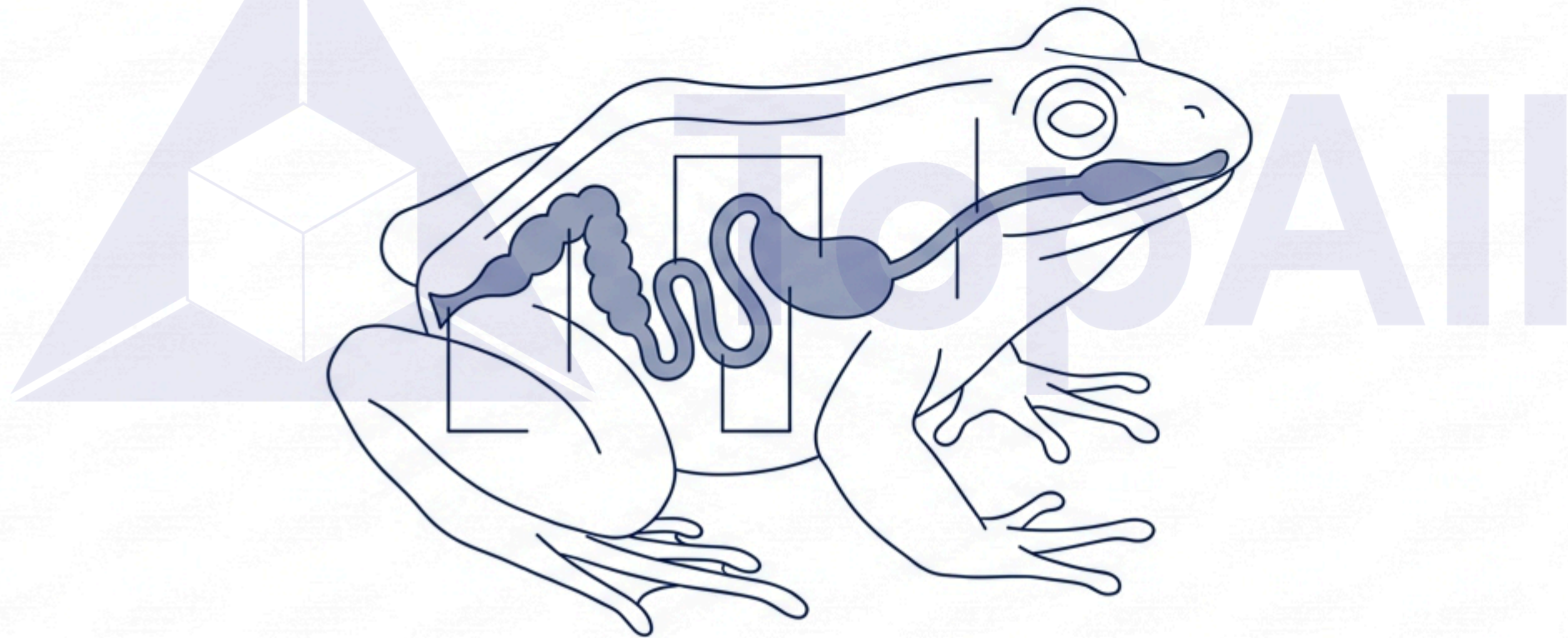


From Tongue to Cloaca

An Anatomical Schematic of the Frog Digestive System



This deck traces the complete morphological and physiological journey of food through the digestive tract of *Rana tigrina*.

Form Follows Diet

PREDATION



Frogs are strict carnivores, hunting live prey such as insects and small invertebrates. Animal protein and fat are generally easier and faster to break down than tough plant cellulose.

MORPHOLOGY

HERBIVORE
INTESTINE
(LONG, COILED)



CARNIVORE
INTESTINE
(SHORT, DIRECT)



Because of this highly digestible carnivorous diet, the frog requires less time and space for digestion. Consequently, the length of its alimentary canal (specifically the intestine) is significantly reduced compared to herbivores.

EVOLUTIONARY INSIGHT

Evolutionary Insight: The shortened digestive tract is a direct evolutionary trade-off, minimizing unnecessary metabolic overhead for a poikilothermic (cold-blooded) hunter.

The Alimentary Canal Blueprint

A macro-view of the digestive organs and accessory glands.

Accessory Organs:

Liver

Gall Bladder

Pancreas

The Main Pathway:

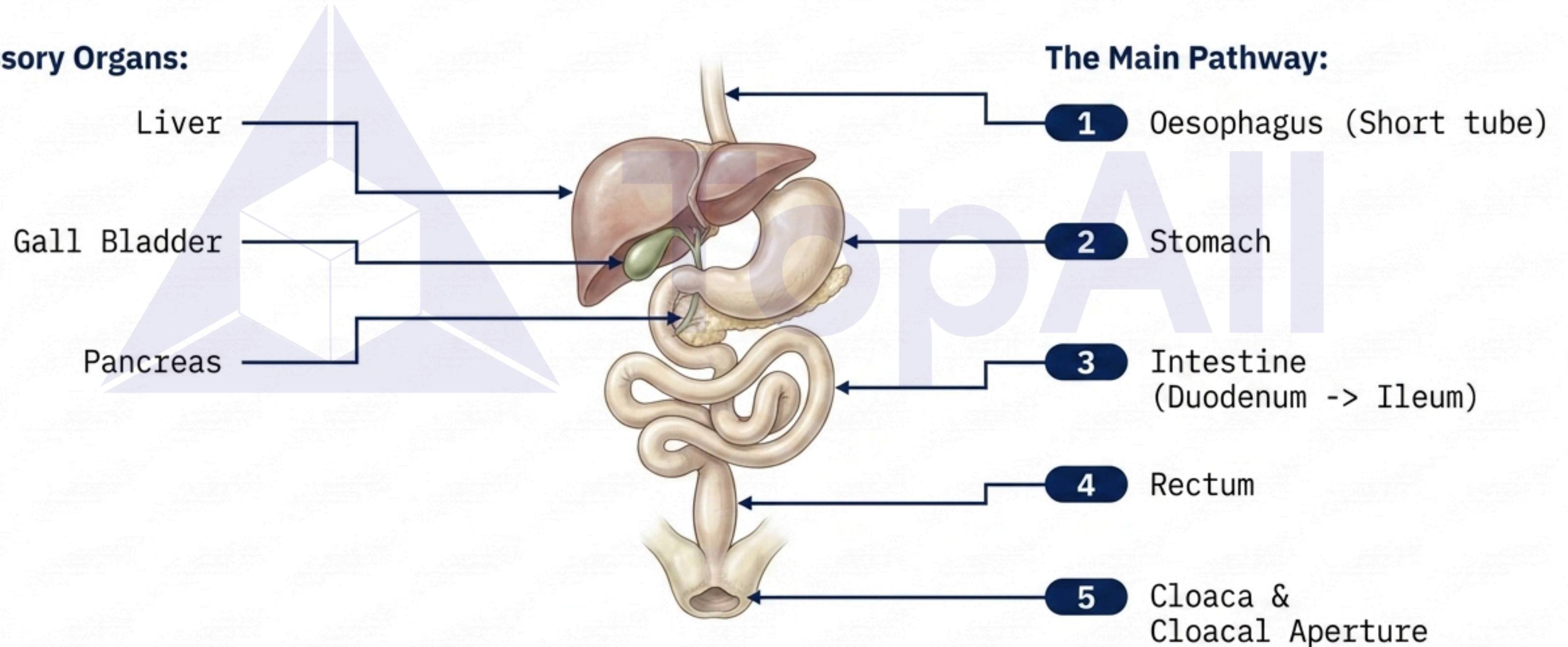
1 Oesophagus (Short tube)

2 Stomach

3 Intestine
(Duodenum -> Ileum)

4 Rectum

5 Cloaca &
Cloacal Aperture





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Key Highlights

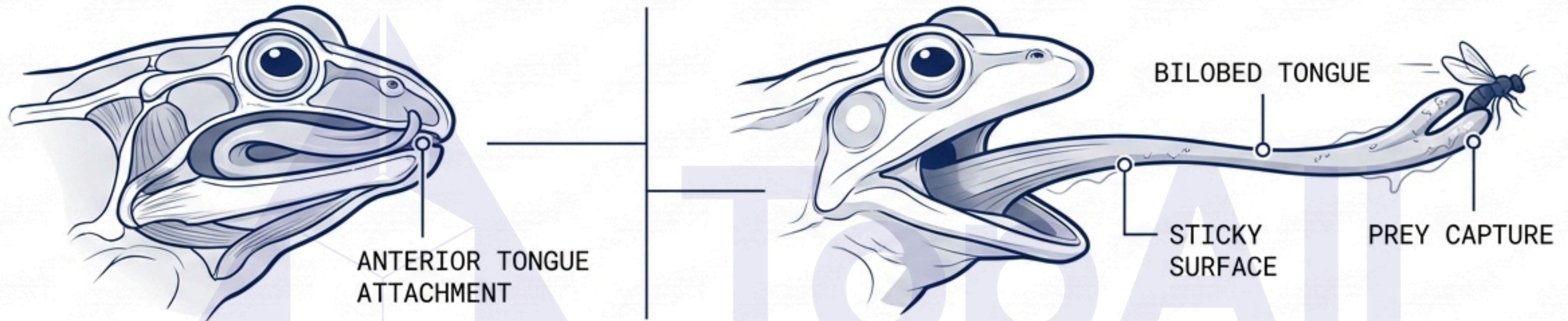
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STAGE 1

Step 01: Capture & Ingestion

Unlike humans, a frog's tongue is attached at the front of the mouth, not the back. The tongue is **bilobed** (split into two points at the tip) and highly muscular.



DEPLOY



The bilobed tongue is rapidly flipped outward.

ADHERE



Sticky mucus on the tongue's surface traps the insect prey.

RETRACT



The prey is pulled directly into the buccal cavity and swallowed whole, bypassing the need for chewing.

EVOLUTIONARY INSIGHT

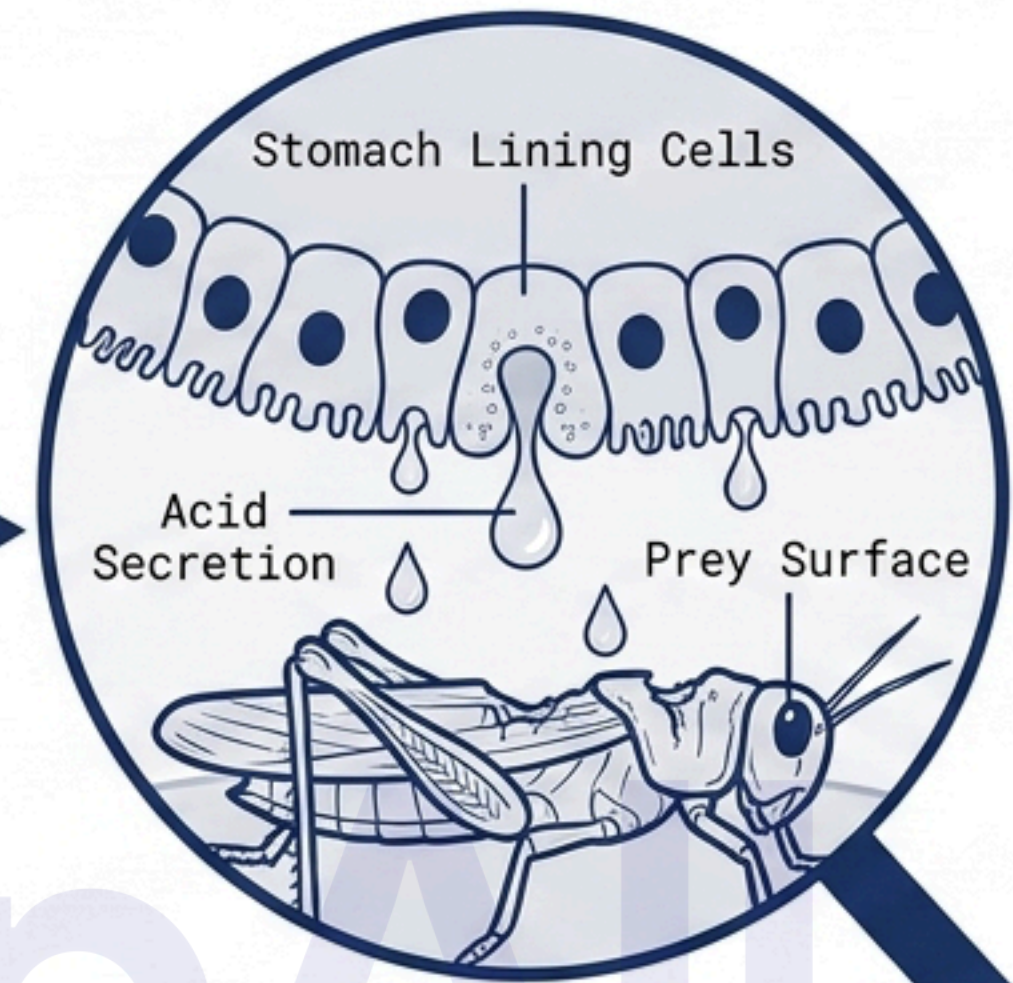
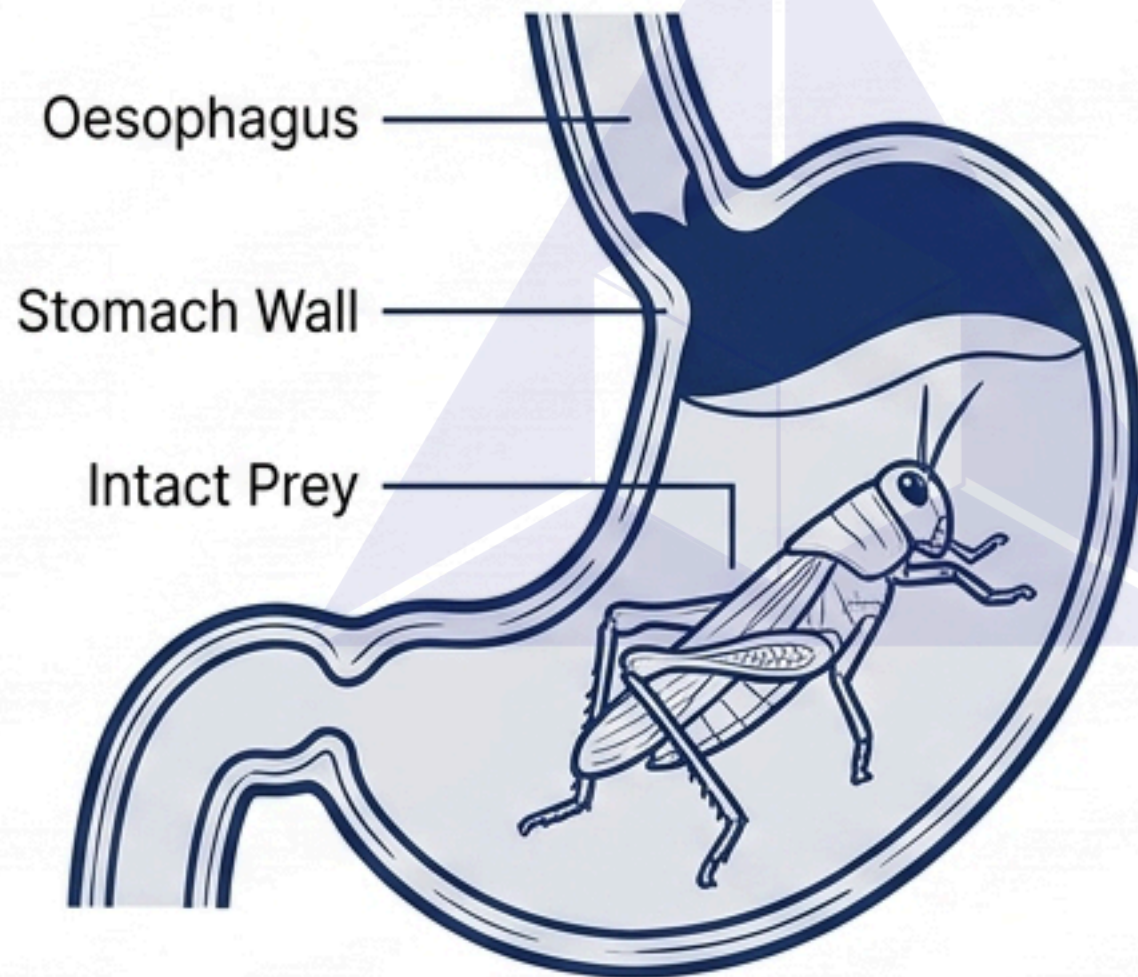
Note: Frogs lack a true neck. Once swallowed, food passes almost immediately through the pharynx into the short oesophagus.

STAGE 2

Step 02: Gastric Digestion

Once food drops from the oesophagus into the muscular stomach, primary chemical digestion begins.

HIGH ACIDITY ENVIRONMENT



The Secretions

The muscular walls of the stomach secrete highly concentrated Hydrochloric Acid (HCl) and potent gastric juices.

The Transformation

The combination of muscular churning and acid completely breaks down the structural integrity of the swallowed prey.

The Result: The solid prey is reduced to a semi-liquid, partially digested acidic soup known as chyme, which is now ready for the next stage.

STAGE 3

Step 03: The Accessory Glands



Chyme exits the stomach and enters the duodenum (the first part of the small intestine). Here, digestion is finalized with the help of two vital accessory glands.

Input A (Liver & Gall Bladder)

The **liver** secretes **bile**, which is stored in the **gall bladder**. Bile flows into the duodenum to emulsify fats.

Input B (Pancreas)

The pancreas produces **pancreatic juice**, rich in digestive enzymes that digest carbohydrates and proteins.

Input C (Stomach)

Acidic chyme.

Central Node (Common Bile Duct / Duodenum)

Both fluids enter the duodenum together through the common bile duct, neutralizing the acidic chyme and finalizing digestion.

STAGE 4

Step 04: Maximizing Absorption



Once the food is completely digested, the final and most crucial step is extracting the nutrients into the bloodstream. This takes place in the lower sections of the intestine.



Villi

The inner wall of the intestine is not flat. It is heavily pleated with numerous finger-like folds called villi.



Microvilli

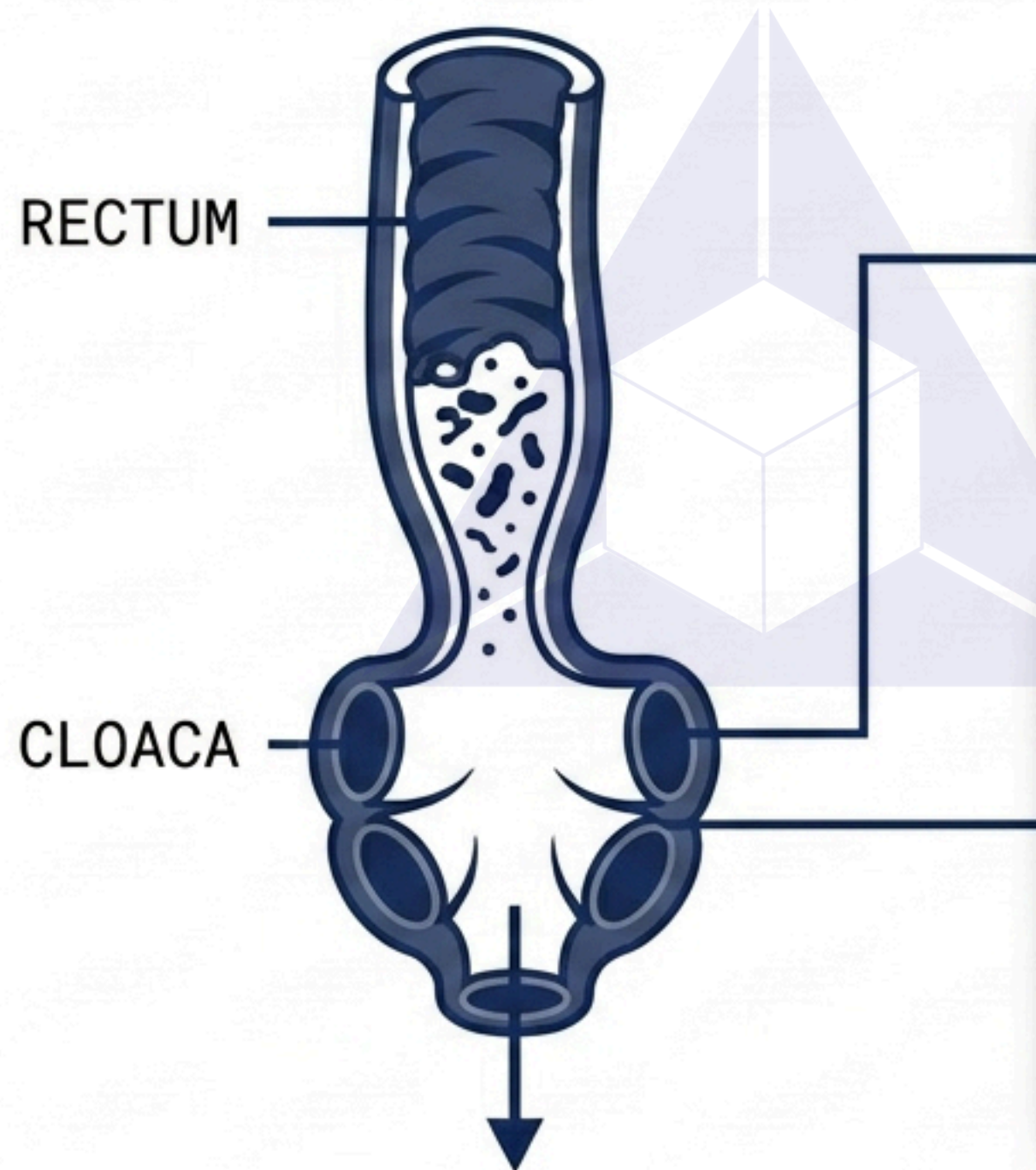
The cells on the villi are further textured with microscopic projections called microvilli.

Form Follows Function: Because the frog's intestine is so short, these folds are critical. They aggressively multiply the internal surface area, ensuring maximum nutrient absorption in a minimal physical space.

STAGE 5

Step 05: Elimination & Summary

The Final Exit



The Complete Path

Rectum

Undigested solid waste passes into the rectum.

Cloaca

Waste is expelled through the cloaca—a single, median chamber in frogs that uniquely serves as the common exit for the digestive, excretory, and reproductive systems.

The Journey of a Meal

1. **Mouth:** Captured by bilobed tongue.
2. **Oesophagus:** Swallowed into a short tube.
3. **Stomach:** Broken down into chyme via HCl.
4. **Duodenum:** Processed by bile and pancreatic juices.
5. **Intestine:** Nutrients absorbed via villi/microvilli.
6. **Cloaca:** Solid waste expelled to the exterior.



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