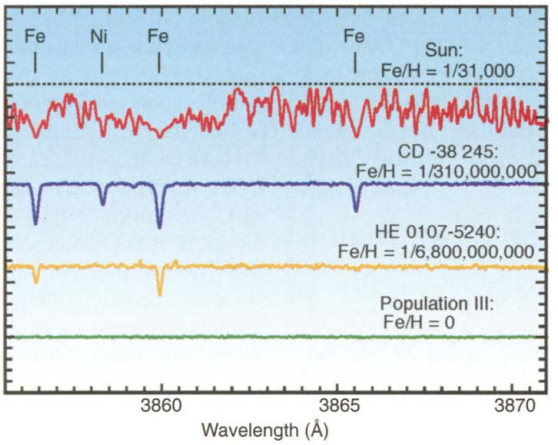
transforming hydrogen and helium (products of the big bang) into heavier elements such as carbon, oxygen, silicon, and iron. Massive elements also form in the fires of supernova explosions, which spray the rich mixtures into space. Generations of stars have seeded our Milky Way galaxy in this way, altering 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

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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.

examine 200 to 400 genetic samples from four populations in Africa, Asia, and the United States. (Previous studies have shown that haplotype patterns differ in part based on migratory histories.)

Enthusiastic about the HapMap's potential to provide medical answers that the full human genome sequence has yet to offer, NIH paved the way, planning a $40 million commitment early this year. Since then, the Canadian government kicked in a little under $10 million and, more recently, the Wellcome Trust Sanger Institute in Hinxton, U.K., about $25 million. Japan, China, and the SNP Consortium, a public-private group seeking single-base differences among genomes, are also adding to the pot.

Work is expected to begin as soon as participants at genome centers in the United States and abroad agree on some ground rules for the project, perhaps the most unwieldy collaboration since the sequencing of the human genome. They have yet to determine, for instance, how data collection will be standardized. Also uncertain is precisely how the map will be structured and how the work will be divvied up.

"We've learned how to find good ways to work together," says David Bentley, head of human genetics at the Sanger Institute. But he notes that unlike the 3 billion bases biologists knew they'd uncover in the genome project, here no one knows quite what to expect.

–JENNIFER COUZIN

WOMEN'S HEALTH

More Questions About Hormone Replacement

Three months after a review panel abruptly stopped a 16,600-woman study of hormone replacement therapy (HRT), a stunned medical community is trying to resolve questions raised by the trial. Last week, several hundred experts and observers gathered at the National Institutes of Health (NIH) in Bethesda, Maryland, to weigh the implications. Most agreed that hormone therapy should not be used to prevent disease. But HRT might still have valid, short-term uses in treating the symptoms of menopause. The risks are not clear, however, nor will they be easy to study, for many acknowledge that large-scale hormone trials might no longer be feasible or ethical.

That point was underscored when the U.K.'s Medical Research Council announced in London at the same time that it was abandoning a similarly ambitious hormone study. The British trial, Women's International Study of Long Duration Oestrogen After Menopause (WISDOM), had planned to enroll up to 22,000 women. It was already struggling to recruit volunteers when the U.S. study of Prempro, a drug combining estrogen and progestin, was halted in July. An interim analysis of the U.S. research, part of NIH's Women's Health Initiative (WHI), had shown that the hormones increased the risk of heart disease, breast cancer, and stroke more than they reduced chances of osteoporosis, bone fractures, and colorectal cancer (*Science*, 19 July, p. 325).

WISDOM's leaders, fighting to keep their trial alive, argued that the benefits might still outweigh the risks for many women. But the Medical Research Council overruled them. Results from the $32 million study, not expected until 2016, were unlikely to differ enough from those of WHI to alter clinical practice, says Oxford University's Ray Fitzpatrick, chair of an international panel that recommended terminating the study.

> **"The dilemma now is [how do we decide] who's at too much risk to take hormone replacement therapy?"**
>
> **—Deborah Grady, UCSF**

WHI's outcome, meanwhile, has sown confusion among women and their doctors. NIH organized the workshop in an attempt to clear it up. The befuddlement was due in part to the fact that most women take hormones to counter symptoms of menopause such as hot flashes, which the trial was not designed to evaluate. It examined other health endpoints among women whose average age was 63. Many doctors questioned whether the WHI results applied to women typical of those in their waiting rooms—in their early 50s and just entering menopause. Could the risk of disease attributed to hormone use be lower in a younger cohort?

Shutting down the trial raised broad questions like these, said Deborah Grady of the University of California, San Francisco: "The dilemma now is [how do we decide] who's at too much risk to take hormone replacement therapy?" WHI investigators are poring over 5 years of data to try to identify risk factors. Grady and others cautioned against making assumptions that are not backed up by WHI's data.

The study was halted when 38 per 10,000 women receiving Prempro for a year were diagnosed with invasive breast cancer, compared to 30 in the placebo group. Although this 26% increase is substantial, the risk for an individual woman remains small.

In the future, researchers should "focus on 50 to 59 [year-olds]," was the message from the audience, says Marian Limacher, a WHI investigator at the University of Florida College of Medicine in Gainesville. But she thinks it would be next to impossible to run such a trial: "Who's going to be willing to stay on long-term hormones now?" she asks. Not many, if the aborted WISDOM trial is any indication. Although closely watched trials of HRT to prevent Alzheimer's disease will continue, others—including one on lupus patients—have been abandoned, according to NIH officials.

One of the most vexing questions is whether the risks linked to Prempro use apply to the four other combination HRT products on the market. The National Heart, Lung, and Blood Institute (NHLBI), which funded the WHI study, hopes to find out, although NHLBI's Jacques Rossouw agrees that "women might be a little leery" about enrolling in another hormone trial. Although the Food and Drug Administration is considering relabeling combination hormones to reflect the risks, Janet Woodcock, director of the agency's Center for Drug Evaluation and Research, says differences among product recipes make it "not possible to extrapolate" from Prempro to other medications.

While efforts to sift the results continue, investigators are watching for the next step by Wyeth, Prempro's manufacturer. In July, Wyeth requested access to the study data; NIH agreed to hand the information over. "Once it's released we can't control what they do with it," explained Limacher, who's unhappy that Wyeth will access the data before investigators publish all the findings. But Wyeth vice president Ginger Constantine argued, as Prempro sales plummeted, that "nobody needs science more than us."

–JENNIFER COUZIN AND MARTIN ENSERINK

ANTHROPOLOGY

Going Head-to-Head Over Boas's Data

Studying skull dimensions is commonplace in forensics and paleoanthropology. But two new papers offering diametrically opposed analyses of a classic study by Franz Boas suggest that the technique is still controversial for many anthropologists entwined in the ongoing debate over the relation among genes, environment, and race.

Boas, the father of American anthropology, published a study in 1912 challenging the prevailing belief that ironclad genetic rules govern cranial shapes. He took measurements from 13,000 European immigrants and their offspring living in New York comprising seven ethnic groups, the