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Unsustainable Soil Use Can Cause Civilizations to Collapse

Earth is running out of soil. At least that's the conclusion of a new study supporting the long-held belief that current farming practices are causing soil to erode more quickly than new soil can be produced.

The best way to measure the effects of farming is a before-and-after comparison of soil erosion on the same kind of land, looking at both cultivated and wild-growing areas. David R. Montgomery of the University of Washington compiled the data and published his findings last August. On average, he found, plowed land erodes at slightly more than 1 millimeter per year, while new soil builds up at about 0.2 millimeter per year. Montgomery calculates that cultivated soil becomes exhausted, depending on original thickness, within 500 to sev-

eral thousand years—a number correlating reasonably well with the life spans of civilizations around the world.

"Soil erosion is one of the least appreciated but most important environmental challenges we face," Montgomery says. "It's every bit as important as global warming. And part of the problem with both these things is the slow timescales over which problems accumulate."

Fortunately, there is a solution: no-till agriculture, a method in which crop stubble remains in place (instead of being plowed under) and a special drill inserts the seeds into the soil. As of 2000, however, only about 16 percent of cultivated areas in the United States used the method, and worldwide, only 5 percent of cultivated land is managed this way. If Montgomery is right, civilizations around the world will continue to disappear like clockwork as their soil goes blowing in the wind.

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Human Egg Harvesting Succeeds

In July, a group of doctors in Montreal presented a paper announcing a live birth resulting from an egg harvested before maturity, then matured in the lab, frozen, thawed, fertilized, and implanted. The procedure has now been successful with four mothers who had polycystic ovary syndrome, a disorder that prevents eggs from properly maturing in the ovaries.

Hananel Holzer, a research team member and assistant professor of obstetrics and gynecology at McGill University in Montreal, said that the work's importance is not necessarily for these patients; they could have undergone regular in vitro fertilization, despite its risks. Rather, cancer patients—whose eggs might be destroyed by chemotherapy or radiotherapy—will benefit the most if this still-experimental procedure becomes practical.

"Some patients don't have enough time to go through the two to six weeks of an IVF procedure," Holzer says. "They need treatment for the cancer, so you have to retrieve immature eggs."

Frozen eggs have previously been fertilized, and immature eggs have been brought to maturity in a test tube. But this is the first time all the processes—harvesting the immature egg, maturing it in a test tube, freezing, thawing, fertilizing, and implanting it—have been put together to produce a healthy baby. "Until our study, no one knew whether eggs matured in the lab could survive these procedures," Holzer says. "We've proved that they can."

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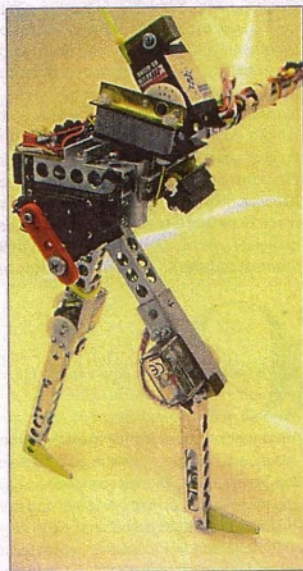
Biped Robot Walks With Human Grace

Using a set of simple rules for moving and two knifelike feet, a robot in Germany has learned not only how to walk with a remarkably human gait but also how to ascend a ramp. To be sure, C-3PO and his cinema cousins have been tottering across movie screens for generations, and real-life walking robots are nothing new. But the strides made by RunBot, reported in the July issue of the journal *Public Library of Science Computational Biology*, mark the first time a real-life robot has walked with such grace.

Until now, walking robots like Honda's Asimo, which has an advertised ability to run four miles per hour, have relied on heavy-duty computational power, calculating the angle of the knees and ankles every moment of every step. RunBot, developed in the lab of computational neuroscientist Florentin Wörgötter of the University of Göttingen, takes a simpler, more human approach. "Humans do not exert continuous control," Wörgötter says. "During parts of the walking process, we just fall forward and catch ourselves on the next step."

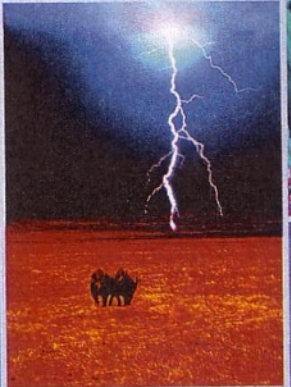
Wörgötter and his colleagues designed RunBot to walk almost automatically, with a simple set of control circuits

Jeffrey Winters



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