

A Crocodile's Touch: Tactile Communication in Humans and Crocodiles

by Mackenzie Kelley

Part 1: Touch Sensitivity in Crocodiles

Very few people would describe a crocodile's external coating as "delicate" or "sensitive." The appearance of a crocodile's rough, scaly skin usually adds to its reputation as a fierce, mean reptile. However, research has discovered that a crocodile's skin is covered in ultra-sensitive bumps that are actually more receptive than human fingers. The thick, rugged armor of crocodiles certainly protects the animal from predators and is useful in other processes like absorbing heat. Yet, research has found that crocodile skin may have a much greater purpose than scaring off predators, particularly with communicating and sensing movement and pressure in the water. This discovery has revealed a new meaning in crocodile interaction and the importance of touch to this species, which could explain some motives behind human touch as well. The sense of touch in crocodiles, like humans, is an integral part to the species' survival and communication. Studying tactile communication in crocodiles could provide new understandings about the important role of nonverbal, tactile communication in humans and how the significance of touch crosses many species.

To discover just how sensitive crocodile skin is, Duncan Leitch, a student at Vanderbilt University, studied both crocodiles and alligators. Crocodiles differ from alligators in regards to touch in that their entire bodies are covered with sensitive bumps, whereas alligators only have them on their snouts (Fischer). According to Leitch, crocodiles have around 9,000 of these tiny bumps, called integumentary sensory organs, covering their bodies. The purpose of these bumps was largely unknown to scientists until it was recently discovered that the bumps were filled with nerve endings.

According to *National Geographic* reporter Shannon Fischer, writing on the findings of Leitch's crocodile research, "The spots contained touch receptors tuned specifically to pressure and vibration, plus a host of raw nerve endings" (Fischer). In his studies, Leitch used tiny, hair-like wires called von Frey filaments to test crocodiles' sensitivity. He found that crocodiles could feel light touches that humans were unable to detect with their own skin. Although Leitch's and other scientists' research has revealed this function behind crocodiles' bumpy skin, less is known about *why* crocodiles are equipped with such hypersensitive skin.

Nevertheless, Leitch did have some ideas behind crocodiles' unique touch characteristics that could explain the evolutionary presence of the skin domes. One of those reasons is an essential part of any species' means of survival in the wild--protection from predators. Scientists have long believed crocodile skin has protective qualities because of its scary and fierce appearance. However, they did not realize the extent to which crocodiles' skin provides protection until now. Fischer reported in *National Geographic*, "Croc dots . . . could detect ripples from even a single drop of water and therefore even very weak prey movements" (Fischer). The extreme sensitivity

to vibrations in the water allows crocodiles to detect potential predators' movements from far away. Just as human skin can perceive the difference between "good" touches and "bad" touches that could be harmful, so too does crocodile skin detect "safe" and "threatening" pressures and vibrations in the water.

Another purpose of the crocodile's touchy hide is to detect food and prey. Feeling for movement in the water is also helpful for stalking prey in addition to sensing predators. Fischer states, "The animals use their mouths to feel for and snap up food" (Fischer). In fact, Leitch discovered in his research that the nerve systems in the bumps flow to a certain nerve in the crocodile's brain that is connected to the motions of eating, chewing, and swallowing (Fischer). These findings point to an interesting drive behind the sense of touch, specifically for eating.

However, what is perhaps the most interesting and least understood use of touch in crocodiles is as a means of communication with other crocodiles. Most notable are the touches associated with mating. Crocodiles are known for having fights and growling matches to win females and assert dominance. Yet, despite this aggressiveness, crocodiles are also affectionate animals and often attempt to show their warmth through touches during mating. A male crocodile will rub against the female, "to see if she will return the affection or not" ("Crocodile"). In fact, both males and females will rub against each other to diminish their ferocious impression on the potential mate in the hopes he or she will respond to its advances. In addition to this, snout rubbing is often used as a sign of submissiveness from one individual to another. A crocodile will rub its snout against that of another crocodile to show that it recognizes the other's dominance ("Reproduction").

Part 2: Connecting the Role of Touch in Crocodiles and Humans

Studying the communication behaviors of crocodiles can provide insight into similar communication patterns found in humans. Since crocodiles have no vocal cords, unlike humans, they have adapted to rely much more heavily on their other sense of touch to communicate. Researching communication in species without vocal cords can demonstrate the importance of touch for other species, such as humans, that use vocals as a primary means of communicating. Despite humans' large dependence on the use of language to communicate, touch is also a major component in human interaction and can affect our emotional and physical health. Studies have shown that touch can reduce symptoms of stress, depression, Alzheimer's, and even autism.

Of all the major motives for touching among humans, one of the primary reasons is to demonstrate compassion or love. Dr. Dacher Keltner, a professor of psychology at the University of California, Berkeley, has examined how touch affects humans and, especially, expresses compassion toward others. In his own research, Keltner conducted an experiment where he separated two individuals on opposite sides of a wall except for an opening for one individual's hand. The person with his or her arm through the opening would receive touches from the other person that represented an emotion, and the individual would then have to guess what emotion was being conveyed through that touch (Keltner). According to Keltner's findings, "The odds of guessing the right emotion by chance were about eight percent. But remarkably, participants guessed compassion correctly nearly 60 percent of the time" (Keltner). Other emotions that were often guessed correctly were gratitude, love, anger, and fear, with a rate of over 50 percent.

Interestingly, these most recognizable emotions sensed through touch parallel the types of touch used by crocodiles in the wild. As mentioned, crocodiles use a relatively abundant amount of touch both during and before mating practices. The rubbing of a crocodile against another to reduce aggressiveness and increase mating suitability can be compared to humans' tendency to touch as a sign of intimacy and compassion. Human touch is much more frequent between emotionally close individuals, which is also similar to crocodiles because they are more inclined to touch when attempting to become close with another crocodile.

Another notable similarity between crocodiles' and humans' use of touch is with their offspring. In humans, touching infants can produce significant health and growth benefits. Although touching is such a necessary part of taking care of babies, adult humans may not realize the significant effect of touch on newborns. In fact, parents so frequently touch their infants naturally in the course of a day that they may not even think to purposefully touch them in order to enhance development. Touch researcher Tiffany Field claims, "... that preterm newborns who received just three 15-minute sessions of touch therapy each day for 5-10 days gained 47 percent more weight than premature infants who had received standard medical treatment" (Keltner).

Crocodiles, like humans, seem to possess an innate understanding of touching newborns in order to take care of them. As soon as a mother crocodile realizes her eggs are hatching, she may help the hatching process by gently cracking the eggs with her mouth so the newborns can escape easily. In addition, a crocodile mother will carry her newborn babies in her jaws to the water where they will remain close to her for months ("Reproduction"). Throughout the time that the newborns surround the mother, constant touching occurs. A mother will carry her baby on her snout or back, or remain near them to guard against predators. One explanation for crocodile mothers' intense care for their young may be the low survival rate of baby crocodiles, which is only about one percent. Since environmental predators, including other adult crocodiles, are such a large threat to crocodile babies, mothers may have evolved a sense of protection in order to ensure the survival of the species.

However, with new knowledge of crocodiles' heightened touch sensitivity, research may prove that touching among crocodiles could more likely be for communicative purposes. Mothers of many animal species exhibit protective instincts over their young, but not all express touch in the same ways. Surely, if a mother crocodile needed to protect her young, remaining within close range to them would suffice. Nonetheless, crocodiles' innate sense of touching also implies that touch carries a greater meaning in raising their young, perhaps even as a portrayal of love and compassion similar to that of humans.

As a rhetorical device, touch can be quite a persuasive tool. As discussed in crocodile mating, touching among crocodiles can be a decisive factor in whether a male and female will proceed in mating. Likewise in humans, touching can persuade an individual of compassionate feelings held by a significant other, or reinforce vocal expressions of compassion. Moreover, touching of snouts can persuade an aggressive male of another crocodile's submission to him. In human contexts, some cultures recognize bowing their heads to a hand or kissing a hand or foot as a sign of deference or submission. Thus, the importance of tactile communication connects across species.

Crocodiles' acute sense of touch and its similarities to human touch can provide information on how touch affects both humans and animals. Tactile senses seem to have evolved because of the benefits of touch on species' survival, as both a warning of danger and as social communication. The use of touch across animal species illustrates its importance in raising young, showing affection, or serving as a warning to danger, all of which are necessary in most species. The recent discovery of hypersensitive feeling domes on crocodiles, which were previously believed to have tough, callous, and rather non-sensitive hides, sheds new importance on the notion of touch and tactile communication. Humans can undoubtedly learn more about their own use of tactile communication through the examination of its role among other species. Research concludes that language is not the only effective way of communicating, although humans commonly rely on it as such. Instead, touching can perhaps be even more persuasive and can better reinforce certain emotions.

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