

By Science Editor

## [A First: Different Chemistry in Males and Females](#)

### *Female and male bodies, with a different composition*

We know men come from Mars, women from Venus. Now, scientists are on the way to prove they really represent different worlds. Chemically. A team at the University of Illinois at Chicago has found for the first time a chemical in male blue crabs that is absent in females: a whole enzyme chain appeared to be functional in just one sex. "Although hormone level differences are generally accepted as the primary cause of variation between the sexes in animal and human development, the existence of a sex-specific metabolite is a previously unrecognized and potentially significant biochemical phenomenon," said lead author Robert Kleps, director of the UIC Research Resource Center NMR Lab. "It's possible to speculate that the presence or absence of a sex-specific metabolite might affect an animal's development, anatomy and biochemistry. Differences between the sexes such as susceptibility to heart disease or average life span might be due to the presence or absence of a metabolite," said Kleps. "Now that the existence of a sex-specific metabolite has been proved for one animal, researchers might review metabolic studies in other animals, including humans, to look for the presence of a sex-specific metabolite that might have escaped notice in the variation among individuals." By employing phosphorus-31 NMR (nuclear magnetic resonance), the researchers detected a chemical in the gills of male blue crabs that females lacked. NMR revealed the presence in the male gill tissue of a phosphorus compound, identified as 2-aminoethyl phosphonate (AEP), a metabolite not known to act like a hormone. The tested crabs were harvested in 6 different years from the Chesapeake Bay and the gulf coast of Florida. All males, from both locations, had AEP, while the chemical was totally absent in all females. "But it was still not possible to rule out that the difference between the sexes was due to a difference in their diet," said Kleps. The puzzle was solved by a rare gynandromorphic blue crab, one half male, one half female, divided down the middle, with a typical blue male claw and a female red claw and visible underside divided into male and female halves. When AEP was assessed in both gills of the gynandromorphic crab, AEP appeared to be a sex-specific chemical. "Since both sides of this strange crab have, of necessity, shared a diet and environment, we had completely independent confirmation of the sex-specific nature of this metabolite. That blue crabs have this sex-specific compound may be a fluke, or it might represent a common but overlooked process in animal development," said Kleps.