# Section 2: Body Structure and Function

**General Body Plan**

Rotifers exhibit a compact, bilaterally symmetrical body plan that can be divided into three distinct regions: the **head**, **trunk**, and **foot**. The head typically houses the **corona**, a ciliated structure used for feeding and locomotion, along with sensory organs. The trunk contains the majority of the internal organs, including the digestive and reproductive systems, while the foot, equipped with **toes** and adhesive glands, facilitates attachment to substrates. Despite their microscopic size—most rotifers range between 50 and 500 micrometers—they display remarkable morphological complexity, enabling them to thrive in diverse environments.

**Key Structures in Metaphora**

1. **Corona**
The **corona** (Latin: “crown”) is one of the most distinctive features of rotifers. This ciliated structure, located at the anterior end, creates water currents that draw in suspended particles and plankton for feeding. The corona can vary in shape and arrangement among species, with some exhibiting a pair of rotating lobes, while others have a circular or elongated structure. Beyond feeding, the corona also contributes to locomotion, propelling rotifers through water with a characteristic spiraling motion. The efficiency and adaptability of the corona play a vital role in the ecological success of rotifers, especially in plankton-rich habitats.
2. **Retro-Cerebral Organ**
Positioned near the brain, the **retro-cerebral organ** is a glandular structure thought to play roles in sensory processing and the secretion of mucus. The mucus may assist in trapping food particles or in adhering to substrates, complementing the functions of the corona and pedal glands. While its full functionality remains a topic of investigation, this organ exemplifies the specialized adaptations that enhance rotifers' survival and feeding efficiency.
3. **Pedal Glands**
At the posterior end, rotifers possess a pair of **pedal glands** located within the foot. These glands secrete adhesive and de-adhesive substances that enable rotifers to attach to surfaces temporarily. This ability is particularly advantageous for feeding in flowing water or attaching to vegetation. The glands allow for rapid transitions between anchored and free-swimming states, making them crucial for both mobility and ecological interactions.
4. **Digestive System**
The digestive system is linear, extending from the mouth to the cloaca. The **mastax**, a muscular pharynx containing chitinous jaws (trophi), is specialized for grinding food particles. Food is processed through the gut, with nutrients absorbed in the intestine, and waste expelled via the cloaca. The mastax is a defining feature of the phylum, varying in form and function depending on the species' diet.
5. **Nervous and Sensory Systems**
Rotifers possess a relatively simple nervous system centered around a bilobed brain located near the corona. Paired lateral nerve cords extend from the brain, coordinating movement and feeding. Sensory organs, including **eyespots**, mechanoreceptors, and chemoreceptors, allow rotifers to detect light, vibrations, and chemical signals, enabling them to respond to environmental changes.

**Species Profile: Asplanchna brightwellii**

This Monogonont rotifer stands out as a predator in a world dominated by suspension feeders.Asplanchna brightwelliifeeds on smaller planktonic organisms, including other rotifers, engulfing prey with its soft, flexible body. Its lack of a rigid lorica enhances its ability to hunt in dynamic aquatic environments, playing a critical role in regulating plankton populations and maintaining ecological balance.

### Species Profile:

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**Acanthocephala Body Plan**

The body plan of **Acanthocephala** is significantly simplified compared to Metaphoran rotifers, reflecting their highly specialized parasitic lifestyle. Acanthocephalans lack a **corona** and a digestive system entirely. Instead, they rely on direct absorption of nutrients across their body surface, a trait they share with tapeworms. This adaptation allows them to thrive within the nutrient-rich environments of their vertebrate hosts' intestines.

A distinctive feature of Acanthocephalans is their **proboscis**, a tubular structure armed with hooks or spines. The proboscis extends from the anterior end and is used to attach firmly to the intestinal wall of the host. It is considered a derived feature, likely evolved from the corona seen in free-living rotifers, restructured for parasitic attachment rather than feeding.

The body of an Acanthocephalan is elongated and covered with a tegument, a specialized outer layer that facilitates nutrient absorption while protecting the organism from the host's digestive enzymes. Some species also have spines or ridges along their body that may aid in anchoring to the host tissue. This streamlined, tube-like body plan enables them to maintain an obligate parasitic existence effectively.

**Species Profile: Pomphorhynchus laevis**

This parasitic Acanthocephalan takes survival to the next level by manipulating its host's behavior. Developing inside crustacean intermediates like amphipods,Pomphorhynchus laeviscauses the host to move into exposed areas, making it more likely to be eaten by predatory fish—the parasite’s definitive host. Once inside the fish, it uses a spiny, eversible proboscis to anchor to the intestinal wall, absorbing nutrients directly through its body surface. This remarkable lifecycle showcases the lengths parasites go to ensure their survival and propagation.

### Species Profile:

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