Effects and don't easily cross the blood-brain barrier, although that flaw could be corrected. For example, the currently approved protease inhibitors cause mild to severe side effects and don't easily cross the blood-brain barrier, although that flaw could be corrected in new versions of these drugs.

Despite the promise of the chemokines and the dramatic effects of the protease inhibitors, neither one can be considered the "magic bullet" that could vanquish HIV entirely. Indeed, it's an open question as to whether any drug could actually rout the virus from its many hiding places in the body. For example, the currently approved protease inhibitors cause mild to severe side effects and don't easily cross the blood-brain barrier, although that flaw could be corrected in new versions of these drugs.

But one problem that scientists alone cannot solve is the issue of access to the new therapies. The World Health Organization's statistics indicate that more than 90% of the 22.6 million HIV-infected people live in developing countries, and most of them lack access even to AZT, let alone the expensive triple therapy. Even in the United States, where the new therapies cost an estimated $12,000-plus per year, only a small minority of HIV-infected individuals currently receive them.

So although researchers have added promising new weapons to the fight against AIDS, it's up to policy-makers to see that the fruits of these scientific labors are available to all.

---Michael Balter

And the runners-up are . . .

From the depths of the Earth to the outer reaches of the galaxy, scientists uncovered new marvels in the natural world in 1996. We highlight nine dramatic discoveries that also may have great potential impact on society.

**Original mysteries.** How—and where—did life begin? That's one of humanity's oldest questions, and this year scientists in several fields suggested startling new answers, firing the public imagination with possible traces of ancient life on Mars and supporting one view of life's basic family tree with the genetic sequence of a bizarre microbe. In August, a NASA-led team announced evidence of past life in an ancient martian meteorite, prompting a presidential pronouncement, grabbing front-page headlines, and refocusing NASA's space-exploration plans overnight. Each of the team's four lines of evidence—certain minerals, organic matter, chemical imbalances, and bacterial-like structures—could be due to abiotic causes, but the group argued that taken together, the most likely explanation was life. Then in November, a British team suggested that another martian meteorite also held organic compounds indicative of ancient organisms.

But many scientists remain skeptical, noting that the organic matter could be the leftovers of abiotic chemical reactions or earthly contamination (see Technical Comments). More study could boost the case, if new life signs such as key amino acids or tiny structures turn up. But final answers may have to wait for rock samples from the Red Planet—which aren't due until after the turn of the century.

Back on Earth, isotopic clues in Greenland rocks suggested that life had appeared here by 3.8 billion years ago. And also this year, scientists presented genetic data showing that life falls into just three major domains, rather than the five kingdoms of classical textbooks. This trinomial view was proposed in the 1970s, but this year's work all but clinched the case.

The genetic sequence of a heat-loving microbe, *Methanococcus jannaschii*—a member of one of the big three, the Archaea—was strikingly different from sequences from the other two groups, bacteria and eukaryotes (which include all plants and animals). The data suggest that the Archaea can no longer be lumped with bacteria, and indeed are probably closer kin to eukaryotes. Researchers are now unraveling more genomes from primitive organisms, hoping to work backward to the very root of life on Earth.

**What's hot for 1997? Science offers its picks.**

### Closing in on cancer

Will there ever be a simple, globally effective cure for cancer? In 1997, the standard answer—"No"—may be up for revision. Already, researchers working in experimental systems have foiled many cancers with broadly targeted strategies such as boosting killer T cells, designing a virus to kill cancer cells, and thwarting the growth of blood vessels that feed metastatic tumors.

### Just the place for a squark!

As the Large Electron-Positron Collider at CERN gradually ramps up in energy, many particle theorists are echoing the Bellman in Lewis Carroll's *The Hunting of the Snark*: They believe that elusive supersymmetric particles—which would complete the Standard Model of the universe and which have names like squarks and selectrons—are sure to turn up at CERN.

### Breaking the code(s)

This year, cryptographers testing their handiwork breached computer security codes of all descriptions, from public-key systems that protect smart cards to a secret-key code banks use to swap data. Expect to hear the sound of more codes cracking in 1997, thanks to wider application of the powerful strategy, called a systemic attack, behind the breaches.

**Carbo loading.** Carbohydrates, seemingly simple molecules made from collections of sugars, somehow help cells recognize each other and stick together, but the details have been a mystery. Advances in artificial synthesis and in probing carbo's role in cell-cell interactions may pave the way for synthetic carbohydrates tailored as drugs fighting everything from infection to inflammation.

**The smallest mistakes.** Computers based on quantum mechanics promise undreamt-of speed, but it was thought that correcting the inevitable errors required invoking the blundering, macroscopic world, destroying the quantum advantage. Such worries may have been unfounded: If 1996's theoretical progress in quantum error correction continues, the field may leap ahead in 1997.

**X-ray visions.** After 15 years and nearly $1 billion in the making, the Advanced Photon Source is finally online at Illinois's Argonne National Laboratory. Expect the 70 beamlines using the world's most brilliant source of high-energy x-rays to reveal the dynamics of chemical reactions as they happen, the structure of complex proteins, and more.