# Chapter 27: Circulatory System

Life depends on movement—not only external movement through the environment but also the internal transport of essential substances that sustain cellular functions. From the simplest sponges to the most complex cephalopods, circulation provides the means for delivering nutrients, gases, hormones, and immune cells while removing waste products. This vital process is intricately connected to other physiological systems, such as respiration, digestion, and endocrine signaling, ensuring an organism’s internal stability and capacity to interact with its environment.

Invertebrates, the most diverse group of animals, showcase a remarkable array of circulatory adaptations. Some, like sponges and jellyfish, lack dedicated circulatory systems altogether, relying on diffusion and simple structures to move substances through their bodies. Others, such as annelids and mollusks, have developed highly efficient closed systems capable of supporting active and complex behaviors. The evolution of open systems, as seen in arthropods, highlights the trade-offs between simplicity and efficiency, where reliance on supplementary respiratory structures compensates for the limits of direct transport. Unique innovations, like the water vascular system of echinoderms, blur the lines between circulation, locomotion, and feeding, demonstrating the creative solutions evolution has crafted to solve the problem of internal transport.

This chapter explores the general principles of circulation, the major types of circulatory systems, and the specific adaptations within key invertebrate groups. By examining these systems, we gain insight into how invertebrates have conquered a vast range of habitats, from the deepest oceans to the driest deserts, while meeting the physiological challenges of life.

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