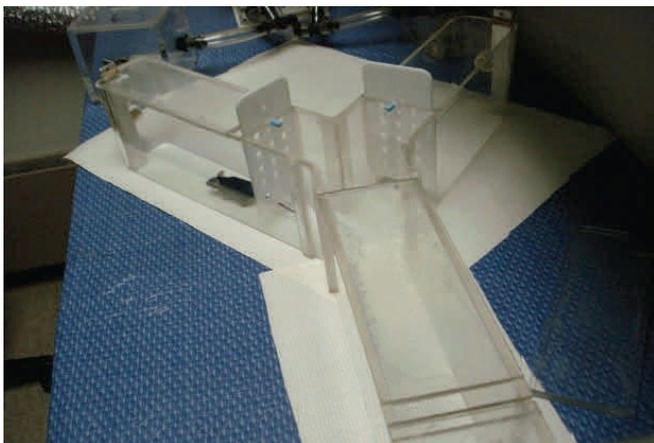


PROGRAM ACTIVITY REPORT (PAR)

NOVEL METHODS TO DETECT DISEASE

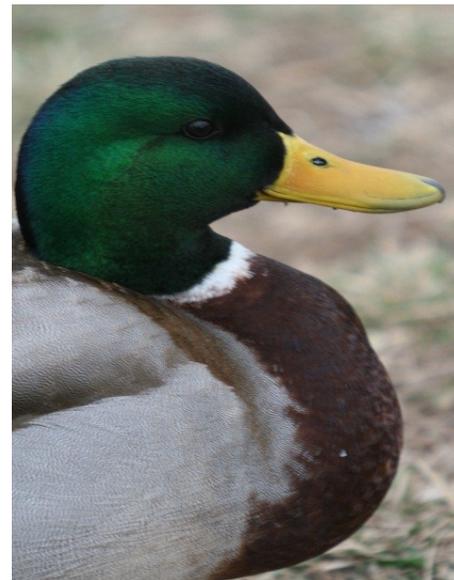
Changes in body odor are known to be a consequence of many diseases. Much of the published work on disease-related changes in body odor has involved parasites and certain cancers. Viral diseases have not been studied as much, possibly due to an absence of good animal model systems. Monell Chemical Senses Center, NWDP, National Wildlife Research Center, and Colorado State University collaborated to study possible alteration of fecal odors in animals infected with avian influenza viruses.

In a behavioral study, mice were trained in a standard Y-maze to discriminate odors emanating from feces collected from influenza infected and non-infected mallard ducks. Mice could discriminate odors from non-infected compared to infected ducks.



Encouraged by these findings, we employed gas chromatography/mass spectrometry to identify chemical markers indicative of influenza infection. Chemical analyses indicated that influenza infection was associated with a marked increase of a particular compound, acetoin (3-hydroxy-2-butanone), in feces. These experiments demonstrated that information regarding viral infection exists via volatile metabolites present in feces. Further, they suggest that odor changes following virus infection could play a role in regulating behavior of non-infected individuals that come in contact with infected individuals.

Additional studies are underway to determine if other animals can discriminate between infected and non-infected individuals based on fecal odors. Also, research is being conducted to determine if these “biosensors” can distinguish among various viral infections. Ultimately, we hope to develop biosensors (animals) and chemical instruments that would be practical for field and laboratory use in determining



if the environment or an individual is infected with a particular pathogen.

For additional information see:

[Kimball, B.A., K. Yamazaki, D. Kohler, R.A. Bowen, J.P. Muth, M. Opiekun, and G.K. Beauchamp. 2013. Avian influenza infection alters fecal odor in mallards. PLoS ONE 8\(10\): e75411. doi:10.1371/journal.pone.0075411](#)

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The original artwork on this page was created by the National Wildlife Disease Program's Erika Kampe and Sarah Goff