pressure of a helium sample and watching when it boils, one can calculate its temperature, again to within a few millikelvin.

Below 0.65 K, the vapor pressure thermometer is not accurate enough to be included in ITS-90, but researchers have several new methods to take the lower limit closer to absolute zero. Robert Soulen from the Naval Research Laboratory described a "noise thermometer" that determines temperature by measuring the level of electrical noise in a resistor. Cooling a resistor decreases the random molecular movement that causes this noise, so the level of noise offers a way to gauge the temperature.

Another measure, described by William Fogle of the standards institute, involves the melting point of helium-3, which is a solid at low temperature and high pressure. By decreasing the pressure until the helium-3 melts, a researcher can determine the sample's temperature. A third method depends on measuring an object's magnetic susceptibility—how easily its electrons align their spins with an applied magnetic field—as a function of temperature.

All three techniques give an accurate measure of temperature down to about 0.01 K, said Lawrence Rubin of the Massachusetts Institute of Technology, who added, "that's about as low as you can go and everyone will agree with you." The international temperature scale will probably be amended to reflect this increased range sometime in the next few years, he added.

Above 13 K, ITS-90 is more accurate than the 1968 scale, mainly because it no longer uses thermocouples. A platinum resistance thermometer is used between 13.8033 and 1234.93 K. As platinum heats up, its resistance to an electric current increases; the temperature can be inferred from resistance. Above 1234.93 K, a radiation thermometer measures the temperature of an object by examining the frequency and magnitude of the radiation it emits.

Besides defining the thermometers, ITS-90 also provides "fixed points" for calibrating the thermometers. For instance, the triple point of water—the unique temperature at which water can be a solid, liquid, or gas—is used to define the point 273.16 K, or 0°C. Other fixed points include the triple point of hydrogen at 12.8033 K, the triple point of neon at 24.5561 K, and the freezing point of silver at 1234.93 K.

Finally, ITS-90 provides formulas for interpolating between the reference points. The resistance of platinum, for example, varies almost linearly with temperature, but not quite. The scale gives scientists a standard way of transforming resistance measurements into temperature readings.

■ ROBERT POOL

Fiber Fracas at FASEB

Scientific arguments over the merits of a high-fiber diet—oat bran in particular—have simmered for a while. But recently they burst into flame, sparked by an article in the *New England Journal of Medicine*. Researchers at Harvard Medical School wrote in the 18 January issue that oat bran has no special power to lower cholesterol and therefore presumably no effect in preventing heart disease. That brought oat bran's champions to a boil, criticizing the Harvard study's design and findings. But the porridge is about to get even thicker.

At the annual meeting of the Federation of American Societies for Experimental Biology (FASEB) next week, both sides will find the issue complicated by a study done by Louisiana State University's Maren Hegsted. Hegsted's study, which is being prepared for publication in the *American Journal of Clinical Nutrition*, finds that the response to dietary fiber is quite individualistic: some people experience a reduction in cholesterol, others don't.

With several apparently contradictory studies on hand, the FASEB organizers have chosen to devote an entire session to dietary fiber and its effects—a session that promises to be exceptionally lively. And the questions are so compelling that other papers on fiber have been scattered throughout the program. Indeed, the FASEB press office has called a press conference highlighting the work of five fiber researchers who will be presenting papers at the meeting.

The paper that touched off the latest round in the debate came from a research group led by Frank H. Sacks. Sacks and his Harvard colleagues set out to test some conventional wisdom. Evidence gathered over the last two decades suggests dietary fiber has a modest—but real—effect on lowering cholesterol, and that water-soluble fiber, such as that found in oat bran, is the most effective.

In Sacks' study, 20 healthy volunteers with serum cholesterol in the normal range were given, successively, supplements of high-fiber oat bran muffins or low-fiber Cream of Wheat. The conclusion was that "high-fiber and low-fiber dietary grain supplements reduce serum cholesterol levels about equally, probably because they replace dietary fats."

Fiber's defenders shot back. Eliot A. Brinton, a biochemical geneticist at The Rockefeller University, told *Science*: "I am appalled. The Harvard study is embarrassingly poorly designed to answer the questions they wanted to answer." One thing that bothers Brinton is that Sacks' study included people with normal serum cholesterol, rather than those with elevated cholesterol, who may have abnormal metabolism.

Sacks acknowledges that the question of what oat bran does for people with elevated cholesterol is important—and he says a recent study finds oat bran doesn't do anything special for that group, either. The study, by nutritionist Wendy Demark-Wahnefried of Syracuse University and her colleagues, published last month in the *Journal of the American Dietetics Association*, tested a high-fiber diet on 68 patients with high cholesterol. The conclusion of that study was that some of the effect of oat bran was due to replacement of fat, as Sacks had found.

But Demark-Wahnefried doesn't think that's the whole story. "There is evidence that something else is going on" that helps reduce cholesterol, she says.

Which may set the stage for nutritionist Hegsted of Louisiana State. She plans to tell FASEB attendees that her study differs from previous ones not only in finding an individualistic response to high levels of fiber, but also in finding that rice bran can lower cholesterol. Yet the fiber in rice bran, unlike that in oat bran, is insoluble in water—hence a different mechanism may be at work.

So what gruel does this leave for the nutrition conscious? One lesson may be that there aren't any miracle preventatives for disease, and that less faith should be placed in diet fads. Jon A. Story, a nutritionist at Purdue University, says fads—including the oat bran craze—put too much emphasis on "diet and disease, rather than on diet and health. Diet should not be disease prevention. Rather, one should eat for optimal health."

That prescription might stimulate those at the FASEB meeting to attend another intellectually nutritious session: "Psyllium: The Latest Fad Grain" by Merry Yamartino of the University of Massachusetts.

■ ANNE MOFFAT

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