

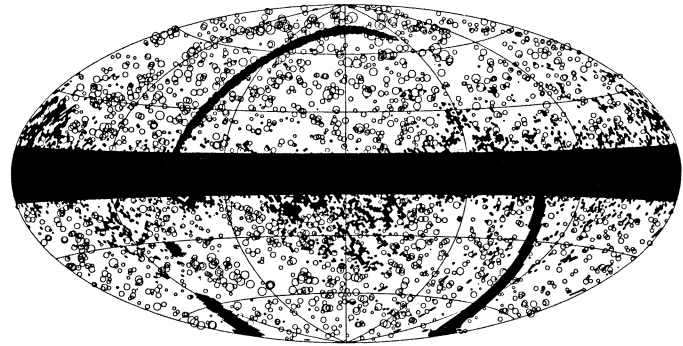
Lumpy local universe unveils cold message

A new map showing the distribution of galaxies across the sky has deepened the mystery of how galaxies formed after the Big Bang. Based on data from the Infrared Astronomical Satellite (IRAS), the map reveals that galaxies within 450 million light-years of the Milky Way have a markedly uneven arrangement. This heightens suspicions that the standard cold-dark-matter model of galaxy formation cannot adequately account for the huge galactic clusters and vast, intervening voids evident in the sky.

"There is more structure on large scales than is predicted by the standard cold-dark-matter theory," write Will Saunders of the University of Oxford in England and his collaborators in the Jan. 3 NATURE. To analyze the IRAS data, the team formulated a new statistical technique for measuring the degree of clustering in the three-dimensional distribution of matter on large scales.

"In the last two years, there have been

This map of the local universe shows the distribution of a sample of 2,163 galaxies detected by the Infrared Astronomical Satellite. Dark bands mask areas of incomplete satellite coverage.



Saunders et al./NATURE

lots of challenges to the cold-dark-matter model," says Lawrence M. Krauss of Yale University in New Haven, Conn. "This is the clearest statistical test [of the model] yet."

Although the results of the sky survey appear to rule out the simplest version of the cold-dark-matter scenario, in which the force of gravity acts on tiny fluctuations in the density of primordial matter to create galaxies, more complicated versions of the theory may still work. Indeed, Saunders and his co-workers furnish strong evidence that the universe must contain huge quantities of dark matter.

"It suggests that the way galaxies formed out of cold dark matter involved more complex processes than we had assumed," Krauss says. "As of now, there is no model that explains why the universe should be the way it is. Until now, cold dark matter provided the best possible model that was consistent with all the observations. It remains the best model that we have."

The new findings don't directly challenge the Big Bang scenario itself. "The Big Bang is in better shape than ever," says David N. Schramm of the University of Chicago. "What we don't know is how to make galaxies." — I. Peterson

Fighting fat with fat: Red meat redeemed

As a physician with a penchant for good food, Donald M. Small knew the heart risks posed by cholesterol and saturated fats, and he recognized red meat as a prime source of those nutritional no-no's. But not wishing to eschew red meats altogether, this kitchen chemist set to work concocting a simple way to extract their deleterious lipids. His stove-top recipe makes its debut in the Jan. 10 NEW ENGLAND JOURNAL OF MEDICINE.

Pour one-half quart or more of vegetable oil—preferably olive or canola—into a frying pan and heat to 176° F. Add ground or thinly shaved meat and stir until the slurry reaches about 195° F. Stir for 5 more minutes, then increase the heat to about 225° F for another 5 minutes to boil off the water and brown the meat. Drain, then rinse with clear boiling water. Save the rinse water, skimming off the surface oil. Boil the liquid to reduce it to a savory broth, and pour this over the meat.

Though health-conscious cooks may recoil at the suggestion to enhance meat's uptake of fat, in this recipe "the vegetable oil acts as a healthy solvent," Small says. The oil extracts about 40 percent of the meat's cholesterol and replaces much of the saturated fat with potentially healthier monounsaturated and polyunsaturated fats, he explains.

If Americans used this new approach to prepare one-third of the red meat they currently consume, "it would lower the [total U.S.] consumption of saturated fats by about 3 percent of calories," Small and his coauthors assert in their report. Noting the relationship between saturated

fat consumption and serum cholesterol levels, they suggest that this "modest dietary change" could reduce an individual's risk of cardiovascular disease, lowering serum cholesterol levels by an average of 7 to 9 milligrams per deciliter of blood.

Experimentally stir-fried lean ground beef lost about 18 percent of its cholesterol, whereas oil-fried batches lost 39 to 49 percent of their cholesterol, report the Boston University researchers, who drained and rinsed both batches identically. Moreover, while both batches lost about the same proportion of total fat (roughly 67 percent), the stir-fried batch retained its initial fatty-acid profile, which included 43 percent saturated fat. The oil-extracted batch, in contrast, contained only 25.5 percent saturated fat.

"For people who love to cook and savor their flavor, this might really expand their food choices," says Margo Denke of the University of Texas Southwestern Medical Center in Dallas. However, she observes, the oil requirement makes it "a very expensive way to cook." And the need to optimize the meat's surface contact with oil means the technique won't help steaks, roasts and patties.

Health-conscious diners might do better exploring "the world's vast array of vegetarian dishes containing no cholesterol and little [saturated fat]," contend Walter Willett and Frank M. Sacks of Harvard University in Boston. "The optimal intake of cholesterol is probably zero," they add in their editorial accompanying the research report. — J. Raloff

Double science funds, Nobel laureate urges

Ten billion dollars can buy a lot of science.

And in order to restore the vigor of campus-based research, that's what the federal government needs to add to its academic science budget, asserts Nobel laureate Leon M. Lederman in a new report prepared for the American Association for the Advancement of Science.

Lederman's call for the hefty increase—which would nearly double the current funding levels—comes just months after a congressional mandate capping the growth of most nondefense items in the 1992 and 1993 budgets at levels that barely keep pace with inflation (SN: 12/15/90, p.378).

But the University of Chicago physicist says his mail survey of some 250 campus researchers compelled him to make the recommendation. He described the survey this week at a briefing in Washington, D.C., and in the Jan. 11 SCIENCE.

Lederman's survey, conducted last summer, focused on the availability of academic research funds. He queried both senior and newly established professors of chemistry, physics and biology at 50 universities, including the 30 institutions receiving the largest share of federal research funds. Lederman acknowledges the limited scope of the survey and admits it could have served largely as a forum for researchers to air long-standing complaints about funding. But he says letters from survey partici-

pants expressed "a depth of despair and discouragement that I have not experienced in my 40 years of science."

"Our senior faculty are demoralized, and our junior faculty are jumping ship," wrote biologist Alan F. Horwitz of the University of Illinois in Urbana. "Undergraduate and graduate students sense the despair and are turning away from science at a time when we need them most."

Physicist James C. Thompson of the University of Texas in Austin echoed the gloom: "My current plans are to quit. . . . As funds for research disappear, I lose the ability to support students and operate a laboratory."

This sense of crisis may seem ironic, Lederman notes, when one considers that basic-research funding has increased faster since the mid-1980s than any other nondefense spending. But he argues that several factors have conspired to put the fiscal squeeze on faculty scientists.

While the number of U.S. university researchers has doubled since 1968, federal funds for basic and applied campus research, when adjusted for inflation, reflect an increase of only 20 percent during that period, he says. (Using another inflation index, Presidential Science Adviser D. Allan Bromley calculates a 60 percent increase.) The rising cost of equipment and the increasing complexity of research pursuits contribute to the

money crunch, Lederman says.

He suggests two ways to create new revenue for federal research spending: issuing government bonds designated for research, and taxing high-tech consumer products. But when a reporter at this week's briefing asked Sen. Albert Gore Jr. (D-Tenn.) about the likelihood of Congress approving such a tax, scientists, policymakers and journalists erupted in cynical laughter. A deadpan Gore said he would "reflect on the matter." Citing the tendency of foreign companies to beat the United States to the punch in capitalizing on U.S. basic research, Gore warned that many Americans remain skeptical that a science funding increase would bolster the nation's economy.

David Goldston, a staff member of the House Subcommittee on Science, Research and Technology, criticized Lederman's report for its singleminded focus on funding. "The science community has to examine how things are done [within its own community]," he asserts, "and not just say that the system should go on the way it has been going on, 'only we need more money.' That is not going to get a sympathetic hearing."

Goldston suggests instead that researchers seek more grants for young scientists, provide the government with more guidance on which projects to fund, and accept that the 1960s "golden age of funding" won't return. — R. Cowen

Vitamin-rich blood may prevent angina

High blood levels of certain nutrients, especially vitamin E, may lower the risk of angina, a type of chest pain that often precedes a heart attack. This new finding, though based on an all-male study sample, adds to growing evidence suggesting that certain "antioxidant" nutrients may prevent blood vessel damage that can cause heart disease.

Harvard University researchers discovered last year that men who took beta carotene — a vitamin A precursor — suffered half as many heart attacks and strokes as men who took placebo pills during a six-year study (SN: 11/17/90, p.308). Many researchers believe beta carotene and vitamins E and C act as potent antioxidants in the bloodstream, thus blocking the formation of oxidized low-density lipoprotein (LDL) cholesterol. Scientific evidence suggests that oxidized LDL represents the worst form of cholesterol, damaging artery walls and triggering the buildup of fatty deposits that can reduce blood flow to the heart and eventually cause a heart attack.

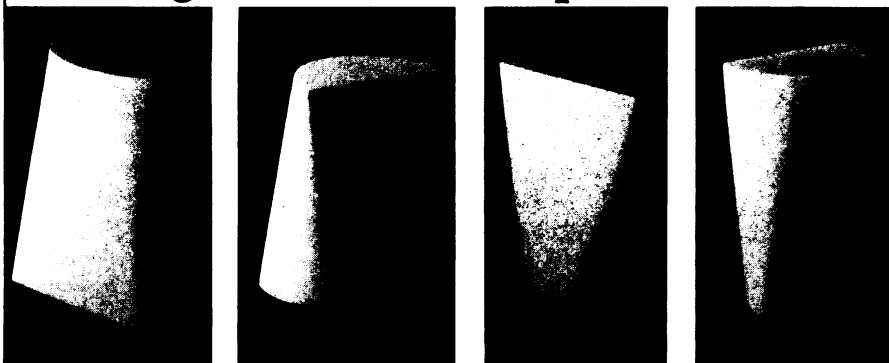
A report in the Jan. 5 LANCET adds another piece to the vitamin and heart disease puzzle.

Rudolph A. Riemersma and his colleagues at the University of Edinburgh in Scotland, working with K. Fred Gey at the University of Berne in Switzerland, studied 110 men with previously undiagnosed chest pain and 394 healthy men who reported no heart disease symptoms. The researchers took blood samples from all participants and analyzed the clear, plasma portion for carotene (primarily beta carotene) and vitamins E and C. Their statistical analysis revealed that men with higher-than-average plasma levels of these nutrients — particularly vitamin E — were less likely to experience chest pain than were men with lower-than-average plasma concentrations of the nutrients.

Riemersma recommends that people eat more fruits and vegetables, as well as vitamin-E-rich cereals, nuts and vegetable oils. Noting that middle-aged men in Scotland typically eat very few fruits and vegetables, he suggests that vitamin-poor diets may help explain why Scotland has one of the world's highest rates of heart disease.

It remains unclear whether a vitamin-rich diet can actually lower the incidence of heart disease in Scotland or elsewhere, cautions Lawrence J. Machlin, a vitamin researcher at Hoffmann-La Roche, Inc., in Nutley, N.J. Nevertheless, he says, this study and others like it offer compelling evidence for the theory that antioxidant nutrients, and especially vitamin E, may offer some protection against heart disease. — K.A. Fackelmann

'Leaning' column creates optical illusion



These four pictures, taken from different angles, show the same object. Which way does it lean?

Actually, it doesn't lean at all; it stands perfectly vertical. The three-dimensional optical illusion results not from some photographic trick but from the unusual properties of the shape itself. As a viewer walks around it, the recently designed form, called a Bareiss column, appears to tilt or wobble in various directions.

The structure has a semicircular base oriented in one direction and a semicircular top rotated 180° relative to the base. The column appears vertical only when viewed along the diameters of these semicircles or from an angle perpendicular to either of the diameters.

Several variations of the Bareiss column will go on exhibit for the first time next September at the Massachusetts Institute of Technology Museum in Cambridge. "It links art and technology beautifully," says Warren Seamans, director of the museum.

Artist/inventor Raymond Bareiss of Watsonville, Calif., conceived the shape in 1987 while trying to design an unusual, twisted canopy for hotel entrances. Since then, he has constructed numerous variations and contacted U.S. museum directors in search of similar forms. "I've been everywhere with it, and I can't find another object that is as visually deceptive," Bareiss told SCIENCE NEWS. "It's a very simple shape. I don't know why anyone hasn't come up with it before."