A team led by Dartmouth cognitive neuroscientist Michael Gazzaniga, Ph.D., received a $22-million grant from the National Science Foundation to study brain mechanisms involved in learning.

"A time to be born, and a time to die"

"To everything there is a season," says Ecclesiastes 3, including "a time to be born, and a time to die." Though understood in the Biblical sense to apply to human affairs, the concept appears in the biological sense to be built into the simplest life forms. In multicellular organisms, even in the absence of outside threats to survival, certain cells are destined to die during the life of the organism.

Biologists call this process apoptosis, or programmed cell death. The remarkable thing is the precision with which the cells march to their demise. But it is for the good of the organism that apoptotic cells fulfill their function and then expire.

Unraveling the sequence of events in apoptosis is the goal of DMS geneticist Barbara Conradt, Ph.D. She and colleagues recently reported a new finding about the process in *Nature:* a role for mitochondria, the cellular power plant, in prompting cells to self-destruct.

An example of apoptosis in mammalian development includes the purging of nearly half of the brain neurons formed during embryogenesis, because they failed to establish the correct synaptic connections. Mice unable to undergo apoptosis are born with swollen heads because faulty neurons were not eliminated.

Stages: Scientists are still unsure exactly what triggers apoptosis, but they've determined that in its terminal stages, proteolytic enzymes called caspases are activated to digest the cell from the inside. It's also been known that mitochondria were involved in the intermediate stages—they appeared to fragment—but it wasn't clear whether this was a critical step in apoptosis or a result of the process.

Conradt and her colleagues use a small worm, *C. elegans,* for their studies. It carries the concept of "programmed" to a new level. During each worm's development, exactly 1,090 cells form and precisely 131 undergo apoptosis. It is the only model organism in which the time and place of doomed cells' extinction is known, making it an important experimental tool.

The first step in their latest work was showing that, as in mammals, *C. elegans* mitochondria fragment during apoptosis. More importantly, it turned out that either inducing or preventing mitochondrial fragmentation respectively enhanced or impeded apoptosis. Thus mitochondrial fragmentation was shown to be a determinant and not a result of apoptosis.

Role: The next step for the lab will be looking at the role this fragmentation plays. Previous work has shown that a key event in apoptosis is the release of cytochrome c from mitochondria, but there is little agreement on how that occurs; the fragmentation may be what triggers it.

Since apoptosis is important in cancer and autoimmune diseases, a lowly worm may one day suggest new treatments by showing that there is "a time to kill, and a time to heal." Roger P. Smith, Ph.D.

JON GILBERT FOX

How cells die is the focus of Conradt's research.

TB or not TB

Current tuberculosis screening guidelines for HIV patients in the developing world may not be adequate, according to new findings from a Dartmouth-Tanzania research collaborative known as DARDAR. Publishing in the journal *Clinical Infectious Diseases,* the authors of the study point out that "tuberculosis is the leading cause of death among persons with HIV infection in the developing world," but a substantial number of TB cases may go undetected. "Some cases can only be identified by sputum culture," they said, a technique not available in many resource-poor settings.

Beer pressure

Adolescents who own t-shirts, backpacks, and other items with alcohol brand names or logos are more likely to drink alcohol than their peers, according to a study led by DMS pediatrician Auden McClure, M.D. In a survey of 2,400 Vermont and New Hampshire middle-schoolers, McClure and her colleagues found a strong correlation between owning branded paraphernalia and alcohol use. The authors of the study, which was presented at the annual meeting of the Pediatric Academic Societies, are urging alcohol companies to voluntarily stop producing such goods—as the tobacco industry did in 1998. ■