had a specific *CETP* gene variant that blunts CETP activity, compared to 8% of controls.

Questions persist about CETP's influence on particle size, however, particularly on LDL. But cardiologists are generally intrigued by both the CETP results and the predominance of large lipid particles in the centenarians and their children. "We really need to pay attention to this," says Jean-Pierre Després, director of research at the Quebec Heart Institute in Quebec City, Canada. It's striking, he adds, that LDL particle size, and not LDL levels—the target of drugs and heart disease prevention efforts—appears key. Six years ago, Després reported that having lots of small LDL particles upped the risk of atherosclerosis.

Earlier work also supports the importance of CETP in heart disease. Stefan Blankenberg, a cardiologist at Johannes Gutenberg University in Mainz, Germany, found that the same *CETP* gene variant prominent in the centenarians confers a lower risk of cardiac death in already ill individuals.

Still, the team's results will likely be debated for some time. Neither particle size nor CETP is "a predictor of whether you're going to become a centenarian," because most people with the good variant will still die before 100, says James Vaupel, director of the Max Planck Institute for Demographic Research in Rostock, Germany. Finding such a crystal ball, if it exists, is probably years off.

–JENNIFER COUZIN

GEOSCIENCES

A Call for Telling Better Time Over the Eons

WASHINGTON, D.C.—Ever since modern geology began to emerge almost 2 centuries ago, scientists have been trying to whittle the expanse of geologic time into small, manageable bits. At a workshop held here early this month at the National Museum of Natural History,* geochronologists declared that they must do better, much better and called for an unprecedented effort to calibrate the geologic time scale. An order-of-magnitude improvement in ordering and pacing the geologic record could reveal underlying causes of mass extinctions, evolutionary divergences, and geologic catastrophes—central questions in geology, paleontology, and evolutionary biology.

"We need a major international cooperative network of geochronology centers dedicated to the goal of science-driven, integrative calibration," said Samuel Bowring of the Massachusetts Institute of Technology, a workshop organizer. Although no specific plan emerged, Bowring notes, participants agreed that "we have to make sure we're all getting the same answer on the same rocks."

That doesn't always happen. Bowring himself is embroiled in a debate over the age of the mother of all mass extinctions, the Permian-Triassic, in which 85% of all species living in the sea became extinct. In 1998, he and colleagues reported that the clocklike decay of uranium to lead inside zircons from China pegged the Permian-Triassic at 251.7 million years ± 0.3 (2 sigma). But then Roland Mundil of the Berkeley Geochronology Center in Berkeley, California, and colleagues published uranium-lead data from similar Chinese zircons that supported an age of more than 252.5 million years. That seemingly slight discrepancy poses a serious problem for paleontologists and geologists seeking a cause for the Permian-Triassic extinction. Many suspect the humongous volcanic outpourings that formed the Siberian Traps 251 million years ago, but only a more precise date for the catastrophe can close the case (*Science*, 6 October 1995, p. 17).

Other crucial ages are also out of whack. In the Dolomites of northern Italy, geochronologists have measured how long it took to pile 600 meters of microscopic carbonate skeletons on the sea floor about 240 million years ago to form the Latemar limestone (*Science*, 12 November 1999, p. 1279). Assuming that the distinctive layers of the Latemar matched climate cycles driven by clocklike variations in the shape of Earth's orbit, sedimentologists estimated that it took about 8 million years to form the whole pile. Uranium-lead dating of zircons from volcanic ash beds in the Latemar, however, produced a figure of about 2 million years—too little time to form such deposits, sedimentologists say. Years of work on both ways of dating the Latemar have failed to resolve the conflict.

How old? The fine layers in Italy's Dolomites mark time, but researchers can't agree on how much.

Earlier in the geologic record, great ice ages pushed glaciers into the tropics and may have encased the whole globe in ice. But even proponents of such "snowball Earth" scenarios can't agree on whether there were two or three glaciations late in the Precambrian about 600 million years ago. No one site records more than two glaciations, and radiometric dates are too sparse to settle the argument.

The general sparseness of reliable ages was the primary complaint at the workshop. "We desperately need more dates, and we want them now," said geologist Bruce Wardlaw of the U.S. Geological Survey in Reston, Virginia, only half-jokingly. How to get them was less clear. Geochronologists tend to favor adding more labs led by individual researchers who can collaborate closely with paleontologists and others on fundamental science problems. On the other hand, some nongeochronologists looking for high-volume dating would like to see centralized national facilities as well.

In addition to more dating, researchers want better dating. Long-recognized problems with standards, interlab calibration, and sample processing have limited both the precision and the accuracy of uranium-lead and argon-argon radiometric dating. At the moment, these two leading techniques consistently differ on the age of the same sample by 1%. At the workshop, Bowring proposed that by 2015 geochronologists narrow dating precision to a consistent 0.1%—the equivalent of erring by 3 or 4 seconds in an hour. "Open, interlaboratory comparisons haven't been done at the 0.1% level," says Bowring. "A lot of the new effort would be through shared samples analyzed at multiple labs."

Such cooperation was the workshop's watchword. Bowring called for new mechanisms to bring together geoscientists, from geochemists who mark time by swings in Earth chemistry to paleontologists who peg it to the comings and goings of long-dead beasts. Geochronologists themselves, everyone agreed, should work together to hammer out generally accepted "best practices" to help harmonize the discrepant ages of the Permian-Triassic extinction. Geochronologists could even help fieldworkers recognize the ash layers all-important to radiometric dating. How much this new spirit of cooperation would cost did not come up.

–RICHARD A. KERR

* "Calibration of Geologic Time Scale" Workshop, 3–4 October, Washington, D.C.; sponsored by the National Science Foundation.