Reproductive Medicine in Amphibians

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KEYWORDS

• Amphibians • Reproduction • Anatomy • Artificial reproduction • In vitro fertilization • Reproductive surgery • Reproductive disorder

KEY POINTS

- In general, to stimulate reproduction, environmental conditions have to be arranged to simulate changes in natural habits.
- Reproductive life history is well documented in amphibians; a thorough knowledge of this subject will aid the practitioner in diagnosis and treatment.
- Reproductive disorders are rarely described in amphibians.
- Some protocols of artificial reproduction were developed with research models and may be transferable to privately kept or endangered species.

INTRODUCTION

Amphibians are globally distributed except in the polar regions of Antarctica. They display a diversity of life history and reproductive strategies to suit almost all habitats, from rainforests to deserts. New species continue to be discovered. There are 3 orders of amphibians: Anura, Caudata, and Gymnophiona. The AmphibiaWeb database currently contains 7546 amphibian species.[1] Each year more veterinarians are seeing amphibian patients, and the knowledge of how to manage these animals is increasing at a rapid pace. If reproductive disorders are rarely described in private practice or zoo collections, it may be a future common topic in research facilities or some breeding program for conservation initiatives to fight against declining populations.

Reproduction of amphibians includes ovulation, spermiation, fertilization, oviposition, larval stage and development, and metamorphosis. Thus, a problem at any stage could lead to reproductive failure. To stimulate reproduction, environmental conditions have to be arranged to simulate changes in natural habits: raining, cooling, heating, varying photoperiod, varying amount of food, and so forth. Optimal reproduction in captivity of one species is linked to the extensive knowledge of its natural biology (examples in **Table 1**).

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Table 1
Reproductive life history of selected species of amphibians

Family	Sexing	Life History, Habitat	Reproduction Biology
Fire-bellied toad (*Bombina bombina*, Bombinatoridae)	Male has resonators, a slightly larger head, and, during the breeding season, black nuptial pads on the 1st and 2nd fingers and on the inner surface of his forearm	Eurasia. Temperature usually at 18–20°C. Activity in the daytime, but the maximum calling by males occurs at dusk Tadpoles consume mainly algae and higher plants; lower animals frequently are eaten. Adults consume mainly various insects	Breeding season: May to the end of summer. Male vocalizes floating on the water surface (also able to call from under the water). Amplexus is pelvic
Toads (*Bufo* sp, Bufonidae)	Male differs from female in having nuptial pads on 1st finger (during the breeding season on 1st, 2nd, and/or 3rd fingers), smaller body size and in some body proportions	Eurasia. Active mainly in twilight. Adults are voracious and eat wood lice, slugs, beetles, caterpillars, flies, earthworms, and even small mice. They need spacious terrarium (100 L for a pair of *B bufo*), deep litter of leaf and important hygrometry maintained by vaporization. Temperature never above 23°C	Breeding season: March to June (usually late April to May). No vocalization. A few males often clasp one female, and in many instances several males try to clasp the same female. Amplexus is pectoral
Dendrobates (*Dendrobates* spp, *Phyllobates* spp, Dendrobatidae)	Difficult; sometimes variation in colors	Central and South America. Need a terrarium from at least 60 cm × 40 cm × 40 cm for 4 animals maximum with high temperature (26–28°C) and hygrometry (near 100%). Diet with small arthropods: drosophilas, micro-crickets, plant louses, ants, termites, very small insects	Diurnal, they lay eggs on land. Males are highly territorial (vocalization, wrestling competitions) and display cephalic amplexus (grasping the female around the head during mating, unique among anurans). Example in *Dendobates tinctorius*: Mating behavior starts with the male calling. The male then leads the female to his chosen spot, where a clutch of 2–6 eggs are laid. The eggs hatch within 14–18 d, and the tadpoles are carried to water pools within a plant leaf by both the female and the male

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