

This Week

- 4 The Cosmos' Fate: World Without End
Ron Cowen
- 4 Zeroing in on an infinite number of primes
Ivars Peterson
- 5 New foam tames an asbestos
Janet Raloff
- 5 Xenon injects images with brightness
Corinna Wu
- 6 Mongolian dinosaurs give up sandy secrets
Richard Monastersky
- 6 DNA tests find phony seal penises
Susan Milius
- 7 A surprising encounter of the NEAR kind
Sid Perkins
- 7 Gene pushes cells into forced retirement
John Travis

Articles

- 8 Space 1998
From the moon to Mars and beyond
Ron Cowen
- 14 Children of the C₄ World
Did a decline in carbon dioxide concentrations spur our evolution?
Richard Monastersky

Letters

Shafted

The photograph in "Relying on geology to jail nuclear waste" (SN: 11/1/97, p. 277) is indeed of a tunnel-boring machine. However, as the name suggests, these machines bore tunnels, not shafts.

A horizontal or near-horizontal opening through rock is a tunnel; a vertical opening is a shaft.

*Thomas J. Hydock
Minersville, Pa.*

Leafing out the tree of life

I've read about species extinctions in connection with biodiversity but never species creations ("Population Diversity Crowds the Ark," SN: 10/25/97, p. 260). Since evolution is a continuing process, I assume that new species are being added to the tree of life.

Has anyone made a projection of the rate of species creation, or is that rate assumed to be at or near zero in the diversity calcula-

tions? If the creation rate is not known, how can we know whether the tree of life is becoming sparse or full?

A discussion of the rate of species creation would be an interesting article to balance out the picture.

*Bob Lind
Inverness, Fla.*

Depending on the type of organism and the time period, it can take from tens of thousands of years to millions of years for a species to be created—that is, for a single species to diverge into two (SN: 10/18/97, p. 251). Many biologists maintain that the present loss of biological diversity is on a par with the mass extinctions recorded in the fossil record, after which 5 million to 10 million years passed before species radiated and restored diversity to precrash levels. They also point out that the current large losses of tropical forests and other habitats that have been hotbeds of species creation

are clipping the evolution of whole groups of organisms.

—C. Mlot

Life imitates art, baffles computer

It is such fun when life imitates an art form I love, in this case science fiction. "Immersion for analyzing complex software" (SN: 10/25/97, p. 261) discusses how computer programmers are creating three-dimensional representations of computer programs in virtual reality.

Neither the author of the story nor the programmers involved mentioned the inventor of such representations: William Gibson, in his novel *Neuromancer* and his story "Burning Chrome." You shouldn't slight so good an author and envisions of the future!

*Fred Gilkey
Pittsburgh, Pa.*

A virtual reality arrangement for analyzing complex computer systems might be very

Letters continued on p. 10

Research Notes

- 11 Astronomy
Europa's salty surface
Fossils from Mars: Point, counterpoint
- 11 Behavior
Evolution of attention
Magnetic mood brightener
- 12 Biology
Frogs that talk through their ears
Frog real estate: More than location
- 12 Biomedicine
Mammograms get boost for women over 40
Role of cancer mutation scrutinized

Departments

- 2 Science News Books
- 3 Letters

Cover: Known as the Hubble Space Telescope of the X-ray universe, the \$1.4 billion Advanced X-ray Astrophysics Facility is scheduled for launch in November. **Page 8** (Illustration: TRW)

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study nova and supernova explosions, testing theories of how these explosions synthesize heavy elements and examining how supernova shock waves heat surrounding gas.

● A shuttle flight will test the space-worthiness of a cryogenic cooler that astronauts plan to install on the Hubble Space Telescope in 1999. The cooler, which operates mechanically rather than relying on frozen nitrogen or some other ice, would extend the lifetime of Hubble's infrared camera, NICMOS. Soon after the camera was installed in 1997, the dewar that houses it and maintains its frigid operating temperature developed a leak (SN: 5/3/97, p. 272). Without repair or replacement, NICMOS is expected to last for only 1.6 years rather than the 4 to 4 1/2 years planned. The shuttle test will determine the new cooler's ability to maintain temperatures within a narrow range under zero-gravity conditions.

November

● Dubbed the Hubble Space Telescope of the X-ray universe, the Advanced X-Ray Astrophysics Facility (AXAF) takes a one-way ride on the shuttle. AXAF was originally intended to last for 15 years, including periodic repair missions by astronauts. Budgetary constraints reduced the scope of the project to only 5 years, with no servicing missions planned.

While orbiting Earth, AXAF will pro-

duce ultrasharp images and high-resolution spectroscopy at low X-ray energies, ranging from 100 to 10,000 electronvolts. Among its goals is investigating the existence of black holes a few times the mass of the sun, determining how much of the total mass in the universe is in the form of hot gas, searching for dark matter in galaxies, making a determination of the age of the cosmos independent of the distances of galaxies, and testing theories of stellar evolution and supernova explosions.

December

● The second wave of an armada of U.S. craft bound for Mars begins its journey this month. Mars 98 Orbiter is scheduled to reach the planet in September 1999 and start its main mission 2 months later. From a nearly circular polar orbit 400 km above the planet, the orbiter will monitor the climate for an entire Martian year. The craft's pressure-modulated infrared radiometer, the duplicate of a device lost on Mars Observer (SN: 9/4/93, p. 149), will measure the distributions and time variations of temperature, pressure, dust, water vapor, and condensates in the atmosphere. Another tool, the Mars color-imaging system, will monitor the interaction of the atmosphere with the surface. Data from both instruments may indicate the most likely places for subsurface reservoirs of water. The orbiter may also serve as a relay station for future Mars landers. □

Letters continued from p. 3

useful for a system made up of software modules with conventionally engineered, preassigned functions. However, it is doubtful that such an approach would be suitable for the kind of neural network intended to simulate "how people think and how the brain works," as one researcher puts it.

This is because cognitive behavior most likely emerges from a large, distributed network of local processes; each one of these deals with low-level data unrelated to the sort of variables that would be meaningful to an investigator. In other words, major problems of internal representation remain unsolved for natural cognitive systems.

Paul B. Post
Norwalk, Conn.

Power lines

Enjoyed the eye-opening "Must We Pull the Plug?" (SN: 10/25/97, p. 266).

The cumulative demand of all our "leaky" appliances is indeed shockingly high, but aren't the digital clocks in many of these gadgets taking the place of many plug-in wall or shelf clocks? Also, today's quartz wall clocks are often battery-powered, eliminating a few more "watts from the wall."

It would be interesting to see research comparing the energy draw from those bygone electric clocks with the "leakage" powering the VCR and microwave clocks that replaced them!

Tom Robinson
Chicago, Ill.

I've always used powerstrips with wall packs so I can power them off completely. I also use surge protectors for computers and my entertainment console, which, when I remember to do so, I also power off.

Bernie Rice
Park Forest, Ill.

What good would it do to charge a battery to power memory chips and so on while an appliance is in the "off" position? The power ultimately has to come from the power station anyway. All the battery would do is make it less efficient than direct operation.

Walt Gray
Richland, Wash.

If appliances were required to carry a notice of their standby wattage, it would give manufacturers an added incentive to demand innovative power-saving designs from their engineers.

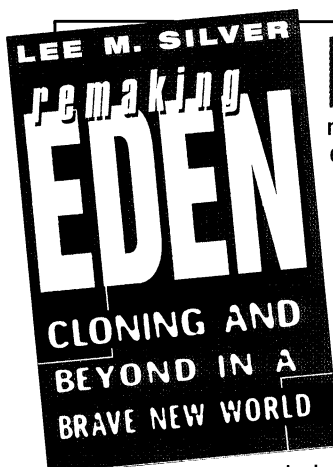
Standby power drain is not new. Ever since they came out early in the century, doorbells have depended on continuously energized transformers, and the power company uses such transformers throughout the grid. Increased transformer efficiency would help.

Homer B. Tilton
Tucson, Ariz.

The researchers are concerned about small energy consumers that account for about 5 percent of the power consumed by a typical household.

I am more concerned about the 95 percent that accrues through normal usage when appliances are turned on. I can turn off TV sets when they are not being watched. I have no way to make them more efficient.

Virgil H. Soule
Frederick, Md.



Princeton University professor Lee M. Silver reveals what awaits in the brilliant light of the new day now dawning. **Remaking Eden** is a fascinating exploration of the future of regenerative technologies—a cautiously optimistic look at the scientific advances that will enable us to engineer life in ways unimaginable just a few years ago—indeed, in ways that go far beyond cloning and are more thrilling and frightening.

Could a woman give birth to her identical twin sister? Could a child have two genetic mothers? Could a man become pregnant? Could parents choose not only the physical characteristics of their children-to-be but personalities and talents as well? The answers will excite some and alarm others. In clear and accessible prose, Silver demystifies the science involved in all these possibilities, calmly and efficiently dismantling our preconceptions and misconceptions. Throughout, he eloquently examines the profound ethical questions raised by these

new technologies. Yet he reminds us that the desire both to have children and to provide them with all possible advantages in life is a uniquely powerful force—a force, he suggests, that will overcome all political and social attempts to curb the use of regenerative technologies. —from Avon Books

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