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Caiman crocodilus Does Not Require Vision for Underwater Prey Capture

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In a recently completed study of vision of six species of crocodilians (including *Caiman crocodilus*) Fleishman et al. (pers. obs.) showed that the eyes focus very poorly underwater, but are well suited for vision in air. This led us to ask the question of whether crocodilians require any visual input at all in capturing prey underwater.

On the night of 24 April 1986, three juvenile *Caiman crocodilus*, ranging in length from 12 to 18 cm snout to vent were captured from Gatun Lake, Panama. Each was placed in a separate 26 × 52 cm aquarium filled to approximately 6 cm depth with water. Three days after their capture we darkened the room in which they were kept by sealing all windows and light emitting cracks with black plastic, such that with room lights extinguished, in broad daylight, nothing was visible within the room (to a human observer), even after 10 min or more of acclimation to the dark. We then performed the experiments described below at night, with all nearby light sources extinguished, thus assuring total darkness. At 2000 hr we introduced four fish (*Astyanix*-like characins) 2–4 cm in length to each aquarium, immediately covered each tank, extinguished the room lights and left the room. We returned 3 hr later and counted the fish remaining in each tank. In one tank all four fish had been eaten, in one tank three had been eaten, and in the last, two fish were eaten. This is a simple and unequivocable demonstration that caiman can capture prey in the total absence of visual cues.

One of our captive caiman would feed readily in the presence of a human observer, and we used it in the following feeding experiment. A device was rigged that allowed us to suspend a small piece of mashed fish from the end of a thread into the water next to the jaw of the caiman. The food item could then be moved up and down gently by 2 cm, with little or no movement in the horizontal plane. In each experimental trial the food item was suspended 1.5 cm perpendicular distance from the long axis of the snout, midway between the eye and the tip of the snout, and at a depth even with the line of the jaw. While positioning the food the caiman made no attempt to snap. We then waited 30 sec and began one of three trials: (1) the food remained motionless, and the room lights remained on, (2) the food was steadily moved up and down and the room lights remained on, and (3) the room lights were extinguished, and the food item was moved up and down. In each case we timed the delay until the caiman grabbed the food item (this involved a vigorous snap with the jaw which was clearly audible). If no snap occurred within 2 min the trial was ended. The caiman usually remained motionless for the duration of the trial, but if it shifted position the trial was discarded. Ten trials were conducted for each case.

The results were that the caiman never snapped at the motionless food item. It snapped at, and ate, the moving food item 7 of 10 times with a median delay of 73 sec with the lights extinguished, and 6 of 10 times with a median delay of 85 sec with the lights on. There was no significant difference between the delay, for moving food, in light versus dark ($P > 0.05$, Mann Whitney U-test).

The results of the second experiment must be regarded as tentative since only one individual was involved. They suggest, however, that the presence of visual cues does not enhance the feeding response. Motion appears to be necessary to elicit feeding. The likeliest sensory stimulus for feeding, in this case, was tactile stimulation by the moving water. There are several anecdotal accounts of crocodilians being attracted to, or even snapping at, splashing or dripping on the water surface (Lazell and Spitzer, 1977; Webb et al., 1978). In addition, olfactory cues cannot be ruled out as potentially important.

Several authors have noted the apparent lack of importance of visual cues for underwater feeding by crocodilians (Neill, 1971). Schaller and Crawshaw (1982) found that feeding efficiency was nearly the same in clear versus turbid water in free-living *Caiman crocodilus*. Here we present the first conclusive evidence that a crocodilian can feed underwater in the total absence of visual input. Crocodilians do feed in the air and in these cases visual input probably is quite important (e.g., Charbreck and Dupuie, 1976; Dugan et al., 1981; Schaller and Crawshaw, 1982).

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