

Homeostasis & Feedback

Mrs. Gardner 115

What is homeostasis?

- Homeostasis is the ability of an organism to keep a relatively constant internal state.

What are some things that your body keeps constant?

- Homeostasis requires a large amount of energy to maintain!

Where do we get that energy??

- Small changes in homeostasis will occasionally occur, but they must be within a small range (body temperature 95° - 111°)

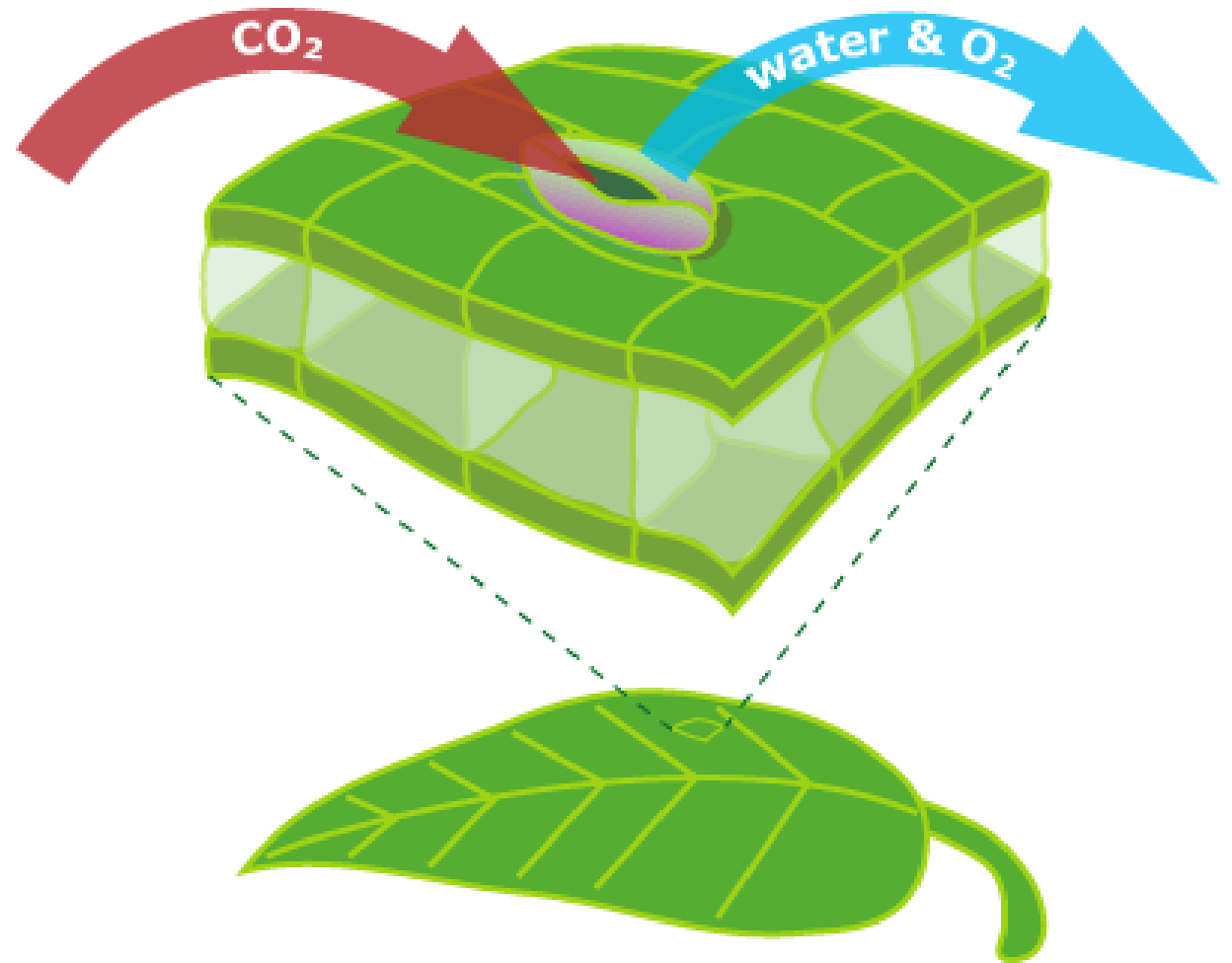
Responding to Stimuli

- Maintaining homeostasis is something that all living things do!
- Organisms do this by *responding* to external stimuli (changes).

How does your body respond to cold?
How does your body respond to hot?
How does your body respond to being sick?

Plants
maintain
homeostasis
too!

Carbon dioxide enters, while water and oxygen exit, through a leaf's stomata.



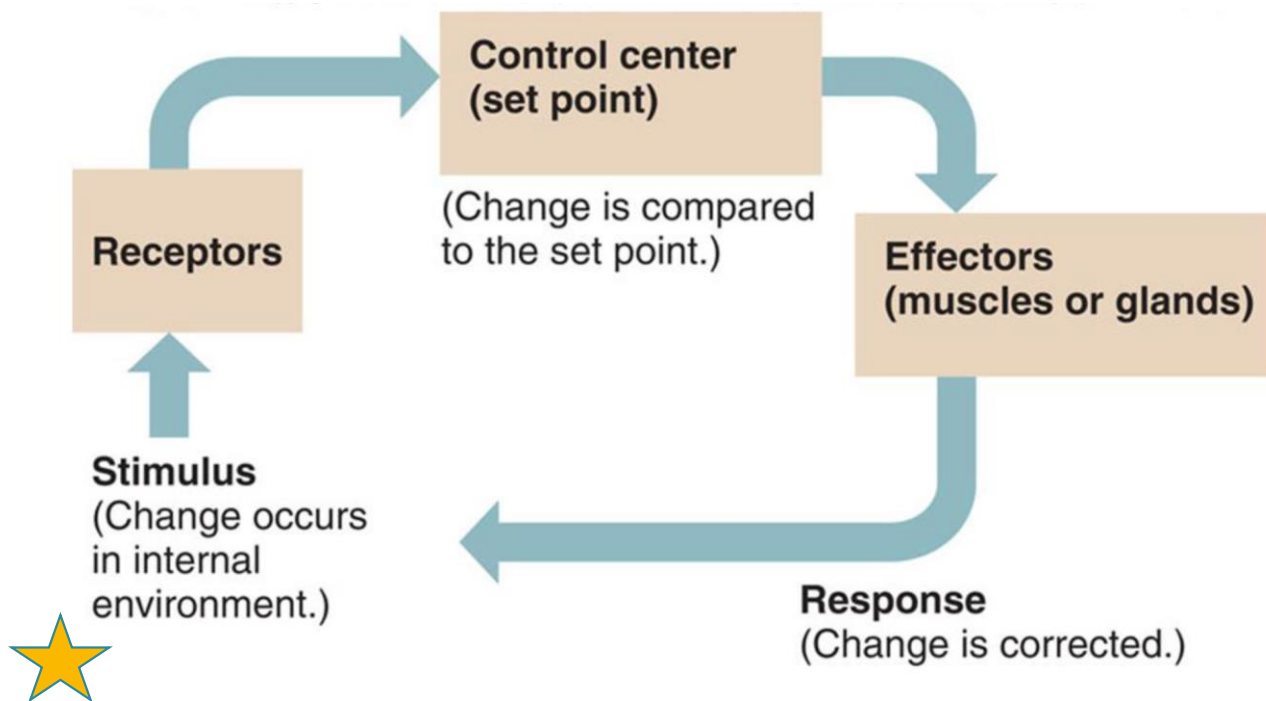
Negative Feedback

- These mechanisms change the body back to its original state or “ideal state”.
- **Most** homeostatic control mechanisms are negative feedback mechanisms.

Ex: Thermostat



How Negative Feedback Works



- **Stimulus**: A change or event that occurs
- **Receptor**: Structure that monitors internal conditions and sends messages to the control center.
- **Control Center**: Organ (usually the brain) that determines the “normal setpoint” and analyzes information from the receptors.
- **Effector**: Muscle or organ that receives messages from the control center to change its function to return body to normal setpoint
- **Response**: the change that brings body back to setpoint.

Ex: Blood Pressure

An increase in blood pressure is detected by receptors in the blood vessels.

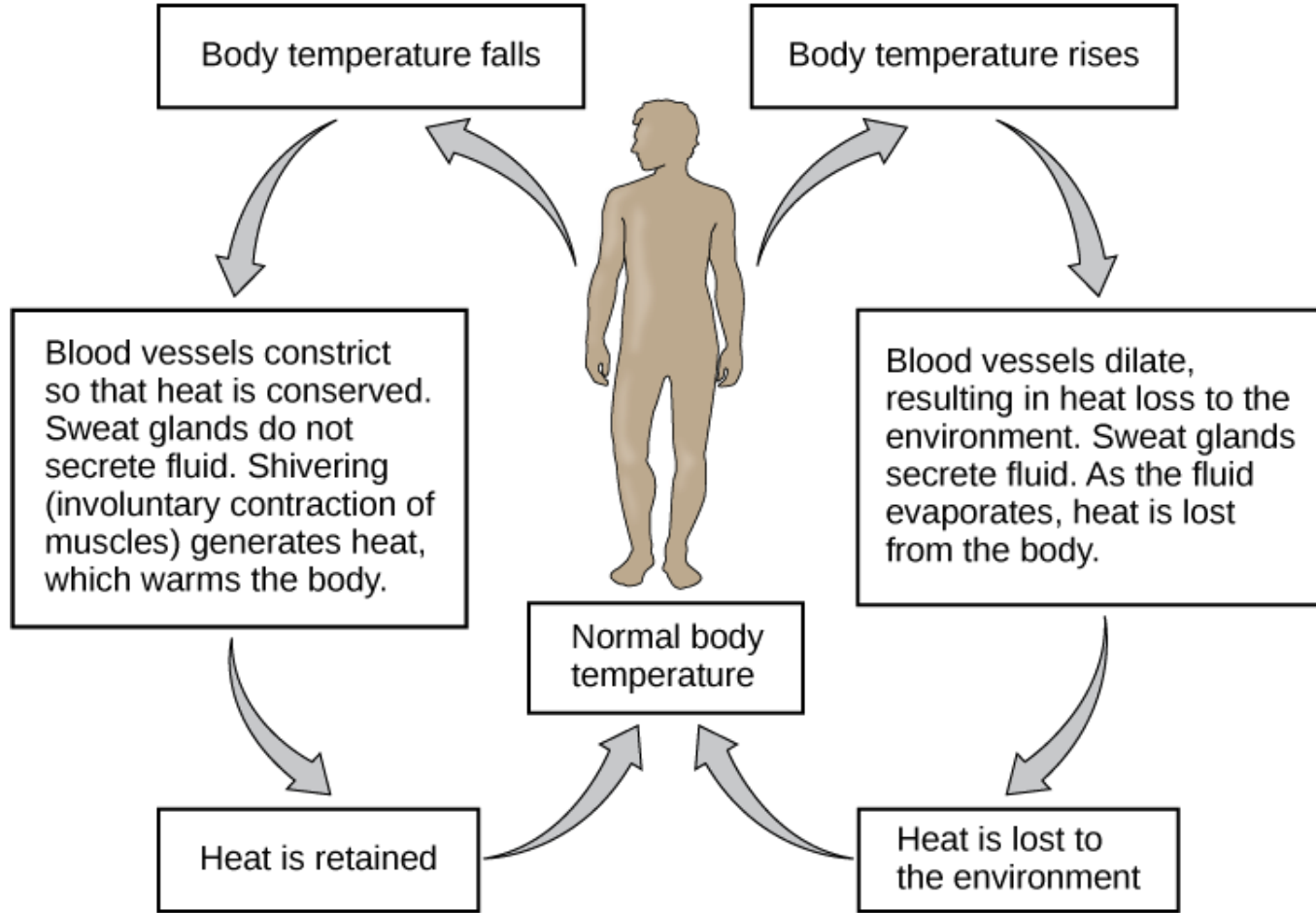
The receptors relay a message to the brain, which in turn sends a message to the effectors, the heart and blood vessels.

The heart rate decreases and blood vessels increase in diameter, which cause the blood pressure to fall back within the normal range or set point.

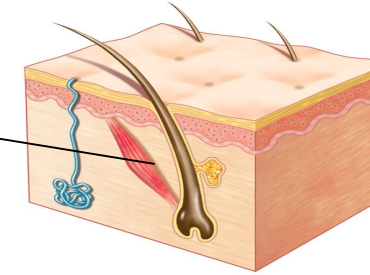


- **Stimulus:** Stress on the body
- **Receptor:** Blood vessels
- **Control Center:** Brain
- **Effector:** Heart & blood vessels
- **Response:** blood pressure lowers

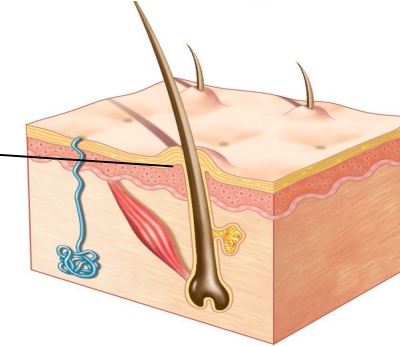
Human Response to Temperature



hair
follicle
muscle



goose
bump



Traps heat
close to
the body
so body
heat is
conserved.



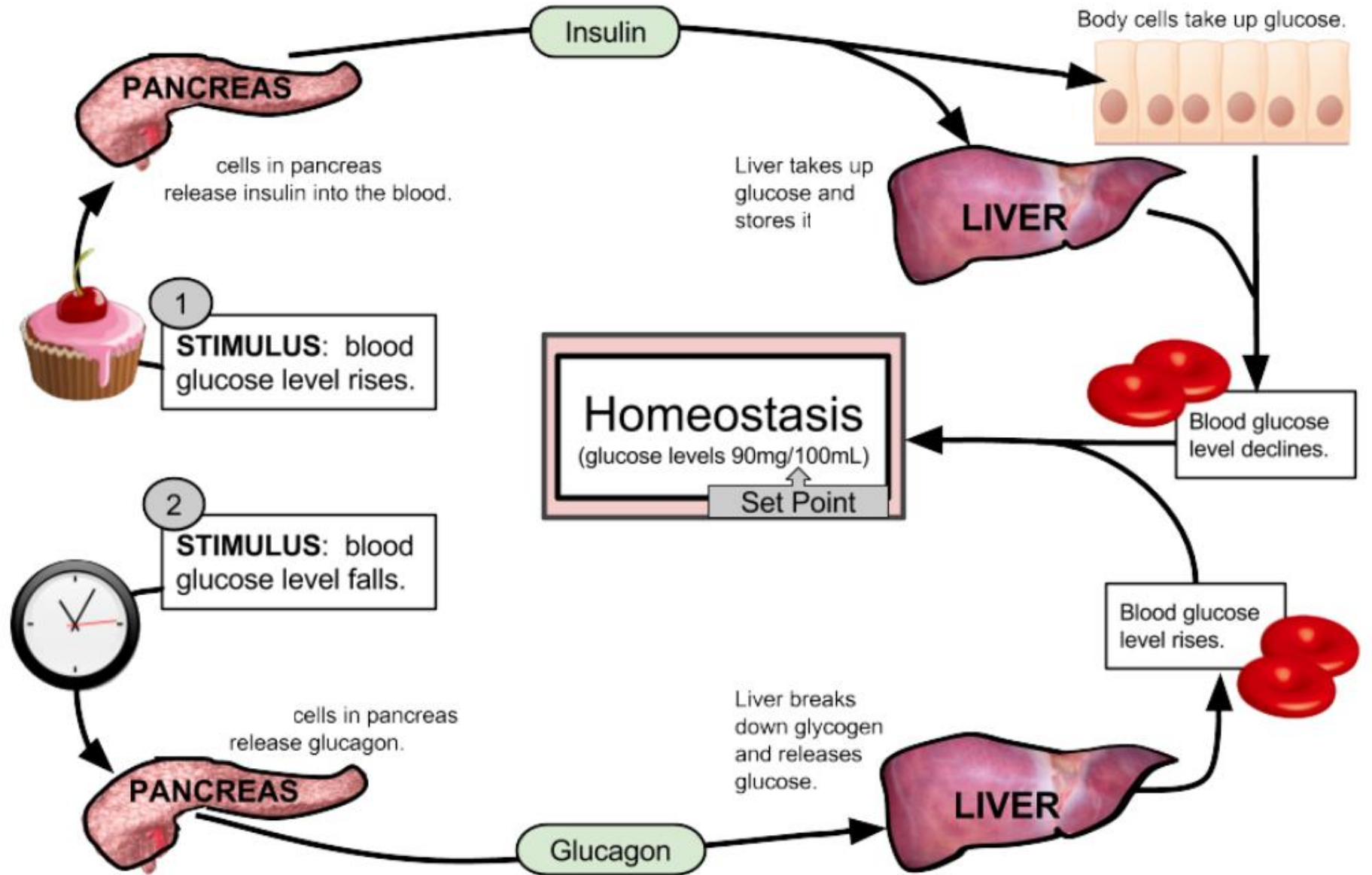
Infant Response to Temperature Change



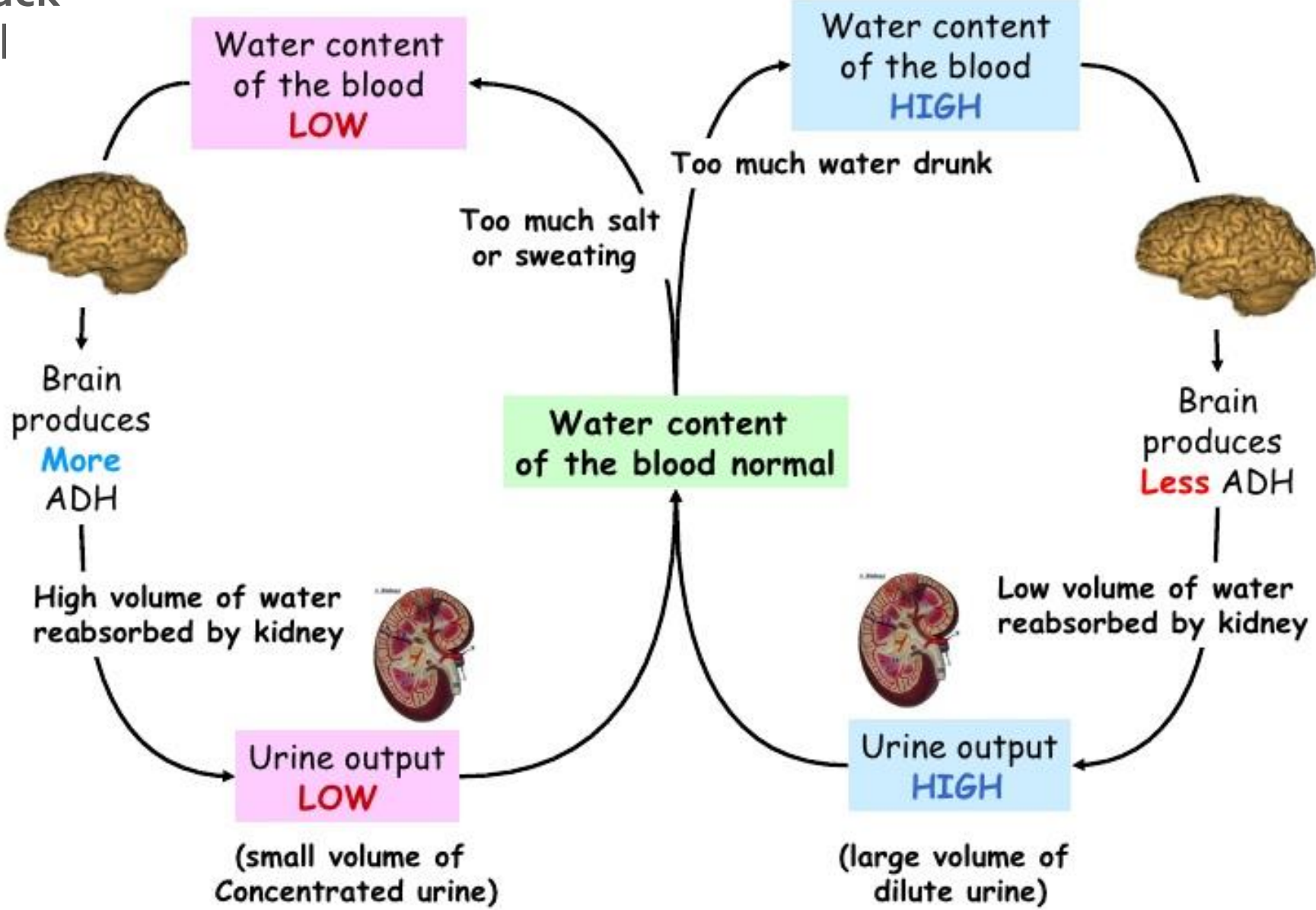
- Newborns cannot shiver to produce heat.
 - Little body fat to insulate them.
 - Low movement = less heat generated
 - Large head = more heat lost.
-
- Blood vessels near the skin are avoided to keep heat in the body's core.
 - Hats are placed on baby's head to keep heat in.

Negative Feedback: Responding to changes in blood sugar

- **Stimulus:** change in blood glucose level
- **Receptor:** Pancreas
- **Control Center:** Pancreas
- **Effector:** Liver
- **Response:** blood glucose responds

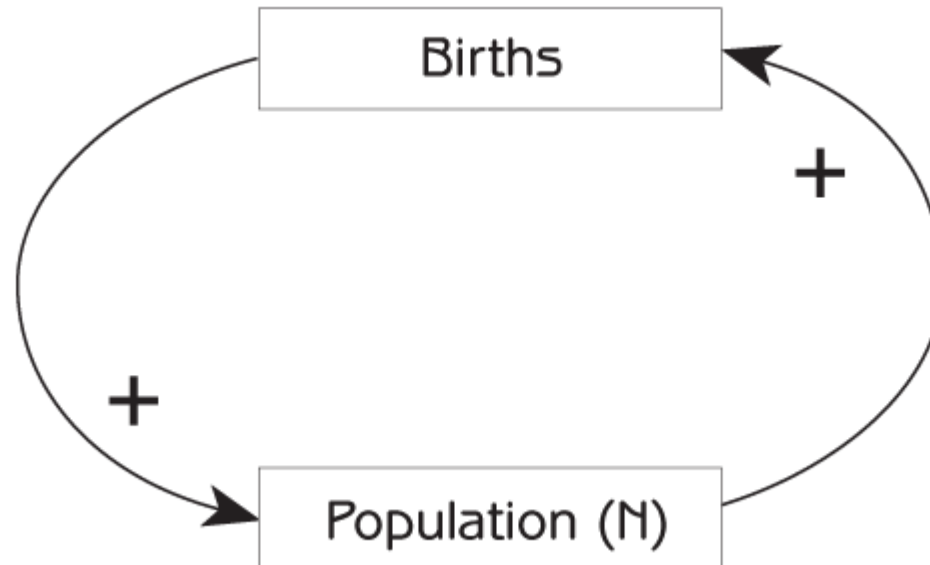


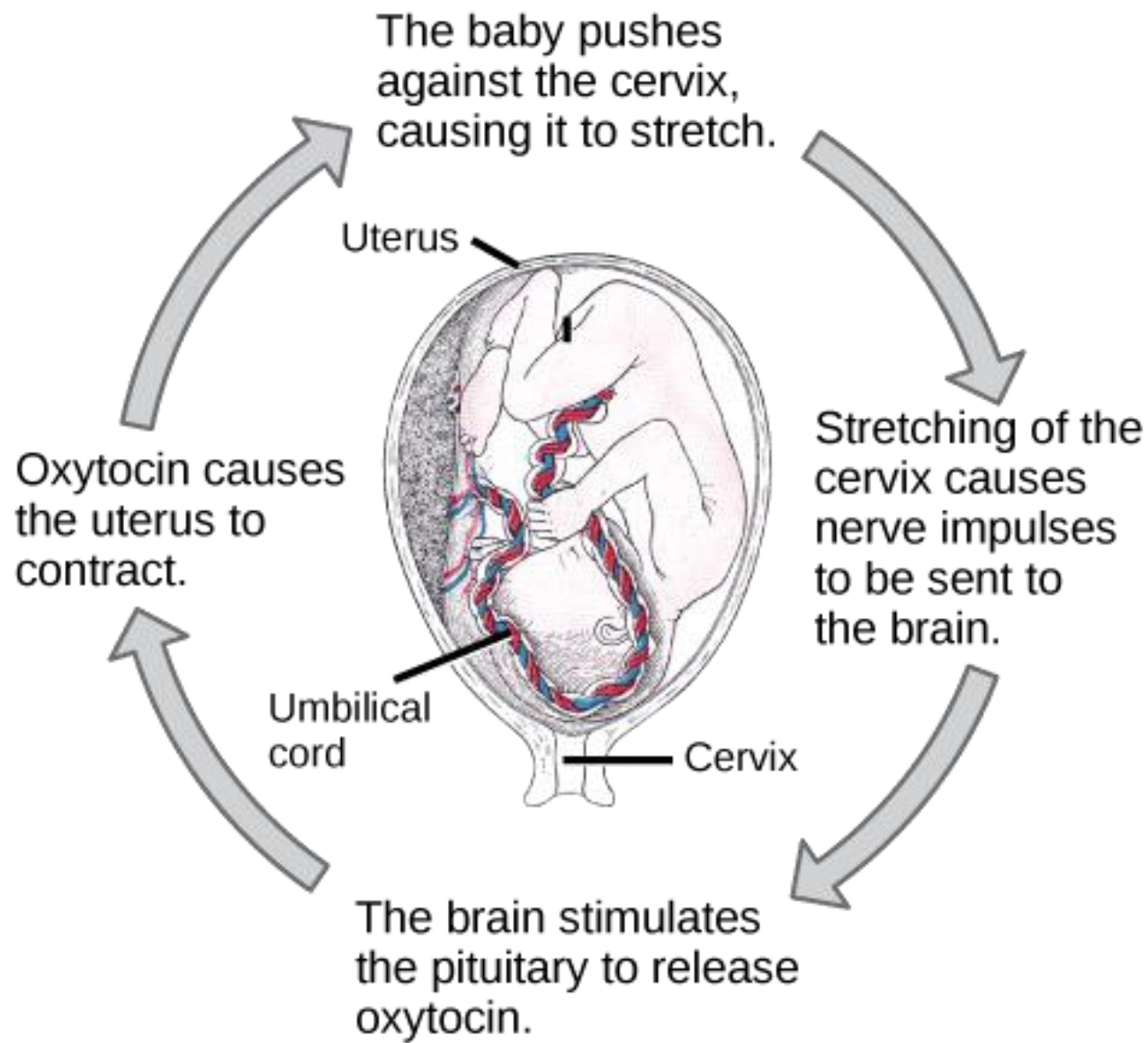
Negative Feedback- Body Water Level



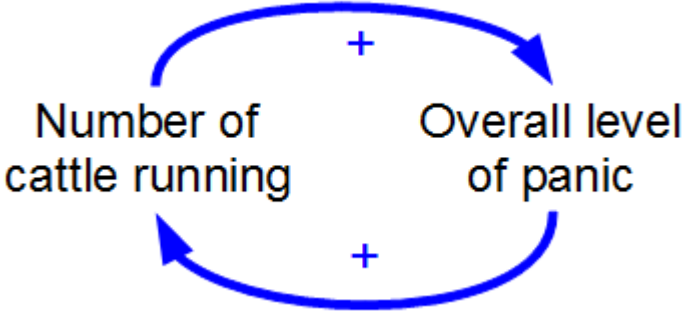
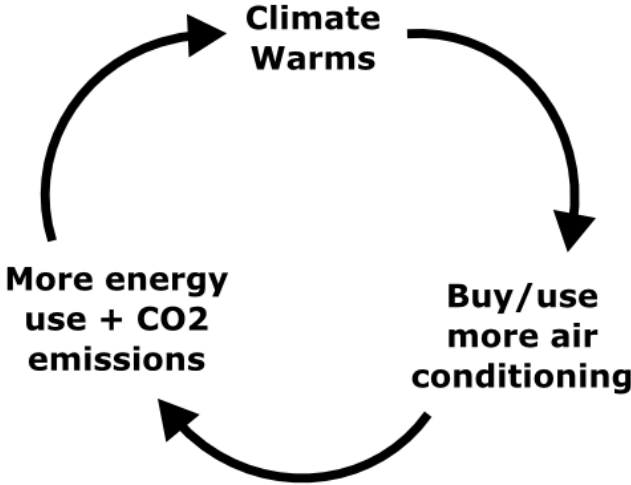
Positive Feedback

- Positive Feedback loops enhance or increase changes in the body
- This tends to move a body system further away from its homeostatic state until the problem is resolved.





Other examples of positive feedback:



Positive Feedback- Blood Clotting

