Class Ophiuroidea

Two thousand species have been species identified in Subclass Ophiuroidea. All are marine, as are all echinoderms. They are found in all seas, at all latitudes, and from the intertidal to the abyssal zone (to a depth of 6,000 meters).

Ophiuroids exhibit the three distinctive characteristics of the phylum Echinodermata: a body plan with five part symmetry (pentaradial), an internal calcium carbonate skeleton in the mineral form of calcite, and a water vascular system of fluid-filled vessels that end in tube feet. Nearly all ophiuroids have five equal rays or arms that are clearly set off from the central disk. The rays differ from those of asteroids and crinoids in being long and slender, and nearly solid. They are very flexible and enable the animals to make snake-like movements (which is the source of the class name: G. ophis = serpent) -- an ophiuroid locomotes by using two rays to produce a rowing motion. The rays of basket stars branch. Ophiuroids possess considerable powers of regeneration: an arm can be regenerated at any point, but if the disc is totally separated from all arms, the animal will die. An ophiuroid can easily cast off portions of an arm if attacked by a predator. This ability to autotomize is the source of the common name brittle star.

The water vascular system, which plays a role in locomotion, generally has one madreporite, but some species lack a madreporite. A radial canal extends into each arm from the ring canal, and lateral canals from each radial canal supply the tube feet. The tube feet of ophiuroids lack suckers and ampullae.

Ophiuroids are carnivores, filter feeders, and scavengers; those of some species use more then one method to obtain food. Mucus on the tube feet can trap phytoplankton, bacteria, and even medusae from the water or particles from sediment that are moved by the tube feet to the mouth; some ophiuroids capture small crustaceans or worms by looping the organisms with their rays. The mouth is surrounded by five jaws and leads to an esophagus that connects to the sac-like stomach. The stomach fills much of the disc, but does not extend into the arms, and ends blindly (that is, it has no anus). Digestion occurs within 10 pouches or infolds of the stomach.

Gas exchange and excretion occur through cilia-lined sacs called bursae; each opens onto the interambulacral area of the oral surface of the disc, and typically there are 10 per animal. Gonads are located in the disc; sexes are separate in most species. Gametes are shed into the water by way of the bursal sacs. Fertilization may result in a free-swimming larva called an ophiopluteus, which undergoes metamorphosis without an attachment stage. However, many ophiuroids brood their young, commonly in the bursae.

The ophiuroid coelom is much reduced compared to that of other echinoderms. The nervous system consists of a nerve ring in the disc that sends out a radial nerve to each arm. Ophiuroids lack eyes but the epidermis is sensitive to light and other stimuli.

Ophiuroids have little importance in human commerce but they are very important in the diets of many crustaceans and fishes.

References:

Hendler, G. L., M. P. Kier, J. E. Miller, and D. L. Pawson. Class Ophiuroidea, pages 89-195 in Sea Stars, Sea Urchins, and Allies. Washington: Smithsonian Institution Press. 1995.

Hyman, L. H. Class Ophiuroidea, pages 589-689 in The Invertebrates volume IV: Echinodermata. New York: McGraw-Hill Book Company Inc. 1955.

Kozloff, E. N. Class Ophiuroidea, pages 745-750 in Invertebrates. Philadelphia and other cities: Saunders College Publishing. 1990.

Contributors:

Michelle Morris (author). Daphne G. Fautin (author).