

# Research News

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## Mutant plants provide valuable information

BY SEAN MOORE  
Research Promotion

Nature is no doubt creative, but it does repeat its tactics and that's why you have more in common with a mustard plant than you would think.

Developmental geneticist Dana Schroeder, biological sciences, is studying mutant forms of a light-response regulating protein called DET1, which is found in the fully sequenced genome of *Arabidopsis*, a reputedly bad-tasting mustard plant. DET1 was first discovered in *Arabidopsis* but the homologue was later identified in humans.

Schroeder tampers with DET1 proteins in *Arabidopsis* plants to make mutants for experimentation. The mutants have exaggerated responses to certain environments and that response offers clues to what the protein does. For example, she grew samples in total darkness and the plants developed as though they were in the light – they invested in chloroplasts and enlarged their leaves to gather light that was not there. They were, as Schroeder said, delusional.

The more she fiddled with mutant varieties the more she learned about DET1, and she soon discovered it interacts with a protein called Damaged DNA-Binding protein 1 (DDB1). DDB1 was first discovered in humans, where

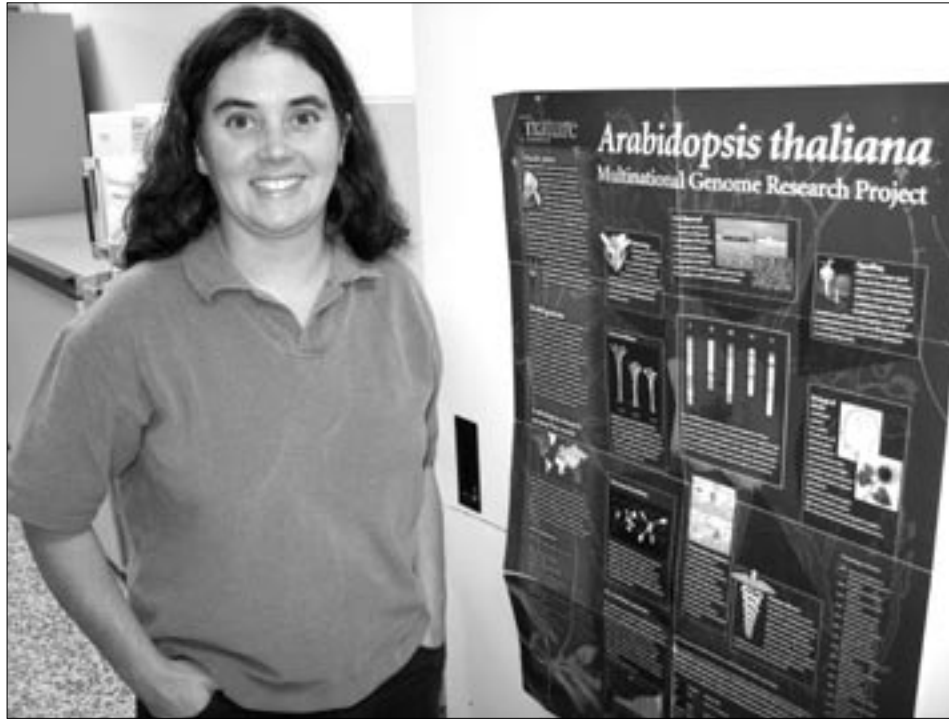


Photo by Sean Moore

**Dana Schroeder, biological sciences, is studying specific proteins in mustard plants.**

it is involved in a bio-chemical process that results in the repair of UV damaged DNA. DDB1 appears to be involved in plant DNA repair as well. In recent experiments her lab shone UV light on normal plants. The plants died. But when more DDB1 was added to the plants they became more tolerant of UV light.

Schroeder's findings have led other researchers to re-examine how these proteins interact in other systems. It's since been found that DET1 and DDB1 control some cell growth in humans. Indeed, defective DDB1 in humans can result in xeroderma pigmentosa, a skin disease that leaves the patient more susceptible to skin cancer because UV

damaged DNA cannot be repaired.

Schroeder, however, is concerned with plant systems and by further studying DET1 and DDB1 she hopes to help plant scientists design new crops with both optimal light responses and UV protective capacity.

"Our goal is to find out how the plant works," she said. "Someone else can then take that information and use it towards a certain end point. Our goals are mostly for the information gathering stage."

Schroeder's lab has also noted that *Arabidopsis* plants with mutant DET1 also have defects in their flower size, and levels of pollination and germination. DET1 also interacts with DDB1 in something called protein degradation, wherein they travel around and tag unwanted proteins for another set of proteins to come along and dismantle at a later time. It's the same idea used in the City of Winnipeg's Dutch Elm Disease eradication program: someone finds a bad tree, marks it with spray paint, and another person later comes to cut it down.

"By initially looking for things involved with light response, we identified a gene that seems to be involved throughout the plant's development in a variety of things," Schroeder said. "That's exciting."

## Burden of inflammatory bowel disease

BY SEAN MOORE  
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Canada has higher rates of inflammatory bowel disease (IBD) than any other nation tracking it, but unless you have it you likely know little about it, perhaps because many people think it's taboo to talk about gastrointestinal problems.

But Charles Bernstein, internal medicine, isn't one of those people. A leader in the study of IBD, Bernstein will describe his research and answer your questions surrounding IBD at a public lecture on September 25. Spoiler: it's a painful disease with no known cure or cause, but researchers have recently made some fascinating discoveries.

IBD affects 170,000 Canadians, with 7,000 of those patients in Manitoba. Most diagnoses occur in people in their late teens and twenties. From an economic standpoint, the total cost of an IBD patient's lifetime treatment rivals those of cancer and heart disease patients.

"We don't understand what it is about Canada that makes our numbers so high," Bernstein said. "There was a hypothesis generated in Europe back in the 1980s that said there was a north-south gradient, in other words northern climates were more likely

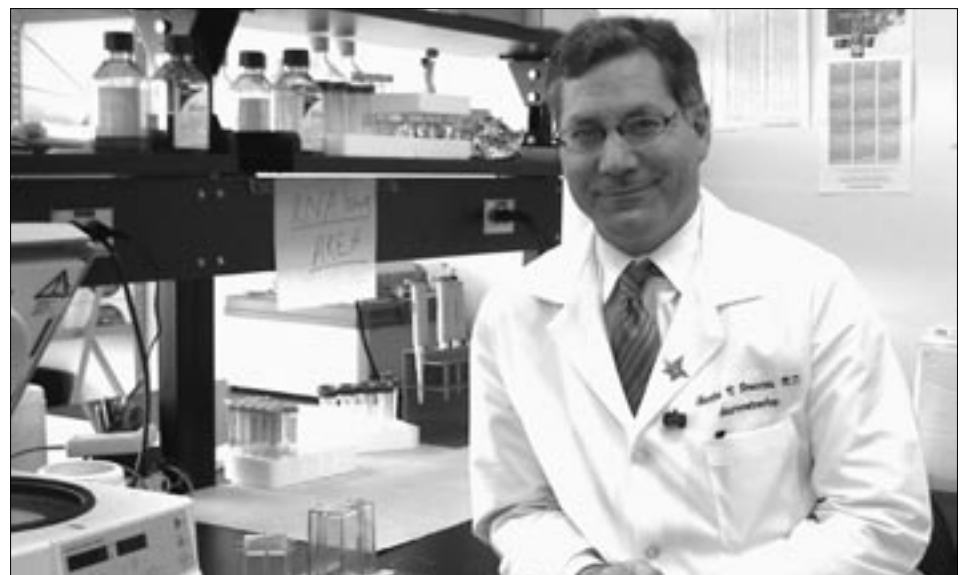
to have more immune diseases than southern populations. But we didn't know if that was true or whether the north just had better data collection."

Yet, as years go by, the discrepancy between infection rates in the north and south still holds, although southern countries are seeing a rise in incidence rates, Bernstein said.

IBD is a blanket term describing two similar, but distinct, conditions called Crohn's disease (which can inflame every layer of tissue in any part of the gastrointestinal tract) and ulcerative colitis (which affects only the inner layer of the colon or large bowel). Symptoms include abdominal pain, cramping, fatigue and diarrhea.

To learn more about these conditions, Bernstein established the IBD Manitoba – Clinical and Research Centre through the University in 1994 ([www.ibdmanitoba.org](http://www.ibdmanitoba.org)). This Centre has allowed for some of the most thorough population studies ever done in this field.

One current project is the Manitoba IBD Cohort Study, which has followed roughly 400 patients for five years and provides data describing predictors of outcomes: how IBD will evolve in certain scenarios and what determines disease outcomes. Other studies have



Submitted Photo

**Charles Bernstein, internal medicine, is the director of the IBD Clinical and Research Centre at the University of Manitoba.**

examined the effects IBD has on bones, found links between it and asthma, and have recently homed in what could be a possible IBD-causing bacterium.

Bernstein said there are three major elements that are suspected to play a part in the pathogenesis of IBD: genetics, an environmental trigger, and the host's immune response – mainly an unyielding one that continues to cause inflammation.

Bernstein's presentation, "The Burden of Inflammatory Bowel Disease," is part of the *Get to Know Research at Your University* speaker series. It takes place at 7 p.m. on September 25 in the Smartpark boardroom, located at 135 Innovation Drive. Admission is free and everyone is invited to attend. For more information please call 474-9020.

## Bringing Research To Life

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Comments, submissions and event listings to:  
[stefaniu@ms.umanitoba.ca](mailto:stefaniu@ms.umanitoba.ca)  
Phone: (204) 474-9020 Fax (204) 261-3475