

Amphibian Husbandry, Natural History, and Medicine

A review of important amphibian veterinary information

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Abstract

Amphibians are a fascinating and extremely important taxonomic group of animals. Amphibians are valued as environmental sentinels, biomedical research subjects, public display animals, private pets, and even as a human food source.

Anatomy and physiology

Class Amphibia is divided into three orders and 75 families, containing 8,530 species, however this group shares many common anatomic and physiologic features. Most species possess a two-stage life cycle, which usually includes a carnivorous adult stage. Many amphibians can respire through the skin. Most species also possess lungs, although plethodontid salamanders do not. All amphibians also possess a three-chambered heart. Another common characteristic of this taxon are their unusually large erythrocytes. Finally, most amphibians have external fertilization. Eggs are typically laid in wet or moist areas.

Important diseases

There are a number of infectious disease conditions commonly seen in Class Amphibia, that are caused by a variety of etiologic agents, including viruses, bacteria, fungi and parasites.

Lucke's tumor is a renal adenocarcinoma affecting the northern leopard frog (*Rana pipiens*) caused by a herpesvirus. This was the first neoplasm demonstrated to be caused by a herpesvirus. Lucke published his belief that a filterable virus was associated with the tumor in 1934. Koch's postulates were fulfilled in the 1970's. There is a seasonal change in tumor prevalence with tumors being most common in early spring as frogs emerge from hibernation. Virus is shed in frog urine. Oocytes and young embryos are susceptible to infection with virus.

Ranavirus is a highly contagious and serious disease of amphibians can cause high morbidity and mortality among infected animals. These viruses belong to the Iridoviridae and are likely transmissible to reptiles and perhaps other taxa. Sound quarantine and biosecurity measure should be followed in order to prevent and/or minimize the impact of these organisms. Details on this disease can be found in the Reference Section of these notes.

Red Leg Syndrome (RLS) refers to a spectrum of clinical signs that include erythema and ecchymoses on the underside of the legs and abdomen of frogs and salamanders. Affected amphibians may also show skin ulceration, anemia, and ascites. These clinical signs are typical of a number of bacterial septicemias and are not pathognomonic for any specific infection, but *Aeromonas hydrophila* is commonly cultured from and incriminated in the pathogenesis of this syndrome. *Aeromonas hydrophila* is an opportunistic pathogen of

amphibians that is ubiquitous in aquatic environments. *Aeromonas* establishes itself in stressed or immunosuppressed animals, and latent infections are common. Prevention and control centers on proper sanitation and environmental quality. Particular care should be taken to avoid the buildup of high levels of organic matter within tanks. In the face of an outbreak, antibiotics should be administered based upon culture and sensitivity results. Numerous other pathogens, including viral and fungal organisms, can result in clinical signs consistent with RLS.

Amphibians are susceptible to infections by several atypical Runyon IV mycobacteria including *Mycobacterium fortuitum*, *M. marinum*, *M. xenopi*, and *M. thamnophaeos*. These organisms are ubiquitous saprophytes, found commonly in nature. Amphibians normally have a high degree of natural resistance to disease. Infection with mycobacteria appears to require immunosuppression of the amphibian host.

Chlamydia psittaci has been diagnosed in *Xenopus* and other anurans. Clinical signs mimic an acute bacterial septicemia. No successful therapy regimen has been documented.

Chromomycosis is caused by pigmented fungi that may result in characteristic pigmented granulomas that are disseminated throughout the internal organs. Skin lesions can also be observed. Therapeutic efforts have been unrewarding to date. This is a zoonotic disease.

Chytridomycosis is a serious fungal disease of amphibians, caused by *Batrachochytrium dendrobatidis*. Chytridomycosis is believed to be responsible for an unprecedented global amphibian population decline. The wide introduction and dissemination of this pathogen is most likely the result of human activity. In the past decade, much effort and emphasis has been placed on the prevention, control, diagnosis, and treatment of this problem. Diagnosis is based on biopsy or necropsy followed by histopathology and PCR testing. Individuals and captive populations have been successfully treated with antimicrobial agents, such as florfenicol and itraconazole, combined with supportive care and environmental disinfection. For a thorough review of chytridomycosis see Van Rooij et al., 2015 and Fisher and Garner, 2020).

Fungi (water molds) of the genus *Saprolegnia* can cause dermatitis that can be severe. Saprolegniasis is usually a secondary pathogen and readily controlled with proper animal handling, husbandry, and hygiene.

Rhabdias lungworms can cause pneumonia in captive amphibians. Amphibians may be a source of infection for reptiles where the parasite is considered a serious pathogen.

Xenopus are susceptible to cutaneous capillariasis that causes irritation, blotchy skin, skin sloughing, and may predispose toward bacterial superinfections that can cause death.