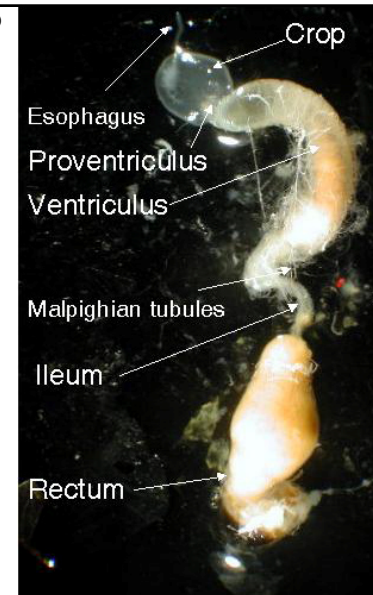
20

Flight muscles

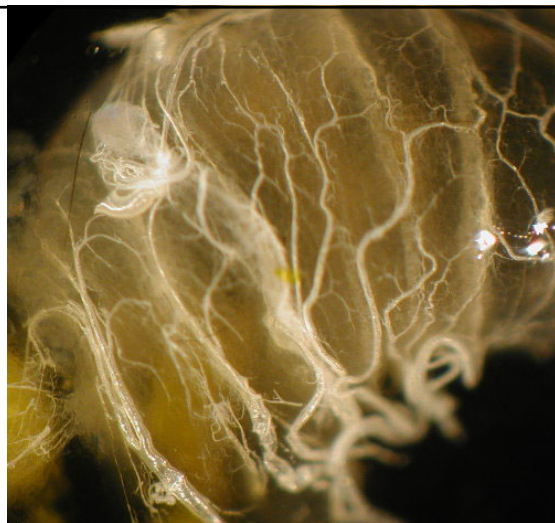


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Are honey "bee vomits"?



22



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Inside the head:
hypopharyngeal glands:
produces protein for royal jelly in nurses,
but invertase in foragers



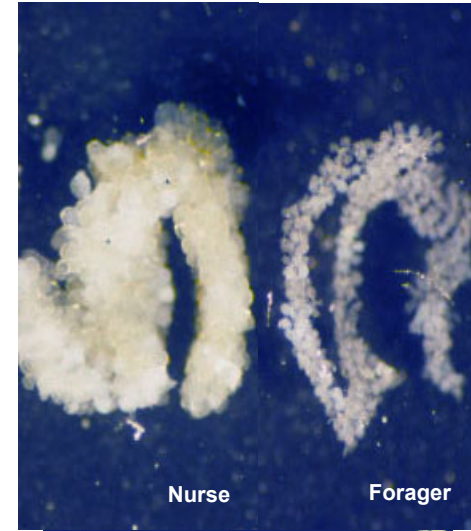
24

Individual “acini” of glands



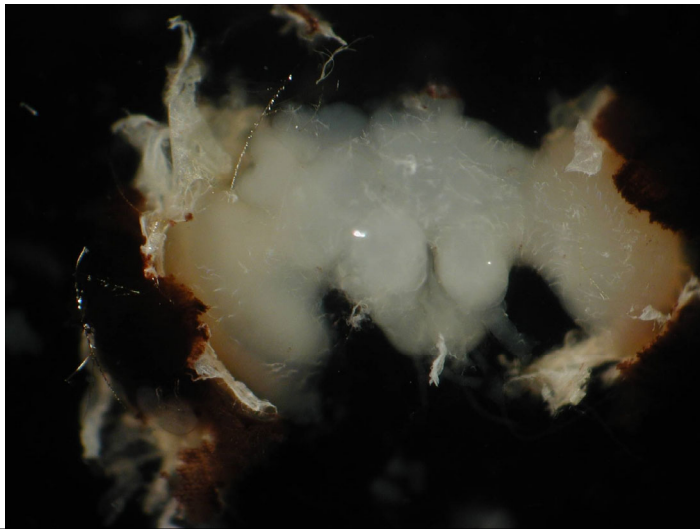
25

Regression of hypopharyngeal gland



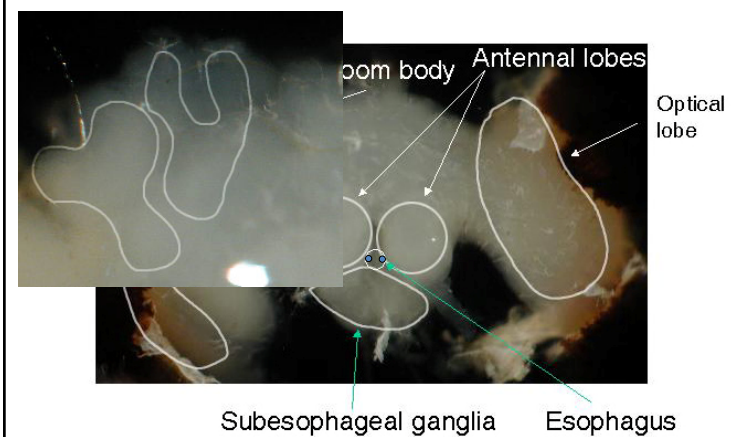
26

After removal of glands and trachea:

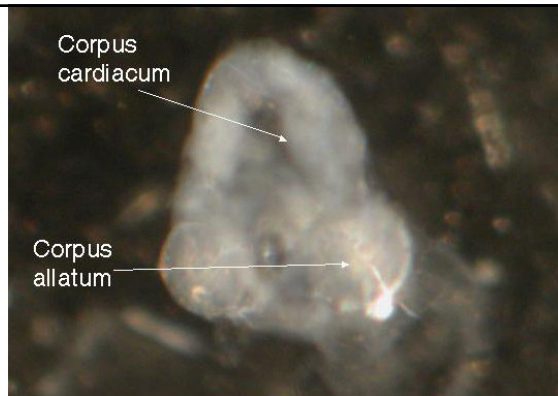


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An annotated bee brain



28



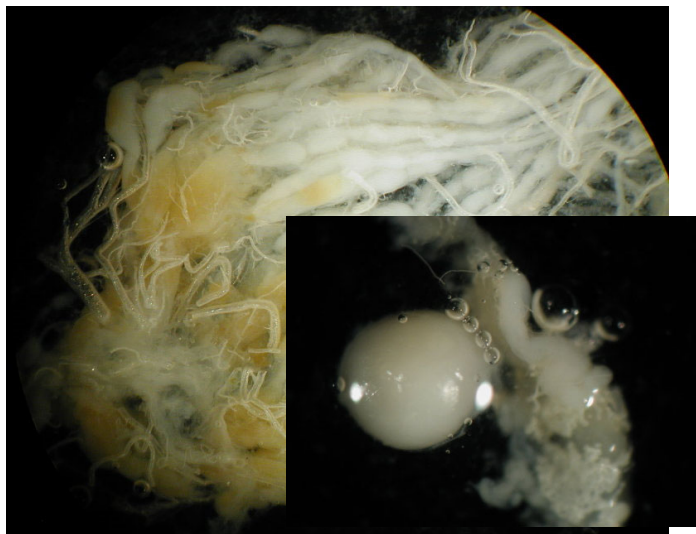
Corpora allata: the only organ that produces juvenile hormone (caste differentiation, molting, division of labor)

29



30

Ovarioles of Queen



31

Summary

- Antenna can hear, smell and taste
- Bees do have brains! (1 million neuron)
- Two glands change functions with age
- Thorax is almost all muscles
- Pollen basket is really a dent with hairs
- Hind wings hitch-hike on the front ones
- Honey is not "bee vomit"!

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Huang's websites

All photos available at
<http://cyberbee.net/gallery>

Content similar to this lecture on the web:
<http://www.extension.org/pages/21754/anatomy-of-the-honey-bee>

Email: bees@msu.edu

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Thank you for your time

www.beetography.com



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