

Nailing Down Pheromones in Humans

When biopsychologist Martha K. McClintock documented in 1971 that women living in college dormitories often have synchronized menstrual periods, scientists suspected that chemicals called pheromones were responsible. Animals give off pheromones, which convey messages to others of their species, but scientists have found only sketchy evidence that people do.

Now, McClintock has uncovered clear evidence of at least two human pheromones.

In a series of tests at the University of Chicago, she and her colleague Kathleen Stern showed that most of the women exposed to chemicals shed by other women found that their monthly cycles sped up or slowed down, depending on when the samples were taken from the donors. The scientists report their findings in the March 12 NATURE.

McClintock and Stern enlisted 29 women between the ages of 20 and 35 for the test. Nine donated pheromones; the other 20 received them. The donors kept a gauze pad in each armpit for 8 hours a day. The researchers then mixed perspiration from these pads with isopropyl alcohol to mask odors and dabbed the mixture under the noses of the recipients.

Women were influenced by the samples only during the 2 to 4 days before they ovulated. Samples taken from donors who were in the pre-ovulation stage shortened a recipient's monthly cycle by roughly 2 days. In contrast, samples taken from donors during ovulation delayed the cycles of recipients by about a day and a half. The donors, used as a control group, received an inert dab of the alcohol; they showed no changes in cycle.

To ascertain that the changes in menstrual cycles weren't random, the researchers tested recipients with one set of samples for 2 months and then switched, testing them with the other set for 2 more. The first set sped up the cycles two-thirds of the time; the second set slowed them down just as often. Nasal congestion in some participants apparently hampered the effect.

By using this crossover technique, the researchers "have come out with some nice, crisp data," says David H. Abbott, a behavioral endocrinologist at the University of Wisconsin-Madison. This study indicates that there are at least two human pheromones, McClintock says. "There are likely to be others, but that has not yet been established."

Pheromones' role in animal life is well

described. For example, when two ants meet on a trail and pause to rub antennae, they are passing pheromones back and forth to ascertain each other's species and, often, their colony identity, says William C. Agosta, a chemist at Rockefeller University in New York.

Higher animals, such as mammals, have individual pheromones or special combinations of these chemicals that signal their identity, enabling babies to recognize parents and vice-versa, Agosta says.

Although research over the past 2 decades has hinted at the existence of human pheromones, some scientists have remained unconvinced that people harbor and react to them, says Charles J. Wysocki, a neuroscientist at Monell Chemical Senses Center, a nonprofit research facility in Philadelphia. This

study "is the final nail in the coffin" of those doubts, he says.

Several puzzles remain. The chemical structure of these pheromones is unknown. Moreover, studies have failed to determine whether men exude pheromones that affect fertility. As to why women radiate these pheromones, one theory holds that simultaneous ovulation in a group of women helped in prehistoric times to promote genetic diversity, since one man couldn't impregnate everyone in the group.

Aside from affecting the hormones that induce ovulation, no one knows what reactions human pheromones trigger. "What is the neural mechanism?" Agosta asks. In insects, the answer to that question has proved complicated, he says. In humans, the answer is still elusive. —N. Seppa

Human ancestor may have taken to sea

An evolutionary predecessor of modern humans known as *Homo erectus* apparently used some type of seaworthy craft to reach the Indonesian island of Flores at least 800,000 years ago, according to a new study.

Most researchers treat the settlement of Australia by *H. sapiens* between 40,000 and 60,000 years ago as the earliest instance of systematic sea travel.

"Even at times when the sea level was lowest, water crossings were necessary to reach Flores from Southeast Asia," write archaeologist Michael J. Morwood of the University of New England in Australia and his colleagues. "We conclude that *H. erectus* in this region was capable of repeated water crossings using [sea]craft."

Fission-track dating of volcanic ash grains provided the estimated ages of two sites on Flores, an island located east of Java and Bali, the scientists report in the March 12 NATURE. This dating method relies on counting the microscopic damage tracks that accumulate as uranium atoms spontaneously undergo fission, or splitting.

One Flores site, called Mata Menge, yielded 14 stone tools in a 1994 excavation and several more last year, Morwood's group reports. The artifacts lie in sediment that contains the bones of several ancient animals also found in Southeast Asia, such as large, elephant-like creatures, crocodiles, and giant rats. The Mata Menge finds date to between 880,000 and 800,000 years ago.

The second site, Tangi Talo, contains animal remains but no stone artifacts.

The site dates to approximately 900,000 years ago.

The new evidence supports a couple of previous reports of stone artifacts on Flores attributed to *H. erectus*, discoveries that have been generally dismissed or ignored, the scientists say. The limited array of animals found in the ancient soil indicates that Flores was a relatively isolated island at that time, they theorize. A sea crossing from the mainland would have covered at least 11 miles, in their view.

H. erectus may also have made shorter ocean trips from Java. Some investigators place this hominid on Java as early as 1.8 million years ago (SN: 3/5/94, p. 150).

Other researchers now suspect that *H. erectus* crossed small stretches of the Mediterranean Sea beginning around 1 million years ago (SN: 1/4/97, p. 12).

"This is a very provocative new report," remarks anthropologist F. Clark Howell of the University of California, Berkeley. Dating and excavation techniques appear thorough, he notes. Drawings of the stone finds are "highly suggestive" of genuine artifacts, says Howell, though he cannot vouch for their authenticity with absolute certainty.

The existence of *H. erectus* in Indonesia around 800,000 years ago is not surprising, remarks archaeologist Stanley H. Ambrose of the University of Illinois in Urbana. Earth's crust has frequently shifted in this region, he notes, raising the possibility that a land bridge once connected the Southeast Asian mainland to Flores. —B. Bower