Earth Science

Richard Monastersky reports from San Francisco at the fall meeting of the American Geophysical Union

Twin of El Niño found in Indian Ocean

The devilish, weather-disrupting phenomenon known as El Niño is not an only child, report scientists who have discovered a sibling in the Indian Ocean.

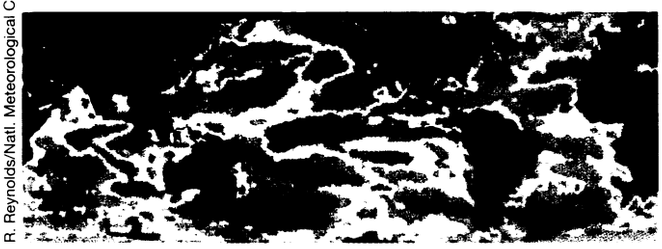
The term El Niño (Spanish for "the child") refers to a pronounced warming that develops occasionally in the equatorial eastern Pacific and warps weather around the globe. South American fishermen coined the name because the warming typically reaches their western coastline around Christmastime. An El Niño begins when ocean warmth and thunderstorms normally found in the western Pacific spread eastward along the equator.

Yves M. Tourre of Columbia University's Lamont-Doherty Earth Observatory and Warren B. White of the Scripps Institution of Oceanography discovered that a similar type of warming occurs in the Indian Ocean at the same time an El Niño grips the Pacific. Tourre and White discerned the Indian Ocean pattern while studying records of sea surface and subsurface temperatures for the period 1979 to 1991.

The Indian El Niño starts when warming along East Africa moves along the equator to the center of the ocean. That shift happens in lockstep with the relocation of warmth from the western to eastern Pacific. Following the mature stage of an El Niño, the central Indian warmth moves southeast into the Timor Sea separating Australia from Indonesia.

Meteorologists in the past have noted that Pacific El Niños can have long-distance effects, robbing moisture from India and even southern Africa, on the opposite side of the globe. The discovery of an Indian El Niño much closer to Africa could help explain such long-range connections, Tourre says.

R. Reynolds/Natl. Meteorological Center



Map of November sea temperatures shows El Niño warmth (red) building in east-central Pacific and central Indian oceans.

Seattle's slippery underside

Geoscientists have been making sense out of earthquake faults in Puget Sound, thanks to once-secret data provided by the oil industry. With low foreign oil prices and declining interest in U.S. drilling, petroleum companies have started releasing some proprietary information to geoscientists, who cannot foot the bill for their own high-cost measurements of the subsurface, says Thomas L. Pratt of the U.S. Geological Survey in Seattle.

Using the oil company data, Pratt and his coworkers have discovered a nearly horizontal fault, or decollement, beneath Puget Sound that separates the top 15 kilometers of crust from rock beneath. They believe the layer of upper crust in Puget Sound slides northward, buckling like cloth pushed across a table. Although the decollement does not itself produce quakes, it connects with shallower faults, providing the motion that drives earthquakes in the region. Geologists think that a similar type of arrangement underlies Los Angeles and creates quakes by gradually compressing the crust in a north-south direction.

By understanding the decollement, Pratt says, researchers can calculate how fast faults in the region move and how often they produce quakes. "This is the first time people have known what the faults in the area were doing," he says.

Nutrition

Chocolate: Heart-ier than you thought

Although a saturated fat, stearic acid is unusual in that consumption of it does not raise concentrations of cholesterol in the blood. Why remains a mystery, though not for lack of investigation, notes Edward A. Emken of the Agricultural Research Service (ARS) in Peoria, Ill. He fed a deuterium-tagged quantity of five different fats — including the saturated stearic and palmitic fatty acids — to seven men.

Over the next 2 days, he monitored how their bodies converted and incorporated those fats. Animal data, he notes, had suggested that the body might not absorb stearic acid well, or preferentially converts most of it to a monounsaturated fat that would therefore have no effect on cholesterol.

But in a December supplement to the AMERICAN JOURNAL OF CLINICAL NUTRITION (AJCN), which focuses on stearic acid's effects, Emken reports finding that "no single metabolic difference between the [two saturated fats] is sufficiently large enough to fully explain the lower cholesterolemic effect of stearic acid."

He did detect small differences in the fats' absorption, in their rates of desaturation (loss of hydrogen from the fats' chainlike backbone of linked carbon atoms), and in their incorporation by tissues. But at best, he says, these offer only a partial explanation of stearic acid's unusual cholesterol effect.

Emken's colleagues at ARS labs in Beltsville, Md., and San Francisco identified other differences in the way the body handles the two fats. Ten men who switched from a diet high in palmitic acid to a diet high in stearic acid formed smaller and apparently less activated blood platelets — clot-forming elements in the blood. Moreover, their blood clotted more slowly during the stearic-rich portion of the 11-week study, Norberta W. Schoene and her coworkers report in the AJCN supplement. As a result, they conclude, these fats should not be seen as comparable risks for clot-based strokes.

Cholesterol watchers with a "fat tooth" can find stearic acid among the mix of fats in lean beef and other meats. But cocoa butter represents a concentrated source. In fact, a relatively fatty milk chocolate bar can be swapped for a low-fat daily snack possessing the same calories without raising low-density lipoproteins in the blood— a major risk factor in heart disease. At least that's what Penny M. Kris-Etherton of Pennsylvania State University in University Park and her coworkers observed in their 14-week study involving 42 young men. It is also described in the December AJCN supplement.

Broccoli inhibits cancer — mostly

Estrogen is a major risk factor in breast cancer. Studies have shown that indole-3-carbinol (I3C), a component of many brassica vegetables (such as cabbage and broccoli), alters the way the body metabolizes estrogen — stimulating the preferential production of a benign byproduct instead of a highly estrogenic and potentially carcinogenic one (SN: 7/3/93, p.10). In animal studies, this compound has even suppressed the natural rate of mammary tumor development.

But in acidic environments, such as the stomach, I3C will break down into a compound known as ICZ. And in cultured human breast cancer cells, ICZ exhibits both weak estrogenic and more strongly antiestrogenic activity, note Hong Liu of Texas A&M University in College Station and his coworkers in the Dec. 7 JOURNAL OF THE NATIONAL CANCER INSTITUTE.

ICZ's antiestrogenic activity probably contributes to its anticancer effects, the researchers say. Moreover, they argue, "publications that suggest that environmental estrogens may contribute to the increased incidence of breast cancer in women and disorders of the reproductive tract in men [SN: 1/22/94, p.56] have failed to take into account the existence and possible counteractive effects of both dietary and environmental antiestrogens" — such as the ICZ they studied.