HISTORY OF SLEEP RESEARCH

Early Theories & Observations (Greek, Roman)
- Alcmaeon (6th century BC)
- Empedocles of Agrigentum (5th century BC)
- Diogenes
- Homer’s Iliad, Hypnos & Thanatos (twin brothers)
- Aristotle (384-322 BC)
- Galen (2nd century AD)

Renaissance period (1400’s)
Finally recognition of the brain as source of sleep

Late 19th and early 20th centuries
- Reduced blood flow to brain, hypoxia/anemia
- Sensory input to brain cut off due to swelling
- Neural contact points retracted, synapses disconnected
- Overcome by fatigue secondary to movement
- Pavlov, widespread brain inhibition
- “Hypnotoxins” poisoned the brain
- Recovery state (passive) necessitated by too much wake

“Sleep is the intermediate state between wakefulness and death; wakefulness is regarded as the active state of all the physical and intellectual functions, and death as that of their total suspension.” (MacNish, MD, 1834)

So… sleep seen as passive, near-death state, inactive, lack of brain/body activity
And the sleeping brain was forced into wakefulness by the bombarding of the brain by sensory input, which then produced an active state in the brain

Sleep was viewed as being similar to a coma, to stupor, to intoxication, to a deep central anesthetic state, to hibernation, and to a near-death state
Sleep was assumed to characterized by a complete lack of awareness, of no brain activity at all… curious when you think of awareness of dreaming…

Role of lack of technical advances…could only observe sleeper’s overt behaviors (or lack thereof) and social mores

Recording electrical activity in the brain
  Camillo Golgi & Santiago Ramon y Cajal
  Luigi Galvani
  Emil du Bois-Reymond & Hermann von Helmholtz
  Richard Caton (1875)
  Hans Berger (1928), electroencephalogram = EEG
  Kleitman (Univ of Chicago), 1939 publication
    Wake vs. Sleep EEGs described
  Sleep now seen as another state of consciousness

So…by 1930’s knew that sleep occurred when there was brain activity…but still thought that brain in sleep was a passive state, that brain was driven into wakefulness by sensory “bombardment”

Bremer, 1935 & 1936 publications
  brain studies that transected brain, cutting off incoming sensory signals…would brain remain asleep?

“encephale isole” – brain sectioned at posterior medulla (brain still had sensory inputs from cranial nerves I, II, VI, VII, olfactory, visual, auditory/vestibular, & facial senses) And cortical EEG showed alternating cycles of S&W

“cerveau isole” – brain sectioned just posterior to cranial nerve III, just anterior to midbrain (brain still had sensory inputs only from cranial nerves I&II, olfactory&visual) And cortical EEG showed only sleep EEG
Concluded that brain indeed did need some threshold amount of sensory stimulation to drive passive brain into wakefulness and that without this stimulation ("cerveau isole") brain remained asleep

which was the **right observation**, but the **wrong conclusion**
(hint: What if there is an active brain site posterior to the cut made in the brain that normally produces wakefulness? Without access to that structure, brain could not produce wakefulness, regardless of how much sensory input it has.)