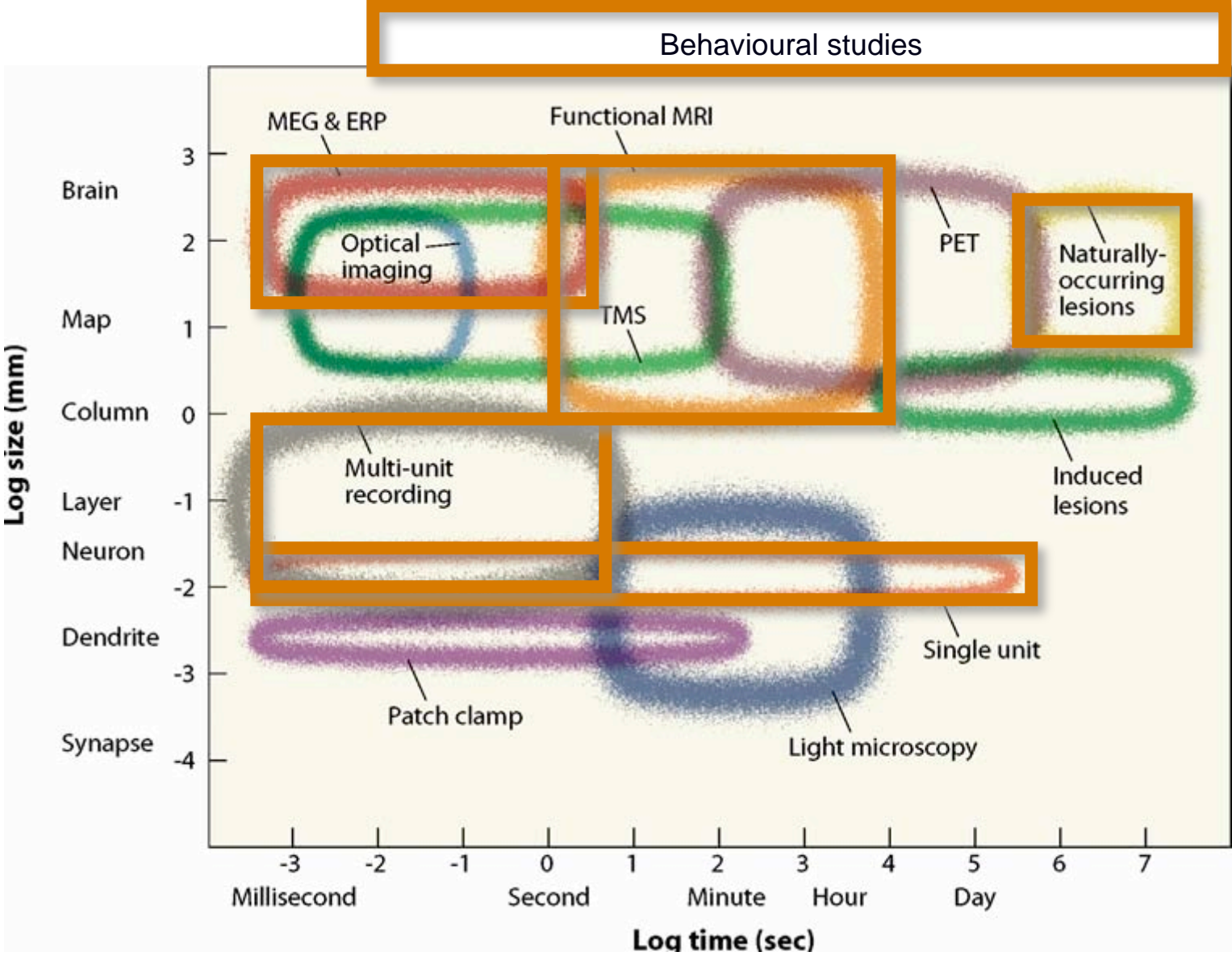


# Methods in Neuroscience



Carlson Ch 5

# Spatial and temporal resolution of neurotechniques



# Methods really limits what questions can we ask?

- Santiago Ramon y Cajal suggests we can ask how but not why questions
- But how questions can be asked on many different levels
- **Cellular** – how do neurons communicate?
- **Anatomical** – how are different areas interconnected (cytoarchitectonics)?
- **Functional** – how do certain areas sustain or subserve certain behaviours?
- **Systemic** – how do disease processes affect brain function?

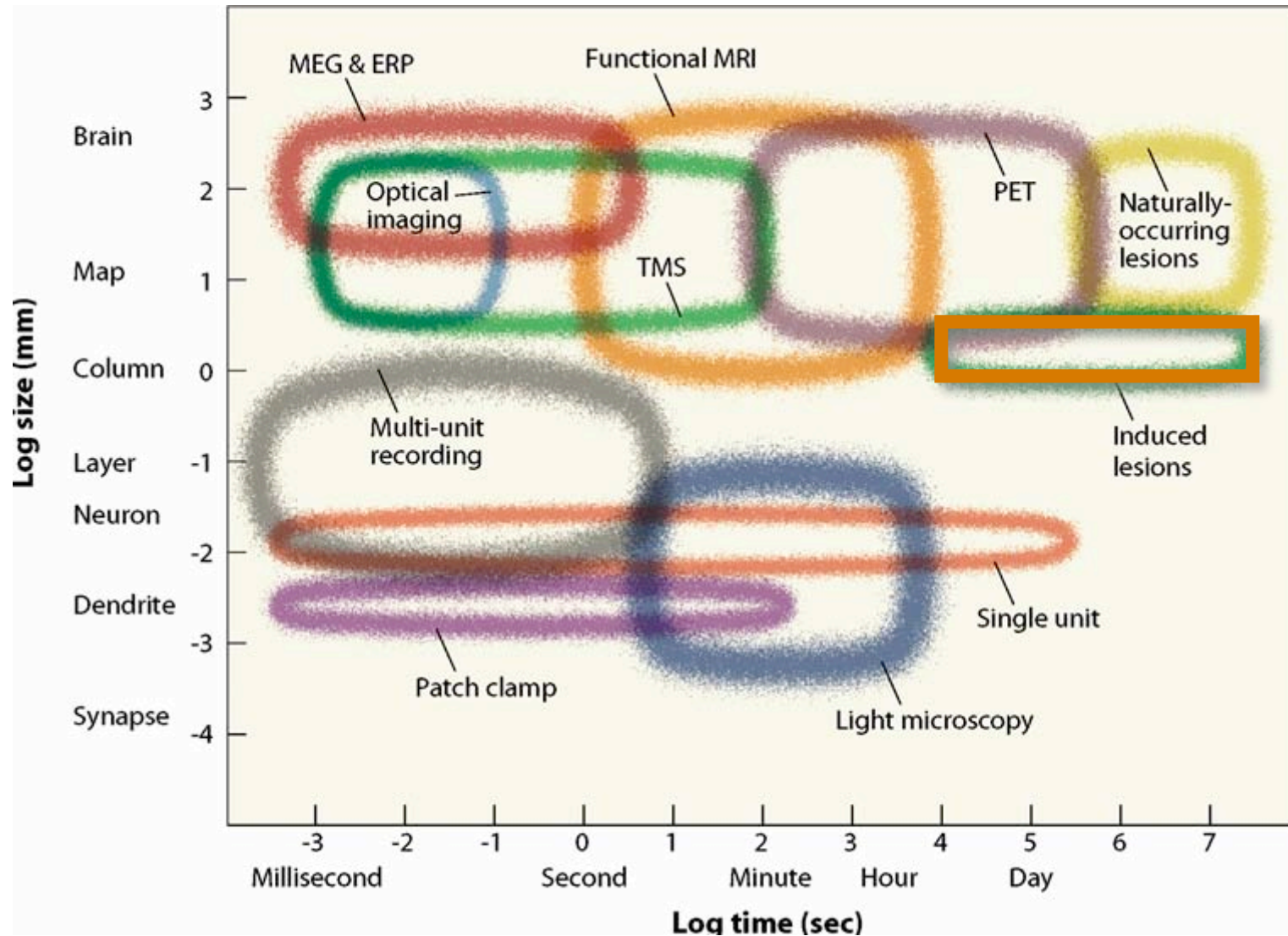


won Nobel prize  
in medicine 1906

# Converging methods

- Anatomy – to understand brain – behaviour relationships at a larger level
- Physiology – includes electrical activity, neurotransmitter characteristics
- Imaging – metabolic activity related to neural activity

# Spatial and temporal resolution of neurotechniques

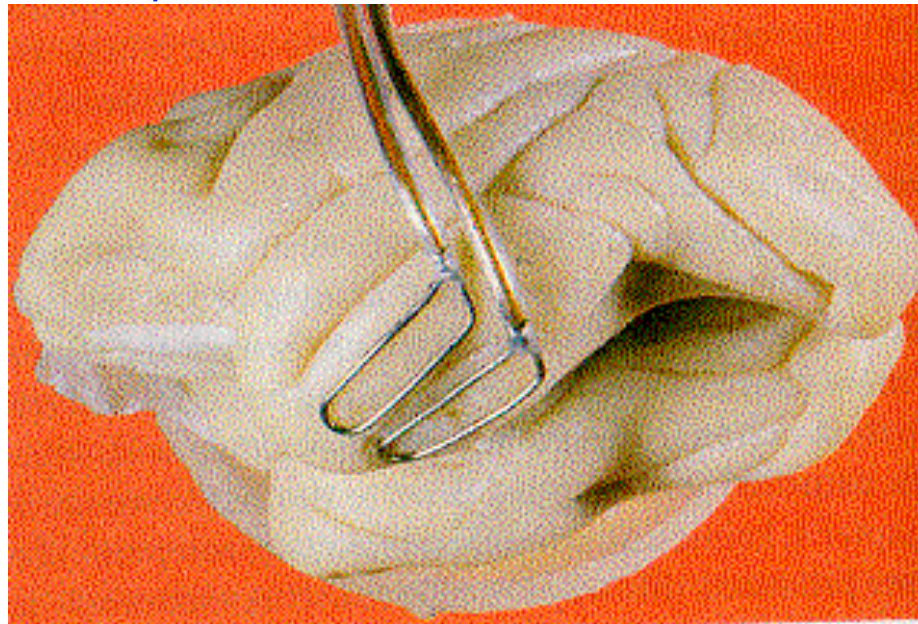


# Animal lesion studies

- experimental ablation
- caution in interpretation – change in behaviour after a lesion could be due to many things
  - the loss of function supported by that particular region
  - the loss of a sub-component necessary for the behaviour caused by disruption to the network
  - co-existing behavioural changes unrelated to the particular region

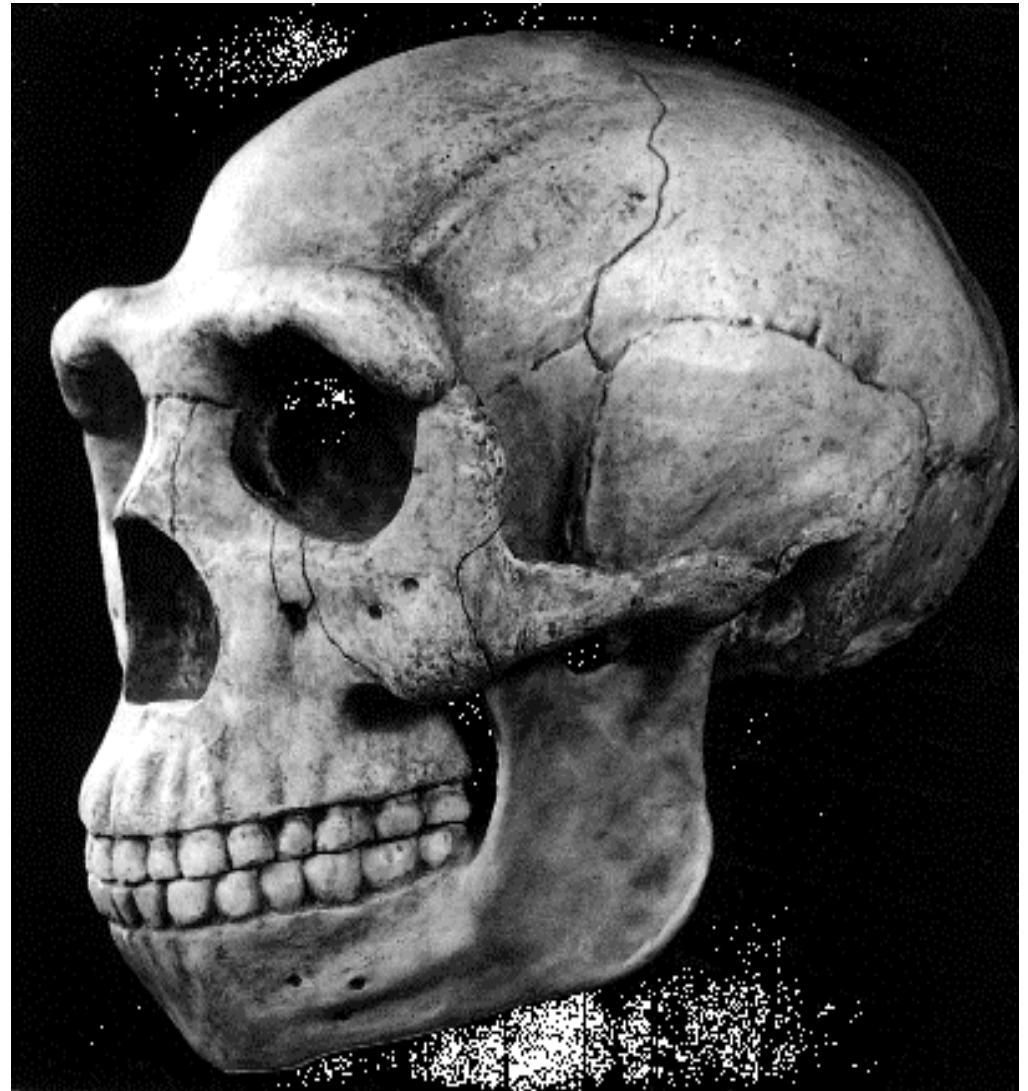
# Animal lesion studies

- high frequency radio pulse – destroys everything
- excitatory amino acid (kainic acid) – excitotoxic lesion (more specific – spares axons that are passing through area)
- chemical lesions – targets neurons that respond to specific neurotransmitters
- **reversible lesions** – anesthetic or cooling (Steve [Lomber](#) @ UWO)

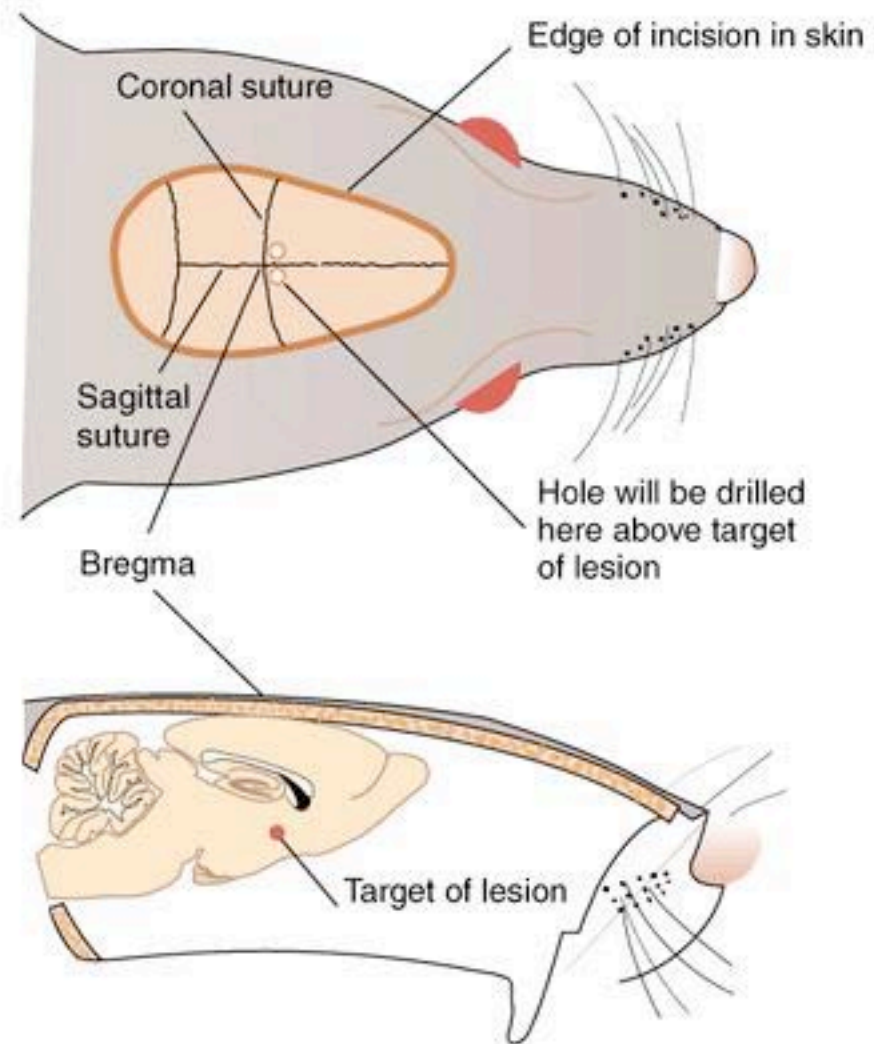


# Stereotaxic Surgery

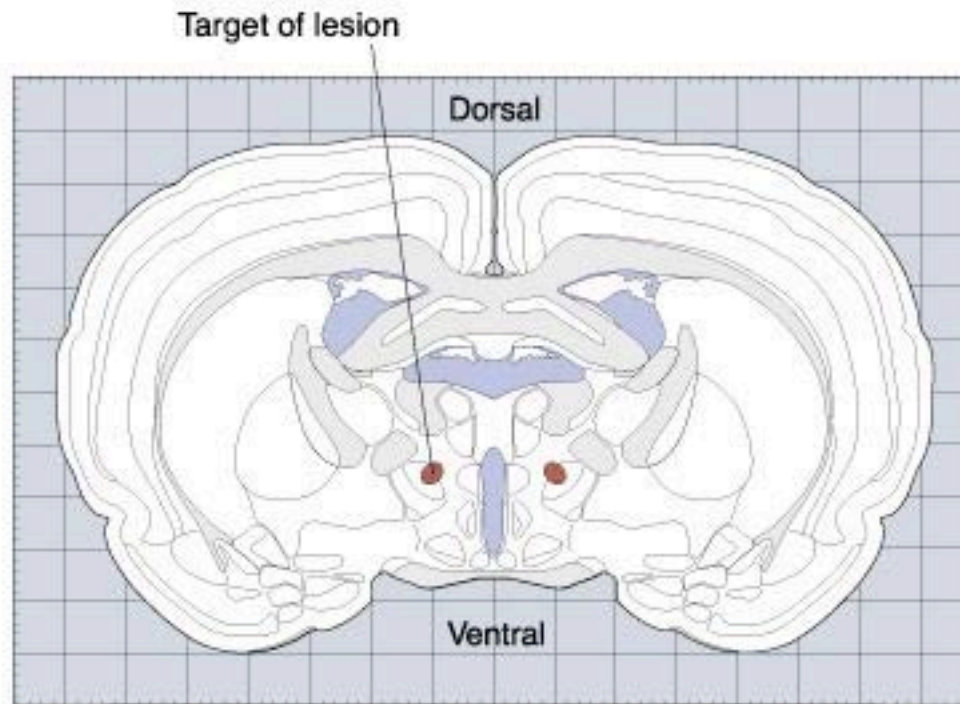
- use a particular seam in the skull (a *suture*) as a landmark
- *Bregma* - the junction of the coronal and sagittal sutures



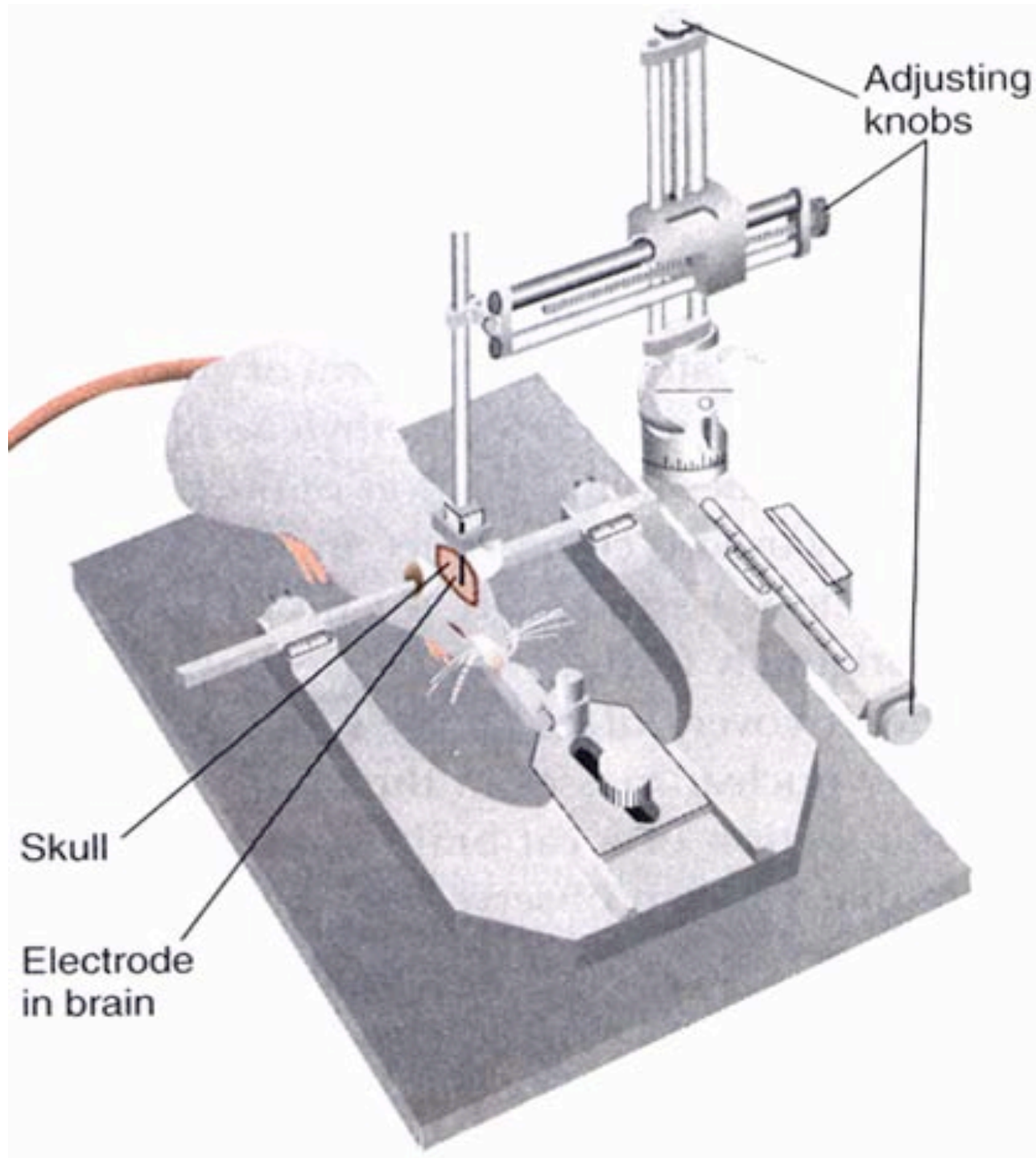
► **Relation of the Skull Sutures to a Rat's Brain, and Target for Electrode Placement**



► A Sample Page from a Stereotaxic Atlas of the Rat Brain



Source: Adapted from Swanson, L.W. Brain Maps: Structure of the Rat Brain. New York: Elsevier, 1992.  
Copyright © 2001 by Allyn & Bacon



Rats are anesthetized, holes are drilled and the tip of the electrode is sunk down to the level specified in the stereotaxic atlas

Current is turned on, ablating the structure

Rat is sutured and is tested after a couple of days

Also for other species, Fish, mice, monkeys