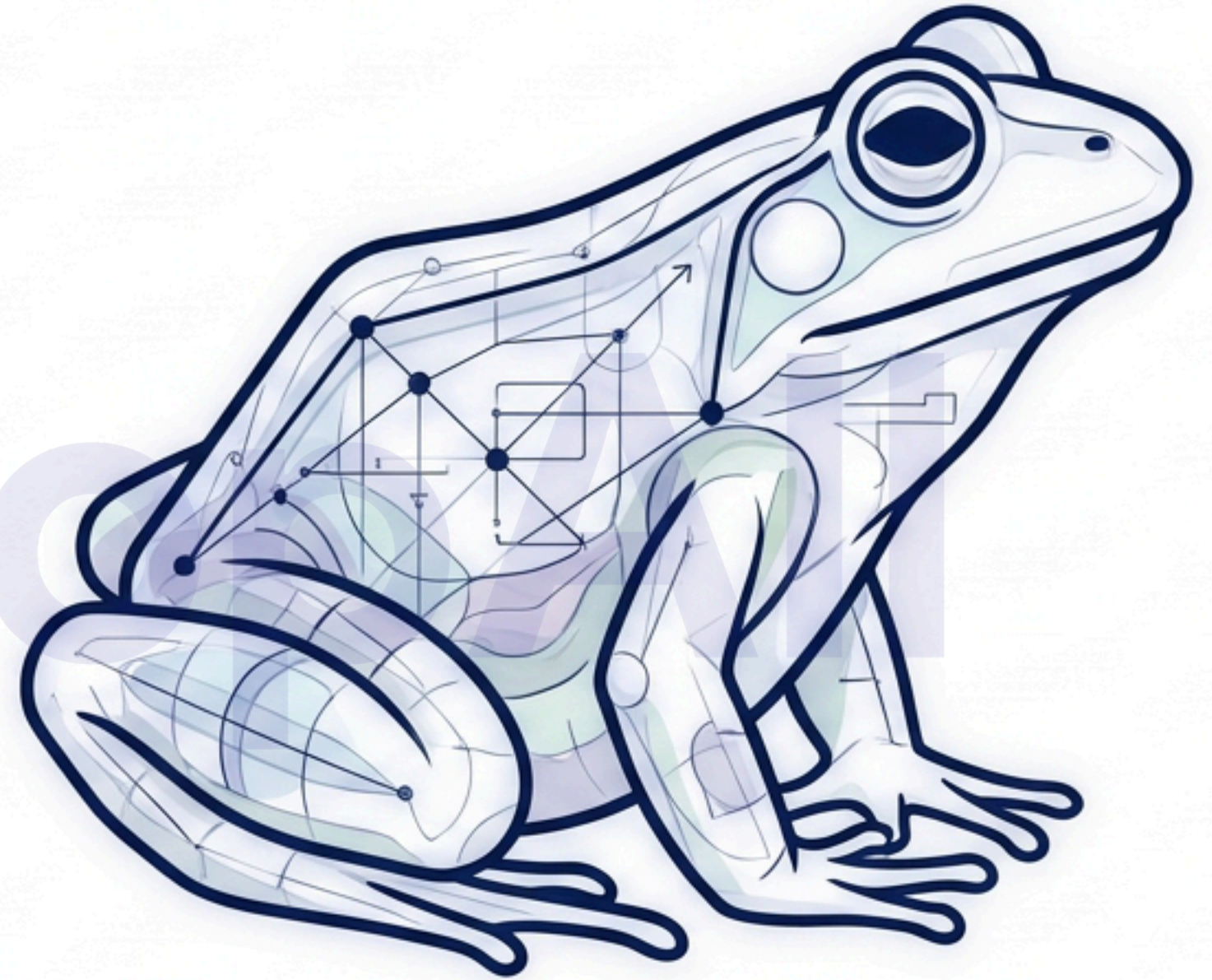


Inside a Frog

The Internal Architecture of *Rana tigrina*

The internal architecture of the Indian bullfrog (*Rana tigrina*) reveals a highly evolved network of specialized organ systems. Despite their compact size, frogs display an advanced division of labor essential for survival, seamlessly adapting physiological functions for both terrestrial and aquatic environments.



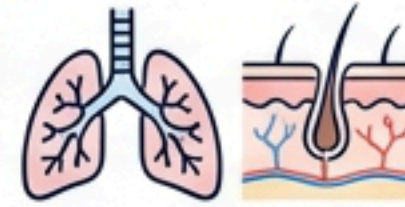
Coordinating Complex Functions Within a Compact Space

DIGESTIVE



Shortened alimentary canal and specialized glands for highly efficient carnivore nutrient extraction.

RESPIRATORY



Dual-mode gas exchange utilizing cutaneous (skin) and pulmonary (lung) pathways.

CIRCULATORY



Closed vascular system with a 3-chambered heart and specialized lymphatic network.

EXCRETORY



Advanced ureotelic filtration system for eliminating nitrogenous wastes via the kidneys.

NERVOUS



Highly evolved neural network and endocrine glands for systemic chemical coordination.

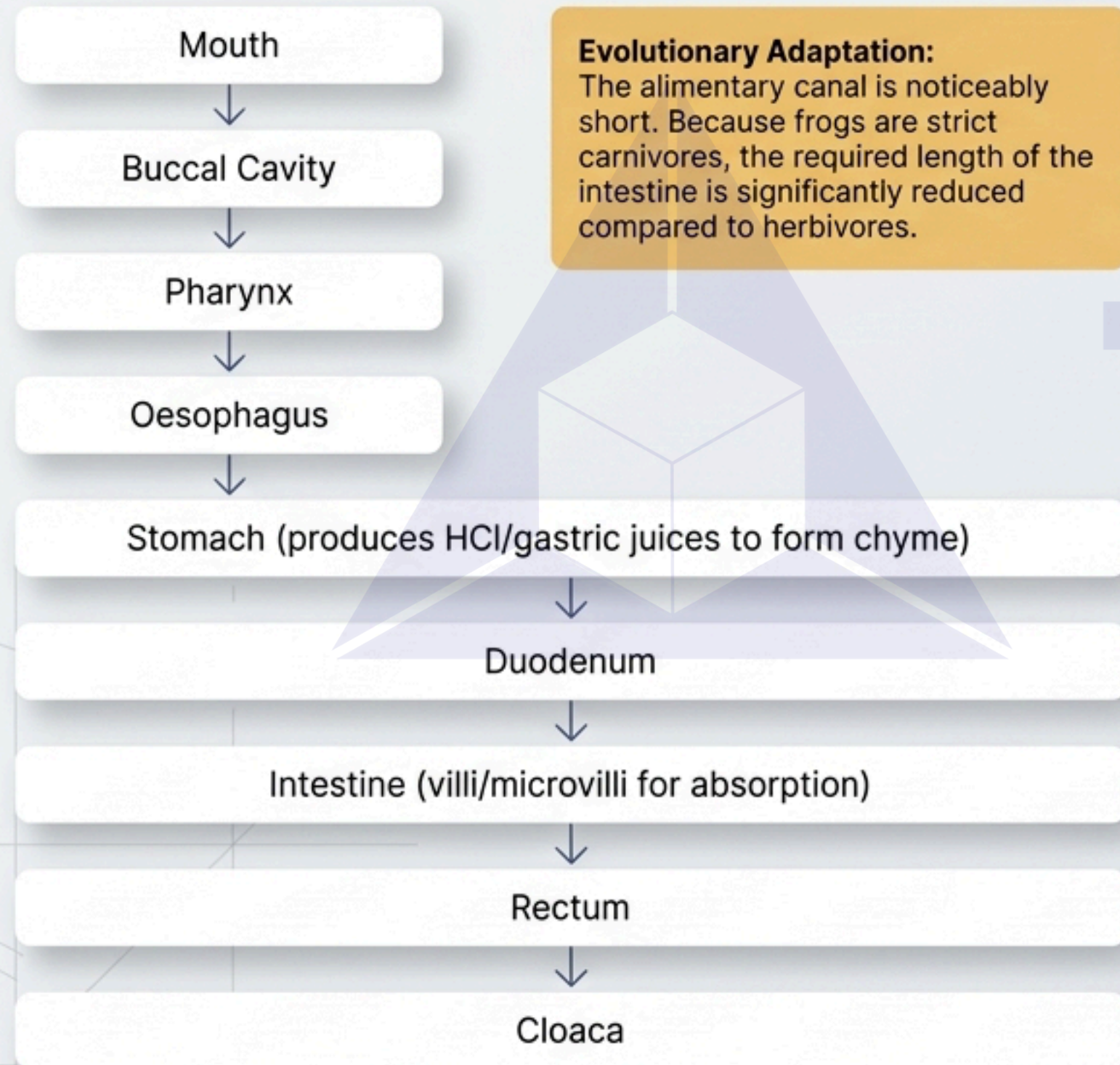
REPRODUCTIVE



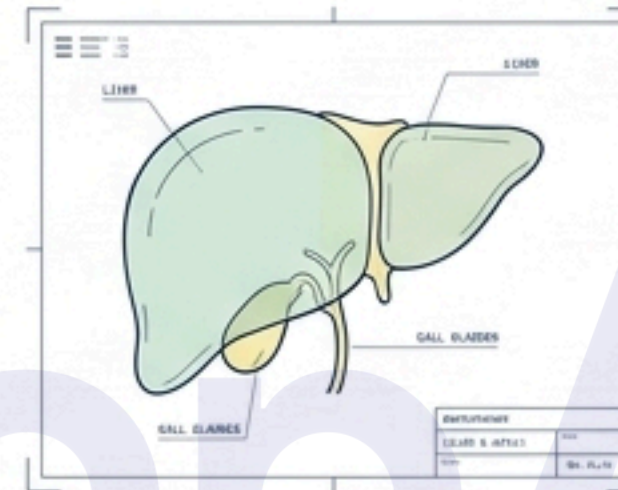
Distinct sexual dimorphism with specialized male and female organs for external fertilization.

The Principle of Division of Labor: Cells, tissues, and organs split up physiological work. This displays a clear evolutionary trend toward systemic specialization, ensuring the survival of the organism as a whole.

Nutrient Extraction and Chemical Processing Pathways

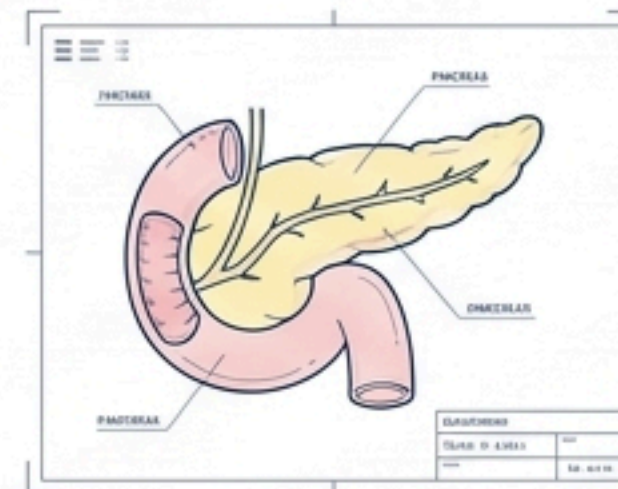


LIVER & GALL BLADDER



The liver secretes bile, which is stored in the gall bladder until needed. Bile is released into the duodenum to emulsify fats.

PANCREAS



Operates as a critical digestive gland, producing pancreatic juice rich in enzymes for the final breakdown of carbohydrates and proteins.



You've Learned the Theory. Let's Test Them Now.

$$E=mc^2$$



Turn theory into marks with **unlimited MCQs, smart analysis, and focused revision.**

Practice Now



At prep.topall.app

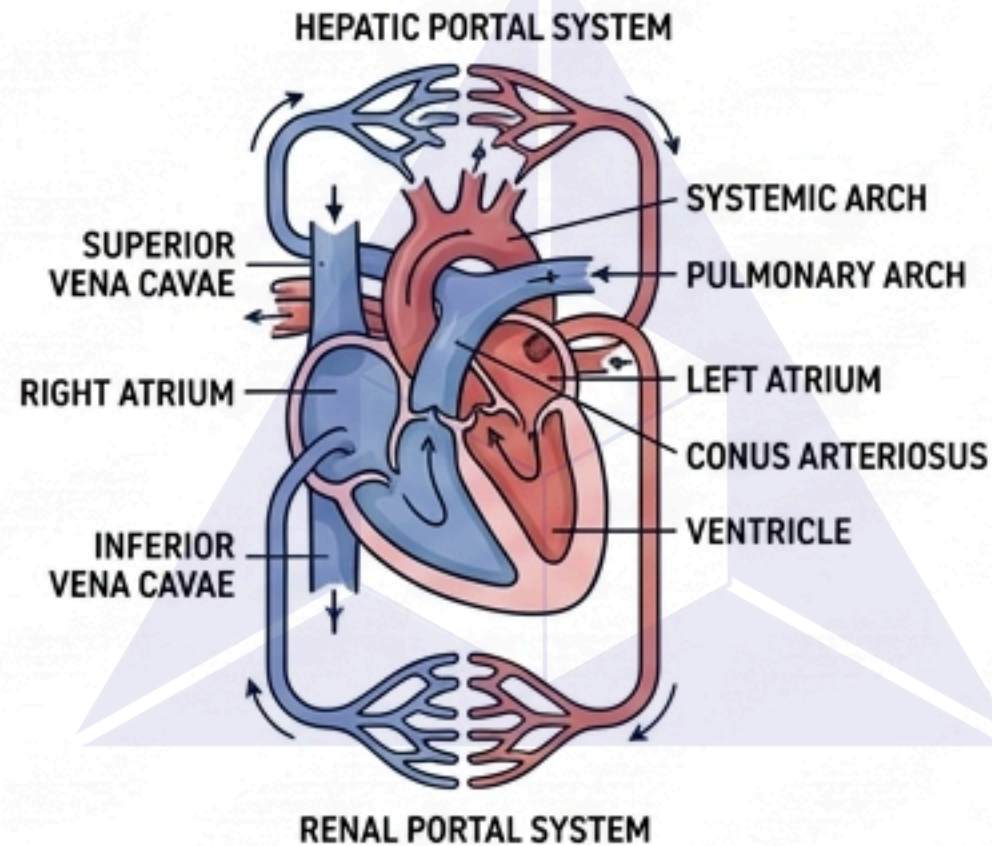
Key Highlights

- » Free Study Material, Videos & Infographics
- » Push Your Limits with Level-Based Challenges
- » Climb the Leaderboard Among Fellow Aspirants
- » Practice Unlimited MCQs for NEET & JEE
- » Get Clear Explanations, Not Just Marks
- » Track Your Performance Smarter



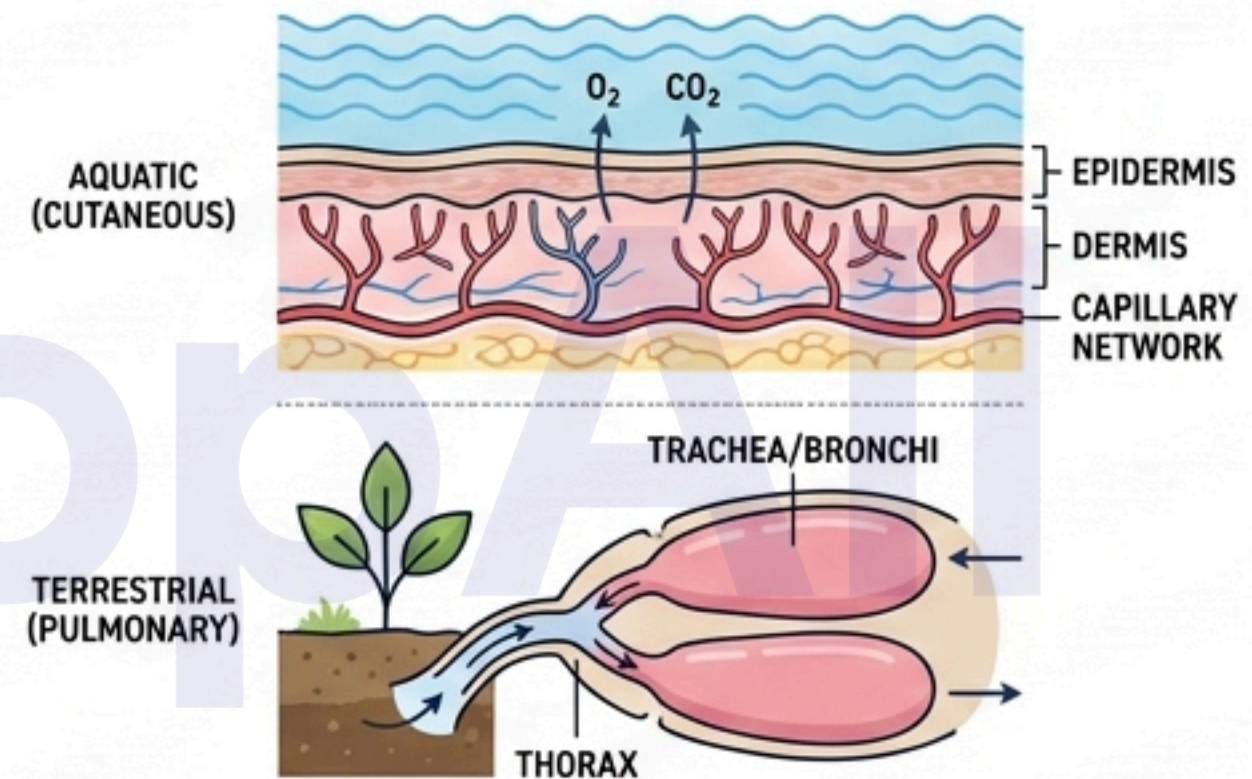
Transport Mechanisms and Dual-Mode Gas Exchange

CLOSED CIRCULATORY SYSTEM



- **The Pump:** Muscular, 3-chambered heart (2 atria, 1 ventricle) covered by the pericardium, featuring a sinus venosus and conus arteriosus.
- **The Fluid:** Blood comprises plasma, leucocytes, platelets, and uniquely nucleated erythrocytes (RBCs) containing haemoglobin.
- **The Network:** Features an arterial/venous system, a distinct lymphatic system, and specialized venous connections (Hepatic and Renal portal systems).

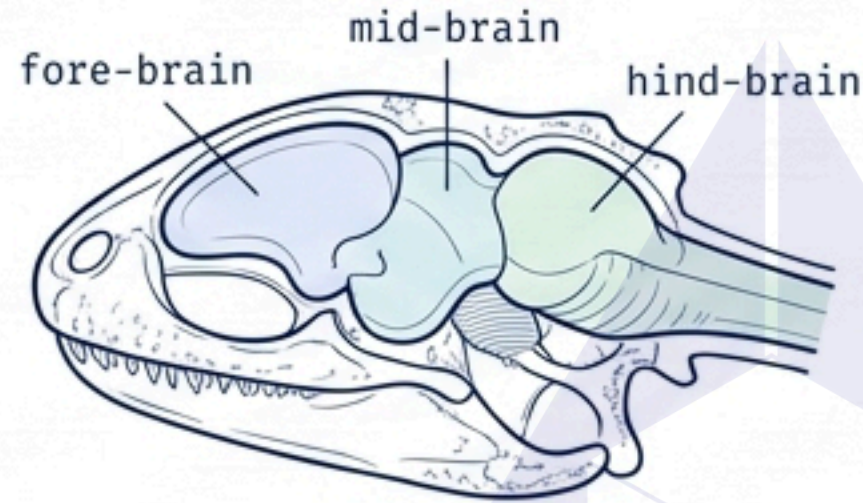
ADAPTIVE RESPIRATORY SYSTEM



- **Aquatic (Cutaneous):** In water, the highly vascularised, moist skin acts as the primary respiratory organ. Dissolved oxygen is exchanged via direct diffusion. Also utilized during aestivation/hibernation.
- **Terrestrial (Pulmonary):** On land, respiration is facilitated by the buccal cavity, skin, and a pair of elongated, pink, sac-like lungs located in the thorax.

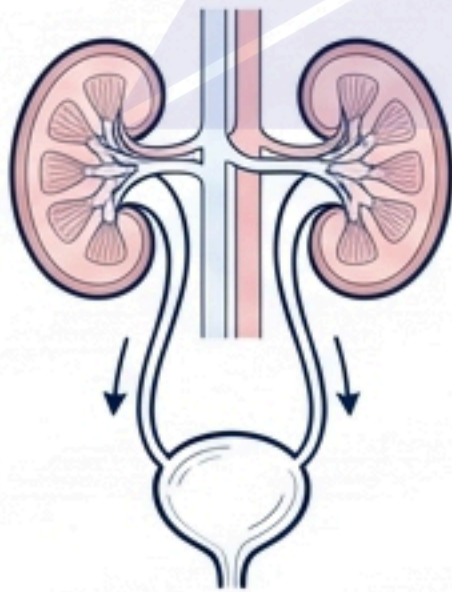
Systemic Control and Waste Elimination

NEURAL & CHEMICAL COORDINATION



- **Central & Peripheral:** Brain (enclosed in a bony cranium, divided into fore/mid/hind-brain) connects to a spinal cord. Coordinated by 10 pairs of cranial nerves.
- **Autonomic:** Features both sympathetic and parasympathetic divisions.
- **Endocrine System:** Chemical control achieved via hormones from the pituitary, thyroid, adrenals, pancreatic islets, and gonads.

UREOTELIC EXCRETORY SYSTEM

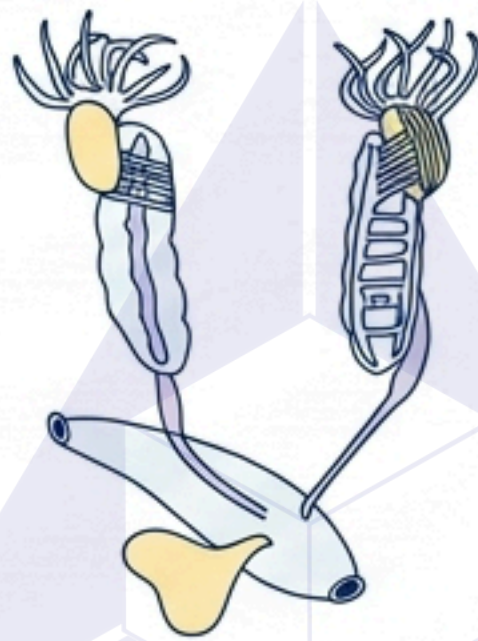


- **Filtration Units:** A pair of compact, dark red, bean-like kidneys made of structural nephrons (uriniferous tubules).
- **Waste Pathway:** Kidneys extract nitrogenous waste from the blood, specifically urea (making frogs ureotelic). Urine travels via ureters to the urinary bladder.

Important Anatomical Distinction: Unlike mammals, the frog utilizes a single, shared median chamber called the Cloaca. It acts as the universal exit for fecal fecal matter, urine, and reproductive gametes.

Sexual Dimorphism and Reproductive Anatomy

MALE



- **Primary Organs:** Pair of yellowish, ovoid testes adhered to the upper part of the kidneys via the mesorchium.
- **Transport Ducts:** 10 to 12 vasa efferentia enter the kidneys and open into Bidder's canal.
- **Exit Pathway:** Communicates directly with the urinogenital duct, exiting the body via the shared cloaca.

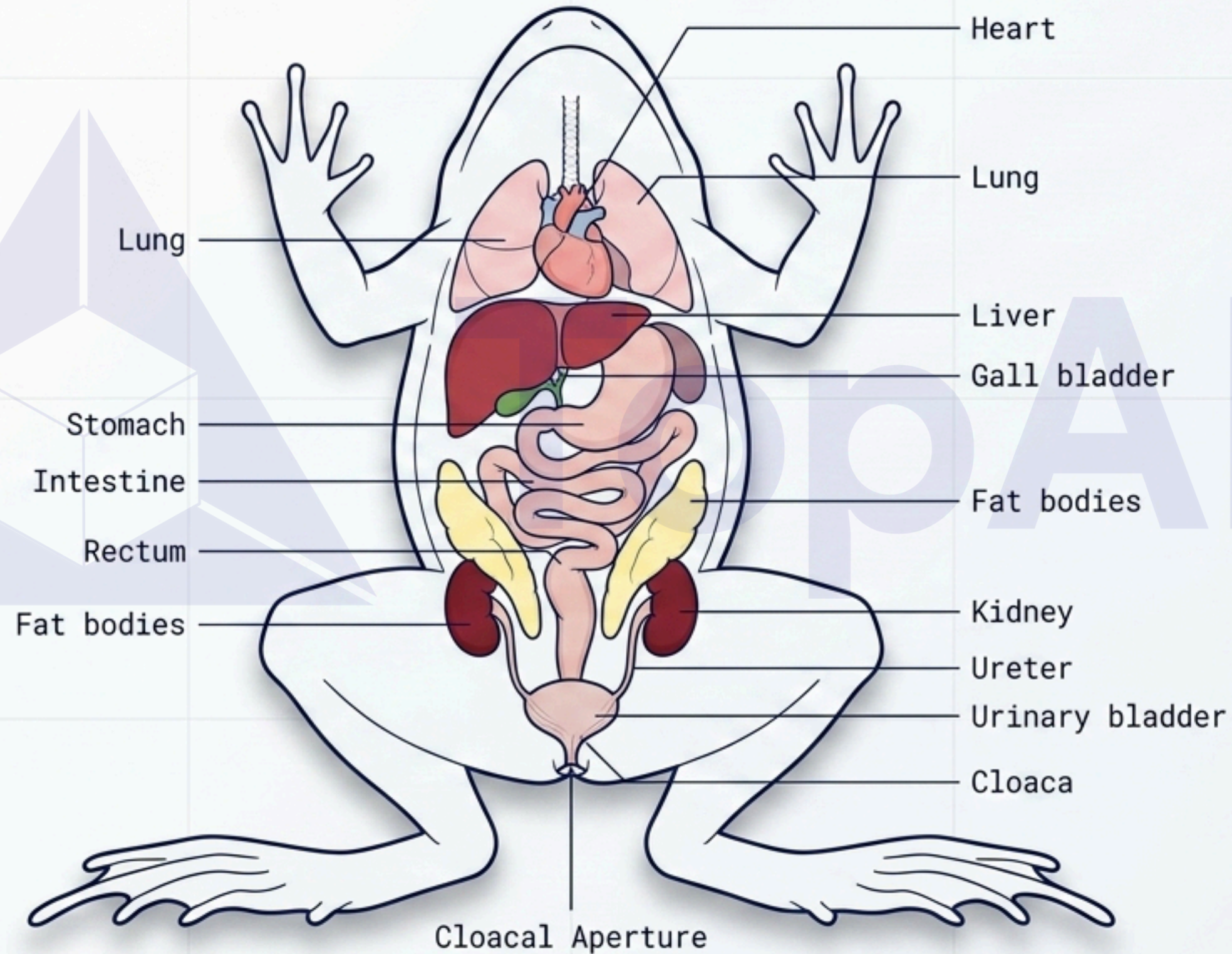
FEMALE



- **Primary Organs:** Pair of ovaries situated near the kidneys, but strictly possessing no functional connection to them.
- **Transport Ducts:** A pair of oviducts arising from the ovaries.
- **Exit Pathway:** Oviducts open completely separately into the cloaca. A mature female can lay 2,500 to 3,000 ova simultaneously.

Developmental Cycle: Fertilization is completely external and occurs in water. The life cycle involves a distinct aquatic larval stage (tadpole) that must undergo full metamorphosis to become a terrestrial adult frog.

Anatomical Synthesis: The Complete Biological Blueprint





You've Learned the Theory.

Now Let's Test It.

Reading notes gets you knowledge.

Practicing MCQs gets you marks.

That's exactly what TopAll Pro is built for.

Try TopAll Pro Now

What TopAll Pro Does Differently

-  **Stuck? Snap it. Solve it. — Doubts AI**
Photo → step-by-step solution in seconds, 24/7
-  **Your AI Coach finds your blind spots**
Concept-level weakness detection — not just chapter-level
-  **4.5 Lakh+ questions. Never run out.**
13× more content than any other prep app in India
-  **Build your own test in 60 seconds**
Pick a chapter, set difficulty — AI does the rest instantly.
-  **AI Recommendation that helps you improve**
AI Recommendation Analysis your Tests and tell you where you need to improve.



Practice the moment you finish studying
Jump in while the concept is still fresh in your head

4.5L+
MCQs

1.5L+
Students

AI Powered
In-Depth Analysis