Flies, too, feel the influence of their peers, studies find

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We all know that people can be influenced in complex ways by their peers. But two new studies in the September 11th issue of *Current Biology*, a Cell Press publication, reveal that the same can also be said of fruit flies.

The researchers found that group composition affects individual flies in several ways, including changes in gene activity and sexual behavior, all mediated by chemical communication.

"Many take for granted that communication among insects is hard-wired," said Joel Levine of the University of Toronto Mississauga. "We have observed that communication may be influenced by relationships even in insects like fruit flies, which have not been traditionally considered to be social insects. We have seen individual responses that appear to be altered quickly--within a day of joining a group. This level of spontaneity or plasticity is complex because it occurs on many levels: involving neural and non-neural tissues, changes in gene expression and physiology, and changes in behavior, all of which are inter-related."

That connection between an individual and its environment, both social and otherwise, reveals a depth that is often missing in experiments that focus exclusively on one or the other, he said.

In one study, the researchers reveal that specialized cells of the fly called oenocytes, which produce chemical signals known as pheromones, operate according to an internal circadian clock. However, the "ticking"

of that clock varies depending upon the social environment the flies find themselves in: Males in mixed company—meaning in the company of other flies that were less similar at the genetic level—produced different chemical signals than did males in genetically uniform group, they found.

Those signals had a clear effect on behavior: flies in genetically more mixed social groups had more sex than those in more uniform groups did.

To further explore the connection between chemical communication amongst fruit flies and their physical and social environments, the researchers examined in a second study the chemical composition of pheromones produced by flies in mixed versus homogeneous groups. Those tests were conducted in flies under conditions of constant darkness and in those under a normal light-dark cycle.

Their results showed important effects on flies of both the physical and social environment. Moreover, they found a strong interaction between the genetic background of individual flies and their social environments.

"The response of an individual male to others like him depends on his neighbors," Levine said. "That response is quite specific because it affects some of the chemicals made by a fly, but not others."

The results suggest that chemical communications is a rather "fickle" trait, depending heavily on the influence of a fly's peers.

The findings also challenge the traditional view of the relationship between behavior and the underlying mechanisms that control that behavior, Levine noted.

"The bottom line is that membership in the same social group trumps

genotype as a predictor of chemical displays," he said. "At a general level the surprise comes from appreciating that molecular function is altered by behavior. Behavior is not only the product of molecular mechanisms, it is also a player in those mechanisms."

Source: Cell Press