Unearthing Soil's Secrets

Ask people about the sorts of habitats harboring species unknown to science, and they're likely to point to the deep ocean or rainforests. But the biggest unknown realm could be right beneath our feet, according to United Nations researchers.

Many members of the fungus family remain obscure.

Scientists estimate that every gram of forest soil might contain as many as 40,000 types of bacteria—10 times the number of all bacteria described so far. Other estimates suggest that we have cataloged only 5% of fungi and mites, 15% of nematodes, and 50% of earthworms. We've also seen only the tip of the iceberg when it comes to ants, termites, amoebae, and flagellates.

Inventorying subterranean ecosystems is the aim of a new $26 million initiative launched on 28 November. The 5-year project will zero in on the underground fauna of seven species-rich tropical countries: Brazil, Ivory Coast, Uganda, Mexico, Kenya, India, and Indonesia.

The project, backed by the U.N. Environment Programme and the Global Environment Facility, is expected to yield clues for replenishing damaged ecosystems, developing new medicines, and boosting agriculture. Michael Gundale, a forest ecologist at the University of Montana, Missoula, says the project also "will likely advance current methods for measuring microbial diversity."

The Mystery of Culture

"One of the great mysteries of psychology is why psychologists don't yet understand the [role of] environment [in influencing human behavior]. Environment in behavior genetics is still a residual. That's a scandal."

—Twin researcher Thomas Bouchard of the University of Minnesota, Twin Cities, last week in Nashville, Tennessee, at a meeting of the International Society for Intelligence Research.

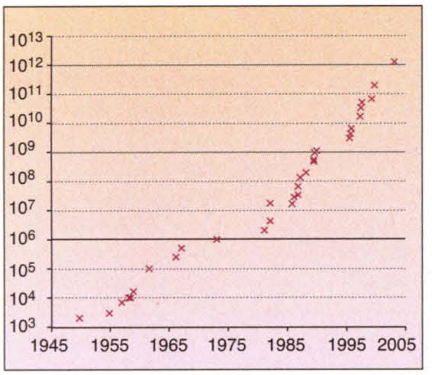
Pi Record High

The precision of pi has passed the trillion digit mark—a six-fold increase over the previous record. Yasumasa Kanada and colleagues at the University of Tokyo recently announced the completion of a calculation of 1.241 trillion digits of mathematicians' favorite constant, 3.14159...

Kanada is the world's unquestioned pi king these days: He and his team have set virtually all the records since the mid-1980s. Their last one, in 1999, reached 206 billion digits.

The latest calculation took over 400 hours on a Hitachi supercomputer. The programs for doing all the high-precision arithmetic, Kanada reports, were 5 years in the making. To nail down their result, the group actually computed pi using two different formulas.

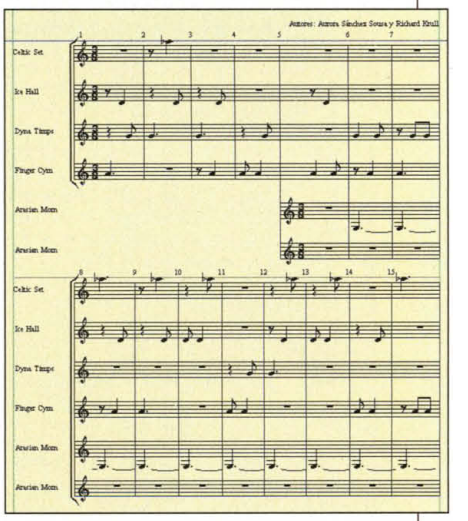
What insights do all these digits offer? Not many, says David Bailey, a mathematician at Lawrence Berkeley National Laboratory, who computed a then-record 29 million digits in 1986. Pi primarily provides a convenient benchmark for measuring machines' ability to juggle huge numerical data sets quickly and accurately.



Log chart showing that computations of pi have grown by nine orders of magnitude, from 2037 to 1.241 trillion digits, in 53 years.

Sing Along With the Genome

Inspired by the idea that music, like life, arises from a fundamental code, two Spanish microbiologists have started a project called "Genome Music." Like Johann Sebastian Bach before them, who composed a piece based on the four letters of his last name, Aurora Sánchez-Sousa and Fernando Baquero of the Ramón y Cajal Hospital in Madrid are writing music based on the chemicals that make up the DNA molecule.



Score for *slt2*.

Working with French composer Richard Krüll, the pair turned the complete nucleotide sequences of several microbe genes into compositions based on DNA bases: A (adenosine), C (cytosine), G (guanine) and Thymine (which they have translated to "Re," or D). Parallel melodies were also constructed by attributing notes to the encoded amino acids. The result resembles Byzantine-Gregorian chants, played by stringed instruments accompanied by flute. The authors embellished the format with melodies that, Sánchez-Sousa and Baquero say, were "harmonically determined by the genome basic sounds, just as productions of the human mind are, to a some degree, necessarily linked to basic genomic information."

The music was first performed last month during Madrid's Week of Science. Now the scientists are going commercial, with a CD containing 10 songs based on 10 different genes. Potential future classics include the "*slt2*" (a gene in *Saccharomyces cerevisiae*, which operates to keep yeast cell walls intact), and the gene for protease nexin-II involved in Alzheimer's disease.

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