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ZNZ Advanced Course in Neuroscience  
Mon 10.05.2010

# Limbic System I

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# Limbic system – outline

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① *Introduction*

- history
- definition

② *Review of anatomy*

- amygdaloid complex
- septal complex

③ *Theories of hippocampal function*

- declarative memory
- episodic memory
- cognitive map
- relational memory

④ *The amygdala and emotion*

- theories of emotion
- fear and fear conditioning

⑤ *The hippocampus beyond memory*

- exploratory behavior and anxiety
- species typical behaviors
- home cage behavior

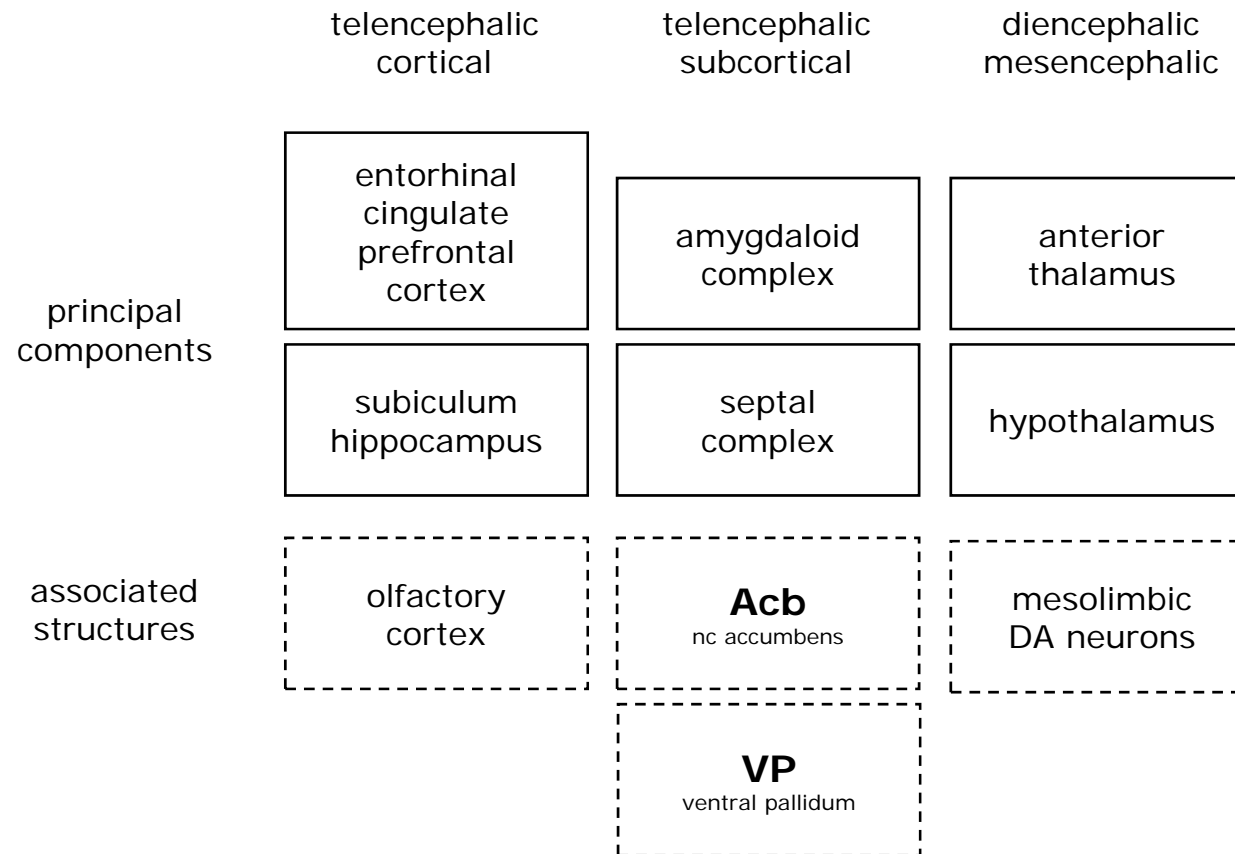
# Limbic system components – history

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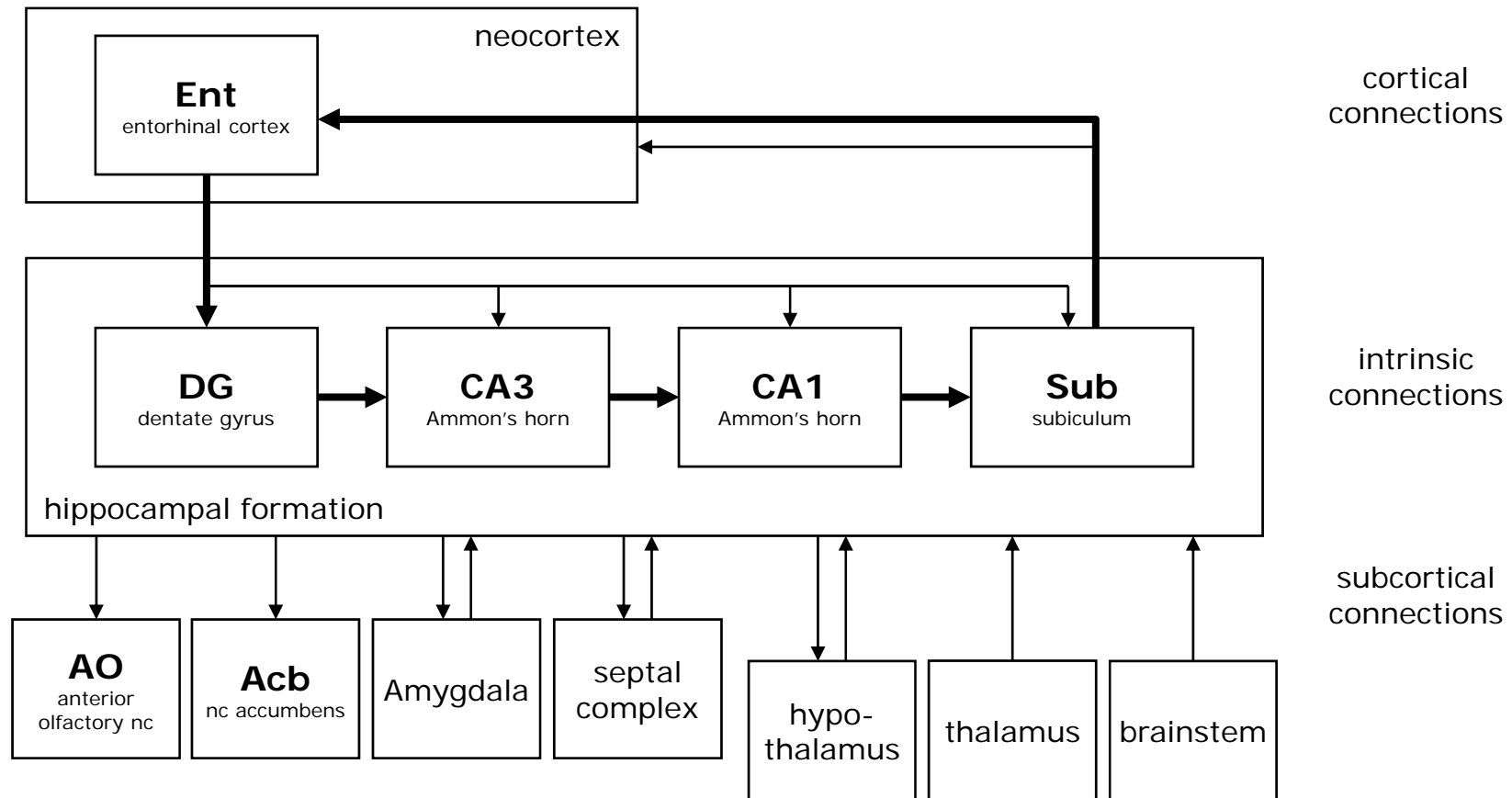
1878	P. Broca	anatomical definition: <b>grand lobe limbique</b> (limbus = border, seam), structures at border between cerebral hemisphere and diencephalon: cingulate cortex, hippocampus and adjacent cortex, olfactory cortex and bulb
1928	P. Bard	hypothalamic theory of emotion: <b>hypothalamus</b> -> event evaluation, control of expression and experience of emotions
1929	W.B. Cannon	
1937	J. Papez	<b>Papez circuit</b> of emotion: cingulate cortex -> hippocampus -> hypothalamus (mammillary body) -> anterior thalamus -> cingulate cortex
1952	P. MacLean	<b>Limbic system</b> (old mammalian brain) as interface between reptilian brain and new mammalian brain, includes prefrontal cortex and amygdala.
1957	B. Millner W.B. Scoville	Patient H.M: identification of <b>medial temporal lobe</b> structures as substrate of declarative memory -> a core component of the limbic system becomes the major target of cognitive neuroscience.

# Components of the limbic system

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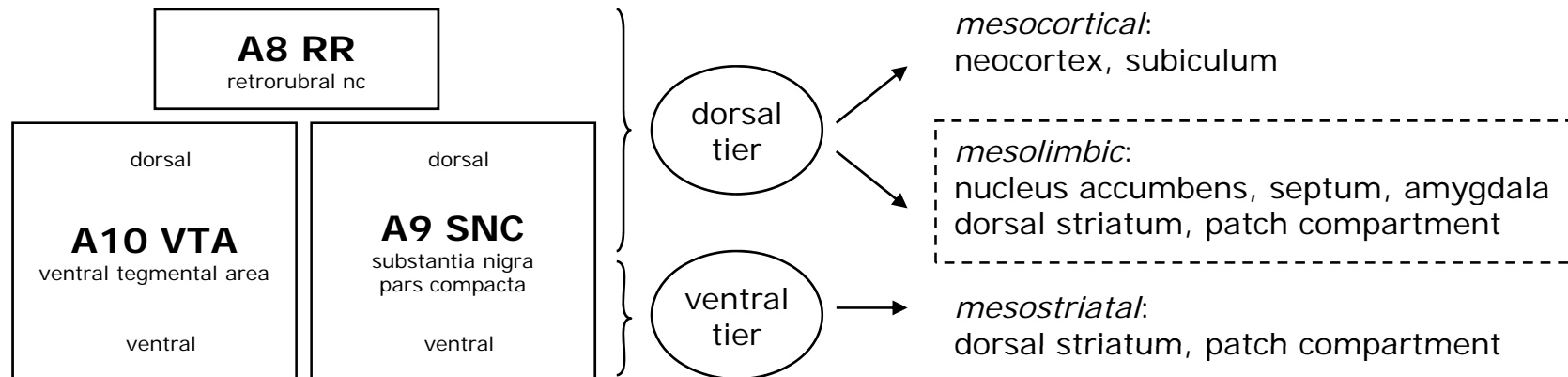


# Anatomy of the hippocampus - reminder



# Mesolimbic dopamine system

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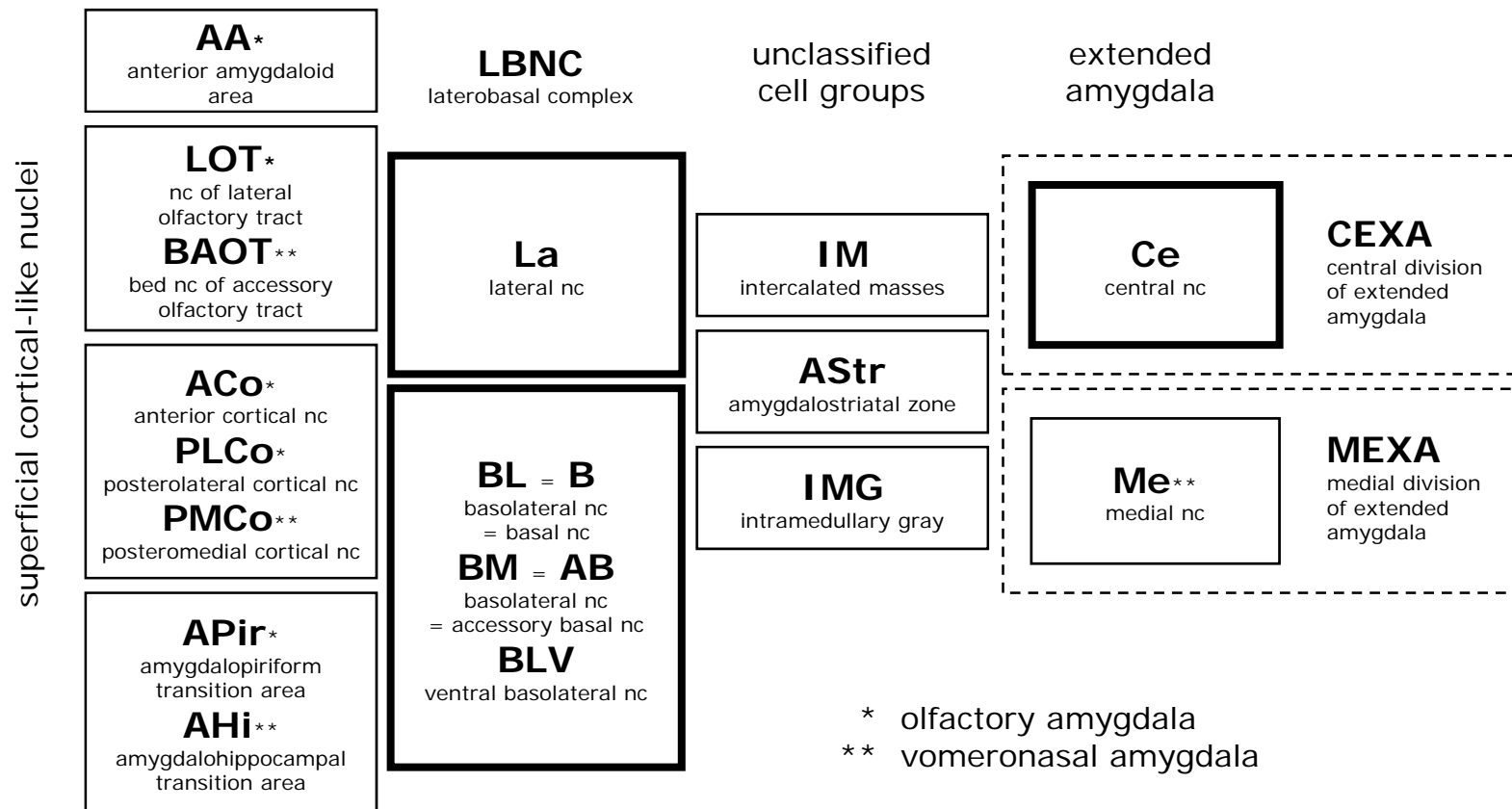


cortical innervation

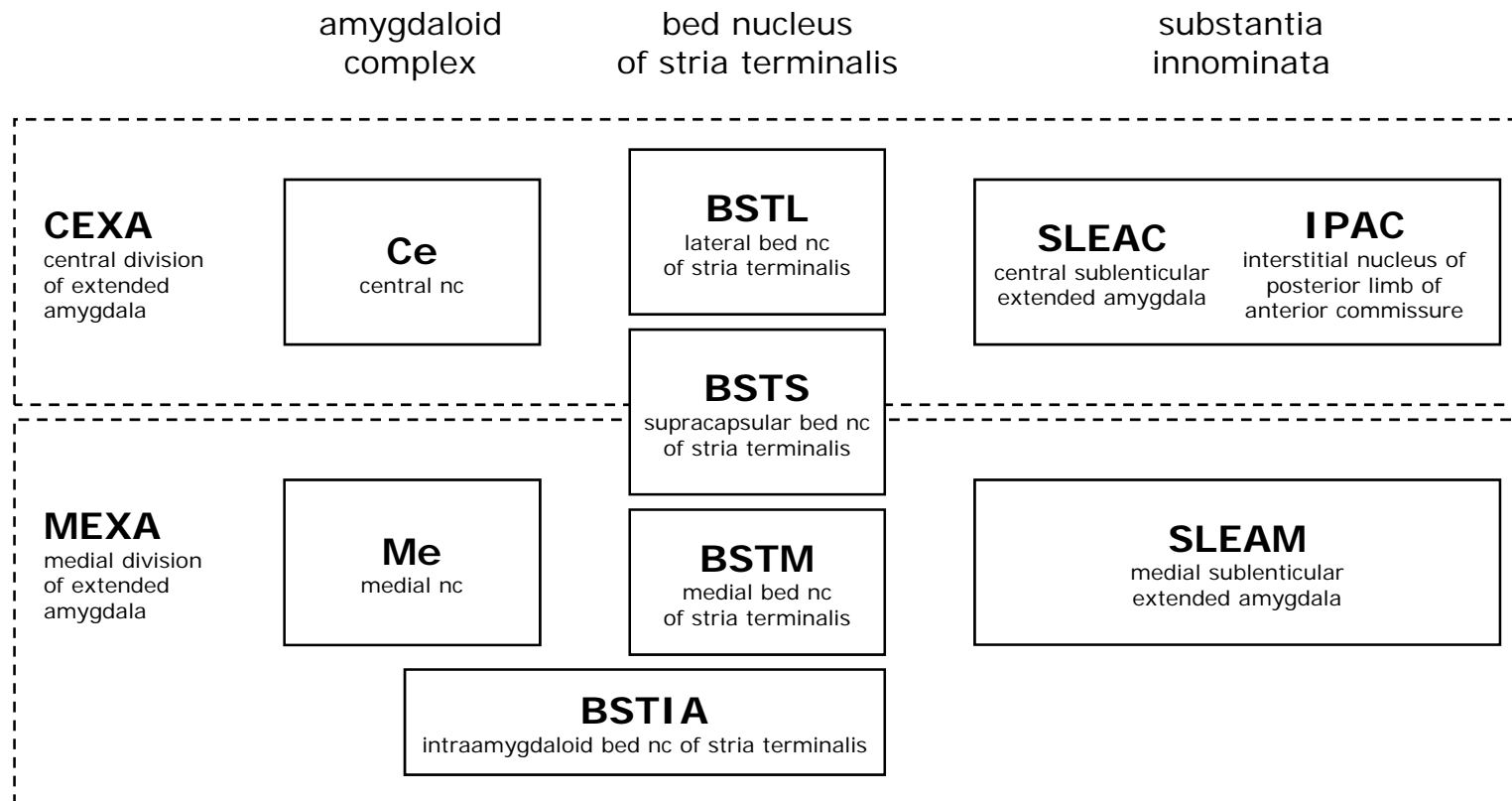
primates: entire cortical mantle

rodents: subiculum, entorhinal cortex, cingulate cortex, frontal cortex

# Amygdaloid complex - components

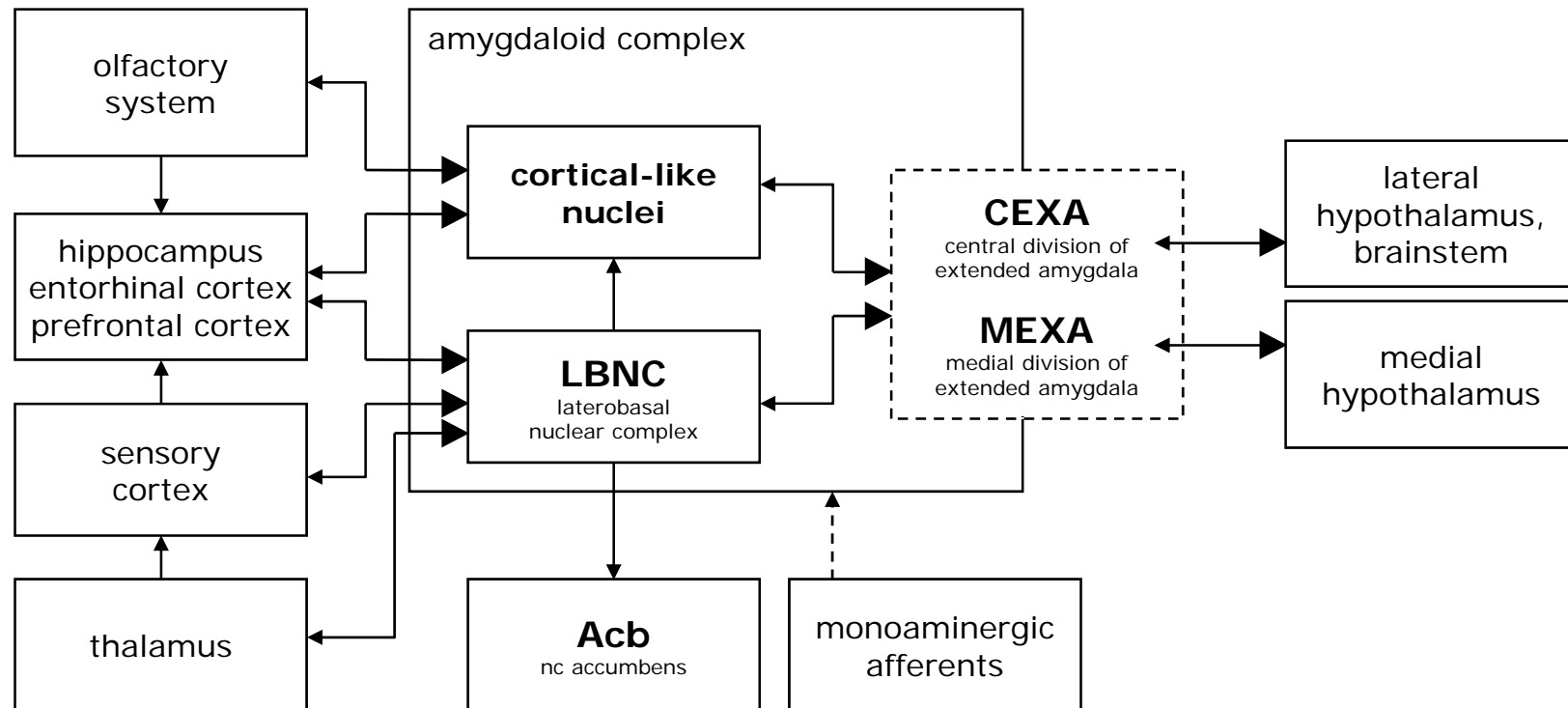


# Extended amygdala



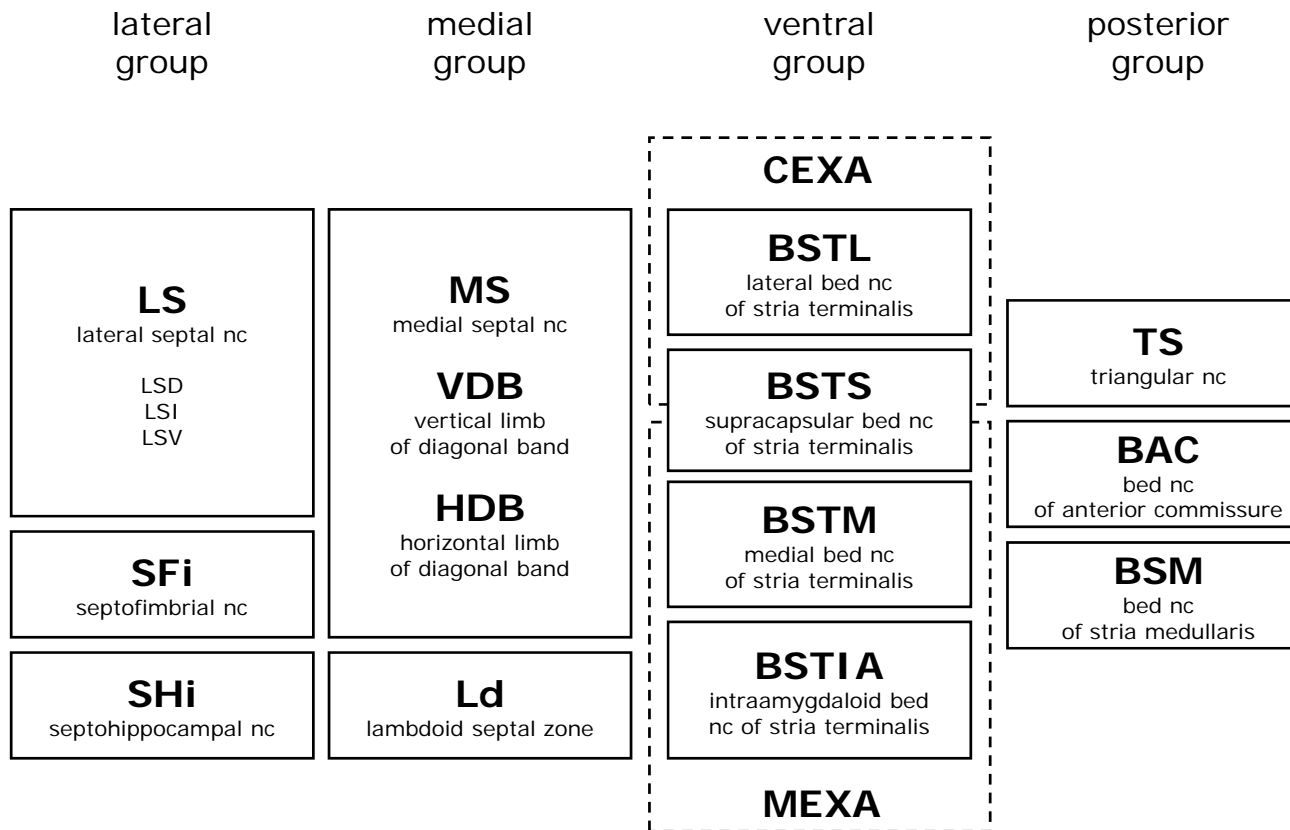


# Amygdaloid complex - connections



# Septal complex - components

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# Septal complex - connections

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**f**  
fornix

afferents (glutamate) from hippocampal formation to lateral and medial group, efferents (ACh) from medial group to hippocampus and neocortex

**st**  
stria terminalis

afferents (glutamate and GABA) from amygdala to ventral and lateral group

**sm**  
stria medullaris

efferents from posterior group to habenula

**mfb**  
medial forebrain bundle

afferents to all components from hypothalamus, thalamus, brainstem. Efferents from most components to hypothalamus, thalamus, brainstem