

Olfaction

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Noses

Why noses?

3 hypotheses:

- evolutionary artifact: result of neutral evolution, genetic drift
- respiration: nose evolved to warm, humidify air (proposed in 1913, retested 2016)
- Stereo olfaction: evolved to support enhanced, adapted movement + navigation
 - ↳ leads to greater space use → larger brains

Using Olfaction

- Odors are objects
 - ↳ elements (single), configurations (mix)
 - ↳ source of directional information
- odor mapping prevalent in highly visual species, incl humans
 - olfaction before brain? olfactory system/bulb evolved before neocortex
- hippocampus related to olfaction
 - ↳ dolphins don't have either
- Stereo Olfaction
 - more accurate mapping w/ two nostrils
 - related to antennae (wide to determine location accurately)
 - ↳ also seen in hammerhead sharks, snakes' bifurcated tongues
 - ↳ Procellariiformes (tube nose birds) → navigation, prey detection

The Human Nose

- no other ape has a wing/pyramid-shape nose
 - ↳ first appears in homo erectus
- evolved in part from climate change:
 - environment becomes drier, more open
 - rise of cooperative hunting carnivores w/ olfactory pursuit
 - endurance pursuit allowed humans to compete bipedally
 - nose widened/narrow based on geographic location → increase/decrease in space use
 - (ex. Arctic noses very narrow, low need for space)
 - agriculture → sedentary life → low space use
- evolved as response to agriculture: increased pathogens, decreased space use
 - ↳ 2 modes: navigational (1.5 mya), diagnostic (15k)

The Scent of Disease

- early physicians trained to detect odors correlated w/ disease
- dogs can detect tuberculosis, cancer, low blood sugar, Covid...

