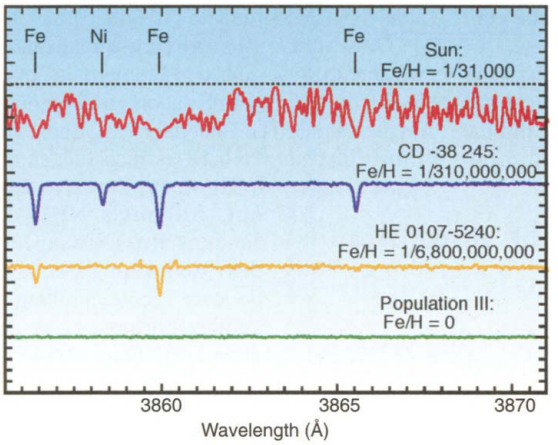
transforming hydrogen and helium (products of the big bang) into heavier elements such as carbon, oxygen, silicon, and iron. Massive elements also form in the fires of supernova explosions, which spray the rich mixtures into space. Generations of stars have seeded our Milky Way galaxy in this way, altering its primordial composition into a potpourri more conducive to rocky planets and computer chips.



Clean slate. Ultraviolet spectral lines of iron and nickel reveal that a newly found ancient star (third from top) contains the lowest proportion of heavy elements yet seen.

Ancestral stars might persist, burning slowly on the Milky Way's sparse outskirts where new stars no longer arise. Astronomers have scoured space for those objects for more than 2 decades. Previously, the most primitive star found in such searches contained about one 10-thousandth as much iron as the sun. Some researchers speculated that they would never come closer to the so-called Population III—the first stars, born with no heavy elements (*Science*, 4 January, p. 66).

However, an ambitious survey of more remote parts of the galaxy has uncovered a star 20 times as anemic. Astronomer Norbert Christlieb of the University of Hamburg, Germany, and his colleagues scrutinized the star in December 2001 with one of the four 8-meter telescopes in the European Southern Observatory's Very Large Telescope array in Paranal, Chile. Analysis of the light from the star, called HE0107-5240, shows that its atmosphere is a strikingly unspoiled broth of hydrogen and helium with the barest dash of heavy elements: just one iron atom for every 7 billion atoms of hydrogen. The team's results appear in the 31 October issue of *Nature*.

HE0107-5240 might record an imprint of the first supernovas, says co-author Timothy Beers, an astronomer at Michigan State University in East Lansing. For instance, dollops of nickel are evident in the previous most iron-poor star, but HE0107-5240 is nearly nickel-free (see figure). That absence might reflect a basic difference in how the earliest supernovas forged elements, because even a single modern supernova would have supplied enough nickel to pollute the star. "This may be the first example of a true second-generation star," Beers says. "It's our best look at the starting recipe that led to the rest of the periodic table [of the elements]."

The star is now a red giant: the bloated end stage of a star that has fused most of its hydrogen fuel. However, Beers notes, it lived for at least 12 billion years as a small star just 80% as massive as our sun. Current models maintain that primitive gas clouds with almost no heavy elements could not have formed tiny stars, because hydrogen alone can't cool clouds to the frigid temperatures needed for small clumps of gas to collapse. Rather, theories hold, the first stars were enormous—perhaps 100 to 1000 times larger than our sun. HE0107-5240 suggests that little stars were in the initial mix as well or were born soon thereafter. Some tiny stars might have formed as companions to gigantic ones and survive as relics to this day, Pilachowski notes.

The Hamburg survey might reveal more primitive stars to help fill in the tale. Christlieb's team has analyzed just one-quarter of its most promising candidates so far.

—ROBERT IRION

CREDIT: N. CHRISTLIEB *ET AL.*/ESO/VLT-UVES

HUMAN GENOME

HapMap Launched With Pledges of $100 Million

A consortium of six nations is diving into a massive new genomics project it hopes will pinpoint the genes behind common diseases. After months of passing the hat among countries and private companies, the U.S. National Institutes of Health (NIH) announced earlier this week that it's garnered the $100 million the 3-year effort to construct a so-called haplotype map is likely to cost. But even as the project was announced with considerable fanfare, many details remained sketchy.

The idea for the HapMap, as it's informally known, arose soon after scientists discovered that the human genome has a surprisingly structured architecture. Thousands of DNA bases, and the patterns of single-base variations among them, fall into roughly the same order in many people. A popular theory is that slight tweaks in those DNA blocks, or haplotypes, could mean the difference between health and ailments ranging from cancer to diabetes. Researchers plan to

ScienceScope

France's Space Crunch French researchers are calling on the head of CNES, the nation's space agency, to resign—and they aren't satisfied by a government promise to review the beleaguered bureaucracy. Research minister Claudie Haigneré last week said she would appoint a committee to study French space policy and the future of the Paris-based CNES.

Some CNES staff members have publicly called on agency chief Alain Bensoussan to resign, saying that he has failed to adequately address financial problems that threaten to squeeze space science programs. Budget shortfalls have already stalled several major projects, including an Earth-observing mission and planning for Mars exploration. And staff members worry that pressure to find funds for the ailing Ariane-space satellite launch company and other ventures will further bleed science efforts.

In a bid to mollify critics, Haigneré's panel will study the situation and report back by the end of the year. But Hubert Rodriguez, a union representative at the agency's Toulouse center, vows to keep up the pressure. He says that "in view of our disastrous financial situation, this does not reassure us in the slightest."

Ozone Debate Over? The U.S. Environmental Protection Agency (EPA) will soon lay to rest a 5-year debate over the potential health benefits of "bad" ozone. The agency is expected this month to issue a new air pollution rule that concludes that the benefits of reducing ground-level ozone outweigh possible skin cancer risks.

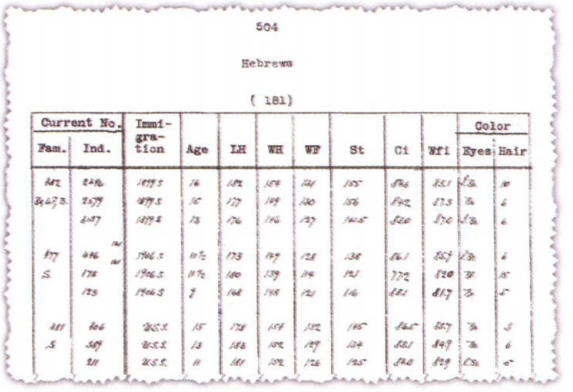
Ground-level ozone from cars and other pollution sources is known to cause severe respiratory ailments. But like ozone high in the stratosphere, it can also protect people against the ultraviolet radiation that causes skin cancer and cataracts. Indeed, in the late 1990s, two EPA reports estimated that tougher ground-level ozone standards could result in roughly 700 new U.S. skin cancer cases annually. Industry groups seized on such predictions in a court challenge to the tougher standards, and 3 years ago a federal judge ordered EPA to consider the science on ozone's possible health benefits before moving ahead.

Some environmentalists decried the decision. But Randall Lutter, a scholar at the American Enterprise Institute in Washington, D.C., says that ignoring the science was a "serious flaw" that smacked of political bias. The controversy apparently hasn't changed EPA's mind, however. Although agency officials can't discuss details, they say the science is still "too uncertain" to warrant delaying the tougher rules.

largest being Hebrews (Jews from Eastern Europe), Bohemians, central Italians, and Sicilians. He compared parent-offspring resemblance in immigrants whose children were born in the United States with those whose children were born in Europe to see whether living in the New World had an effect on skull shape (see graphic).

Using the cephalic index—the ratio of head breadth to head length—Boas found what he saw as a small but significant trend: The U.S.-born children in the four largest groups were more different from their parents than were the foreign-born. Jews, who had "very round head[s]," became more "long-headed," he reported, while long-headed Italians became more short-headed—"so that both approach a uniform type in this country." The study is often cited as evidence that humans can't be pigeonholed in racial categories because their morphology is too malleable.

Rudimentary as his statistical methods may have been, "in general, we conclude that Boas got it right," say Clarence C. Gravlee of the University of Michigan, Ann Arbor, and colleagues in a paper posted online (www.aaanet.org/aa/105-1_gravleeetal.htm) months ahead of its publication in the *American Anthropologist*. The difference in the two groups of offspring, the authors state, is small but "highly significant."



Taking their measure. Two teams of researchers have reanalyzed data (*above*) from a classic study by Franz Boas of European immigrants in America—and come to contrasting conclusions.

Wrong, say Corey Sparks of Pennsylvania State University, University Park, and his adviser, Richard Jantz of the University of Tennessee, Knoxville. The divergence in the U.S.-born offspring is "negligible" and the influence of the environment "insignificant," they say in the 7 October *Proceedings of the National Academy of Sciences*. "Uncritical acceptance of [Boas's] findings has resulted in 90 years of misunderstanding about the magnitude of [cranial] plasticity."

Sparks doesn't disagree that Boas found a difference in cranial shape between foreign and domestic-born children. And Gravlee does not quibble with Sparks about the high heritability—and, hence, stability—of the trait. But the two sides disagree on whether the differences, although statistically significant, are also scientifically meaningful.

Sparks says that the differences pale when compared with the much greater variation seen among ethnic groups. "About 99% of the variation [among all the groups studied] is due to ethnic variation and 1% to immigration," Jantz explains. "Boas was right in identifying a small immigration effect," but that has been confirmed in many subsequent studies, he says. "The real value of Boas's work, as reinterpreted by us, is how small that environmental response is."

Henry Harpending of the University of Utah, Salt Lake City, supports Sparks's analysis, arguing that "with samples this large, almost anything can become statistically significant even if it is not worth any attention."

Gravlee, however, insists that the numbers confirm Boas's "overarching conclusion," namely, that "the cephalic index is sensitive to environmental influences and therefore does not serve as a valid marker of racial phylogeny."

The practical impact of the two papers is not clear. Sparks thinks that his analysis will help those who want to use cranial data to study population history, because the Boas study "has been a burr in our bed for 90 years." Indeed, Jantz was a plaintiff in the long-running suit by scientists seek-

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ScienceScope

From Classroom to Boardroom President George W. Bush has belatedly nominated eight people for 6-year terms on the National Science Board, the National Science Foundation's governing body, and the list (www.nsf.gov/nsb) contains a few surprises. The biggest surprise is JoAnne Vasquez, who would be the first board member to have made her mark as an elementary school science teacher. Vasquez, now semiretired, is a popular speaker on school reform and a consultant for McGraw Hill Inc. Observers were also struck by the absence of any industrial leaders on the list, which is heavy with engineers and other academics.

The board has been short-handed since May, when a third of its 24 members rotated off. But the new members, nominated 17 October, can't step in until they are vetted and then approved by the Senate, which comes back this month for a short, lame-duck session.

Sea-Floor Science Silenced A federal magistrate has ordered the U.S. National Science Foundation (NSF) to cut short a research cruise off Mexico that was using sound to map the sea floor, backing conservationists who claim that the noise killed several whales (*Science*, 25 October, p. 722). This week's ruling disrupts a $1.6 million international project that was supposed to run through 4 November.

The Center for Biological Diversity (CBD), an Idyllwild, California–based environmental group, asked the court last week to halt the cruise after vacationing whale biologists discovered two dead beaked whales in the Gulf of California on 25 September. Environmentalists believe the deaths are linked to the use of sound-generating devices by the U.S. research vessel *Maurice Ewing*, which was mapping a nearby area. Human-created noise, including military sonar, has been linked to other beaked whale strandings. NSF said there was no clear link in this case, but it did halt the cruise for nearly a week and take steps to avoid whales. But that wasn't enough for the CBD, which successfully argued that the mappers didn't have the requisite U.S. permits—an interpretation disputed by NSF. Says agency spokesperson Curt Supplee: "This is a nightmare of legal ambiguity that will have to be hammered out by the courts."

Contributors: Barbara Casassus, Erica Goldman, Jeffrey Mervis, David Malakoff