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Bufo marinus (amphibian)

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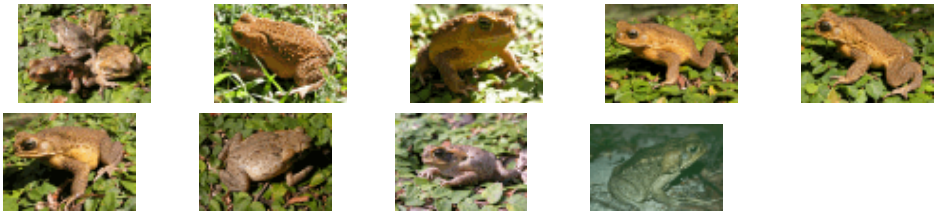

Taxonomic name: *Bufo marinus* (Linnaeus, 1758)
Synonyms: *Bufo agua* Clark 1916, *Bufo marinis [sic]* Barbour 1916, *Bufo marinus marinus* Mertens 1972, *Bufo marinus* Mertens 1969, *Bufo marinus* Schneider 1799, *Bufo strumosus* Court 1858
Common names: Aga-Kröte (German), bufo toad, bullfrog, cane toad (English), crapaud (Caribbean), giant American toad (English), giant toad (English), kwapp (Caribbean), macao (Dominican Republic), maco pempen (Dominican Republic), Maco toro (Dominican Republic), marine Toad, Suriname toad
Organism type: amphibian

The cane toad, Bufo marinus was introduced throughout the world as a biological control for various insect pests of sugarcane and other crops. It has become a pest in its introduced range. It will feed on any organism available. It preys on and competes with native amphibians for food and breeding habitat.

Description
B. marinus is a heavily built toad with short legs. It can grow upto 15cm long sometimes. Fingers lack webbing, but the toes are heavily webbed. Adults have a rough, warty skin, coloured tan, brown or dark brown, dull green or black. The tympanum is distinct, about one half to two thirds the size of the eye.Venom glands are widely distributed around the surface of the skin, but can also be aggregated together to form large parotoid glands, found on each shoulder. these glands are able to ooze venom. (Gautherot, 2000)
Eggs are laid in long strands. Tadpoles are between 10 and 25 mm in length. The body and tail is dark brown or black (Lever, 2001). The male's mating call is a high pithched 'brrrr' resembling the sound of the dial tone of a telephone.(Gautherot, 2000)

Occurs in:
agricultural areas, disturbed areas, lakes, natural forests, riparian zones, urban areas, water courses, wetlands

Habitat description
The original habitat before its dispersal by humans was subtropical forests near fresh water. The species will be found in rain forests both in its native range and in its introduced range like in Hawii and New Guinea, though not at high densities. (Fred Kraus pers.comm). However, they can now be found in many places such as man made ponds, gardens, drain pipes, debris, under

cement piles, and junk beneath houses. Cane toads will usually stay on dry land; and reproduce in any shallow water near its surrounding. Toads and tadpoles are able to tolerate very high levels of salinity. Tadpoles have been observed in water metres from the open ocean.

General impacts
Hinkley (1962) considered that cane toads will eat “almost any terrestrial animal”, although they are more likely to consume those active at ground level during the night. Covacevich and Archer, (1975) in their paper on the effects of the cane toad on indigenous verteberates in Australia state that snakes like the carpet python, the black headed python, death adder and some other snakes have been found dead with the cane toad in their mouths or guts. Studies in Australia where the range of the cane toad is ever expanding have shown that *B. marinus* plays an important role in structuring native anuran communities (Crossland, 2000) *via* direct and indirect mechanisms and is thus a threat to the survival of native Australian fauna (Catling,P.C *et al*.2003).

Toads have been implicated in the decline of populations of monitor lizards in Guam (Jackson 1962, Dryden 1965). Pernetta and Watling (1978) consider that the toads do not interact with native frogs because they use different habitats; the frogs are either along stream banks or in the foliage of dense forest. Villadolid (1956) found rats and mice in stomachs of toads in the Philippine Islands. Hinkley concluded that this toad is “economically neutral” because it consumes both “harmful” and “beneficial” invertebrates. No proper studies of the effects of cane toads on native fauna appear to have been made (SPREP, 2000).

Secretions from the parotoid glands are produced when the toad is provoked or localised pressure is applied to it, such as a predator grasping the toad in its mouth (NRM, 2001). The toxic secretions are known to cause illness and death in domestic animals that come into contact with toads, such as dogs and cats, and wildlife, such as snakes and lizards. Cane toads are able to squirt the toxic secretion over a metre when threatened (Lever, 2001), causing extreme pain if rubbed into the eyes (NRM, 2001). Human fatalities have been recorded from the cane toad, following ingestion of the eggs or adults (Lever, 2001) and there is a risk to children from their toxin. Cane toads are often seen as a nuisance in urban areas, as their calls can keep people awake.

Uses
Bufotenine toxin produced by *B. marinus* is used as an aphrodisiac and hair-restorer in Japan. In mainland China it is used to lower the heart rate of patients undergoing cardiac surgery (Musgrave, 1996). The toxin is also used by South American Indians to add to hunting arrows. The toxin has and is sometimes used as a narcotic by some people. (Lever, 2001).
Cane toads used to be used for pregnancy testing in humans. A woman's urine is injected subcutaneously into the lymph glands of a male toad, resulting in spermatazoa becoming present in the toad's urine if the woman is pregnant (Berra, 1998 in Lever, 2001).

Notes
Hinkley (1962) concluded that this toad is “economically neutral” because it consumes both “harmful” and “beneficial” invertebrates.
Similar species belong to the genus *Pseudophryne*. They have a warty skin and short legs and are usually dull brown or purple, they however dont have venom glands and just like the cane toad they prefer to walk.

Geographical range
Native range: Cane toads are indigenous to northern South America (Argentina, Bolivia, Brazil, Ecuador, Colombia, Paraguay, Venezuela, the Guianas, Peru, Trinidad and Tobago), Central America, and Mexico northward to extreme southern Texas.
Known introduced range: Most introductions were made as early attempts to use biological control against various beetle pests of sugar cane, banana and other cash crops (Hinkley 1962). Introduced to: Hawai‘i, Puerto Rico, U.S. Virgin Islands, Guam and Northern Mariana Islands, American Samoa, and Republic of Palau: found in much of the Caribbean including Antigua, Barbados, Cuba, Dominica, Grenada and Carriacou Island, Guadeloupe, Grand Cayman Island, Haiti, Dominican Republic, Jamaica (including Cabarita Island), Martinique, Montserrat, Nevis, St. Kitts, St. Lucia, and St. Vincent. In the Pacific Australia, Japan, Papua New Guinea, Philippines, Cook Islands, Micronesia, Fiji Islands, Kiribati, Republic of the Marshall Islands, the Solomon Islands, and Tuvalu.(USGS) Other worldwide introductions include Bermuda, Egypt,

Mauritius, and Diego Garcia of the Chagos Archipelago (Easteal, 1981, 1986; Lever, 2001).

Invasion pathways to new locations
Acclimatisation Societies: Introduced to many locations around the world as a biological control agent for crop pests (NRM, 2001).
Road vehicles (long distance): Cane toads have been transported in Australia by large freight trucks or 'road trains' (Sydney Morning Herald, 2002).
Seafreight (container/bulk): Cane toads have been found on Norfolk Islands
Self-propelled: Cane toads have spread over large areas of Australia under their own power (Lever, 2001). In the north of their Australian range (on the invasion front), dispersal is primarily effected by adults hopping large distances (up to about 55km per year), in relatively straight lines. Cane toads in northern Australia are thus the fastest moving anurans yet recorded.
This remarkable dispersal ability appears to be the result of strong selection operating on toads in the invasion front over the last seventy years (Philips *et al.* 2006).

Local dispersal methods
Road vehicles: Cane toads have been transported in Australia by large freight trucks or 'road trains' (Sydney Morning Herald, 2002).
Self-propelled (local): Cane toads have spread over large areas of Australia under their own power (Lever, 2001). In the north of their Australian range (on the invasion front), dispersal is primarily effected by adults hopping large distances (up to about 55km per year), in relatively straight lines. Cane toads in northern Australia are thus the fastest moving anurans yet recorded.
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Water currents: Free-swimming tadpole stage liable to be swept away during flash floods.

Management information
Preventative measures: The main controls on the spread of cane toads in southern Australia are quarantine checks and public awareness and response. One publicity campaign on the north coast of New South Wales resulted in 100 people collecting more than 900 cane toads.

Physical: Toads can be excluded from garden ponds and dams by a 50 cm high barrier such as an thick hedge or a wire mesh fence. Toads may be killed humanely by putting them inside a plastic bag or container and placing them in a freezer (Brandt and Mazzotti, 1990).

Biological: The CSIRO Division of Wildlife and Ecology was assessing the pathogenicity and specificity of viruses against toads in 1994. Current researchers and control experts: Alex Hyatt/Brian Green, CSIRO Animal Health Laboratory, Geelong, Victoria, Australia (SPREP, 2000). Scientists at the CSIRO Animal Health Laboratory in Victoria have been searching for biological controls of cane toads and in 2001 they began investigating gene technology as a mechanism of control. Environment Australia have launched a project for the development of a cane toad biological control. The aim is to develop a self disseminating viral vector to disrup the development of the toad. Scientists at the University of Adelaide have isolated a sex pheromone in a native Australian frog; they hope that a similar pheromone will be found in cane toads and that it could be used to disrupt their breeding cycle. These are long term solutions.

Nutrition
Hinkley considered that cane toads would eat “almost any terrestrial animal”, although more likely to consume those active at ground level during the night. The major items of diet are insects, including grass-hoppers, caterpillars, and ants, together with millipedes and landsnails (Hinkley, 1962 in SPREP, 2000).

The cane toad is opportunistic in its feeding habits and will consume almost anything that it is able to catch (Zug and Zug, 1979 in Lever, 2001). Terrestrial arthropods make up the bulk of the diet, but snails, crabs, small vertebrates (mammals, birds, lizards and frogs), pet food and human faeces may also be consumed (Lever, 2001). Cane toads will gorge themselves if food is in abundance. Unusual items that cane toads have been observed eating include rotting garbage, a coral snake (*Micrurus circinalis*), fledgling birds and a lit cigarette butt (Lever, 2001).

Reproduction
Cane toads breed between the months of April and September in the Northern

Hemisphere.They can be heard as they call their mates beginning in late March.In the Southern Hemisphere, in Australia it has been noticed that the male calls in any month of the year, peaking during the wet season. Every year each female cane toad produce two clutches of about 8,000 to 35,000 eggs. The eggs are externally fertilize by the male's sperm. These eggs can be found floating on the surface of water in a jelly-like string or also wrapped around vegetation and other debris in the water. Age and size of the female will determine how many eggs the toad will produce (Honolulu Zoo).

Lifecycle stages
Within 24 to 72 hours (1-3 days) the eggs will hatch and form a school of tiny shiny black tadpoles. The rate of the tadpole's growth depends on the temperature of its habitat and the food availability. It has been estimated that only 0.5 percent of the cane toads survive to maturity. It takes a year to reach the maturity and they are about 75 mm. long. Cane toads are estimated to live 10-40 years. (Honolulu Zoo)

This species has been nominated as among 100 of the "World's Worst" invaders

Reviewed by: Anon

Principal sources: Lever, C. 2001. The Cane Toad: the history and ecology of a successful colonist. Westbury Publishing, West Yorkshire. 230pp.
Gautherot, J (2000) *Bufo marinus*. 2001 James Cook University.

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