

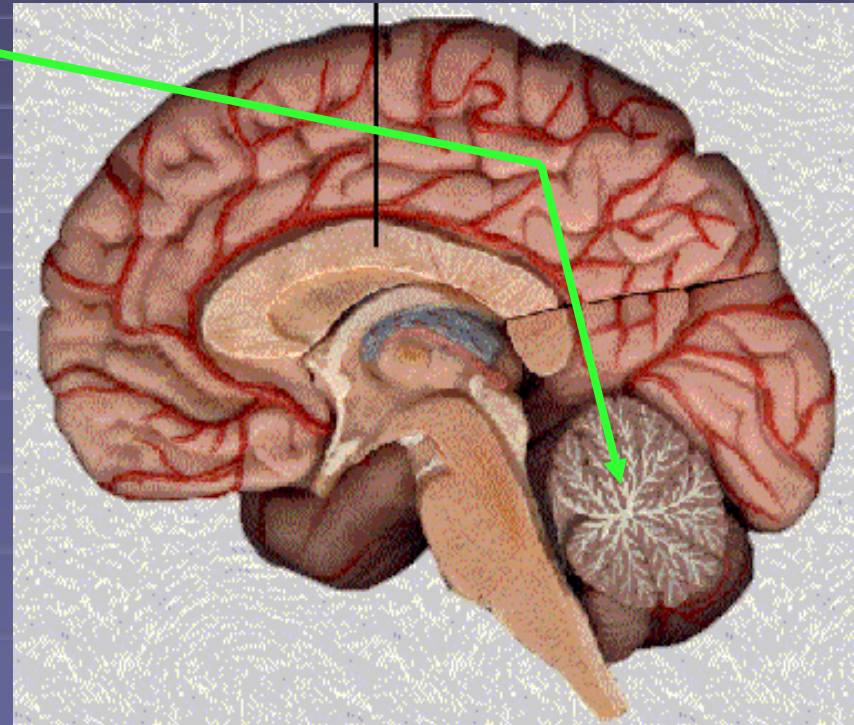
The motor regulator

2) The cerebellum

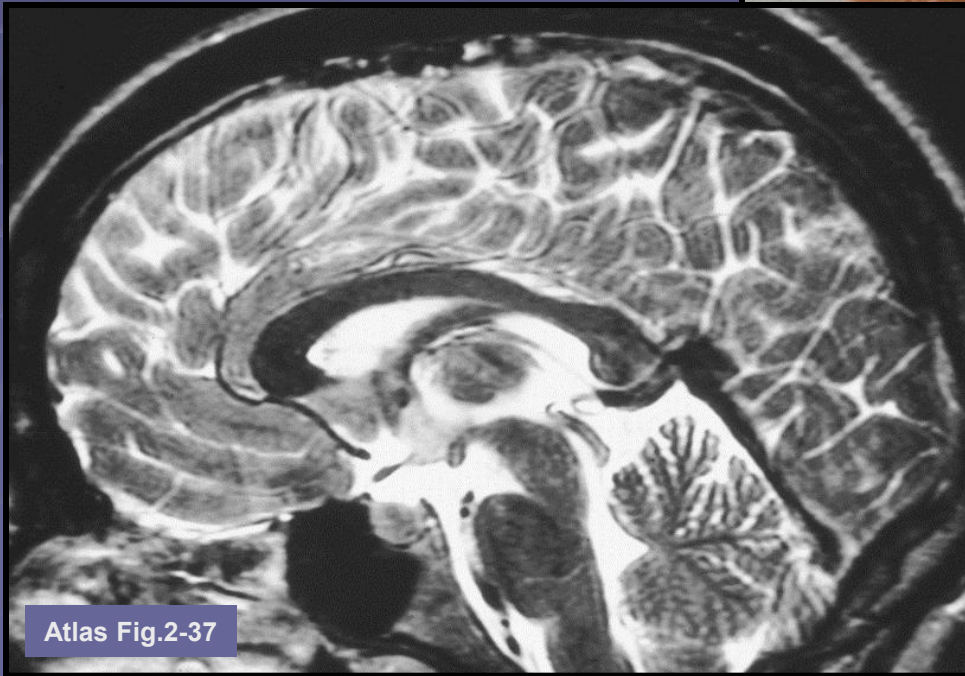
Motor control systems outside the cortex

Cerebellum

- controls neural 'programs' for the execution of skilled movements



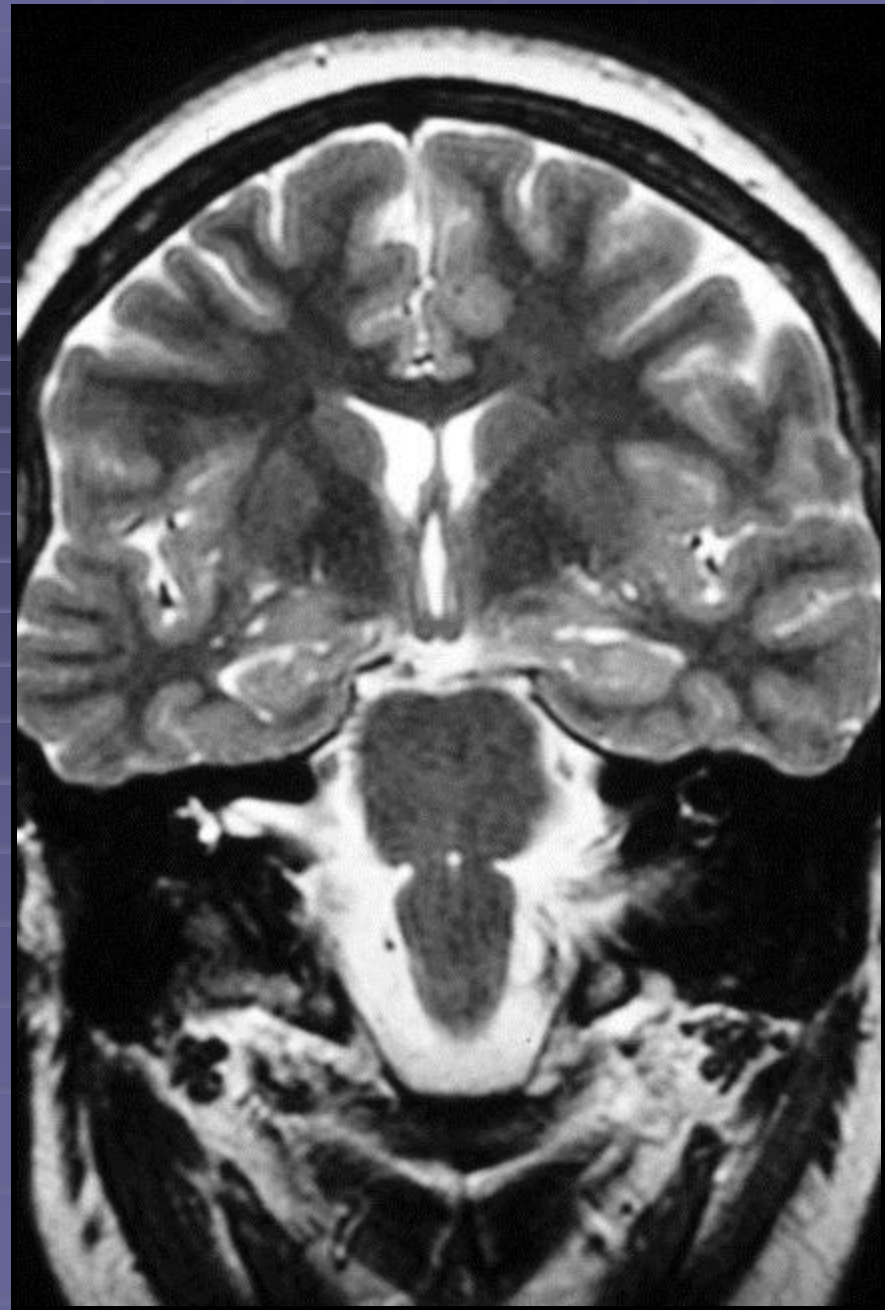
The Location of the Cerebellum: Midsagittal View



The Pons and Medulla



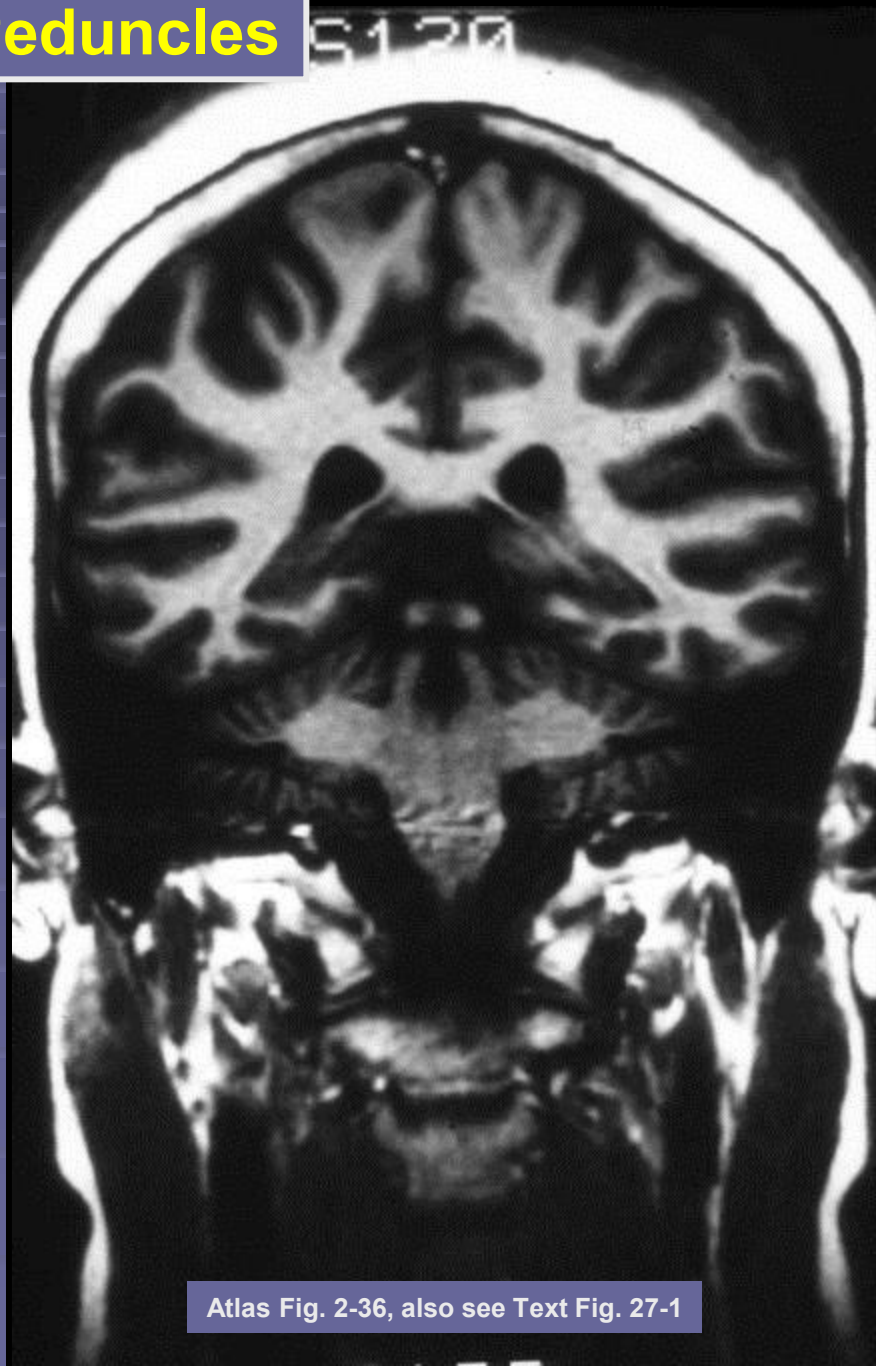
Atlas Fig.2-20



Cerebellar Peduncles



Atlas Fig. 2-31

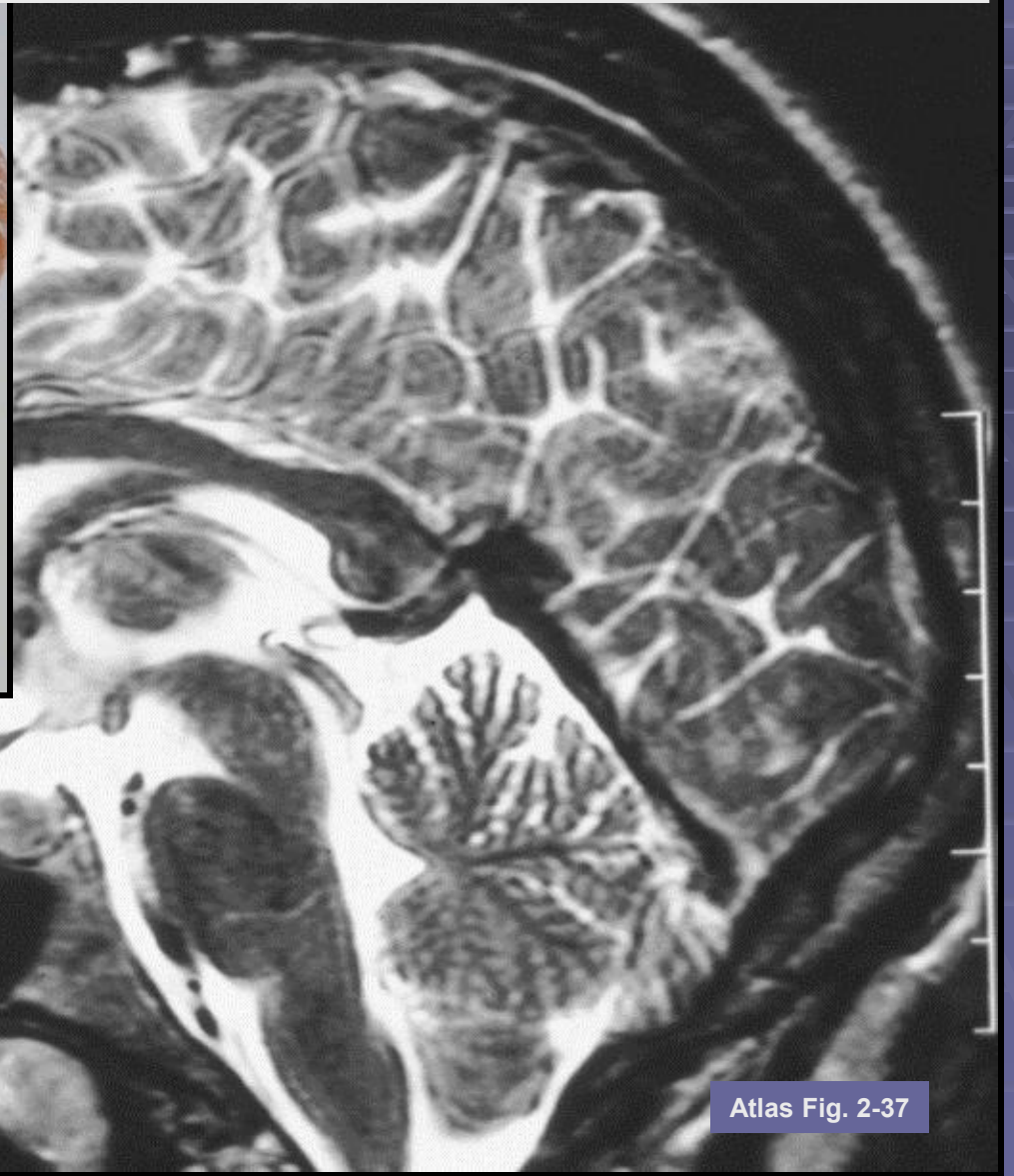


Atlas Fig. 2-36, also see Text Fig. 27-1

The Cerebellum – Mid-sagittal view

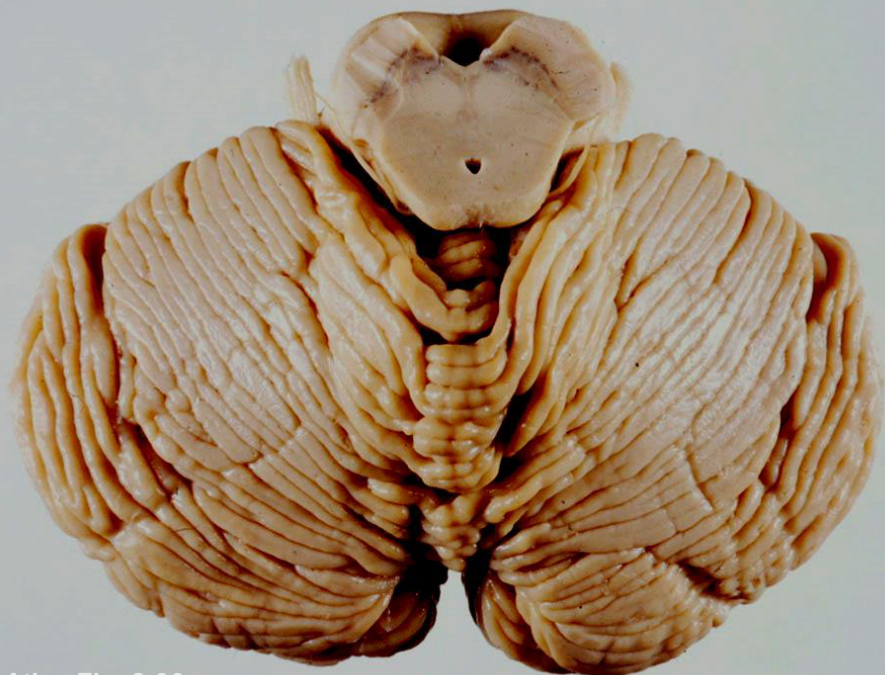


Atlas Fig. 2-37

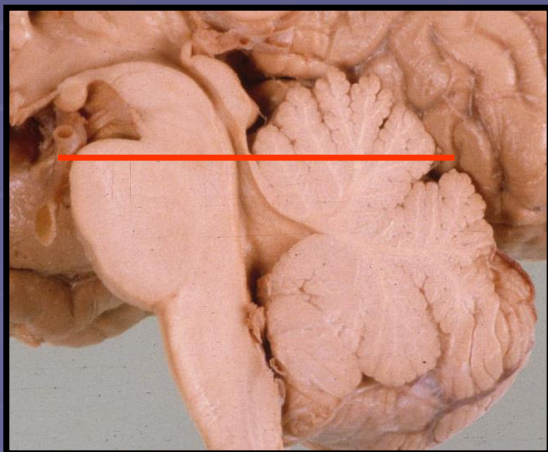


Atlas Fig. 2-37

The Cerebellum – Superior View



Atlas Fig. 2-36

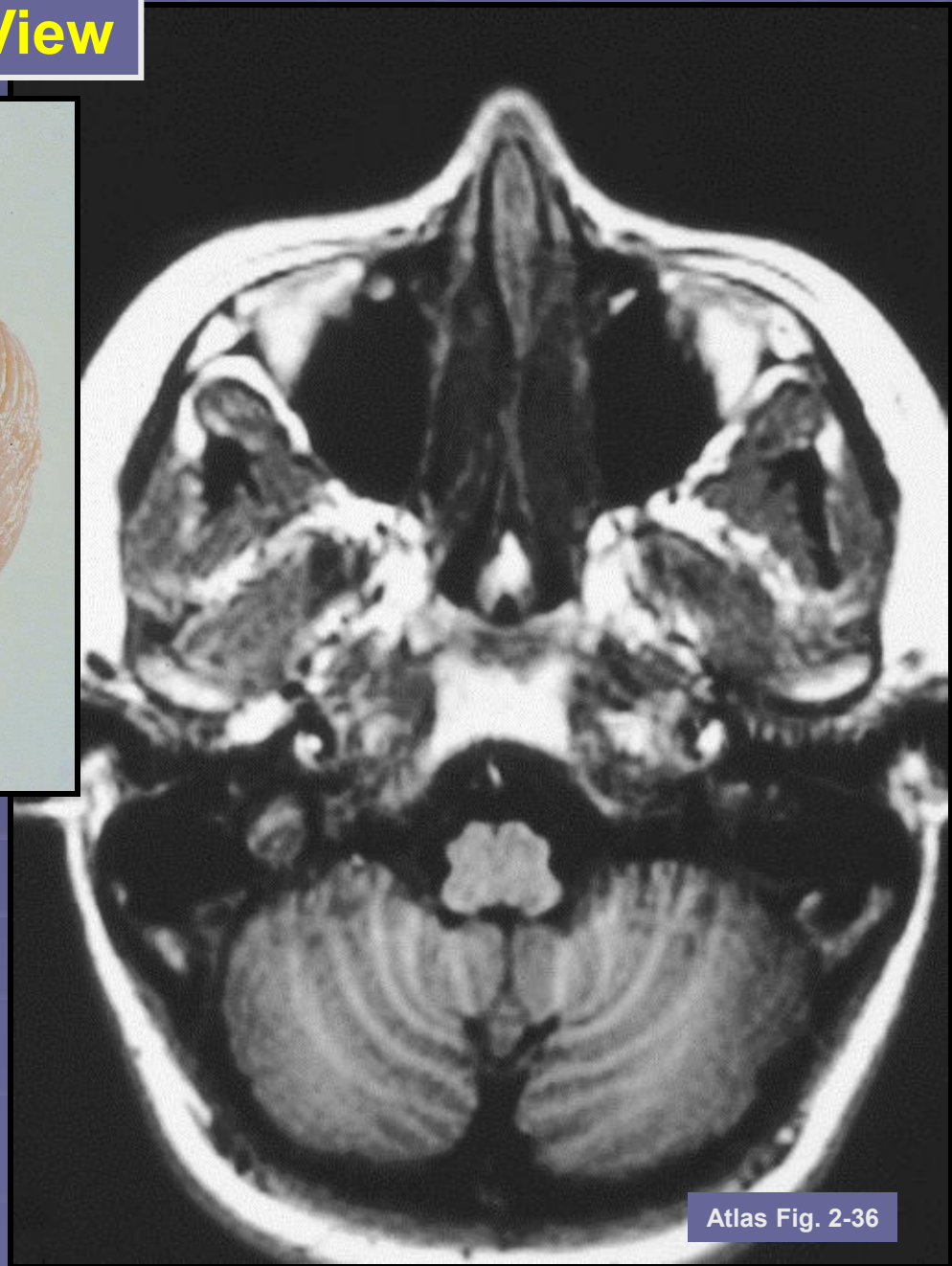
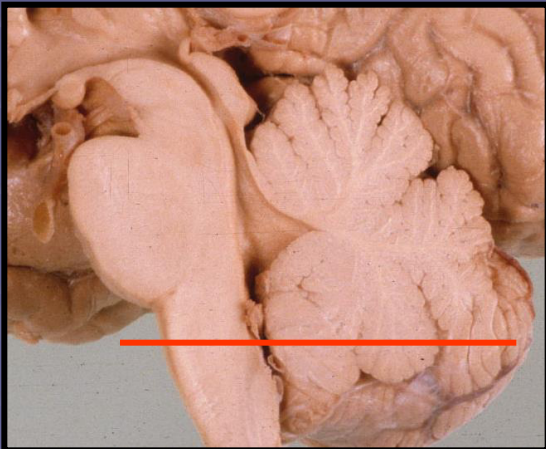


Atlas Fig. 2-36

The Cerebellum – Inferior View



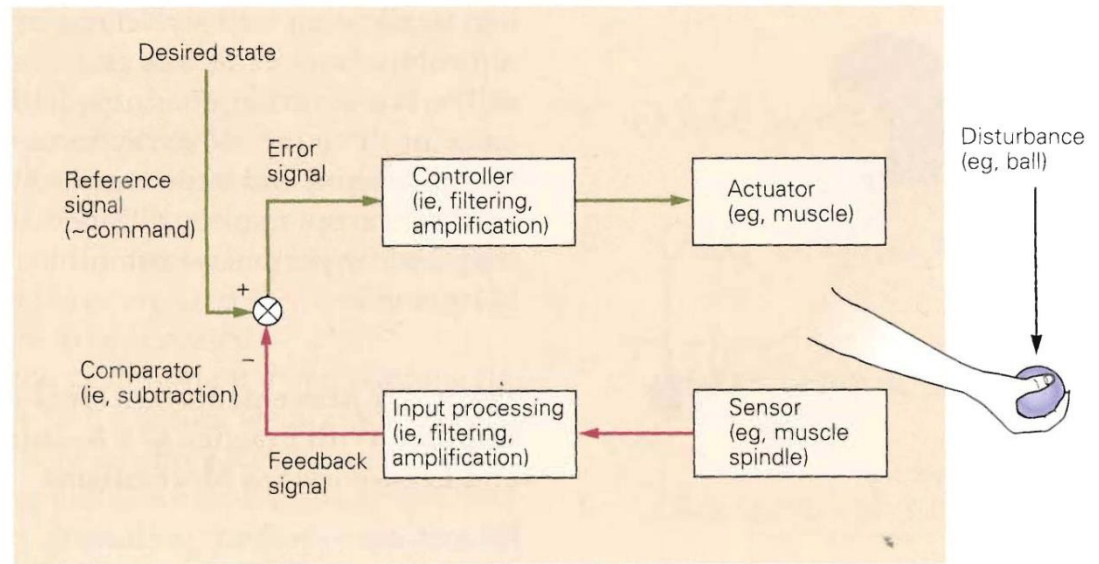
Atlas Fig. 2-36



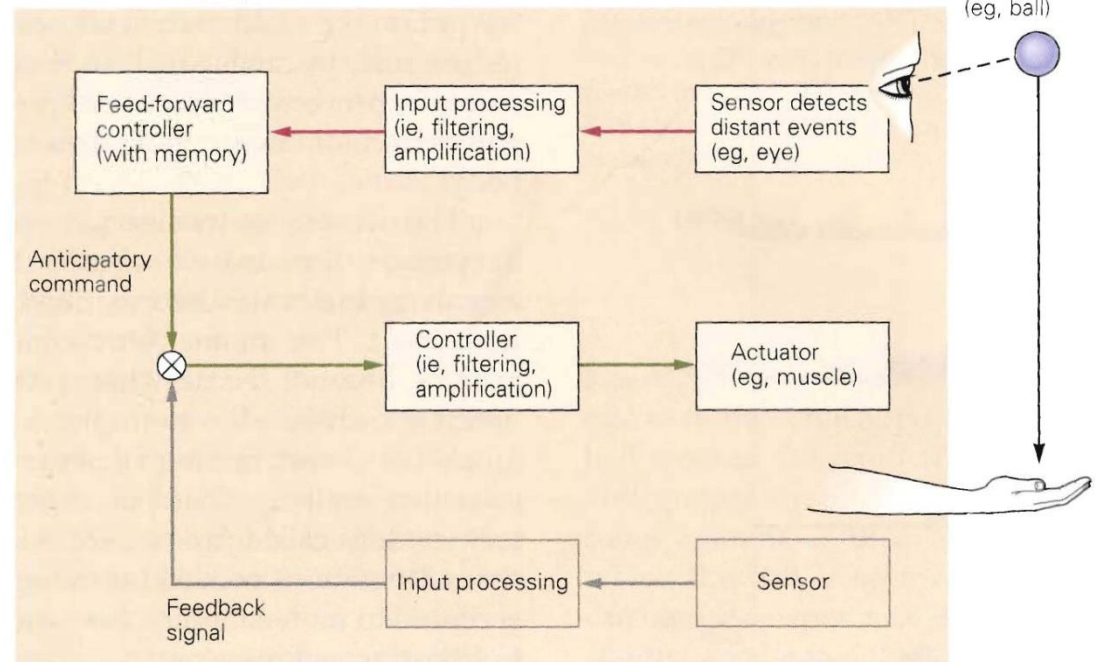
Atlas Fig. 2-36

Feed-back and feed-forward control circuits

A Feedback control: command specifies desired state



B Feed-forward control: command specifies response



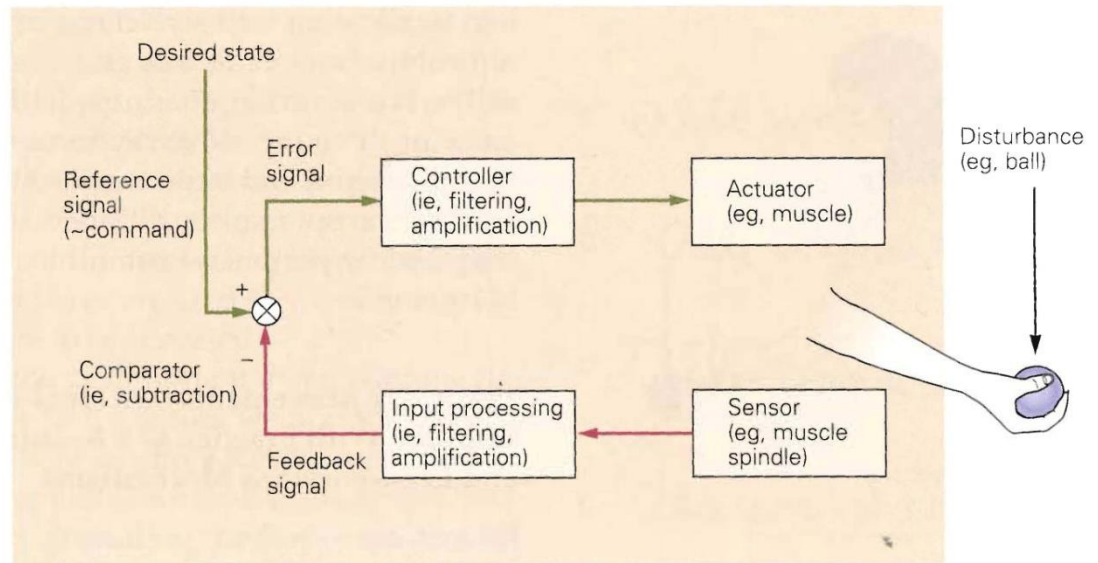
Feed-back and feed-forward control circuits

By acting as a comparator

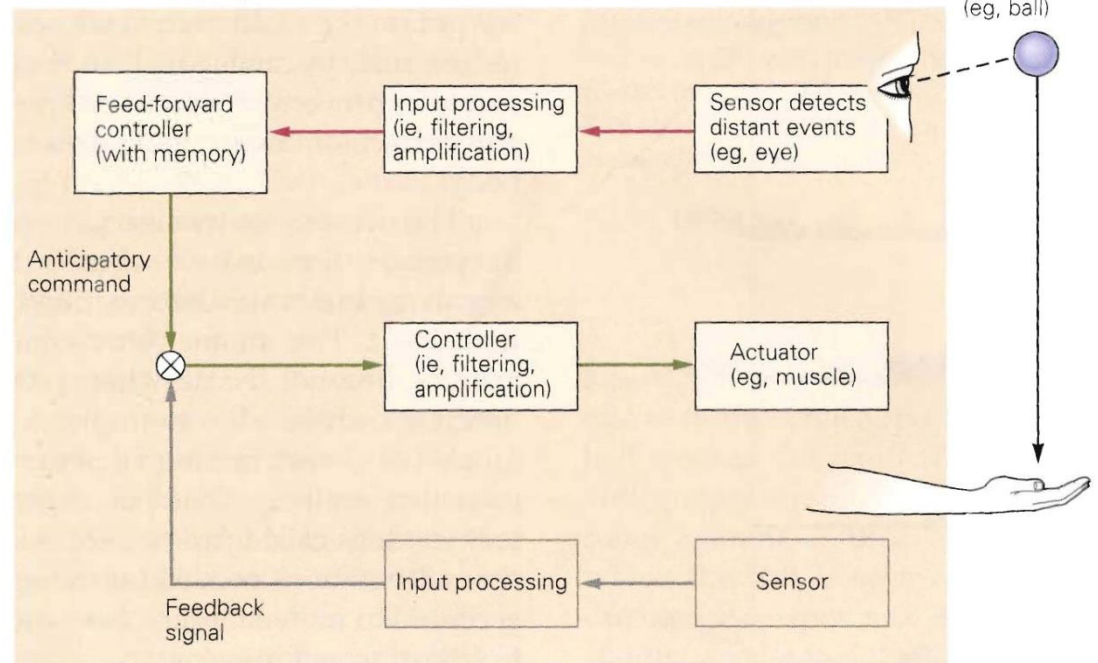
By acting as a timing device

By storing information

A Feedback control: command specifies desired state



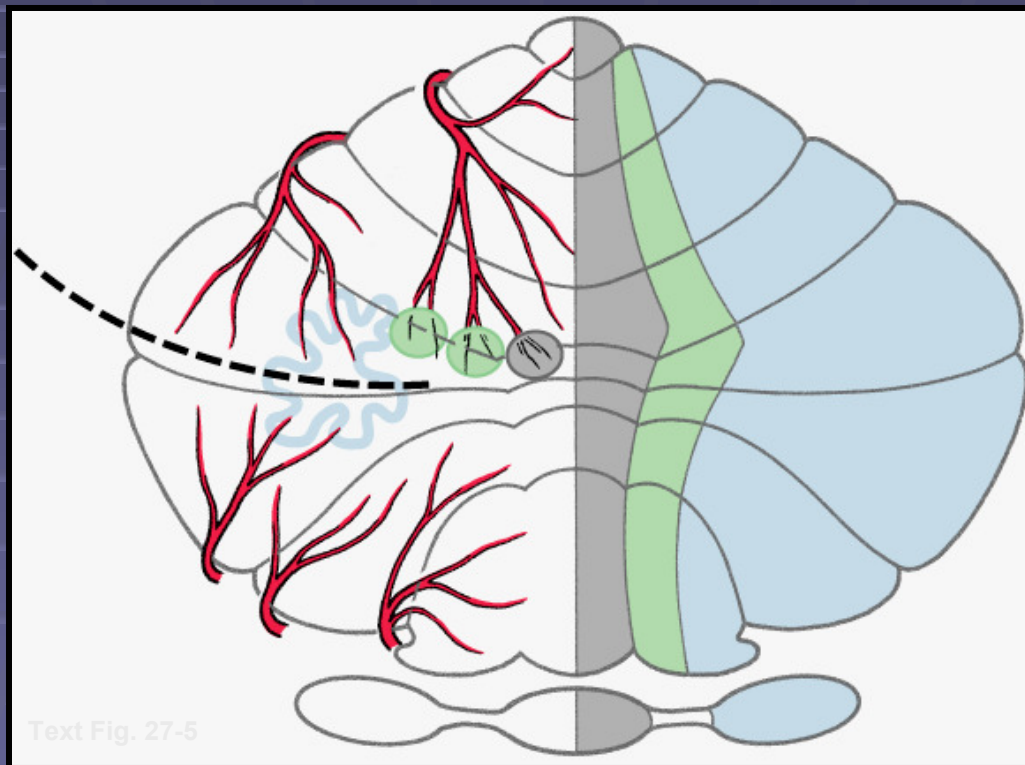
B Feed-forward control: command specifies response

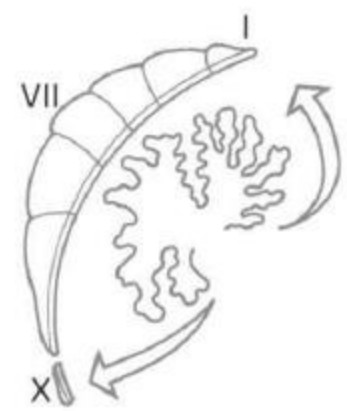
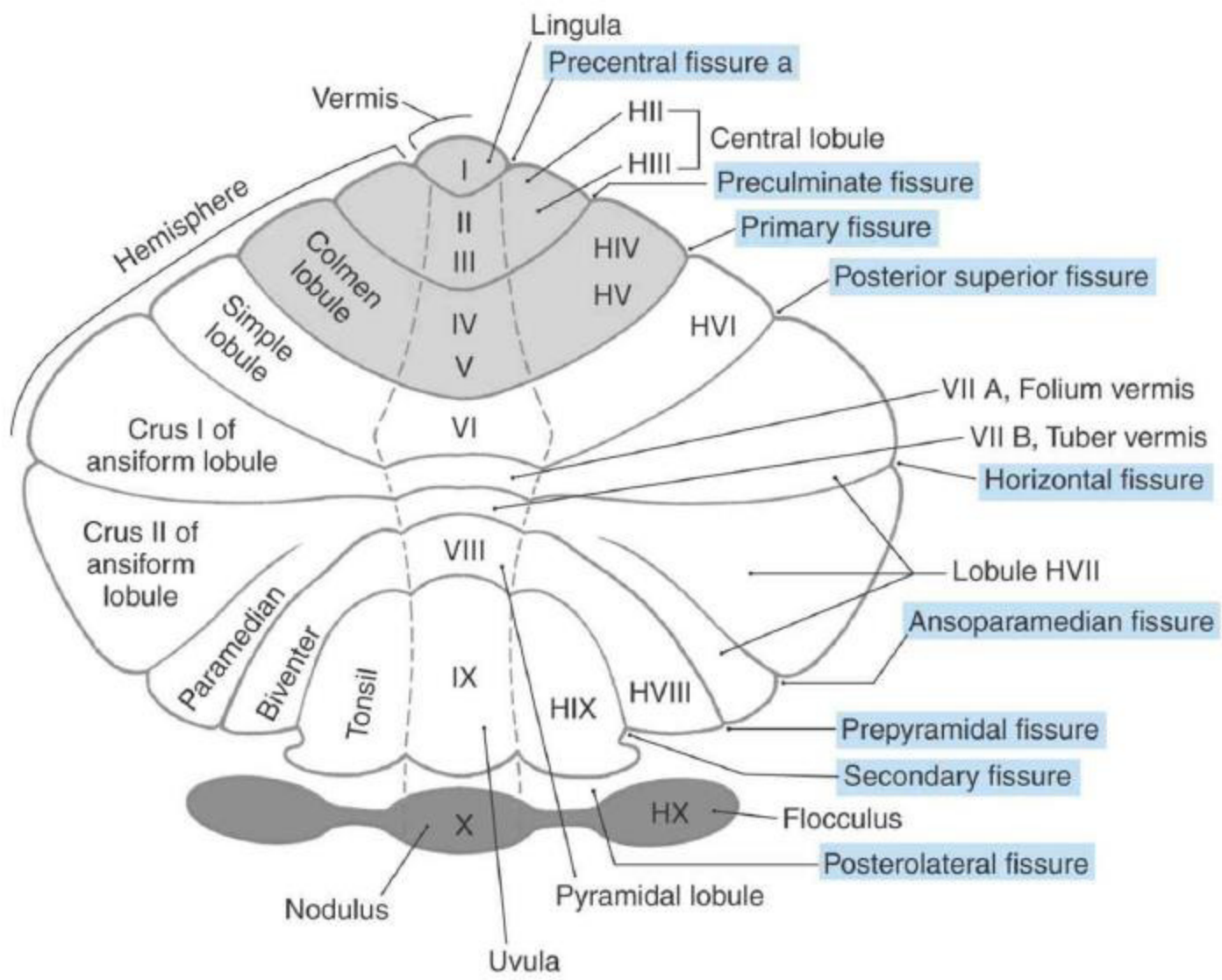


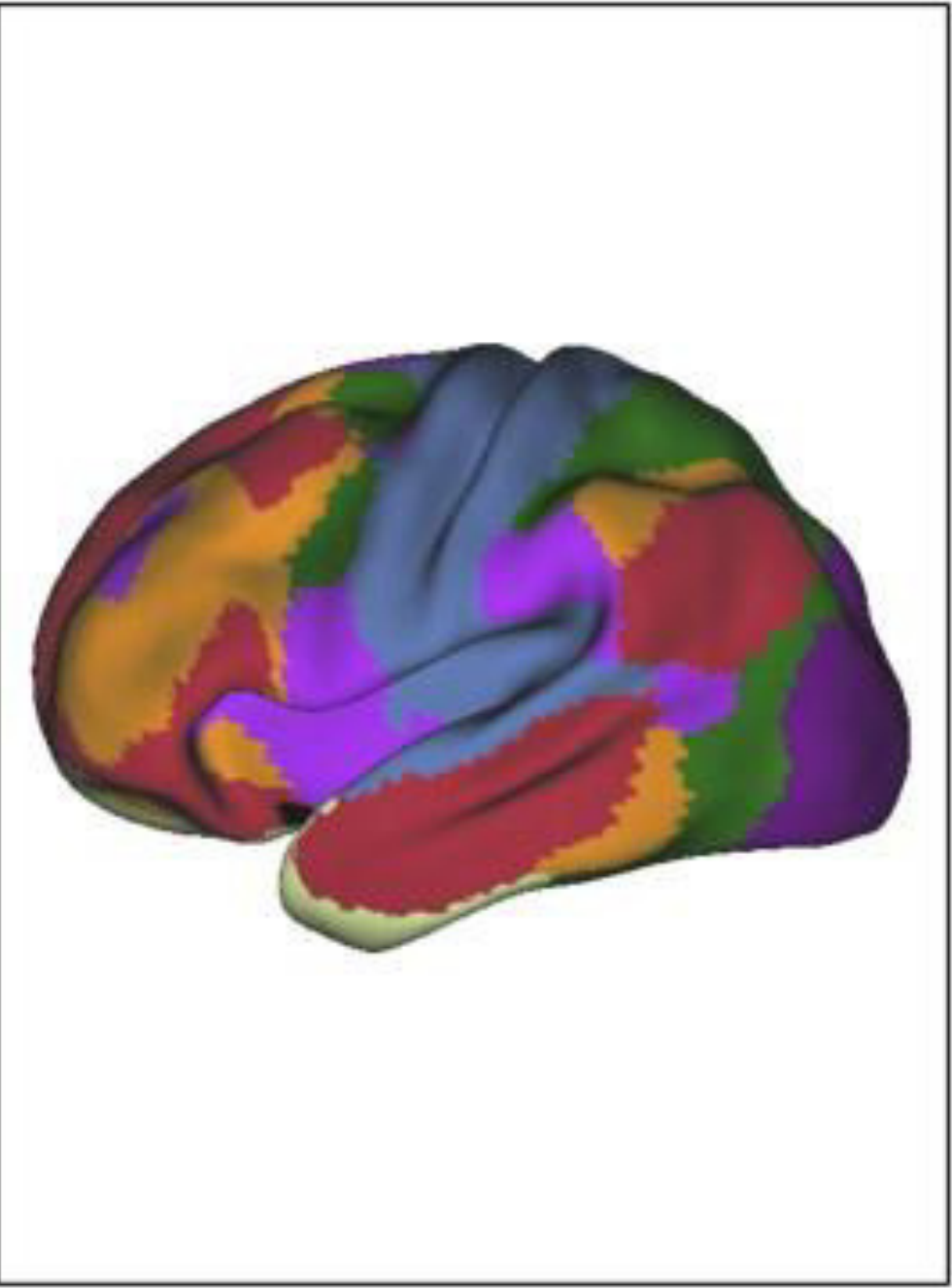
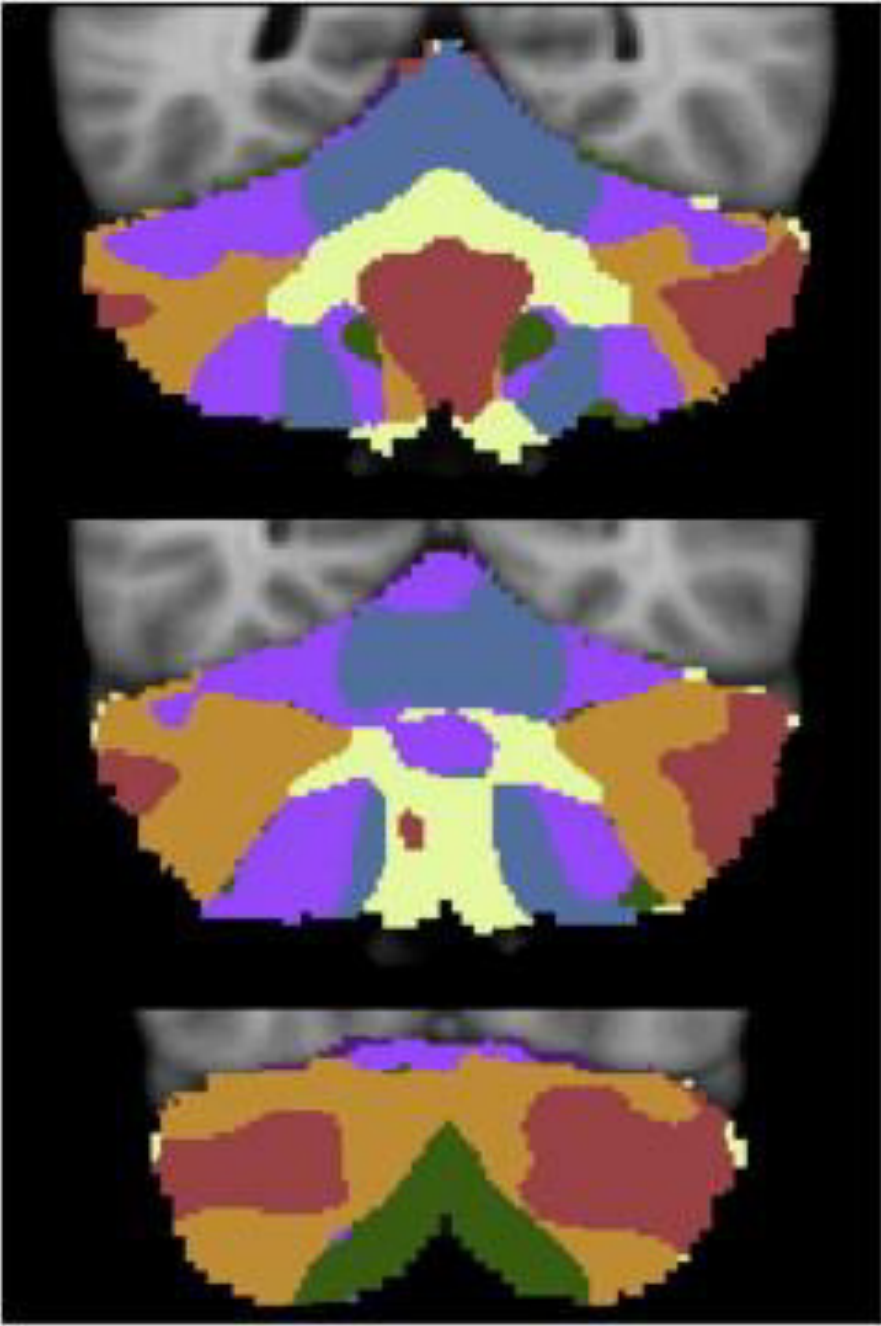
Cerebellar connections

- Input:
 - Sensory cortex (somato, visual)
 - Association cortex
 - Vestibular system
 - Spinocerebellar tracts
- Output:
 - Motor cortex
 - Thalamus motor nuclei
 - Extra-pyramidal tracts
 - Association cortex

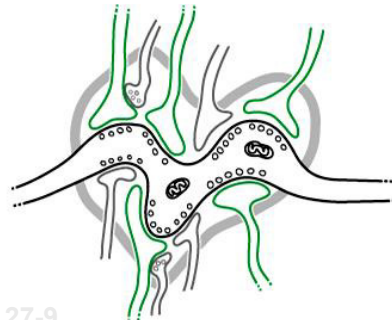
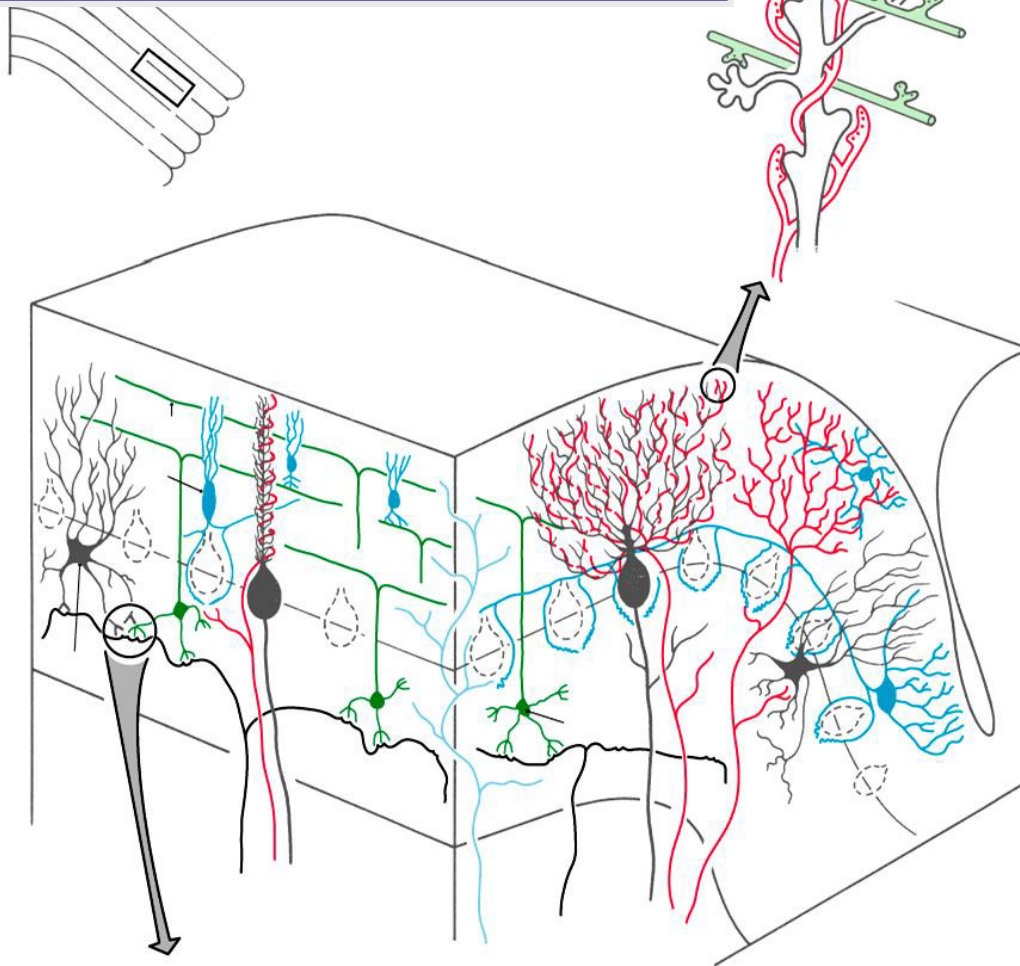
The Cerebellar Cortex and Nuclei: Blood Supply, Zones, and the Concept of Compartments







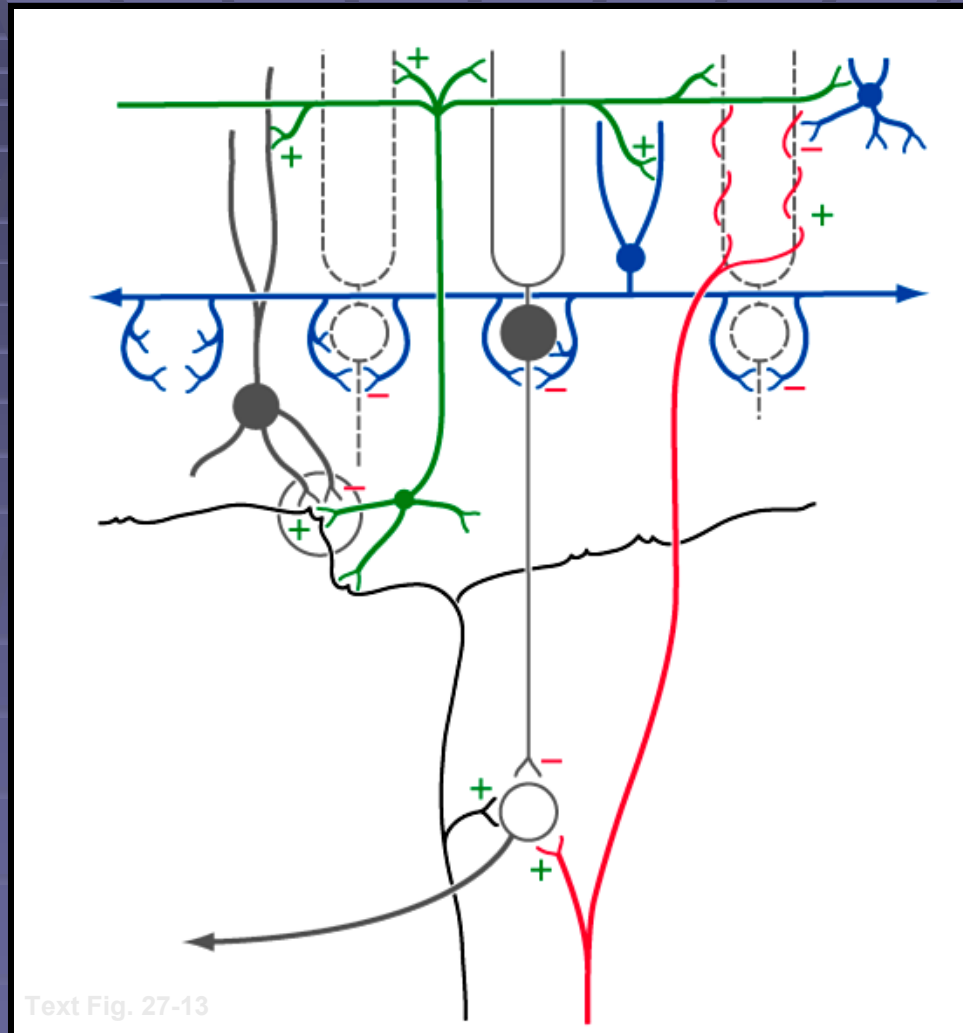
Cells/Fibers of the Cerebellar Cortex



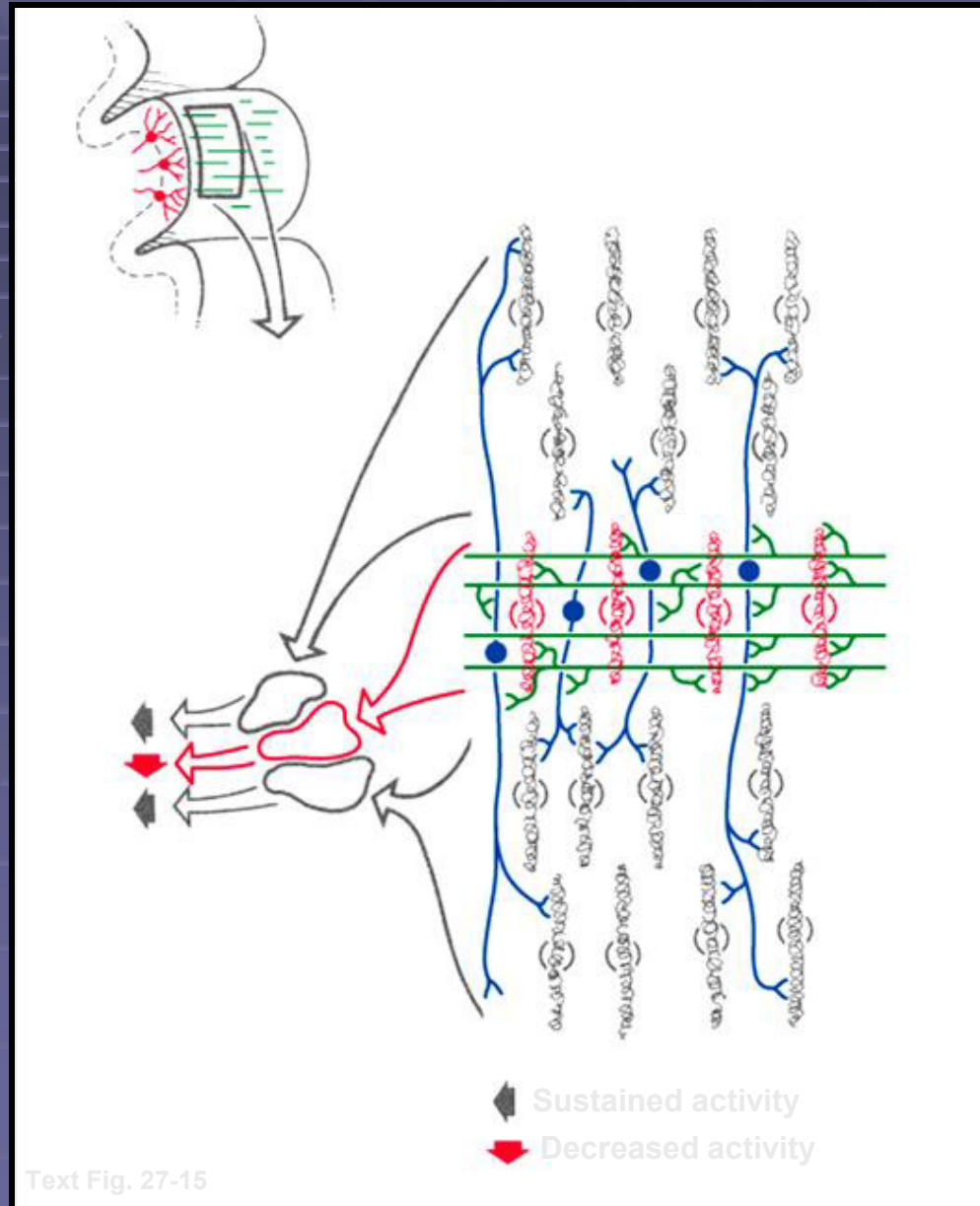
- Basket cell, Stellate cell
- Climbing fiber
- Purkinje cell, Golgi cell
- Granule cell-parallel fiber
- Mossy fiber
- Multilayered fiber

Text Fig. 27-9

Synaptic Interactions Within the Cerebellar Cortex



Excitation-Inhibition in the Cerebellar Cortex



The motor cerebellum functions

The main functions of cerebellum:

- body equilibrium
- regulation of muscle tone
- coordination of movements

Ataxia

- means disturbances of equilibrium of the body and coordination of movements.
- Cerebellum lesion produces **cerebellar ataxia**

Cerebellar ataxia

- **Ataxic gait – patient can't to walk**
- **Disorders of equilibrium – patient can't to stand**
- **Intention tremor – is dynamic tremor (it is more expressed while moving and disappears while rest)**
- *Dysarthria*
- **Nystagmus**
- **Dysmetria (disturbed ability to gauge distances)**
- **Dysdiadochokinesia (Awkward performance of rapid alternating movements)**

The Non-motor cerebellum functions

VISCEROMOTOR FUNCTIONS

- dilated pupils
- flushed face
- decreases in heart rate and blood pressure.

- executive, visual-spatial, linguistic and affective deficits
- Mutism and impaired verbal fluency
- affective symptoms and personality changes
- Attentional and emotional problems