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The Sixth Sense

You may think it's hocus pocus or a gift only given to few, but we all have a sixth sense. And thanks to US bio-psychologist Martha McClintock, we now know it sits right up your nose

by Rachel Louise Snyder

You probably remember the amazing story of menstrual synchronicity, and how it was first detected (but just in case you don't... the principle is that when a bunch of women live or work together in a close environment for some time, their menstrual cycles synchronise). The woman who discovered this, Martha McClintock, 54, is as famous in the US as her story is worldwide. Why? Because what began in a college dorm on a small campus in New England has now become a quest for the sixth sense which the whole world is watching.

And it all started in the nose. Not only does this humble organ process smells, but it may also be the home of our sixth sense - that weird phenomenon we think of as intuition that enables us to read our partners' minds, or sense that our children are in trouble without saying anything. Director of the University of Chicago's new Institute for Mind and Body, McClintock is a tall, thin blonde with eyes as teal as the coat she wears. She earns grants and awards the way Marion Jones earns gold medals. She's just as clap-your-hands-and-holler happy when one of the dozen students she mentors discovers that, say the inflammatory cell response in some isolated rodent has behaved according to theory, as when the National Science Foundation plops a cool $2 million dollar grant on her lap to build herself a new lab.

But what exactly is she searching for? McClintock explains: 'We are interested in thoughts and wishes and fantasies and motivation and tension and all those rich aspects of the mind and how they interact with biology.' Her lab is essentially a foray into biology-meets-psychology - a combination that's never been seen before. It's hard to keep a count of the experiments going on at any given time, but among the current batch are projects on pheromonal signals and mood swings in humans, loneliness in rats, and whether or not rats have chi. Before you say chi my eye,

bear in mind McClintock was able to persuade the University of Chicago to allow a 11 million dollar lab just for her.

It all began nearly 30 years ago when, as a psychology undergraduate (and a classmate of Hillary Clinton's) at Wellesley College, Massachusettes, McClintock had the nerve to stand up before a conference of esteemed male biologists and announce that women who spend time together have their periods at the same time. The scientists had come together to discuss pheromones - the chemical messages that pass between organisms without their conscious knowledge - and how they cause female mice to ovulate at the same time.

"Despite my self-consciousness, I mentioned that the same thing happens in humans - didn't they know? All of them being male, they didn't," McClintock later told Chicago magazine. "In fact, I got the impression they thought it was ridiculous." When the scientists asked her for proof, McClintock pointed to her all-female dormitory. The men scoffed at this observational evidence as 'worthless' unless borne out by scientific study.

"I was dumbfounded and ecstatic," remembers McClintock, praying she could replicate the phenomenon to silence the doubters. She returned to her dorm and followed 135 women for seven months, charting how those who spent time together ended up having synchronous menstrual cycles.

From Rats to Humans

Menstrual synchronicity until then had been folklore - certainly it was nothing that'd been scientifically verified. Not only did 23-year-old McClintock show that women really do succumb to this phenomenon, but also that the stronger the bond between women (in her experiment, this meant room-mates or best friends), the more finely tuned the onset of their periods. In other words, she demonstrated that physiological changes in a woman's body were caused by changes in social context.

McClintock concluded that women sent out invisible signals to each other, announcing when they're on. Though the nature of these synchronising signals remained a mystery, she suspected

pheromones were responsible. "But no-one had documented evidence that would suggest the existence of human pheromones at the time," McClintock explains.

Her truth-seeking journey began in earnest in 1971, shortly after her dormitory experiment was published, to great acclaim, in the prestigious journal Nature (nothing like starting at the top and working your way higher). But it would be another 20 years before she announced that the aerial for the sixth sense lurked in the nose.

In her search she concentrated on the chemical signals picked up by other mammals, beginning with rats. Rats are often studied for the similarity in their biological systems to humans, but McClintock didn't want the cute, cuddly white-haired lab variety bred to be studied in isolated tanks. She wanted authentic sewer rats that could bite through barbed wire. Social context is crucial for McClintock's work, so she rigged up a semi-natural sewer-like environment for her specimens. She was curious to see how communal living affected ovulation and pregnancy, and she found that as group size altered, the reproductive behaviour of female rats changed dramatically. For instance, rats who gave birth communally had larger and healthier pups than those who give birth in isolation. She also found that females living in isolation tended to have shorter life spans and were prone to more diseases, such as breast cancer.

McClintock's sewer rats changed the way the species was studied and led to a raft of questions, which might later be applicable to humans. What effects might isolation have on our reproductive potential? Since half of all human pregnancies fail, understanding how and why these things happen in rats could potentially revolutionise the way we treat infertility and pregnancy in humans, says Charles J Wysocki, a neuroscientist at Monell Chemical Senses Center in Philadelphia, though both scientists caution against making an automatic rodent-to-human leap. 'These chemical signals are very sensitive to context,' McClintock says. 'Humans are clearly much more complex.'

In creatures from insects to pigs, pheromones are known to trigger hormonal changes and instinctive behaviours, such as mating and aggression, but despite McClintock's tireless research, the transmission of pheromone signals between humans remains uncertain. To date, the most solid evidence that we, too, communicate using pheromones came in 1998, when McClintock

and fellow researcher Kathleen Stern showed how ovulation cycles could be lengthened or shortened when a woman was exposed to chemicals from the armpits of another woman.

The researchers made one set of women in varying stages of their cycles wear pads under their arms for eight hours and then, after treating the pads with a chemical compound and freezing them, swiped them on the upper lips of a second group of women. What McClintock and her team discovered was that the second group's ovulation cycles (and therefore, their periods) could be delayed or moved forward by as much as two weeks in response to odourless chemicals from another woman. They identified what they believed were two pheromones for the menstrual cycle (and specifically ovulation) contained in the armpits and, once more, published the results in Nature.

Scientists Fear What They Can't Control

The discovery made headlines around the world and has, says McClintock, potential applications in treating menstrual disorders and infertility, which may lead to a more natural method of contraception. However, her paper is less than two years old which, in science terms, means its applications are still far from reaching mainstream medicine.

Satisfied that human pheromones did in fact exist, McClintock set out to discover where in the human body these signals were being picked up. Where exactly was the receptor for this sixth sense?

Science had long known that many mammals, including dogs, pigs and elephants, have a tube-like structure in the nose called the vomeronasal organ (VNO), responsible for receiving pheromone signals. Female pigs, for example, will automatically assume the mating position if their VNO is exposed to male pig pheromones.

After examining 221 cadavers, McClintock located the VNO in the human nose. Actually, scientists had spotted it in the early 20th century but, astonishingly, they'd forgotten about it with the advent of high-tech, fiber-optic scopes.

McClintock explains: "When they stick the probe in [the nasal cavity], the optical end is always

facing in the opposite direction [to the VNO]." It took the bio-psychologist's lateral mind to swivel the probe the other way and re-discover the tiny cigar-like pits that run parallel to the mouth palate and make up the human VNO.

So thanks to McClintock, we now know that the same satellite dish for receiving 'sixth sense' information in animals is present in humans. But McClintock is quick to admit that "We don't know yet if the VNO has any function in humans." Rat and mouse VNOs are packed with millions of nerve cells, but no evidence has been found that human VNOs contain any (though they may simply be hidden - scientists are currently trying to locate them). So where does all this leave the sixth sense? Well, animals definitely have it; we probably do, too; it's likely to be created by pheromones, and we might or might not 'process' these in our nose. In other words, some uncertainties remain, though you get the impression that in McClintock's hands it's just a matter of time before the missing pieces of the pheromone puzzle are slotted into place.

And yet McClintock's work on the sixth sense has always been somewhat controversial. Suma Jacob, a researcher in McClintock's lab, believes this is because it hints that we are at the mercy of hidden forces. 'I think people are threatened by this - it's a cultural thing,' says Jacob. 'There's a bias you run into as you present the work because people don't want to know that there are things that affect them that they can't control.' And so far the more run of the mill questions like is there a pheremonal difference between the races, sexes, city or country folk all come up against a dead end - no.

Typically, this maverick scientist doesn't have an ordinary lab-coat take on the way these unseen chemicals work. Finding no adequate word in the English language to describe it, she borrowed 'vasana' from the Sanskrit, meaning to perfume. 'It refers to the unconscious chemical signals that leave impressions on the mind,' she says. 'Out of Sanskrit philosophy, it's up there with karma. It [helps] explain why people act the way they do in a particular social situation.'

Karma? From a scientist? You heard it here first.

So can we improve our sixth sense? For McClintock, this would be like asking if we can improve our spleen. We've just figured out that VNO exists and begun asking the whys. The rest will come later.

Pheremone Sprays – Turn On or Rip-off?

With everything McClintock has learned about human pheremones, does she think there's any substitute in synthetic pheremonal love potions? 'They're just ridiculous,' she hoots with laughter (believe her, she's tried them). 'We asked if these products really did the things manufacturers claimed they did,' recalls Suma Jacob, principle investigator on McClintock's human pheromone study. The study involved subjects sitting in a room for two hours hooked up to equipment that measures physiological changes in the body - increased heart rate, sweaty palms, etc - and answering a series of questions after a steroid odorant often used in pheromone-based products was applied under the nose. They found, says Jacob, 'It made very little difference - it certainly didn't make you feel great.'