



Assignment

M.Sc. Zoology
Semester-II

Title of Assignment:

Regulation of
Water balance

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07

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18/8/19

Regulation of

Water Balance :-

Summary :-

- Water balance
- Normal water content of body
- Total body water
- ENTER BODY
- EXITS BODY
- Water Balance
- Water loss
- Water balance equation
- Diagram
- Fluid balance
- Regulation of water intake
- Dehydration and Rehydration flow chart
- Regulation of water

Water Balance :-

★ Normal water content of Body -

- 75% at birth
- 55-60% young adults
- Men slightly higher than woman
- (More Fat, less water)
- 45% in Elderly, obese

Total Body Water :-

- ~40 liters
- Several fluid compartments
- 65% Intracellular fluid (ICF)
- 35% Extracellular fluid (ECF)
- 25% Interstitial fluid (Tissue fluid)
- 8% blood plasma and Lymph
- 2% Transcellular Fluid

ENTERS Body

Osmosis from

Digestive Tract

- Also produced by Aerobic Respiration.

Exits body :-

Urinary, Digestive,
Respiratory & Integumentary
system

Water Balance :-

- Fluid Gain = Fluid Loss
- Both Typically ~ 2500 ML / Day
- 1600 ML from Drink
- 700 ML From Food
- 200 ML From Metabolism

Inborn

Water loss :-

- Typically ~ 2500 ML / DAY
- 1500 ML Excreted As Urine
- 200 ML Eliminated in feces
- 300 ML Expired in Breath
- 100 ML Secreted as swe

Sweat

★ Water Balance Equation

This water balance equation holds good for any part of the year and for the annual water balance as well

$$\Delta S = R^{\text{rainfall}} + R^{\text{other}} - B - G E^{\text{all}} - ET \pm L$$

\pm Inflow/outflow

$$\Delta S = R^{\text{rainfall}} + R^{\text{other}} - G E^{\text{all}} \pm V^{\text{net}}$$

ΔS = change in storage in ground water reservoir
 R^{rainfall} = Recharge from source

R^{other} = Recharge from other sources.

B = Base flow

$G E^{\text{all}}$ = Ground water draft for all uses

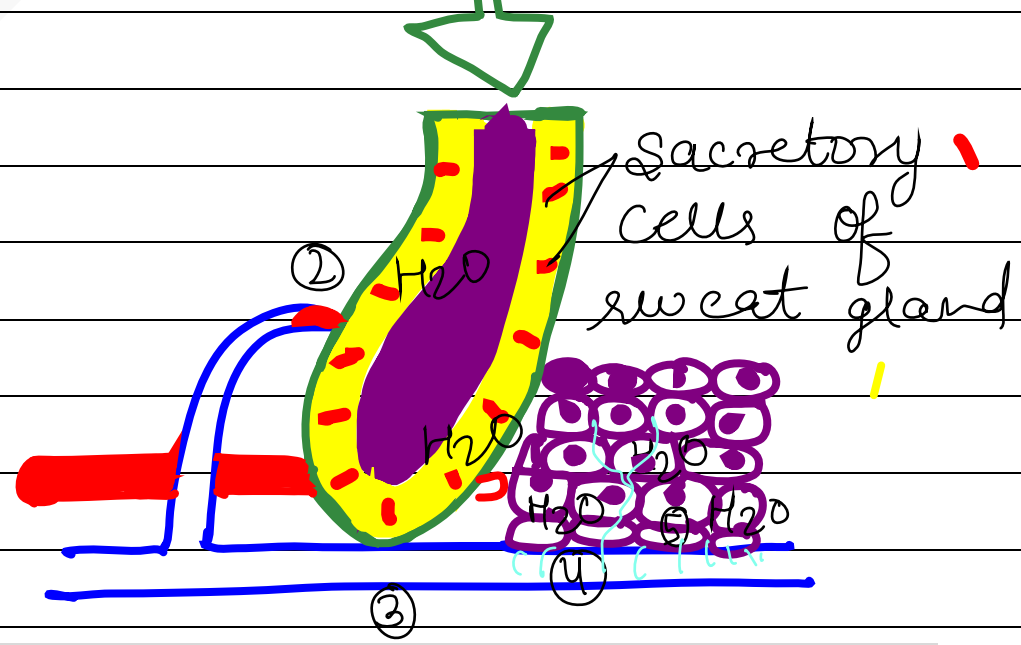
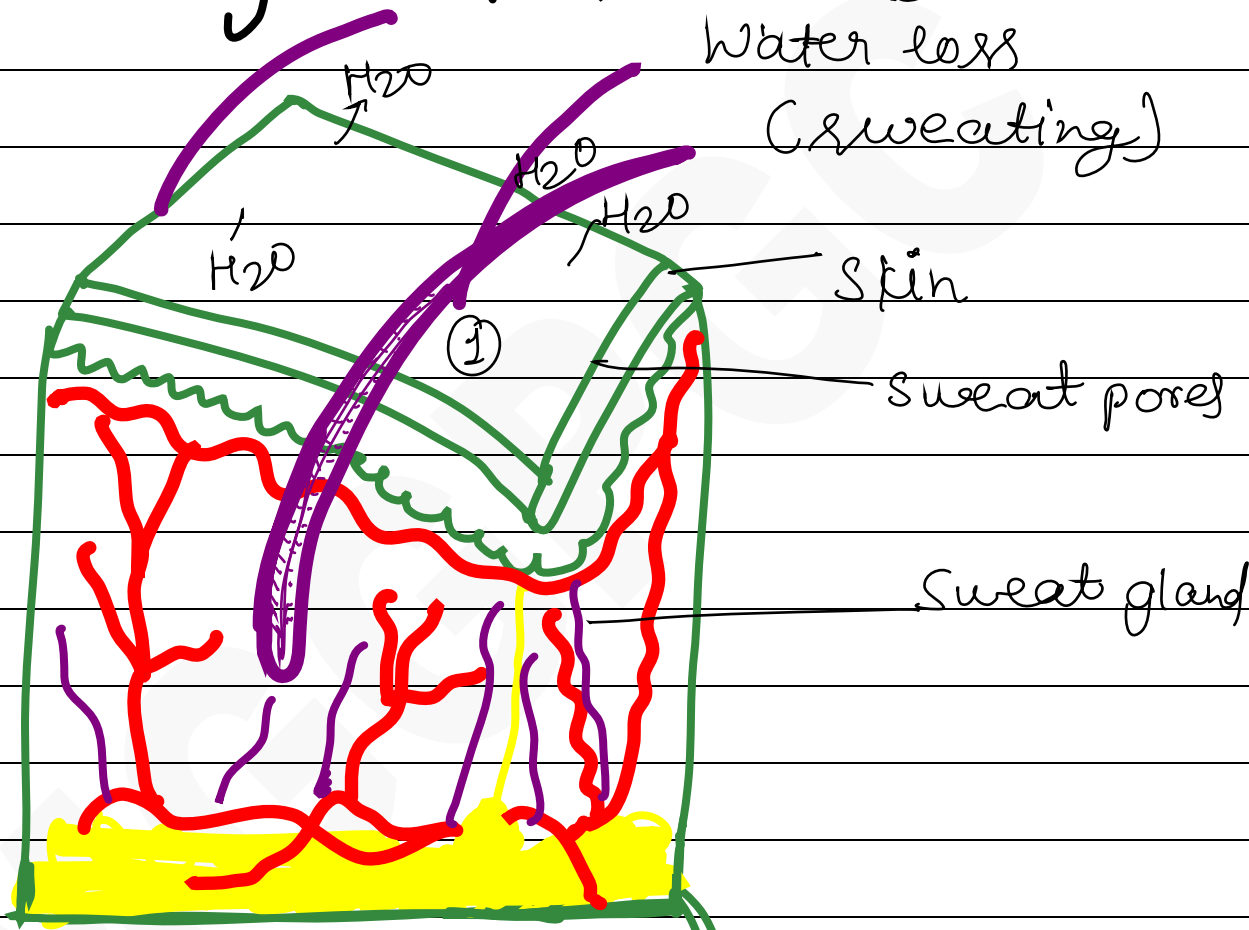
ET = Evapotranspiration losses

L = leakage to or from deeper aquifers.

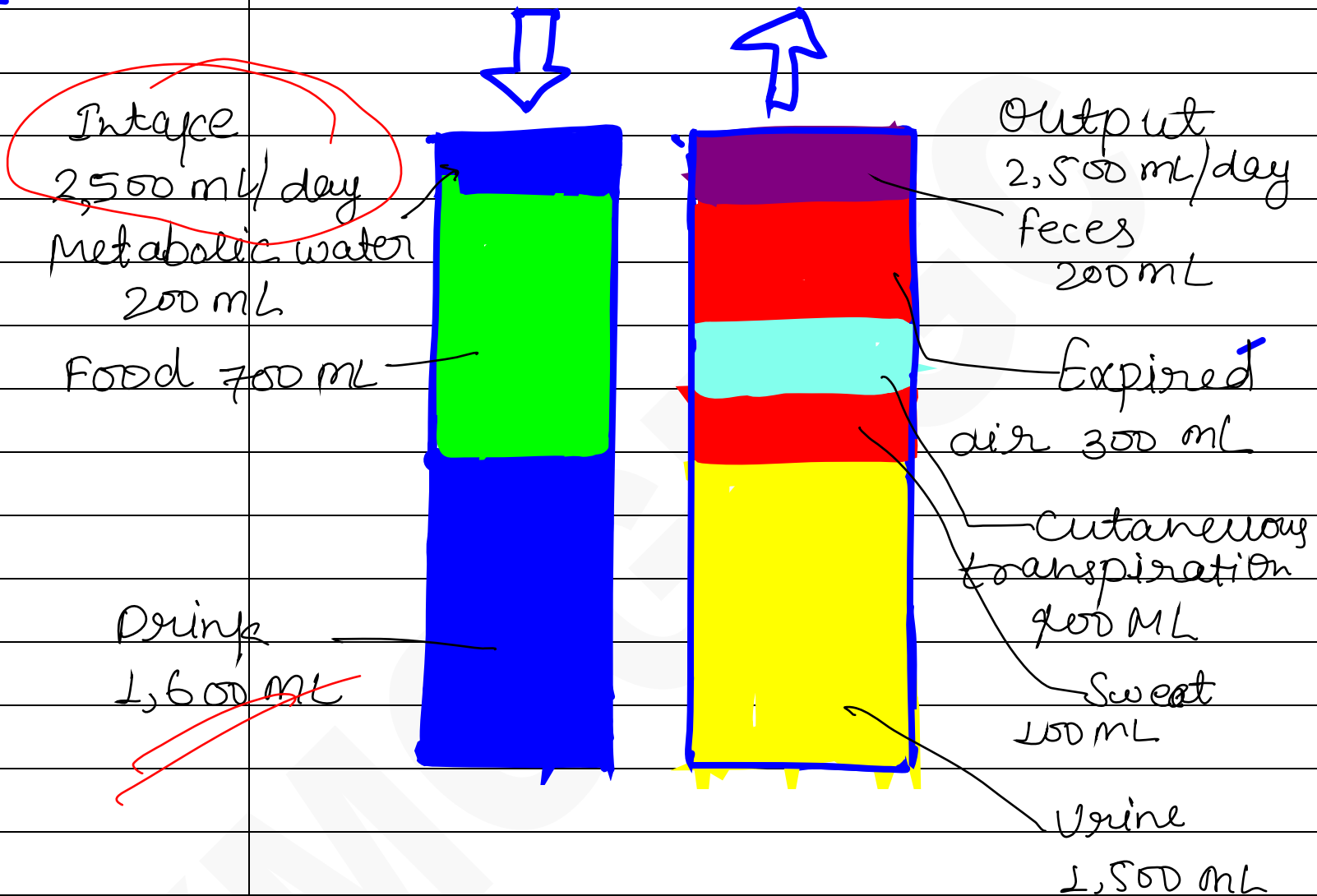
Inflow/outflow = Net inflow/outflow across the boundary of the assessment unit.

$$\Delta S = R_{\text{rainfall}} + R_{\text{other}} - G_{\text{fall}} + v_{\text{outnet}}$$

Sweating and Fluid Balance



FLUID BALANCE



WATER LOSS

- Obligatory water loss
- Relatively unavoidable
Expired, fecal moisture, minimum urine output (~900 mL/DAY)

REGULATION OF WATER INTAKE

- Inhibited salivation
- Dry Mouth
- Sense of Thirst
- Ingestion of water
- Thirst Inhibited

- Governed by thirst
- Provoked by increased plasma osmolarity
- Provoked by blood loss

Thirst Center in Hypothalamus

- Responds to signs of Dehydration
- Angiotensin II
- Antidiuretic hormone (ADH)
- Single form osmocenters
- Inhibits salivation

Dehydration and Rehydration

Dehydration

Increased blood osmolarity

Antidiuretic hormone

Stimulates thirst center

Reduced blood pressure

Renin

Angiotensin II

Stimulates thirst center

Reduces salivation

Dry mouth

Sense of thirst

Ingestion of water

Cools and moistens mouth

Rehydrates Blood

Distends stomach and intestines

• Regulation of Water Output

- Controlled via alterations in urine volume
- Urine volume affected by
 - SODIUM REABSORPTION
 - water flow sodium reabsorption
More water
 - ANTIDIURETIC HORMONE (ADH)

Water Balance Disorders:

- Fluid deficiency
- Volume depletion (Hypovolemia)
- Dehydration
- FLUID EXCESS
- Volume excess
- Hypotonic Hydration

ADH (Hyposecretion)