MAPPING HUMAN CORTEX

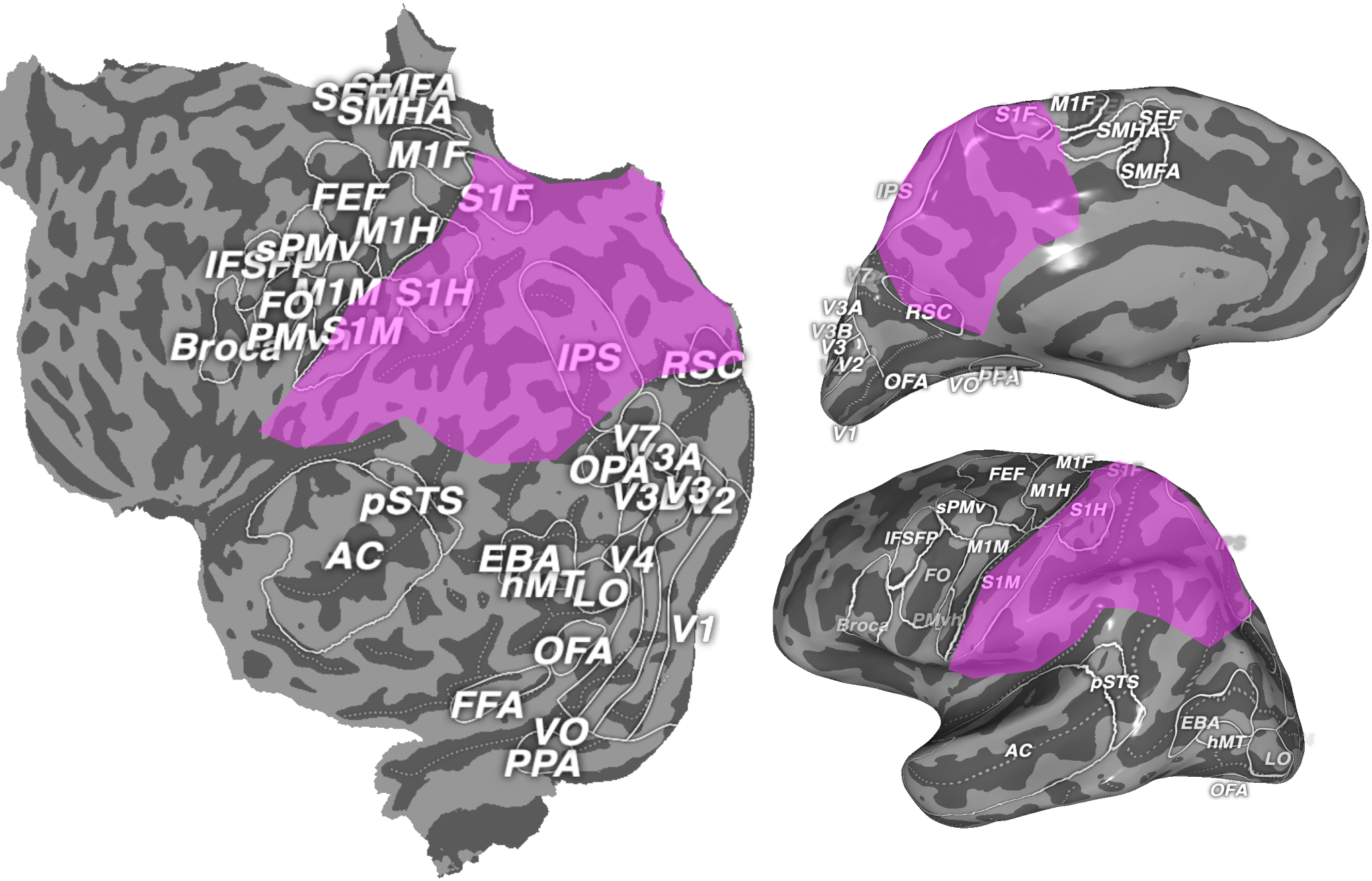
Prof. Alexander Huth

3.24.2021

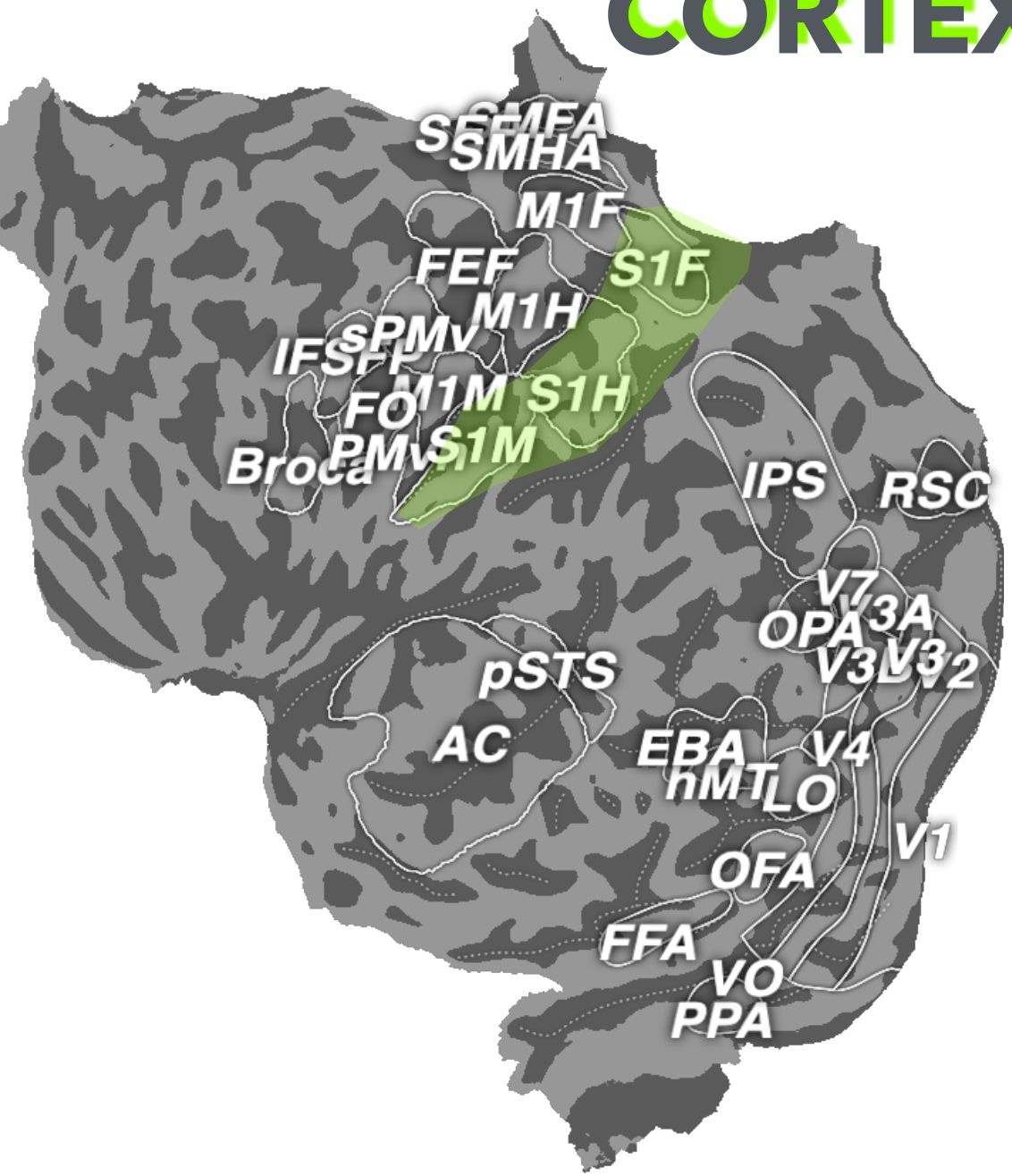
HOMEWORKS

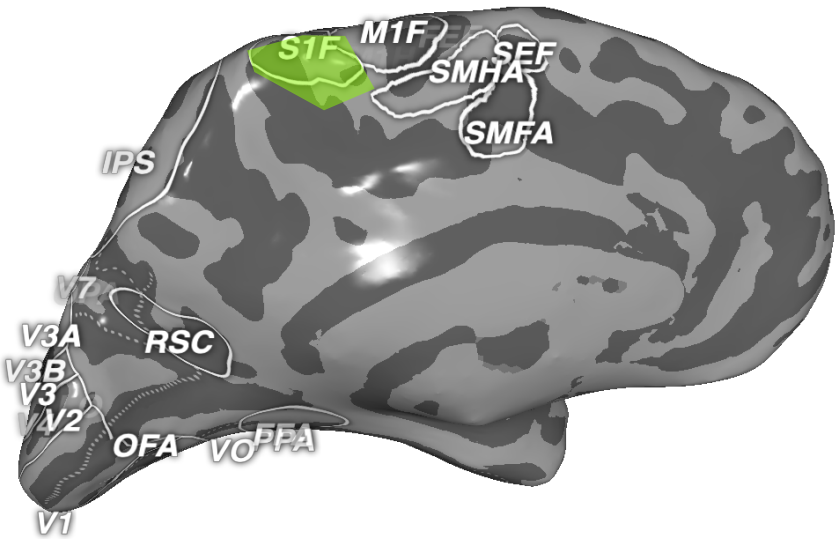
* **Homework 1** grades are posted
    * If you resubmit Homework 1 before next week's class (3/31), you can get up to 50% of the points you lost back! **Email me** the updated solution to resubmit.
* **Homework 2** (visual ctx.) is due in 2 weeks (4/7)
    * Your annotations for Homework 2 should be **added** to what your turned in for HW1

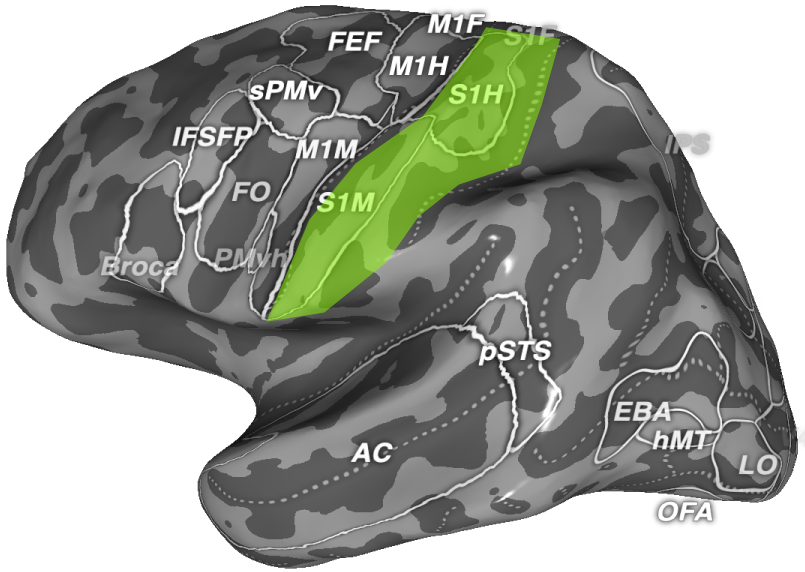
PARIETAL CORTEX



PRIMARY SOMATOSENSORY CORTEX (S1)



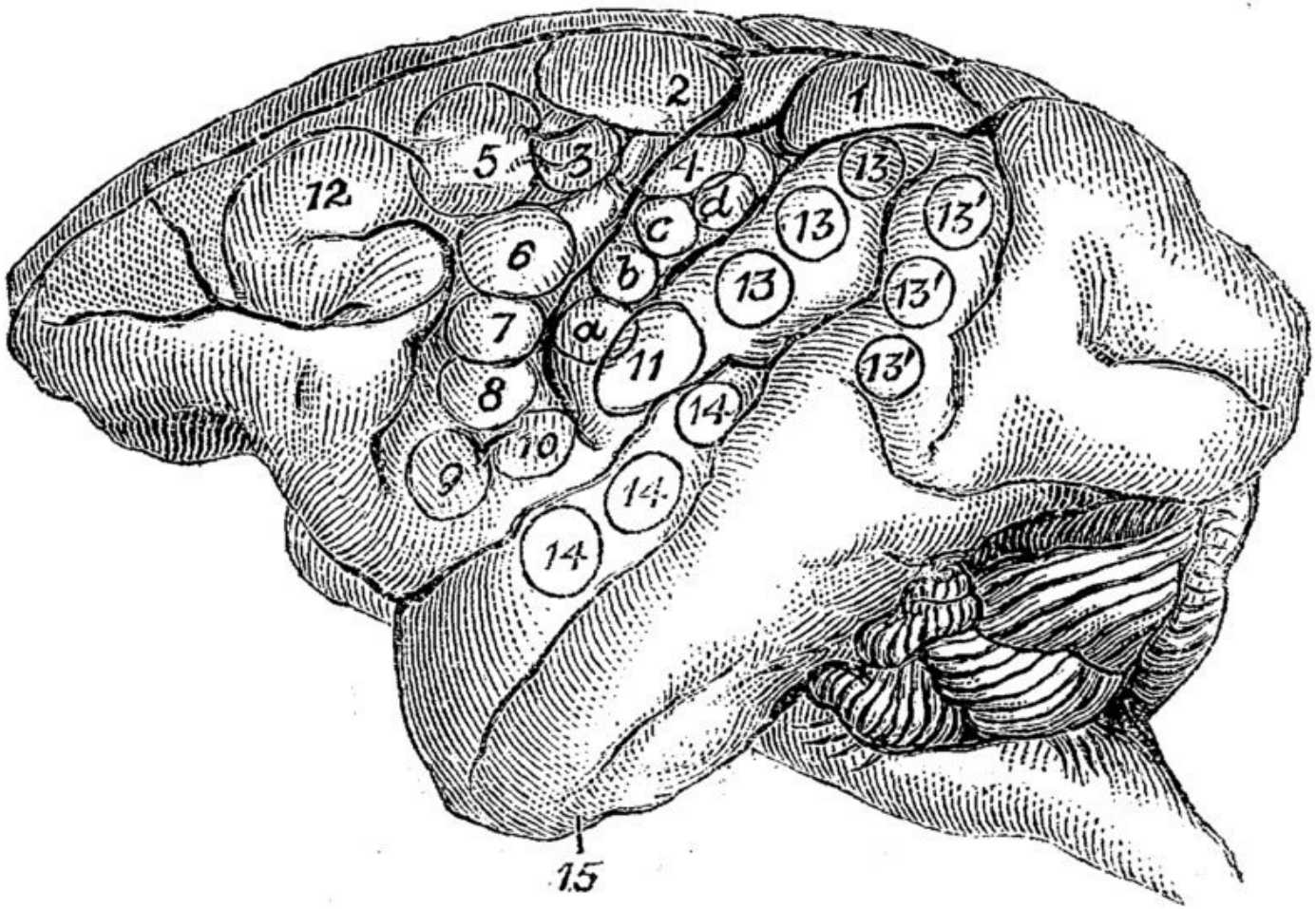




SOMATOTOPY

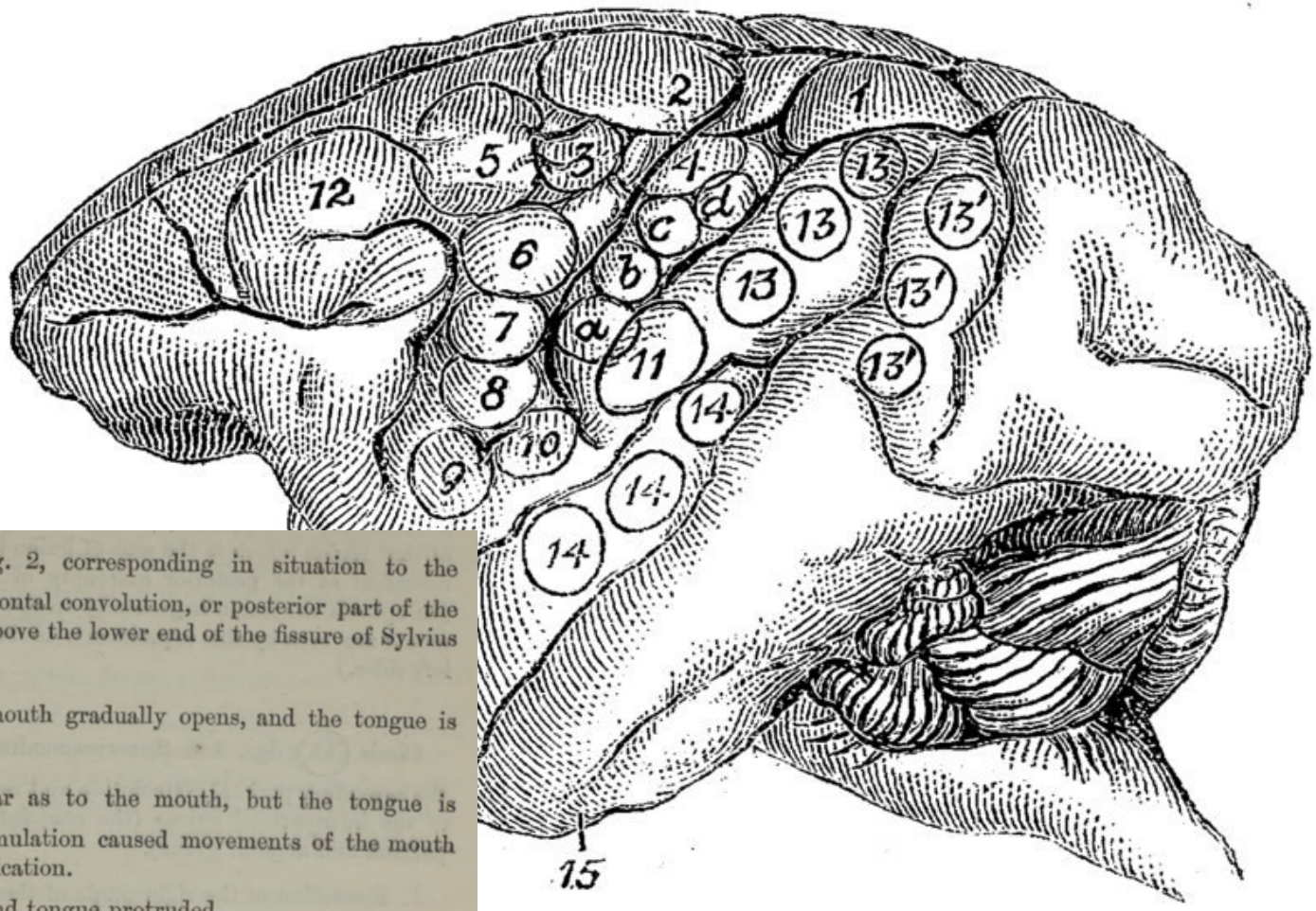
* Primary somatosensory cortex (S1) represents touch on the skin from the *contralateral* body
    * i.e. left hemisphere represents right half of the body
* Areas in S1 are organized **somatotopically**, meaning neighboring body parts are (usually) represented by neighboring cortical areas

SOMATOTOPY



David Ferrier, 1886

SOMATOTOPY



Circles (9) and (10), fig. 2, corresponding in situation to the ower part of the ascending frontal convolution, or posterior part of the nferior frontal convolution, above the lower end of the fissure of Sylvius Broca's convolution).

I. (9). The lips pout, mouth gradually opens, and the tongue is protruded.

(10). Action similar as to the mouth, but the tongue is retracted. Longer stimulation caused movements of the mouth and tongue, as in mastication.

II. (9). Mouth opened and tongue protruded.

(10). Tongue retracted.

Movements of mastication made by continued stimulation.

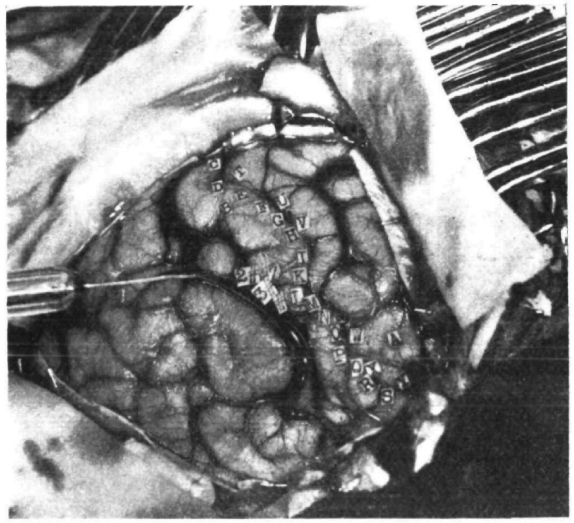
III. Same results as in I. and II.

David Ferrier, 1886

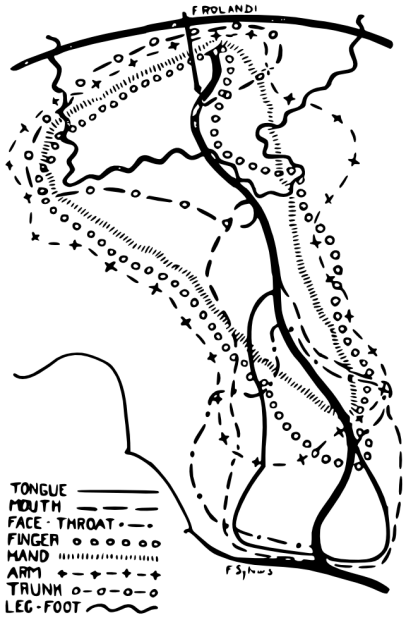
HUMAN SOMATOTOPY

* Intra-surgical stimulation experiments *(Penfield & Boldrey, 1937)*

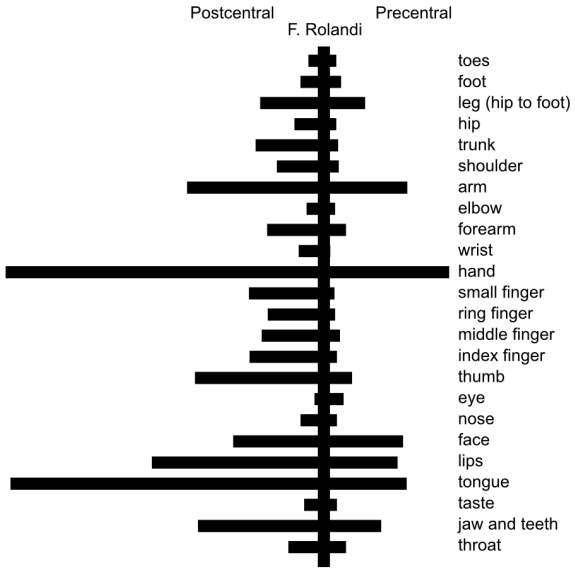
A



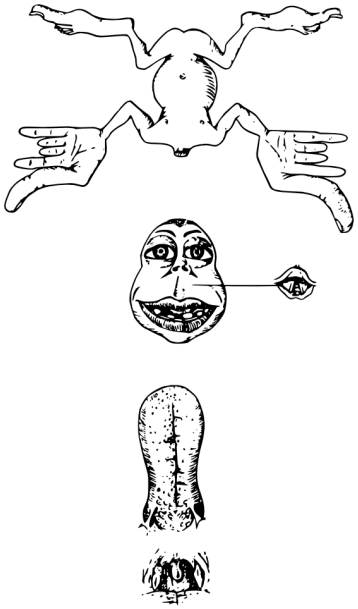
B



C

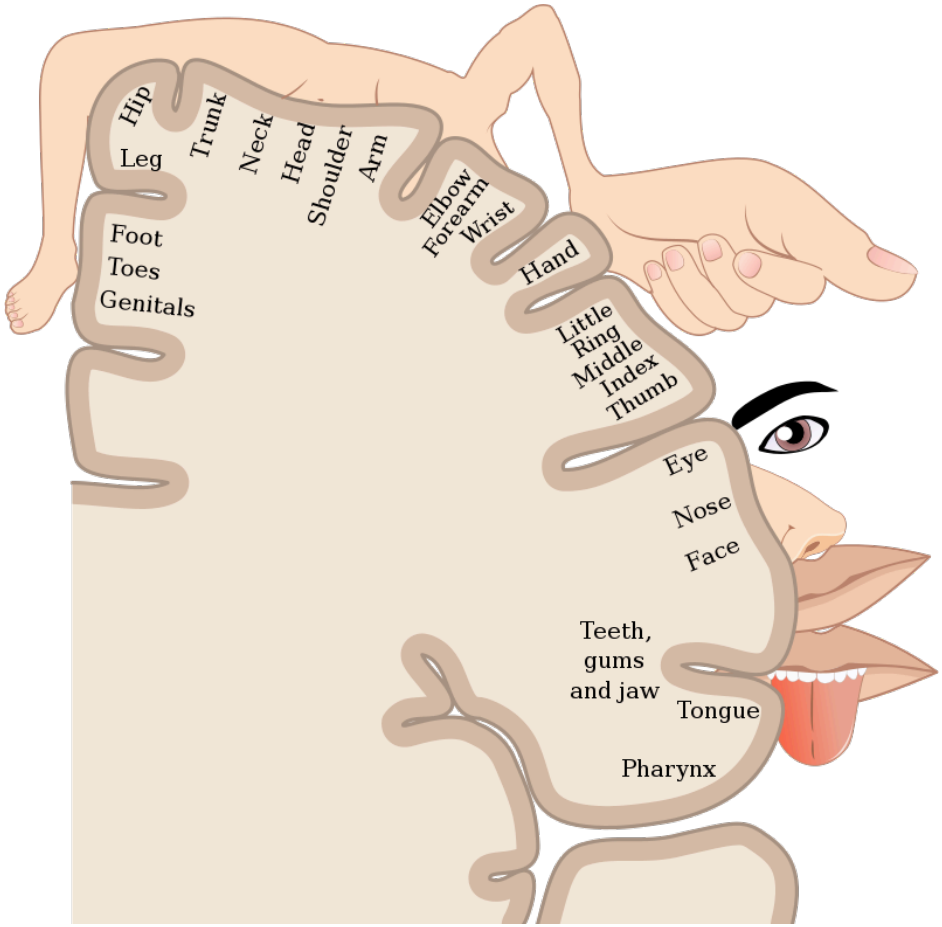


D



CORTICAL MAGNIFICATION

* Like in visual cortex, size of cortical representation does not scale with size of corresponding sensorium
* Some areas are **magnified** (hands & mouth)

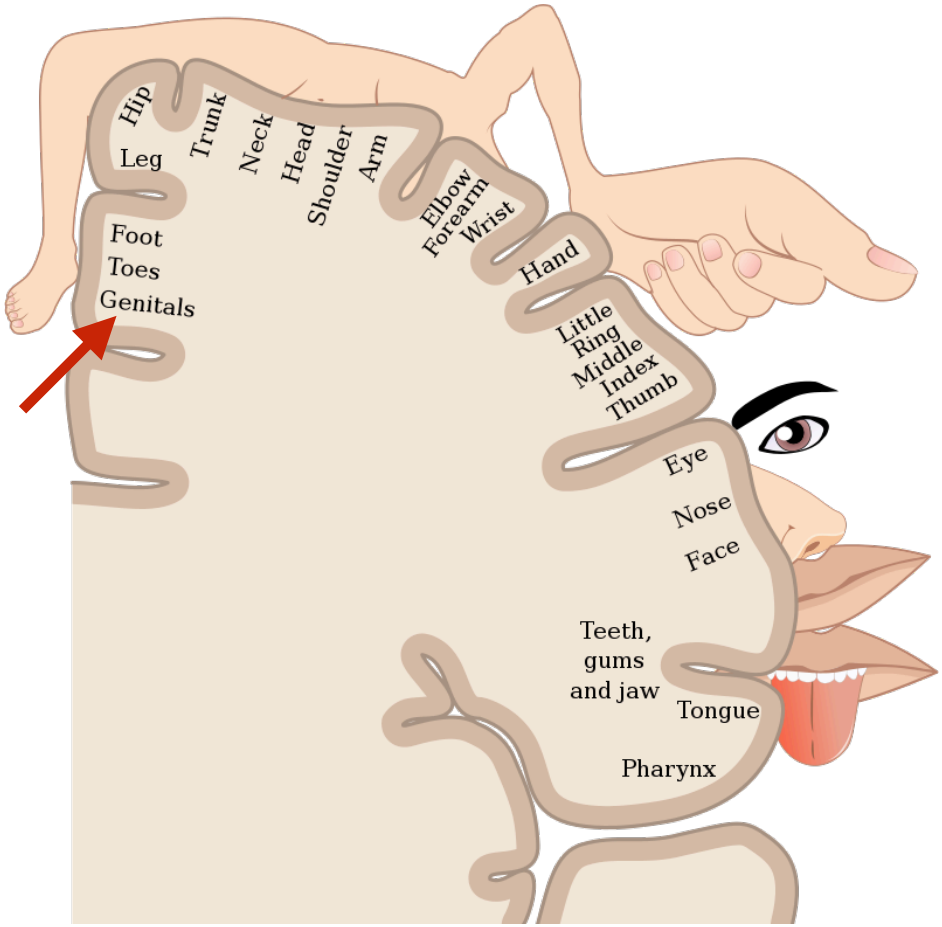


THE HOMUNCULUS

* Fanciful illustration of cortical magnification as a horrible little man *(thanks for the nightmares, Penfield)*

PENFIELD'S MISTAKE

* There's one major way that Penfield & Boldrey's "somatotopic" map is not somatotopic
* It turns out this is probably wrong
    * (And Penfield wrote that only 1% of patients reported this sensation)



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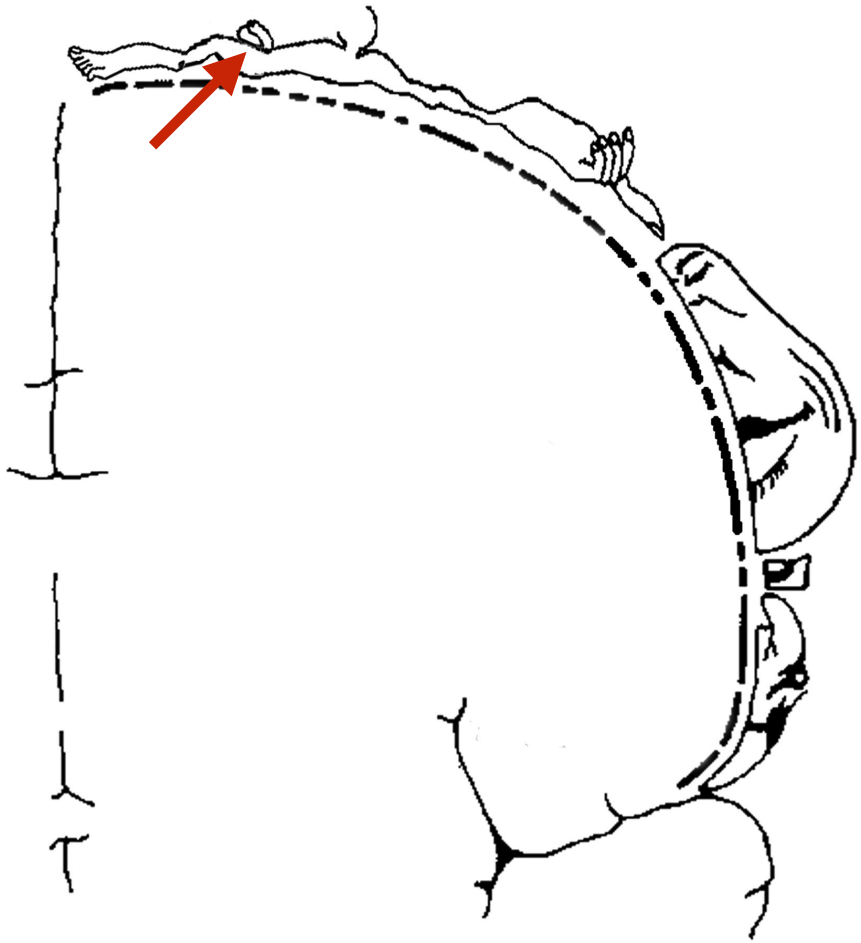
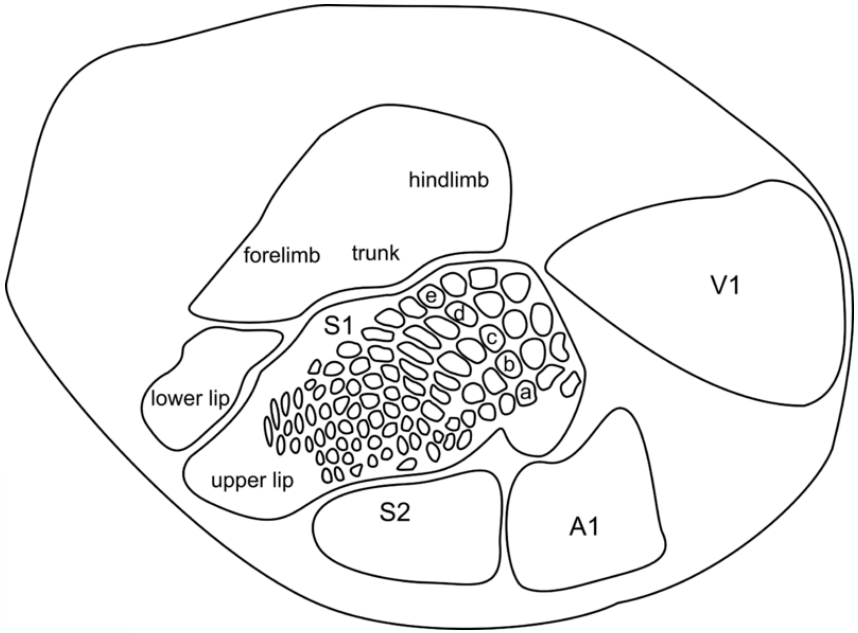
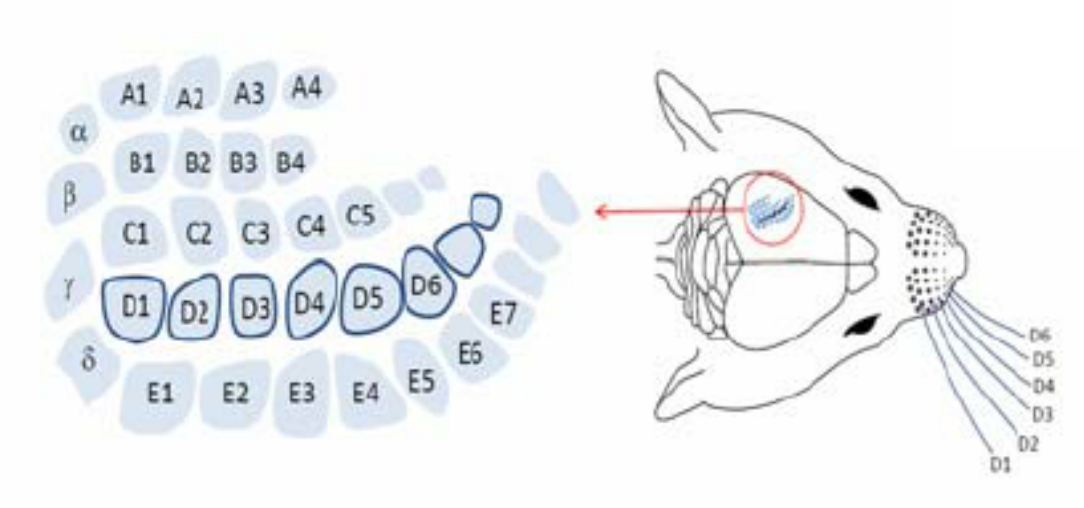


OTHER MAMMALS

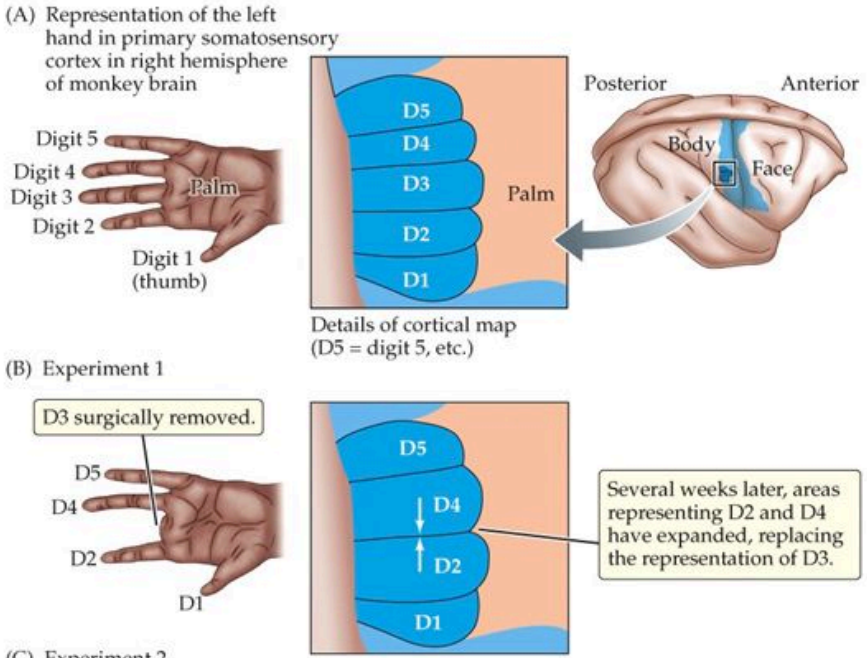
* Rodents have another important somatosensory organ: ***whiskers***





PLASTICITY & REMAPPING

* Depending on use, areas within S1 can **grow** or **shrink**
* e.g. violinists have much larger **left (string) hand** S1 areas than other people
* Areas corresponding to amputated body parts shrink or are taken over



UNTIL

NEXT

TIME