

## Behaviour of a common cobra (*Naja naja*) stranded in a well

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The common cobra (*Naja naja*) is widely distributed in India and a frequent cause of snakebite mortality. The species is active both at night and during daylight hours and is mostly terrestrial in habit. It has been reported to be a good swimmer although to date there is no record of how long the species may remain underwater.

During a visual survey undertaken with an Irula snake catcher in a rice paddy field near Mahabalipuram, Tamil Nadu, India (12°42'18" N, 80°8'27.6" E), at around 11.10h on 27 March 2011, a girl in the village drew our attention to an adult cobra that had fallen into a well (Fig. 1). The well was at ground level, with no parapet, and had an estimated depth of 9 m. The water surface was 1.5 m below ground level.

According to the villagers, the snake had been confined in the well for five days and had failed to escape despite several desperate attempts. Throughout this period the snake was either fully or partially submerged. When we saw the snake floating on water, the ambient air temperature was 42°C and relative humidity 40%. While the snake catcher made a rescue effort, the snake submerged and remained underwater for 45 minutes. The depths to which it submerged ranged from 1 cm to a depth where it was no longer visible. The snake was found to position itself more vertically than horizontally, in the water column (Fig. 2). During this period, it surfaced only twice and breathed for a maximum of two minutes after remaining submerged for approximately 20 minutes on each occasion. Subsequently, the snake resurfaced and began looking for possible resting places, in particular ridges along the wall. At this point, it was rescued in response to repeated requests from the villagers who needed access to the well. The snake appeared to be in sound health when rescued and was an adult measuring 137 cm; on average adult cobras grow to 150 cm (Whitaker & Captain, 2004).

Various snakes that are either aquatic or semiaquatic show specific morphological and physiological adaptations to aquatic environments (Seymour, 1982; Lillywhite & Ellis, 1994; Aubret, 2004; Brischoux & Shine, 2011) that make them potentially better divers than terrestrial species (Brischoux et al., 2011; Lillywhite et al., 2012). However, even within species there may be distinctly different capabilities. Individuals of two disjunct populations of Australian tiger snake (*Notechis scutatus occidentalis*), one that seeks prey in water the other not, have very different capacities for holding their breath before resurfacing from

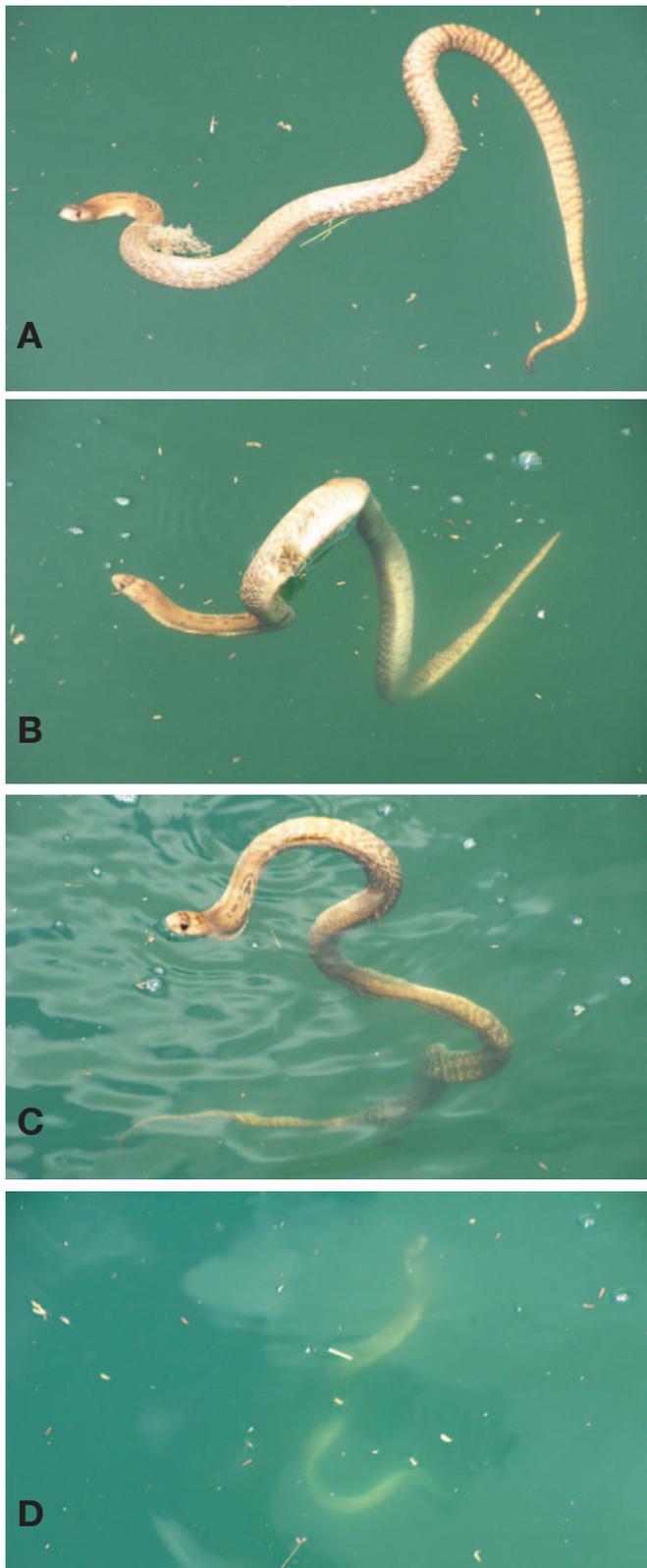


**Figure 1.** *N. naja* floating inside a well in a farmland. The large diameter well made at ground level is typical for the study area in Tamil Nadu.

a dive, i.e. they differ in their apnoea score (Aubret et al., 2007). Viperid snakes, even though largely ground-dwellers, show cardiopulmonary characters similar to those of aquatic snakes giving them the potential to perform well in an aquatic environment (Lillywhite & Smits, 1992); this is supported by two reported instances of underwater breath-holding behaviour in *Trimeresurus malabaricus* from India (Bhaisare & Pelling, 2015). The current observation makes it clear that the common cobra has considerable ability to dive and even at relatively high temperatures can remain without breathing for lengthy periods.

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**Figure 2.** Sequences of submergence (A-D) in *N. naja*. The body was aligned rather vertically during gradual movement under water.

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