

# Introduction

The frog is a member of the class Amphibia (the amphibians) in the order Anura, which means "tailless." Amphibians are cold-blooded animals that grow from a juvenile, water-breathing form to an adult, air-breathing form. Frogs develop from eggs laid in puddles, ponds, lakes, or other aquatic areas into larvae known as tadpoles, which have gills and can breathe underwater. The tadpoles then develop into adult forms with a unique morphology. Adult frogs have long hind legs, webbed digits, and a short body. They lack a tail.

At the time of this printing, there are over 5000 identified species of frogs distributed among habitats ranging from the tropics to subarctic areas. However, frog populations have been declining since the 1950s, with a dramatic decrease observed since the mid-1980s. The diverse populations of frogs have evolved to adapt to their environment in response to their need for water and a temperate climate. Some frogs bury themselves underground during periods of cold or drought, whereas others have evolved a rapid development from egg to adult in order to use temporary water sources. Because of their adaptations, life requirements, morphology, position in the food web, and typically biphasic life cycle, many environmentalists consider frogs and other amphibian species ideal indicators of ecosystem health.

"Frog" commonly refers to species that are aquatic or semiaquatic and have smooth and/or moist skin. "Toad" generally refers to species that are more terrestrial and have dry, warty skin. However, there is no taxonomic distinction between a "frog" and a "toad." Compared to other amphibians such as salamanders, frogs are unique in morphology because they lack a tail and because their hind legs are longer, possessing elongated ankle bones that are specialized for hopping. Like other amphibians, frogs absorb oxygen through their permeable skin. Because oxygen is dissolved in an aqueous film on the skin, amphibians must remain in a moist environment in order to breathe. This

increases their risk for absorbing toxins and pollutants from the environment, which many believe is leading to the rapid decline in frog populations. While breathing through the skin is common, frogs also can breathe by inhaling air through the nostrils and compressing the floor of the mouth, which forces the air into the lungs.

Ranging in typical size from 10 mm to 300 mm, frogs have a shortened vertebral column consisting of approximately 10 free vertebrae and one fused coccyx, or tailbone. Frogs lack loose connective tissue; therefore, their skin is loosely attached to their bodies. The texture of the skin varies. Typical structures found in frogs include a tympanum on either side of the head, which helps in an auditory capacity; triple eyelid membranes, including one membrane that protects the eye while underwater; and maxillary and vomerine teeth on the upper jaw, which are used primarily to grip prey before swallowing it whole.

Some frogs are known for their toxins or poisons. Frog poisons range in toxicity and are either manufactured naturally or acquired from the diet. Some of the toxins act as psychoactive drugs and can cause hallucinations, while others act as natural painkillers and can be 200 times more potent than morphine. Certain toxins are being researched as potentially offering resistance to HIV infection. Most poisonous frogs advertise their toxicity by displaying bright skin coloration. While some frogs are notable for their toxins, all frogs are known for possessing a three-chambered heart that keeps the mixing between oxygenated and deoxygenated blood to a minimum. This increases metabolic rates and allows frogs to be very active.

## Taxonomic Classification

Domain:	Eukarya
Kingdom:	Animalia
Phylum:	Chordata
Subphylum:	Vertebrata
Class:	Amphibia
Order:	Anura
Family:	Batrachia
Genus:	Rana

## Orientation

Before you begin the dissection, you should become familiar with some commonly used anatomical terms.

## Terms of Direction

*Cranial* – toward the head.

*Caudal* – away from the head.

*Ventral* – toward the front.

*Dorsal* – toward the back.

*Medial* – toward the midline of the body.

*Lateral* – toward the side of the body.

*Superior* – above.

*Inferior* – below.

*Proximal* – near or toward the point of reference (e.g., midline of body).

*Distal* – away from the point of reference (e.g., midline of body).

*Rostral* – toward the rostrum (the oral/nasal region).

## Terms for Body Planes

*Frontal (coronal) plane* – divides the body into dorsal and ventral portions.

*Sagittal (lateral) plane* – divides the body or any of its parts into right and left sides.

*Transverse (axial) plane* – perpendicular to the long axis. All sections cut along transverse planes are cross sections.

## Questions

1. What class are frogs members of, and what does the name of the class mean?
2. What are some of the ways that frogs have developed to be able to adapt to their environment?
3. Why do many environmentalists consider frogs to be indicators of ecosystem health?
4. What is one way that frogs absorb oxygen?
5. What is one anatomical feature that all frogs have in common?

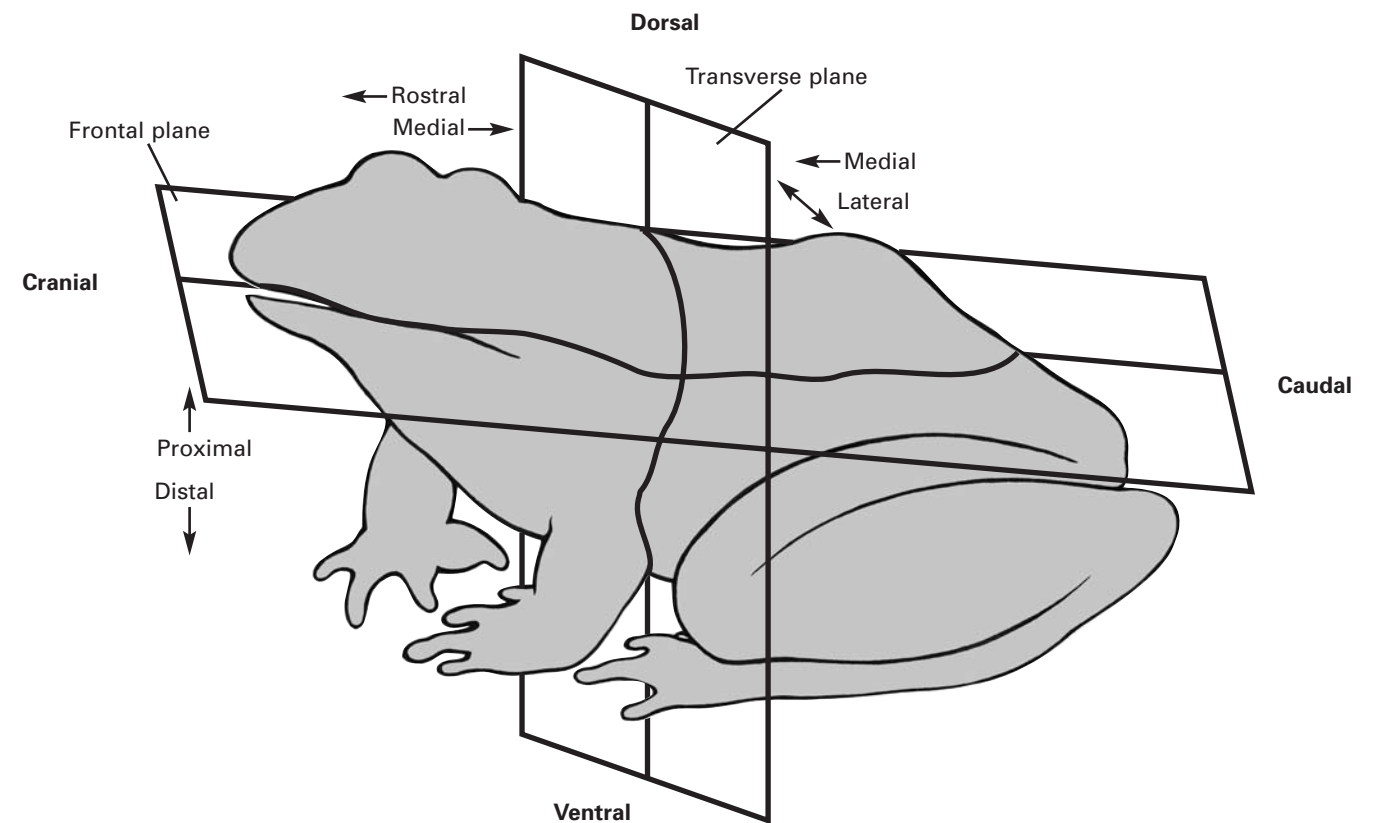


Figure 1. Body planes and directions.