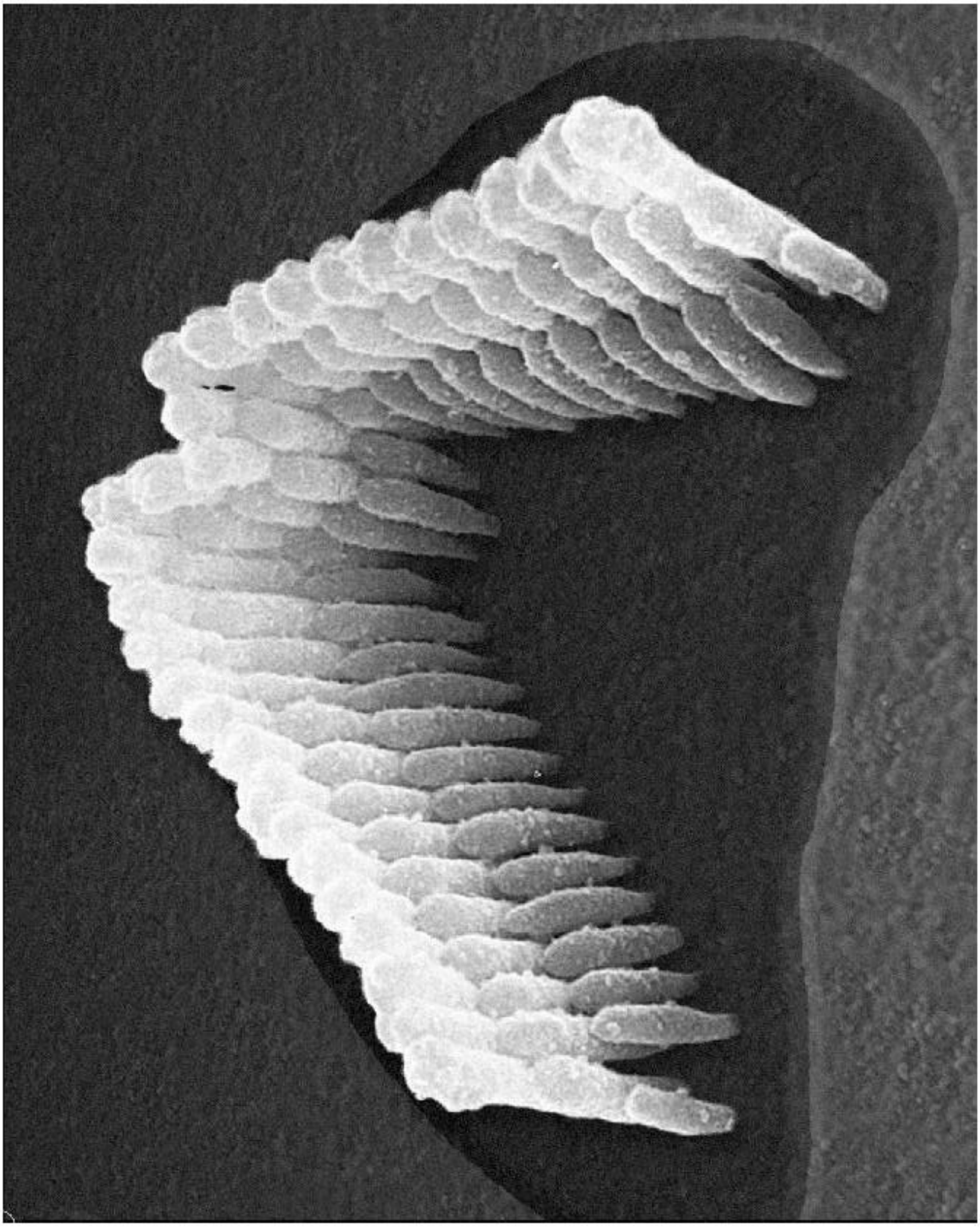
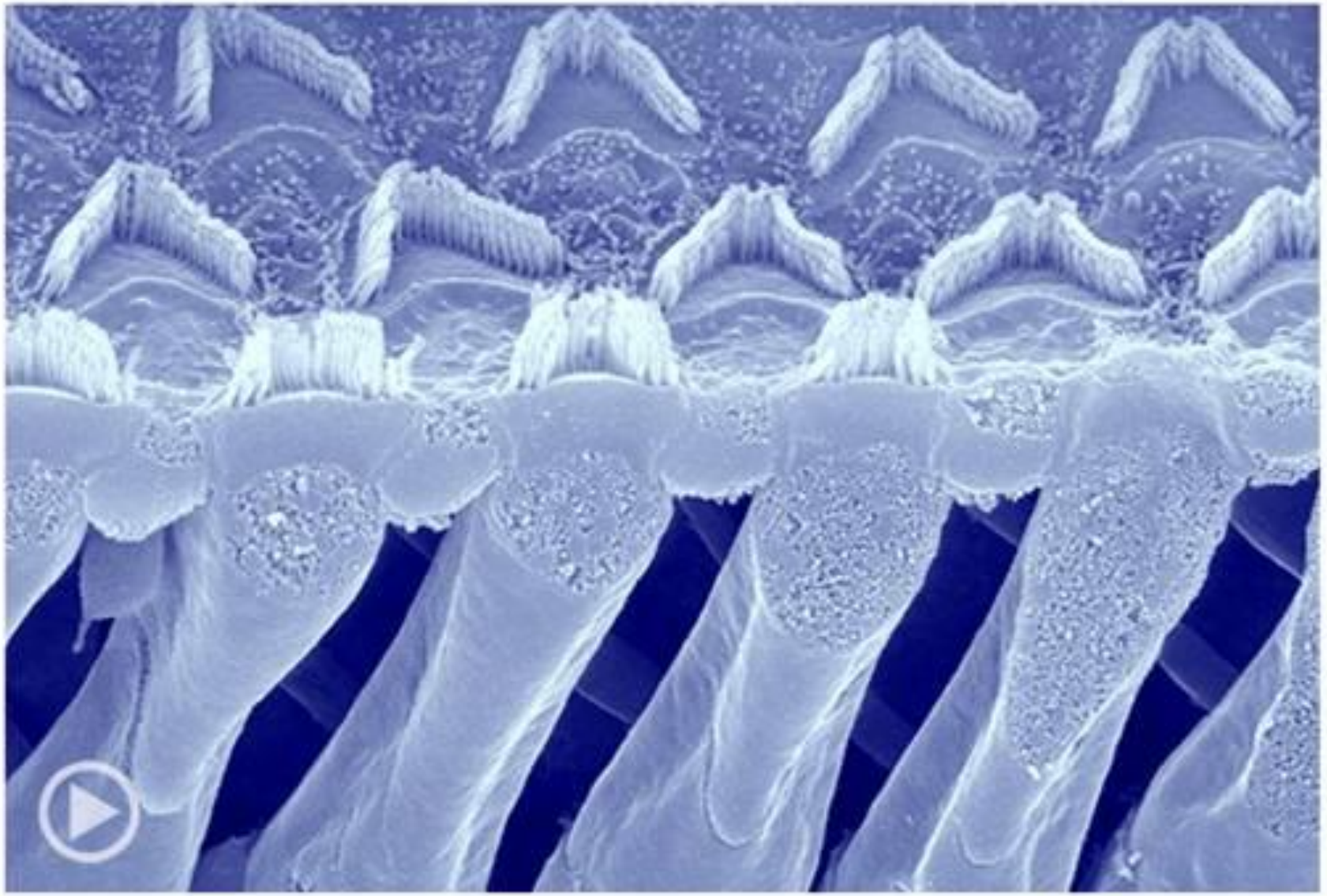
Animal Senses

9/4/15

Appendix D.1 Normal Healthy Hair Cell Stereocilia (Hair Bundle)



Fly Hair Cells



Animal hearing

- Elephants can hear lower frequencies than humans
  - 10 Hz (humans 20 Hz)
- But not as high
  - 12,000 Hz (humans 20,000 Hz)

Elephant Ears

Ears are bigger & tougher

– Ear canal, ossicles, ear drum and cochlea

Why might this be?

A. Longer objects have lower natural frequencie

B. Shorter objects have lower natural frequencie

C. Does not affect how the ear works.

Animal Hearing

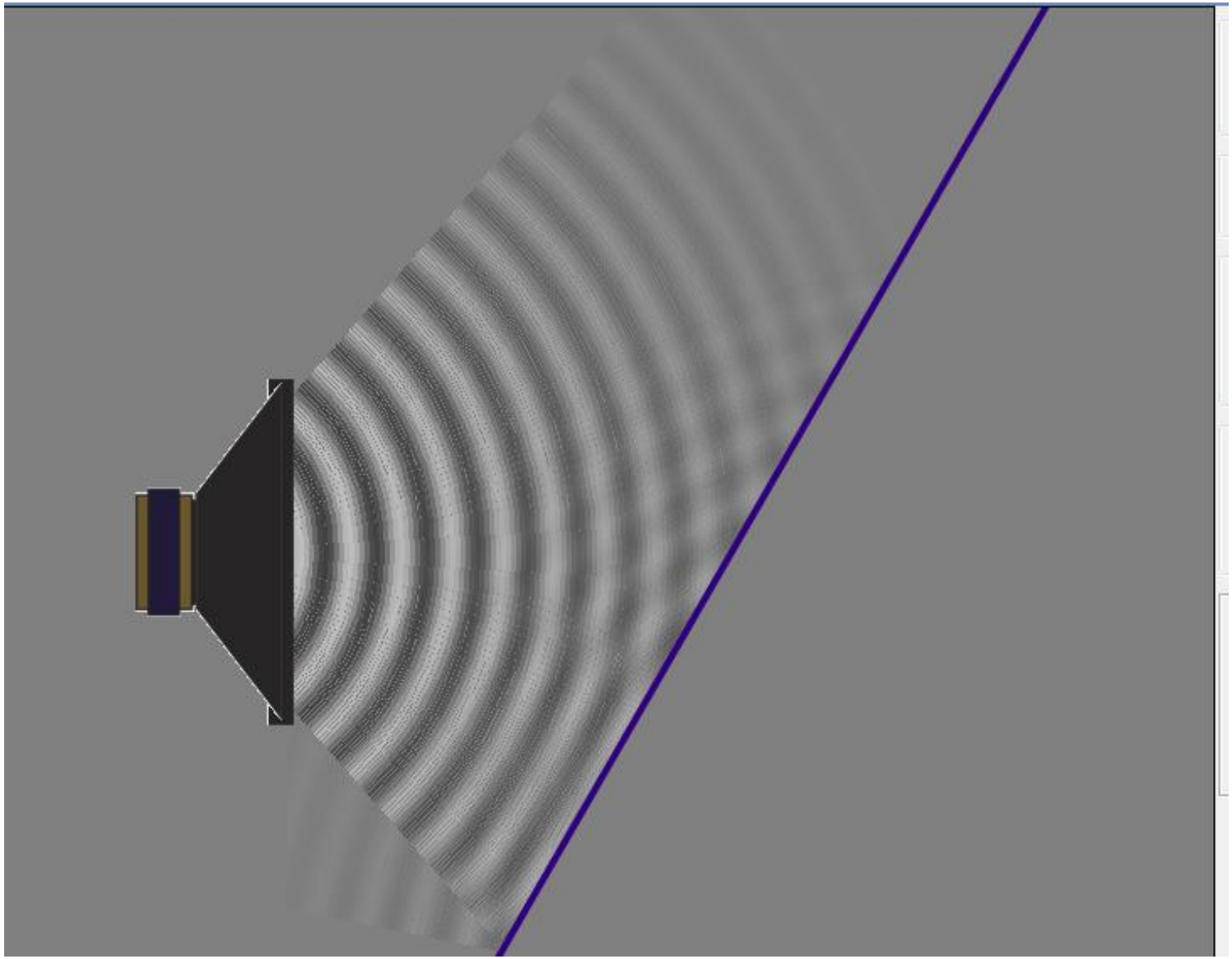
- Bats can hear higher frequencies than humans
  - 114,000 Hz (humans 20,000 Hz)

    Ultrasound (defined by human ears)

  But not as low

  - 10,300 Hz (humans 20Hz)

Sound bounces off of solid objects



Listen for echoes

- Echolocators listen for the sounds bouncing back

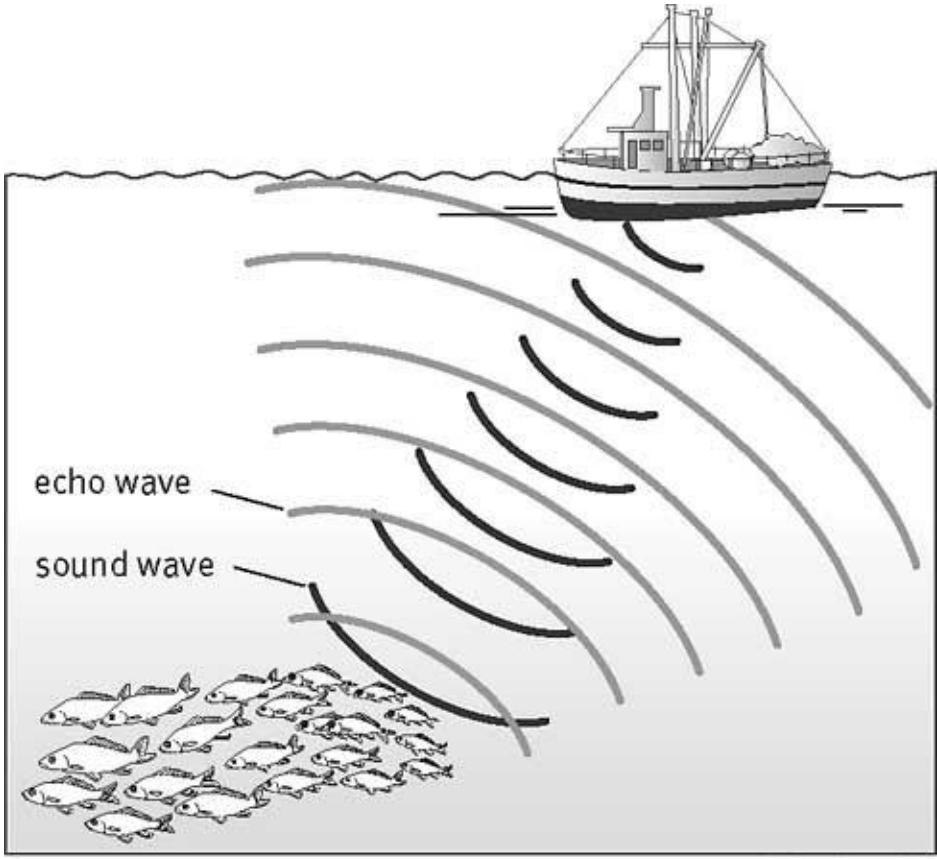
Have you heard of *active SONAR*?

A. Yes, I know what it is
B. Yes, I think I have some idea
C. Yes, I have no idea what it is
D. No, never heard of it

SONAR

(SOund Navigation and Ranging)

- Uses the idea of sound bouncing back.
  - Use speed of sound in (salt) water and delay to calculate distance.



Elizabeth Morales

Echolocation is Nature's SONAR

Listen for echoes

- Most produce their own sounds (such as clicks) and listen for them to come back.

  They are *active* echolocators

Active SONAR – sends out beeps

Passive SONAR – listens for sounds but does not produce beeps, have to listen to what's already out there.

Human Echolocation

- All Humans do this subconsciously

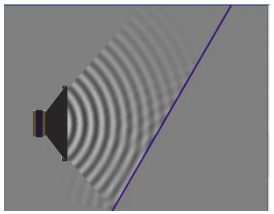
Does that make them active or passive echo locators? (not the folks on the videos, average humans like you and me)

A. Active
B. Passive
C. Both

Listen for the delay

- The delay tells the brain how far away an object is.

This is how dolphins and bats know how far away their prey is!



Speed of Sound

- 4.8 seconds to travel a mile in air
- 1.1 seconds to travel through water
- 0.25 or ¼ of a second to travel through solids!

What did you hear?

How was the sound in the railing different from the sound you heard through the air?

A. In the railing sound was a high pitched tink
B. In the railing sound was like a gong or church bells
C. In the railing sound was the same

Ear Buds

- If you listen to an ear bud 1 inch from your ear, it sounds lame.

- If you put it in your ear, you get full range beautiful sound.

How does this work??

Ear Buds

- Vibrations go directly from speaker to your solid flesh and bone so low frequencies not lost.
- Uses your skull to amplify the sound via *sympathetic vibration*