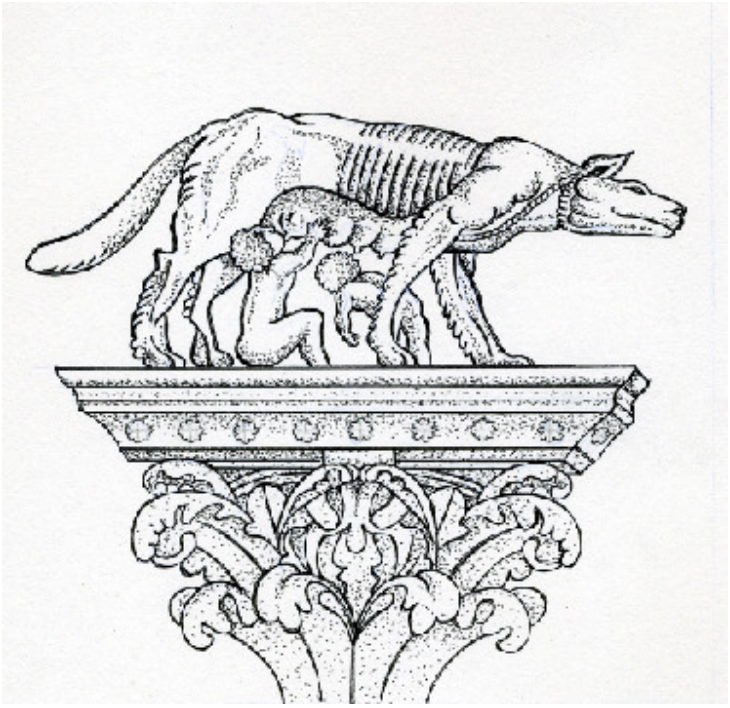

Made for Each Other, The Biology of the Human-Animal Bond

We live surrounded by miracles we call pets. This may seem like a bit of an overstatement when your dog is whining to go out on a cold rainy night or you're writing that fat check to his vet, but it's not. The fact that wolves stopped stalking us and that we took them into our caves proved to be a miraculous leap of faith that changed our world forever. In fact, the animals we can't live without were once creatures impossible to live with. They attacked us or ran from us and we spent the majority of our time hiding from them. So what happened? How did it ever come to this?

Just 30 years ago, scientists began to uncover the biological forces that inspired some humans to see friendship in the eye of the wolf and coaxed some

wolves to enter our dens. This biology of affiliation—the tendency to want to be near and attached to others—is only now beginning to be understood. The most powerful and prominent biological agent in this newly identified social brain network is a hormone named oxytocin. Oxytocin was first known as a pituitary hormone that causes labour contractions and breast milk ejection, two crucial reproductive feats that earned it the label of a "female hormone." It was not until the end of the 1970s that scientists realized that oxytocin nerves and receptors can be found in all the key brain centres that control bodily functions, emotion and behaviour.

This recognition of oxytocin's wide neural reach prompted researchers to investigate what role it might also play in the creation of maternal behaviour and other forms of social bonding. In rats they found that injections of oxytocin made virgin females want to care for rat pups, rather than avoid or kill them. In sheep they discovered that oxytocin produced during labour causes ewes to recognize and claim their lambs. Without this cognitive awakening, a mother sheep will not feed or protect her newborn. In prairie voles, oxytocin was discovered to not only promote parental nurturing; it creates life-long pair-bonds between mates. Male rats that normally avoid or attack each other, approached and remained in each other's company when treated with oxytocin.

Humans are also susceptible to oxytocin's socializing and nurturing influence. A study of nursing mothers, who naturally produce high levels of oxytocin, found that the mothers who reported feeling the calmest, least aggressive, most gregarious, and most attuned to the expressions and sounds of their infants were those who had the highest blood levels of oxytocin. A later study of men who were treated with oxytocin found that it increased their interest in looking at eyes in pictures of faces. After inhaling oxytocin men were also better able to discern the even the subtlest emotional eye expressions than men who were not given oxytocin. In economic studies that measure trust, generosity, and altruism, male participants who inhaled oxytocin proved to be more trusting

and more trustworthy than subjects who inhaled a placebo. Oxytocin can even relieve some of the anti-social tendencies of autism.

The more deeply scientists look at this brain hormone, the more they are able to see how oxytocin, either directly or by interacting with other key brain chemicals, is able to produce these socializing shifts in behaviour and emotion. Brain-imaging studies show that oxytocin can shut down the amygdala—the main fear centre in the brain. It can also inhibit the arousal and stress brain networks that produce the defensive, aggressive behavioural reflex called "fight/flight." In its place, oxytocin creates a calmer, anti-stress condition where heart rate, blood pressure, and stress hormone levels are lowered. This anti-stress state promotes social curiosity, urges us to connect, and allows us to relax in one another's company.

This "calm/connect" response is essential to the survival of social mammals so it makes perfect evolutionary sense that it is released through all sorts of nurturing and friendly sensory stimulation. The sight, sound, or smell of her baby will trigger an oxytocin reaction in a mother urging her to lift the child to her breast to receive the milk oxytocin delivers. The baby's suckling further stimulates the breast nerves that trigger more oxytocin production, keeping a mother's milk and love flowing. Other positive tactile and sensory interactions such as hugs, sex, massage, even the sight of a loved one will produce oxytocin and its many calming, connective responses. And because this chemical is made in the brains of all mammals, the same sorts of nurturing, friendly intentions, expressions, and forms of contact, can cause it to flow across the species barrier.

A study at Sweden's Karolinska Institute showed that gentle human contact could trigger an oxytocin reaction in animals. Rats stroked by lab assistants 40 time a minute for five minutes, raised the rodent's oxytocin blood levels and lowered their blood pressure and stress chemistry. The rhythmic touch

also increased their tolerance for pain and lulled them into relaxation. All these reactions were also produced by injections of oxytocin.

It would be another 6 years before South African researchers, Johannes Odendaal and Roy Meintjes, would finally prove that the oxytocin-effect worked both ways. They measured the blood chemistry of people before, during, and after they interacted with dogs and found that in both human and animal, the levels of oxytocin and the “feel-good” neurotransmitter serotonin almost doubled. This last summer, a team of Japanese researchers lead by Miho Nagasawa, showed that mere eye contact with a dog can raise oxytocin blood levels of their owners.

By proving that social contact with animals raises oxytocin and serotonin levels we now have identified two critical neurobiological components that can explain how humans and animals co-created the interspecies social bond called domestication. When humans began to keep animals, we inadvertently created a powerful chemical feedback system that changed our hearts and minds. This is the biological synergy that brought humans and animals together and is still flowing through hundreds of millions of pets and their owners all over the world today. It is also the biological reason that animal companionship and animal-assisted therapies produce powerful physical and psychiatric effects.

Oxytocin offers potent cardiovascular protection while enhancing our ability to create social bonds with both human and animal companions that further protects us from heart disease. Oxytocin has also proven to be a powerful anti-oxidant capable of treating deadly sepsis infections. It is not surprising then to learn that the major pharmaceutical companies are working to create a safe and effective drug to harness oxytocin’s many healing powers. However, that goal may take years or decades to reach, if ever. In the meantime, we have an immediate, potent, safe, and inexpensive way to boost our oxytocin system sitting at our feet.

We now have, for the first time, a scientific explanation of why animals can love us, why we can love them, and why that love is so good for everyone it touches. Exposing the humble molecular roots of the human-animal bond does not diminish or reduce its life-changing powers, but opens them up to a new level of exploration and admiration. This is science that supports a truth our heart has always known.

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Reference:

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Meg Daley Olmert is a documentary television producer who has created and written programs for *National Geographic Television, The Discovery Channel,* and *PBS*. In 1992, while developing a series on the nature of the human-animal bond, she was asked to join a research team studying the neurobiology of bonding headed by Dr. Carol Sue Carter of the University of Maryland and Dr. Kerstin Uvnas-Moberg of the Karolinska Institute in Stockholm. Her collaboration in this scientific endeavor resulted in her highly acclaimed book, *Made For Each Other, the Biology of the Human-Animal Bond*, which was published by DaCapo Press in February. She and her husband live on the eastern shore of Maryland with their kayaking cats.