

a response which appears to be mediated by increased volatile production on infected plants. Thus, pathogen transmission mechanism is important in pathogen effects on host phenotype and herbivore behavior.

The final section of her talk explored volatile interactions within and among plants. Typically, plant-plant signaling is expressed as damaged plants signal to undamaged plants to ready their defenses. However, De Moraes and her then graduate student Justin Runyon took the unique approach to examine volatile-based host location by parasitic plants (*Cuscuta* or dodder vines). A series of laboratory experiments which selectively removed cues the parasitic vine might be using to locate their host, *e.g.* light and host plant structure, determined that the parasitic vines were using host volatile cues to

locate potential hosts. Further, they determined the vines can distinguish hosts of varying quality; for example, the vines choose tomato over wheat, but will choose wheat in the absence of tomato. Finally, they dissected which volatiles were important in these responses; they found several compounds in tomato which were attractive, and one compound in wheat which elicited negative (repellant) responses. De Moraes ended the plant-plant signaling section with a contrast of between-plant signaling and within-plant signaling, suggesting within-plant signaling via volatile compounds may have evolved as a way around vascular constraints on wound signaling - a hypothesis which has a clear adaptive explanation, unlike the between-plant signaling scenario.

"That's What She Said"--Exploring Laughter

by Lauren M. Dembeck

Smiles, giggles, chortles, and chuckles - If you missed the W.M. Keck Center social evening discussion on November 22, you missed out on a valuable social bonding experience filled with laughter. Robert Anholt led the discussion on the significance of laughter. "Why do we laugh"? "Why is it so funny"?

Anholt highlighted two aspects of laughter. First, it is universal. While the human culture shapes what a particular individual may find funny, everyone laughs. Second, it is a mechanism for social communication and bonding between unrelated individuals - which establishes positive feelings and potentially what we know as friendship.

Laughter begins early in life. Infants laugh (at about 4 months) before they develop speech, and can spend up to multiple hours per day laughing. One mother in the group commented, "I thought that was just gas!" Someone jollily countered, "No, but that's the universal joke!" (I must include some of the jokes from the night because I assure you there was lots of laughing). Unfortunately, adults tend to laugh less than infants, and of course, the amount varies between individuals.

While there is no defined region of the brain for laughing, the limbic system, particularly the amygdala, is believed to play a role. Laughter provides health benefits including reduction in stress hormones such as cortisol and increases the number of antibody-producing cells, potentially strengthening the immune system. There are also cardiovascular benefits. Laughter likely induces the hypothalamus to release beta-endorphin, which ultimately leads to dilation of blood vessels and

increased blood flow. There are many reports of cancer patients seeing their cancer go into remission after laughter therapy.

Laughter can signal "relief" to defuse a threatening situation. There are people who are unable to laugh out loud, a rare condition called aphonogelia. Pathological laughter can be inappropriate and unpleasant. Laughter has also been connected with health disorders such as epilepsy and narcolepsy. People with forms of Asperger's syndrome and other autism spectrum disorders may not recognize laughter as a social bonding cue. Death by laughter? Anholt provided several examples of this rare phenomenon. A few of my favorites:

In the third century B.C., Chrysippus, the Greek stoic philosopher, died of laughter after giving his donkey wine, then seeing it attempt to feed on figs; in 1660, Thomas Urquhart, the Scottish aristocrat, polymath and first translator of Rabelais into English is said to have died laughing upon hearing that Charles II had taken the throne. This prompted a group member to joke, "If Herman Cain becomes president, I wonder how many people will share this fate?" In 1989, Ole Bentzen, a Danish audiologist, died laughing while watching *A Fish Called Wanda*.

The group agreed that laughter is probably adaptive and called for a model for selection. Trudy Mackay suggested that it may serve as individual protectiveness. What about other species? Are humans the only ones laughing? This may depend on how we, the researcher, define laughing; perhaps we are unable to recognize

laughter among other species. Researchers recognize “pieces” of laughter such as distinct motor activity and vocalization in other species. Other primates including chimpanzees, gorillas, and orangutans exhibit laughter-like vocalizations. Rats emit ultrasonic, socially induced vocalization during “rough and tumble” play and when

tickled. This led to Mackay being asked, "Have you ever tickled your flies?"

The evening was filled with laughter, and those of us in attendance now share stronger bonds than ever before.