CAPTIVE MANAGEMENT, HUSBANDRY AND MEDICAL MANAGEMENT OF BOMBINA SPECIES OF FROGS

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Abstract: There are four species of Bombina frogs: The oriental fire-bellied toad (*Bombina orientalis*) from Korea and northeastern China, the European fire-bellied toad (*Bombina bombina*) from central Europe and Turkey, the yellow fire-bellied toad (*Bombina variegata*) found in an area from central Europe to the Carpathian Mountains, and the Asian giant fire-bellied toad (*Bombina maxima*) which ranges from the Himalayas into western China. All four species are members of the Discoglossidae family, and are found only in the old world. Sizes range up to 4.5 cm for the first three species and up to 7.5 cm for the Asian giant fire-bellied toad.

The oriental fire-bellied toad is the species most commonly offered by the pet trade and kept by hobbyists. However, all species of Bombinas are easily cared for, and can live up to 12 years in captivity.

Bombinas have a typical frog shape with a flattened and stocky body. Females tend to be larger and more smooth-skinned than the males. All species of Bombinas have vividly colored ventral surfaces. In the Asian giant species, males are easily identified by the presence of a large nuptial pad on the first digit of each front foot. This pad is present throughout the year, and not just during the mating season as is typical of some other species of frogs.

The skin of Bombinas contains substances that can be irritating and toxic to other animals either by ingestion or through direct contact. Because of this, Bombinas should not be housed with other frogs or pets. Children and adults should be instructed to wash their hands thoroughly after touching a Bombina. As a warning, newly captured Bombinas will often expose their colorful underbelly (Unken reflex) by arching their backs and lifting up their legs when perceiving a threat. Frogs that have been kept in captivity for a longer period of time rarely demonstrate this behavior.

Bombina species are best kept at room temperature, approximately 18° to 24°C (64° to 75° F). Temperatures in excess of 54° C (80° F) can induce heat stress and should be avoided. No external heat source is necessary if the frogs are housed indoors. An ultraviolet B lighting source is beneficial and aids in calcium metabolism. Providing a photoperiod of 12 to 14 hours works well for most species. Frogs can be successfully housed in either very simple aquaria or be kept in more elaborate and naturalistic vivaria. Enclosures should always have a tight-fitting screen cover, as these frogs can escape through even a very small opening.

Enclosures should contain equal areas of land and water. The water should be shallow, as Bombinas are not especially good swimmers. (It should be less than 5 cm deep for

the smaller species, and 10 cm deep for the giant Asian species.) Real or artificial plants should be placed in the water to break the surface, so the frogs are able to easily exit their pond. Water should be changed frequently, even if a filtration system is used, and should be free of both chlorine and chloramines. Bottled spring water is usually a good choice. Land areas should include hiding sites, and can be made up of equal parts gravel, peat moss, and sphagnum moss. The overall design of the enclosure should accommodate easy cleaning and water changes.

In captivity, Bombinas should be fed a variety of invertebrates and occasional feeder fish such as guppies. The frogs feed both on land and in water. Crickets, waxworms, mealworms, silkworms, fruit flies, and earthworms are all suitable food items. To ensure proper nutrition, these food items should be dusted with a vitamin-mineral supplement prior to being placed in the enclosure. Also prior to being placed in the Bombina enclosure, the insects should be gut-loaded with vegetables high in beta carotene; failure to do so will result in the gradual fading of the their vivid ventral coloration.

Breeding Bombinas is possible in captivity. A cooling period of six to eight weeks followed by a gradual warming will usually induce the frogs to breed. Eggs are attached in small groups to water plants, and number fewer than 100 per spawn in all species. Eggs hatch in five to seven days and metamorphose in five to six months. The tadpoles are cannibalistic, and therefore should be housed in small numbers in ponds with enough plants to provide food and shelter. Feeding tadpoles color-enhancing tropical fish foods will ensure natural ventral color development, as will vegetables high in beta carotene. Post-metamorphosis, adult size is reached in 18-24 months.

Artificial stimulation of breeding is possible with the use of human chorionic gonadotropin, although natural breeding is usually much more successful in producing healthy offspring in greater numbers. Injection of 100 to 300 IU of the HCG into the dorsal lymph sac of each sex will usually stimulate amplexus and egg production within 10-12 hours.

Bombinas are generally very healthy, and demonstrate few medical problems. Wild-caught individuals usually arrive in amazingly good condition. If fecal flotations show internal parasites, deworming with appropriate anthelmintics is usually adequate. Rostral abrasions are easily treated with systemic antibiotics and the application of topical antibiotic ointments (ophthalmic ointments have worked well in the author's experience). Affected individuals should be segregated from others until health problems are resolved.

Hypocalcemia can occur if food items are not properly fortified with vitamin-mineral supplements. This condition is especially evident when metamorphosis occurs, as the need for adequate calcium is imperative to achieve proper bone formation.

Bombina frogs make excellent amphibian pets. They are attractive amphibians that are active, hearty and diurnal, and require little specialized care or equipment to maintain in captivity.

Keywords: bombina, *Bombina spp.*, fire-bellied toad, *Discoglossidae* husbandry, care

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