

## Chocolate: As hearty as red wine . . .

Chocolate is a fatty food. So why don't unrefrigerated candy bars turn rancid as they sit on the shelf, the way so many other high-fat foods do? The answer, explains a trio of food chemists from the University of California, Davis, is that cocoa contains a number of potent flavonoids—pigments and other polyphenols that retard oxidation, which can make fats deteriorate.

In the body, oxidation transforms lipid-rich low-density lipoproteins (LDLs) in the blood into the foam cells that create artery-clogging plaque. That realization prompted Andrew L. Waterhouse and his UC-Davis colleagues to wonder how the flavonoids in chocolate compare to those in red wine. After all, several studies have indicated that a daily glass or two of these flavonoid-pigmented wines can cut dramatically an individual's risk of heart attack (SN: 3/30/96, p. 197).

In the Sept. 21 LANCET, Waterhouse's team confirms that cocoa powder extract indeed protects LDLs—the so-called bad lipoproteins—from oxidation. Its polyphenols, at a concentration of 5 micromoles per liter, cut oxidation of human LDLs by 75 percent in test-tube experiments. The extract's antioxidant potency roughly matches that of gallic acid, another potent antioxidant, and, based upon studies conducted by other scientists, it appears to outperform slightly the flavonoid blend in red wine.

So how much chocolate does one have to nosh for this effect? A 5-ounce glass of red wine contains about 210 milligrams of polyphenolic antioxidants. In comparison, Waterhouse's group reports, a cup of hot chocolate made with 2 tablespoons of cocoa would deliver 146 mg of antioxidants, and a 1.5-ounce chunk of milk chocolate, 205 mg.

## . . . but we eat it for pleasure

The average U.S. resident consumes more than 11 pounds of chocolate each year—for reasons that have to do with hedonism, not health. Sweet, fatty foods like chocolate can trigger an addiction in vulnerable people, rewarding them for ingesting such goodies with the release of pleasure-inducing opiates in the brain, studies have indicated (SN: 6/17/95, p. 374).

Now, pharmacologists at the Neurosciences Institute in San Diego report finding that chocolate contains not only its own cannabinoid—a compound that resembles the ingredient in marijuana (cannabis) that induces euphoria—but also a pair of related chemicals that could prolong any pleasurable sensations elicited by a cannabinoid.

In the Aug. 22 NATURE, Daniele Piomelli and his colleagues report isolating from cocoa powder and three different brands of chocolate a substance called anandamide, a cannabinoid that occurs naturally in the brain. Like the active ingredient in marijuana smoke, this compound binds to cannabinoid receptors in the brain. However, the two related chemicals that accompany chocolate's anandamide—and that are present in much higher quantities—don't bind to that receptor, Piomelli says. In fact, these chemicals may be more important than the cannabinoid in explaining why eating chocolate makes people feel so good, he says.

When someone eats anandamide or smokes marijuana, Piomelli explains, active cannabinoids hit all areas of the brain, creating a global high. By selectively slowing the breakdown of the body's own anandamide instead—which is what the two related chemicals in chocolate do—this soothing food may prolong natural, more subtle feelings of well-being.

That's the assumption Piomelli's team is now exploring in follow-up tests with animals. After injecting rats with the chemicals that accompany anandamide in chocolate, the group is examining whether the animals experience greater relaxation, less anxiety, or less sensitivity to pain.

## R&D legislation clears Congress

In the waning days of the 104th Congress, lawmakers passed a series of bills on to the President before adjourning to hit the campaign trail. Though all were expected to become law, at press time Bill Clinton had signed only two.

● Chief among them was the federal 1997 budget, sent to Clinton in the closing hours of the old fiscal year (FY), which ended Sept. 30. Research and development (R&D) analysts at the American Association for the Advancement of Science in Washington, D.C., are sifting through details in a 378-page version of the new budget that appeared in the *Congressional Record*. The AAAS expected to post on its Internet site (<http://www.aaas.org/spp/dspp/rd/rdwwwpg.htm>) this week an initial assessment of funding changes that could affect the research community. The association hopes to issue a print version around Nov. 1.

● In 1991, 26 nations drafted a Protocol on Environmental Protection to the Antarctic Treaty. It aimed to limit pollutant releases on the continent, prohibit mineral prospecting, and require that environmental impact assessments precede any newly planned activities. When Clinton signed the Antarctic Environmental Protection Act of 1996 on Oct. 2, the United States became the 21st nation to ratify the treaty.

The 5-year wait before ratification stemmed not from problems with terms of the accord but from concerns over how to implement them. For instance, U.S. officials were unsure how to comply with the environmental assessment provisions—usually an Environmental Protection Agency responsibility—when EPA officials would not be on-site to review or investigate. Congress resolved the issue by assigning this responsibility to the National Science Foundation, which maintains a staff in Antarctica year-round.

● The new Hydrogen Future Act of 1996 would give the Department of Energy's hydrogen program legal standing. Though DOE already conducts hydrogen R&D, the Republican majority in Congress has said it will consider abolishing any federal programs not specifically required by legislation.

The bill would increase funding for hydrogen programs by \$5 million annually over the next 5 years, beginning from a spending base of \$20 million this year. It also gives DOE the authority to spend \$50 million more for a fuel-cell demonstration program that uses hydrogen made by photovoltaic or waste-to-energy processes. The catch: Any money for the fuel-cell project must be spent by the end of September 1999.

● Sent to the President on Oct. 1, the Savings in Construction Act of 1996 would require metric units in the design of federal construction projects and the labeling of materials, but builders could continue to use existing materials (such as 2-by-4 boards).

A federal metric conversion law passed in 1988 requires that federal construction projects use metric specifications for all building materials. But there is both a "soft" and a "hard" way to implement this mandate, notes Robert S. Walker (R-Pa.), chairman of the House Science Committee. Hard conversion demands that every door, piece of plywood, floor tile, and lighting fixture be manufactured in round (such as whole, half, or quarter) metric units. Though this "is not required anywhere in the law," he notes, it has been written into the rules issued by federal agencies, and hearings have found that to comply with this hard conversion, U.S. companies had to either retool their products or bow out of the bidding.

The new bill would require that each cabinet-level agency name a high-ranking ombudsman to follow the ongoing transition and "apply the flexibility of the existing law" to alleviate hardships when even the soft metric conversion imposes undue costs on the taxpayer or puts domestic industries at a serious disadvantage in relation to foreign competitors when bidding on federal projects.