half-centimeter-thick, wormlike animals. "If it's true, it's staggering," says paleontologist Charles Marshall of the University of California, Los Angeles (UCLA). "It would be the first evidence of macroscopic animals."

For now, experts in such trace fossils—most of whom haven't yet seen these specimens—are divided on the claim, torn between the convincing appearance of the tracks and their appearance in rock radiometrically dated to hundreds of millions of years before any other animal traces. "I'm a believer," says Tony Ekdale of the University of Utah, Salt Lake City, who has seen one specimen. "I find them convincing." Others are not so sure that these squiggles are traces of life. "I wouldn't be surprised if they turn out to be inorganic," says Sören Jensen of Cambridge University.

To the authors of the study—paleontologist Adolf Seilacher of Yale University and the University of Tübingen in Germany, and sedimentologists Pradip Bose of Jadavpur University in Calcutta and Friedrich Pflüger of Yale—the ancient tracings paint a detailed picture of one creature's life 1.1 billion years ago. The wormlike animal, about the thickness of a drinking straw, plowed through the sediment a few millimeters below the floor of a shallow sea, the group suggests. They argue that the creature propelled itself with rhythmic muscle contractions, or peristalsis, leaving open burrows with raised edges like those of modern worms that move by peristalsis. The animal was probably grazing on the decaying base of a thin mat of microbial life on the sea floor, says Pflüger, because the burrows follow the base of a thin veneer of darker sandstone that may be the remains of the mat. (At press time, Seilacher was in the field in Libya.)

Burrowing by peristalsis suggests to Seilacher and his colleagues that the animal was rather complex. Peristalsis implies a fluid-filled cavity that can be contracted by muscles, and they argue that it also implies the existence of a coelom, a lined cavity between the gut and body wall. Coeloms are common to mollusks, annelid worms, and arthropods but are absent in the simpler flatworms and roundworms. If so, the fossil evidence would support one date offered by some molecular biologists: a 1.2-billion-year age for a major evolutionary split among the coelomate animals, between a group including the annelids and one including the echinoderms.

Pflüger admits that distinguishing true trace fossils from all manner of sedimentary cracks, wrinkles, and ripples is a tricky business, but says that he is "85% confident" that the features were left by an animal. He points out that the burrows are too irregular to be the type of cracks commonly found in such sediments and too sharply delineated to be wrinkles in the sediment surface. The grooves vary in width, but each has a constant width throughout its length, unlike a crack. "If they were 700 million years old," says Pflüger, "there would be no reaction [challenging] the paper." But given the antiquity of the finding, "there will be people contesting it."

Indeed there are. "This is not the smoking gun," says paleontologist and early life expert Bruce Runnegar of UCLA. "It is almost impossible to tell trace fossils from tubular body fossils [of large algae] when they are poorly preserved, as these are. I'd say the jury is out."

Paleontologist Mary Droser of UC Riverside is more persuaded, agreeing with Pflüger that "if we found this in the Paleozoic [younger than 544 million years], we would say it is a trace fossil." But she notes that "there have been a lot of examples [of sedimentary features] that people thought were trace fossils and they were not." And because no large worm burrowings turn up again in the rock record until about 600 million years ago, "I wonder why we go 400 million years without another one," she says. Paleontologist Andrew Knoll of Harvard University agrees that "if you see centimeter-scale, coelomate organisms and then don't see them for 400 million years, you have a lot to explain."

It's possible that relatively complex animals did appear very early but died out, says Marshall, only to evolve again later. Or perhaps there are older animal fossils that haven't been found yet, and the gap is only apparent. "I'm not sure enough people have looked at the right rocks for the right thing," he says. "Five or 10 years from now, are the gaps in the record going to be filled in? That will be the proof of the pudding."

–RICHARD A. KERR

CREDIT: JIM PICKERELL/STOCK CONNECTION/PNI

Mexican Fires Charge Up U.S. Clouds

The ancient Greeks believed that lightning bolts sprang from the rage of Zeus in his home on Olympus. Now an odd new discovery suggests that Zeus' moods have a long reach indeed: Last spring, smoke from massive fires in Mexico spawned stronger, more sustained lightning than normal over the Great Plains, thousands of kilometers away. According to lightning records, storms that had absorbed the smoke zapped the ground with three times the usual number of positively charged lightning strokes, which typically last longer than negatively charged ones and can inflict worse damage. Moreover, these positive bolts carried twice as much current as similar flashes produced by smoke-free storms.

ScienceScope

PROJECT RECRUITS WOMEN TO RUN FOR PRESIDENT

Could the first female U.S. president be a scientist? The White House Project believes it's a possibility.

To encourage more women to consider a run at the Oval Office, the nonpartisan, nonprofit group last week released a list of 20 prominent women it thinks might make good candidates. Three women with scientific credentials made the list: psychologist Judith Rodin, president of the University of Pennsylvania; cardiologist Bernadine Healy, a dean at Ohio State University and former National Institutes of Health director; and chemical engineer Mae Jemison, NASA's first female African-American astronaut.

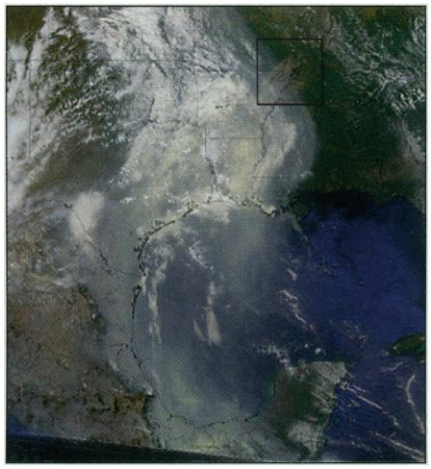
The group is now asking people to vote for the five women they would like to see run for office. It has mailed ballots to more than a million people and will also be inserting them into popular magazines such as *People*. But it's not clear that the winners will respond to a groundswell of support. Healy, for one, says she won't "deal with a theoretical."

MALAYSIAN MIT STILL A DREAM

Political turmoil has delayed for a year Malaysia's plans to open a graduate research university run by the Massachusetts Institute of Technology (MIT). But neither side is abandoning the project, which was supposed to enroll its first students this month.

"We're on hold, waiting for the government to act," says MIT's Fred Moavenzadeh, co-director of the project to create the Malaysia University of Science and Technology outside the capital, Kuala Lumpur (*Science*, 6 March, p. 1474). A private foundation is paying MIT $25 million over 5 years to instill its research-based curriculum into an elite group of scientist-entrepreneurs. But a similar contribution from the Malaysian government has been blocked by political upheavals precipitated by the country's yearlong economic crisis. In particular, last month's firing and arrest of Finance Minister Anwar Ibrahim has disrupted activity at the ministry, which must approve the spending.

The study, reported on page 77 of this issue, has put a charge into veteran lightning researchers, who think it may hold an important new clue to the mystery of how thunderclouds generate lightning. "It's fascinating that smoky air could modify the [electrical properties] of storm clouds so readily," says meteorologist Charles Moore of the New Mexico Institute of Mining and Technology in Socorro. Adds atmospheric scientist Andrew Detwiler of the South Dakota School of Mines and Technology in Rapid City: "This is a wake-up call for those who thought they understood thunderstorm electrification."



Smoky skies. A vast plume of smoke from Mexican fires, seen by satellite on 14 May, sparked supercharged lightning in the central United States.

The amped-up storms struck between 8 April and 7 June, when a pall of smoke from drought-related fires in southern Mexico drifted north and dirtied the air from Texas to Canada, especially over the southern Great Plains. Atmospheric scientist Walter Lyons and his colleagues at FMA Research Inc. in Fort Collins, Colorado, noticed unusual behavior in storms over the plains: They triggered huge numbers of "sprites"—ghostly red glows of excited nitrogen molecules often seen high above violent storms.

The team then checked data from the National Lightning Detection Network, run by Global Atmospherics in Tucson, Arizona, which tracks the location, charge, and strength of most bolts by monitoring the bursts of radio static they produce. The network data revealed that the lightning from smoke-enriched storms was stronger. "There were an abnormal number of positive cloud-to-ground flashes, and the peak currents [of those flashes] doubled," Lyons says. "That really startled us."

Researchers had never seen such widespread outbursts of positively charged lightning, which usually accounts for just 10% of all bolts. A garden-variety negatively charged bolt flickers on and off a few times within its channel like an old neon sign. But a positive lightning stroke releases its charge in a sustained pulse that "looks like an arc welder," as co-author Earle Williams of the Massachusetts Institute of Technology in Cambridge puts it. Those bolts are more likely to damage electrical systems and spark fires. The Texas hill country had a severe fire season in May and June, Lyons notes, although scientists can't say for sure that supercharged lightning was a factor.

Nor do they know how the smoke boosted the rate and strength of the positive lightning bolts, Williams says. "Ordinarily we see negative charge close to the ground, but somehow these clouds have lots and lots of positive charge there." He and Lyons do suspect that the extra positive charge may arise because tiny smoke particles provide more nuclei around which cloud droplets condense. That makes the droplets smaller, which in turn may alter how they acquire electrical charge when they freeze into ice grains and are churned high in the thunderstorms.

Clearer answers could come from airplane studies of smoky thunderstorms, says Lawrence Radke of the National Center for Atmospheric Research in Boulder, Colorado. "It would be thrilling to have observations in these clouds to see what actually changes," Radke says. That will take another season of fires. In the meantime, "it's all speculation." **–ROBERT IRION**

Robert Irion is a science writer in Santa Cruz, California.

GERMAN GENERAL ELECTION

Researchers Wary of Red-Green Coalition

German researchers were both buoyed and apprehensive this week following voters' surprisingly strong rejection of the long-running coalition led by Chancellor Helmut Kohl on 27 September. For the past 16 years, even during the tumultuous days of German reunification, scientists had enjoyed a relatively stable research environment under Kohl's Christian Democrat–led government. But early this week things looked certain to change as Social Democrat leader Gerhard Schröder began to form a new government that seemed likely to include the environmental-minded Green party.

Promises. Schröder pledges more funds for science.

On the positive side, the Social Democrat Party (SPD) has promised significant increases in the federal budget for research and higher education, with emphasis on rebuilding the university system. But some scientists feared the possible effects of a coalition with the Green Party—which attracted 6.7% of the vote—because the Greens have opposed some forms of genetic engineering and nuclear power research.

Biologist Hubert Markl, president of the Max Planck Society, and biochemist Ernst-Ludwig Winnacker, who heads the basic-research granting agency, the Deutsche Forschungsgemeinschaft (DFG), both told *Science* that they were generally optimistic that the Social Democrats—especially if they directly control the research ministry—will strongly support basic research, perhaps even beyond the 5% increases currently slated for next year's Max Planck and DFG budgets. But both scientists also expressed concern about possible policy disputes in some areas of research if the Greens become junior partners in the ruling coalition.

"I would foresee difficult discussions with the Greens relating to both atomic-energy research and the applications of biotechnology to crops and food products," says Markl. For example, he says, some Green politicians might criticize research at the Max Planck Institute for Plasma Physics on the feasibility of fusion energy. And Winnacker—a veteran of Germany's genetic-engineering battles of the 1980s—says he worries about the Greens' strong criticism of certain aspects of biotech research.

As *Science* went to press this week, the SPD was engaged in coalition talks and deciding who would head the government ministries. Edelgard Bulmahn, the SPD's "shadow minister" for research who has been the party's chief parliamentary spokesperson on science issues, told *Science* that the research and education ministry "is very important to the Social Democrats. We agree on the importance of scientific research for Germany's future." Bulmahn says an SPD-led coalition would seek a "significant increase" in the research and education budget over the next 5 years and would block any effort by the Greens to further restrict genetic-engineering research: "We would never agree to any major changes" in biotechnology policies, she says, but added that the Social Democrats might go along with the Greens' idea of sponsoring more research on the potential risks of certain genetic engineering methods.

Manuel Kiper, a member of parliament who is the Greens' chief science spokesperson, says his party recognizes "the need for strengthened basic research." Whereas he says the party would like to see greater

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