

# **HISTORY OF SLEEP RESEARCH**

## **Early Theories & Observations (Greek, Roman)**

**Alcmaeon (6<sup>th</sup> century BC)**

**Empedocles of Agrigentum (5<sup>th</sup> century BC)**

**Diogenes**

**Homer's *Iliad*, Hypnos & Thanatos (twin brothers)**

**Aristotle (384-322 BC)**

**Galen (2<sup>nd</sup> century AD)**

**Renaissance period (1400's)**

Finally recognition of the **brain as source of sleep**

## **Late 19<sup>th</sup> and early 20<sup>th</sup> 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 be 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 an 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.)