TOUCHING BASE

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Molecular Tic-Tac-Toe

Once you have figured out the simple rules of tic-tac-toe, it is hard to lose—you can at least end the game in a draw. If you played against a computer, though, it would only be a matter of time before you made an error and lost. But what about playing against molecules? A recent article by Milan Stojanovic and Darko Stefanovic (*Nat. Biotechnol.* **21**, 1069–1074; 2003) exploits the simplicity of tic-tac-toe to show that programmable enzymes could be used to create a network capable of complex decision-making that is infallible. The two used a combination of multigated deoxyribozymes and substrates to create MAYA, a Boolean network that exists completely in solution in the wells of a tic-tac-toe board. By adding three allosteric domains to the deoxyribozyme E6, the two designed a network of enzymes and oligonucleotide effectors that react to decisions by an opponent by cleaving a fluorescent substrate in the appropriate countermove well. The system, as designed, cannot lose—unless you cheat. Although it is unlikely that schoolchildren will be pipetting deoxyribozymes anytime in the future, the feat is a positive step towards creating artificial decision-making systems that can mimic what happens in a cellular signaling network. Plus, you can always wash your opponent down the drain if you get frustrated. *MS*

Lamarck lives?

Many of our readers will no doubt be familiar with The Sims, the popular computer game that lets players control the lives of virtual characters in a realistic setting. Soon to appear is The Sims2, which, in addition to improved graphics, promises "the groundbreaking addition of genetics, with the DNA of Sims passed down through generations". Will Wright, the chief game designer at Electronic Arts, maker of The Sims, has been quoted as saying, "Giving (the Sims) DNA makes them even more lifelike and increases the personal connection between players and their Sims." Indigo Computer Services has helpfully produced *The Ultimate Sims2 Guide*, which explains that the offspring of adult Sims will combine the physical and personality traits of their parents. But there's more: "[t]he parents effectively pass down trade secrets of the job they are working in to give the child a head start in that career track." We're eagerly awaiting the 2004 release to see for ourselves whether this really implies the *in silico* inheritance of acquired characteristics. *AP*

Essentially (and completely) yours

Earlier this year, the Australian Law Reform Commission (ALRC) published the results of a two-year study of the impact of human genetic information on society. Their final report, *Essentially Yours: The Protection of Human Genetic Information in Australia*, takes up a daunting 1,200 pages. Although the report is not the first attempt to grapple with the implications of genetics, its comprehensiveness makes it a landmark study. *Essentially Yours* discusses a whole host of topics on its way to making 144 different recommendations to the Australian government. A glance at the table of contents finds chapters on the basics of genetic information, ethics, privacy law, genetic samples and testing, discrimination, informed consent, databases, tissue collections, genetic registers, population genetic screening, insurance, forensics and many others. The recommendations include a call for establishing a Human Genetics Commission of Australia, which would oversee some difficult areas where genetics and societal concerns overlap. A recent ABC Science Online story noted that the ALRC did not recommend a moratorium on the present requirement in Australia that applicants for health insurance reveal the results of any genetic test they may have taken. Whatever the outcome on this particular question, the breadth of the ALRC report suggests that it will be at the center of legislative efforts in Australia, for years to come. *AP*

Touching Base written by Alan Packer and Michael Stebbins

"We are particularly concerned about the impact that Dr. Butler's case may have on other scientists who may be discouraged from embarking upon or continuing crucial bioterrorism-related scientific research—thereby adversely affecting the nation's ability to fully utilize such research capabilities in preparing defenses against possible bioterrorist attacks."
—Bruce Alberts and Harvey Fineberg in a letter to US Attorney General John Ashcroft referring to the recent indictment of Texas Tech University Professor Thomas Butler for illegal transport of *Yersinia pestis*.

Mutant of the Month


Courtesy of Maria Smit

Fall is here, and in preparation for the biting cold of winter, we consider our wooly ovine friend, callipyge, October's MoM. The muscle hypertrophy phenotype that characterizes callipyge sheep (right) showed up spontaneously on a farm in Oklahoma in 1983. The name callipyge comes from Greek and is translated 'beautiful' (calli-) 'buttocks' (-pyge). Its pattern of inheritance is the only known example in mammals of paternal polar overdominance; the observed muscle hypertrophy appears only in heterozygotes who inherit the CLPG mutation from the ram. The mutation is a single-nucleotide change in the conserved muscle regulatory binding site between the coding regions for *DLK1* and *MEG3*. A transcript of 547 bp includes the mutation site within an ORF predicting a protein of 123 amino acids has been found, but it is not conserved in mammalian species and no protein was observed. The key to the hypertrophy phenotype is probably a change in the regulation of four imprinted genes: *DLK1*, *GTL2*, *PEG11* and *MEG8*. Sheep carrying a single paternally inherited copy of the CLPG mutation show increased expression of the maternal copies of *DLK1* and *PEG11*, whereas sheep with two copies of the mutation show increased expression of all four genes but do not have muscle hypertrophy. Overexpression of *DLK1* and *PEG11* in transgenic animals will probably pinpoint their contribution to the callipyge phenotype. *MS*