proteins, and in the Golgi complex, where proteins are often modified.

Yet Potter contends that those studies misled investigators because they typically involved cells forced to overproduce presenilins. In such cells, presenilins "tend to pile up in the ER and Golgi," he says.

When Potter and his colleagues, working with antibodies they created, studied cells that produce normal amounts of presenilins, they found that the proteins were part of the nuclear membrane, the sac that surrounds a cell's DNA. The scientists also detected presenilins in kinetochores, which are specialized protein complexes on chromosomes, and in centrosomes, structures found just outside the nuclear membrane.

Kinetochores and centrosomes play crucial roles in distributing identical sets of chromosomes within a dividing cell, says Potter. The two centrosomes organize filaments, called microtubules, along which the chromosomes travel to opposite sides of the cell. The kinetochores are the sites at which the chromosomes attach to the microtubules.

In a nondividing cell, suggests Potter, presenilins stud the inner surface of the nuclear membrane and hold onto chromosomes via kinetochores. If a cell begins to divide, presenilins may aid the process by releasing the chromosomes.

While Potter believes that his data provide strong evidence that presenilins participate in chromosome segregation, he notes that it remains unclear how their mutant versions cause Alzheimer's.

Some brain cells in Alzheimer's patients may accumulate abnormal numbers of chromosomes, including chromosome 21, ultimately causing them to die or otherwise falter, he says.

Alternatively, the presenilin mutations may induce cell death by stimulating neurons, brains cells that normally don't divide in adults, to try to divide, notes Peter Davies of Albert Einstein College of Medicine in New York. Davies published data last year hinting that brain cells in Alzheimer's patients may be attempting to split inappropriately.

Although Potter's data and interpretations are likely to be challenged, Davies welcomes the new work. "I love it. It generates a lot of testable ideas and new hypotheses that take us into ground we haven't covered," he says. —*J. Travis*

Anticancer agent sprouts up unexpectedly

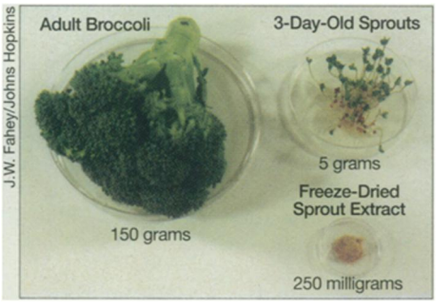
There's good news for George Bush and others who detest broccoli. Without ever downing another forkful of the green veggie, they can naturally enrich their diets with its most potent anticancer constituent. All they need to do is sprinkle a few tablespoons of sprouts on a salad—broccoli sprouts, that is.

Paul Talalay and his coworkers at Johns Hopkins Medical Institutions in Baltimore surprised cancer researchers in 1992 when they isolated sulforaphane, a compound in broccoli and its botanical kin that inhibits the development of cancer (SN: 3/21/92, p. 183). The compound works by turning on detoxifying phase-2 enzymes.

The hoopla over sulforaphane soon died down, however. Researchers realized that to get enough of the compound even from broccoli, its richest source, a diner would have to consume unrealistic amounts each week—about 2 pounds of the brassica, which some people find bitter (SN: 7/12/97, p. 24).

Undeterred, Talalay's team began testing broccoli throughout its life cycle to find how sulforaphane forms and when. "To our surprise," Talalay says, "we found that the seeds were extraordinarily high in [phase-2] enzyme activity." So were 3-day-old broccoli sprouts, which he says are considerably more edible than the seeds. "The sprouts aren't bitter and don't taste like broccoli," he says, though they do possess "a little zing."

Both seeds and sprouts contain a compound that is turned into sulforaphane when their cells are crushed during chewing. As the plants grow, this initial store of sulforaphane's precursor becomes diluted. Indeed, mature plants contain only 2 to 5 percent as much per gram as sprouts do. Even the sulforaphane precursor dramatically inhibits chemically induced cancers in rats, Talalay's team reports in the Sept. 16 PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES.



Each dish contains the same amount of anticancer compound.

Though diets rich in vegetables inhibit cancer development, Talalay's group is one of the few to execute "the very difficult, nitty-gritty studies" of the mechanisms, says Lee W. Wattenberg of the University of Minnesota in Minneapolis. Such work raises the prospect of mining broccoli for extracts that might be administered as cancer-fighting dietary supplements, he says.

Talalay is developing a center to certify that any sprouts ultimately marketed contain high quantities of the sulforaphane precursor. —*J. Raloff*

Glass film yields to a light touch

If an object moves in response to light, is it animal, vegetable, or mineral?

In at least one case, the answer is mineral. Researchers have found that a glassy material made of arsenic and selenium shrinks and expands when exposed to polarized light.

Eventually, the material could be used in nanometer-scale motors, switches, or actuators, says Stephen R. Elliott of the University of Cambridge in England. "The advantage is that no electrical connection is needed." He and his colleagues report their findings in the Sept. 19 SCIENCE.

The glass belongs to a class of materials called chalcogenides, compounds that contain elements of the group including sulfur, selenium, and tellurium. When exposed to polarized light, the glass takes on anisotropic optical properties—that is, it interacts differently with light depending on the lightwaves' direction.

Until now, scientists have explained the anisotropic traits through small-scale changes in the structure of the glass, but the new study shows that "there's some larger-scale, overall effect going on," says Ronald L. Cappelletti of Ohio University in Athens. The work may help scientists understand how the unusual properties arise, he adds.

The Cambridge researchers deposited a thin film of the glass onto a microscopic lever made of silicon nitride and shone a laser on the device. This initial treatment caused the glass to expand, preparing it for subsequent illumination by polarized light.

The researchers found that a laser whose electromagnetic waves are polarized along the length of the beam caused the glass to contract, thus bending the beam upward. Conversely, the glass expanded upon exposure to a laser polarized along the width of the beam, which bent the beam downward. The beam, 200 nanometers long, moved about 1 nm in each direction.

"It's quite a clever experiment," says Cappelletti, who studies the basic properties of chalcogenide glasses both in the lab and with computer modeling. Moreover, the effect could be reproduced reliably—another advantage for nanotechnology applications.

The Cambridge team plans to make more complex devices out of the glass and to look at other chalcogenides. The group also wants to tinker with the chemical composition of the glass to get rid of larger optical effects that accompany unpolarized light, Elliott says. That way, only the mechanical effects triggered by polarized light would remain. —*C. Wu*