



# TOUCHING BASE

QUESTIONS? THOUGHTS? IDEAS?

e-mail us at [ngfeedback@natureny.com](mailto:ngfeedback@natureny.com)

## Mutant of the Month

This month's mutant is the H1N1 influenza A strain from the 1918 Spanish flu pandemic. The global influenza pandemic of 1918, also known as the Spanish flu, caused the deaths of an estimated 20–40 million

people, constituting one of the largest and most devastating outbreaks of infectious disease in history. In most influenza epidemics, the very young and the elderly are at higher risk, but during this pandemic, the 15- to 45-y age group was most adversely affected. The nature of the high transmissibility and virulence of the H1N1 strain responsible for this pandemic has long been of interest, and the recent discovery of remnants of an original viral genome from Alaskan and US army victims allowed these questions to

be addressed through characterizations of the viral sequence (*Science* 275, 1793–1796; 1997). The virus showed high similarity to avian sequences, leaving questions as to how the virus was able to infect human cells. An explanation came from analysis of the crystal structure of the hemagglutinin (HA) protein, a membrane glycoprotein crucial in infection, from an original isolate of this strain. Sequencing of the HA genes had identified a sequence similar to that found in avian flu viruses (*Proc. Natl. Acad. Sci. USA* 96, 1651–1656; 1999), but the structure of the protein showed that its receptor binding site could still adopt a conformation that allowed it to attach to and infect human cells (*Science* 303, 1866–1870; 2004). **OB**



Photo courtesy of James Stevens and Ian A. Wilson.

of homozygous lethal P-element insertion *Drosophila* stocks, using the FLP/FRT system to create knockout clones in the eye. The results of analysis of 1,375 P-element insertions indicate that 36% have an abnormal eye phenotype. Advanced students test stocks for reversion to wild type upon excision of the P-element; 72% of 294 stocks tested revert to wild type. The consortium's online database (<http://www.bruinfly.ucla.edu>) and the fly stocks generated have the added bonus of creating community resources. Although upper-level undergraduate research has long been promoted at research universities, this approach is notable because it is offered to freshman and sophomores (30 students each quarter). This early exposure may prove crucial to engaging students at a stage when they are normally exposed to lectures and cookbook laboratory courses. We hope that this innovative approach previews the increased use of authentic, constructivist, engaging designs for undergraduate scientific curriculum. **EN**

## Avian flu

Avian flu outbreaks in Asia over this past year have raised alarm as to the possibility of another pandemic as strains of avian influenza cross to humans. In recent history, genes from avian viruses with three subtypes of hemagglutinin have crossed species barriers to humans through reassortment of the avian viruses with existing human viruses, and have caused a pandemic each time (H1 in the 1918 Spanish flu, H2 in the 1957 Asian flu and H3 in the 1968 Hong Kong flu). In the current Asian epidemic, the highly pathogenic avian influenza (HPAI) H5N1 strain has spread quickly through birds and has already spread to other animals and humans. The first documented human infections occurred in Hong Kong in 1997, with 18 infections and 6 fatalities. In February 2003, the H5N1 strain again crossed the human barrier, causing several fatalities in a single family in Hong Kong. Another epidemic of avian H5N1 was reported in the Republic of Korea in December 2003 and spread through eight Asian countries. Since this time, there have been 45 documented human fatalities, concentrated in Vietnam and Thailand. Although many of the human cases to date have been attributed to direct contact with infected poultry, there have also been suggestions of direct human-to-human transmission. There is concern that the virus, already successful in crossing the species barrier, may develop high transmission and virulence in human hosts, through continued rapid mutation and antigenic shift. The first global health priority is to control the avian epidemic through detection, quarantine and culling of infected poultry. In addition, the World Health Organization and worldwide agencies are preparing for the possibility of a human epidemic by attempting to develop an avian vaccine in time for next year's flu season. **OB**

## Genetics education at its best

Unknown to most, a revolution in science education is occurring in our midst, as exemplified in a recent report in which Utpal Banerjee, Jiong Chen and Gerald Call present the design and outcomes of the UCLA Undergraduate Consortium for Functional Genomics (*PLoS Biol.* 3, e59; 2005). This discovery-based curriculum blends a bit of didactic instruction and computer work with a solid dose of knowledge-generating laboratory experimentation. Students characterize the eye phenotype



Cartoon by Sean Taverna

*Touching Base* written by Orli Bahcall and Emily Niemitz.