

technique is powerful enough to ease depression and have other possibly long-lasting clinical effects, researchers should be more diligent about including safety studies whenever they use it, Wassermann cautions: "Anything that works well can cause significant side effects."

But if researchers can live with a certain amount of neurobiological ambiguity and

are willing to test the safety of the technique as they go, rTMS is a fairly affordable and therefore democratic tool—especially for neuroscience hardware. A complete setup runs \$30,000 to \$40,000, compared to \$1.5 million and up for functional magnetic resonance imaging. It's still a young field with plenty of unanswered questions and wide-open neural territory to explore. But if

the words "brain stimulation" and "inexpensive" bring improper thoughts to mind, be warned: Those neurons that buzz when someone takes euphoria-inducing drugs or eats ice cream are buried deep in the brain, beyond the reach of rTMS. "We've tried," jokes George, "but there's no way to get a pleasure-center stimulation with the current technology."

—LAURA HELMUTH

SCIENCE EDUCATION

Creationism Takes Root Where Europe, Asia Meet

Harassed but hard-headed, some gutsy Turkish scientists are stepping up their efforts to promote the teaching of evolution

ANKARA—When Aykut Kence opened his mail one November morning in 1998, he was startled to find his face on the front page of a newsletter next to the stern visage of Chinese Communist leader Mao Zedong. After reading the article, which denounced the Turkish biologist as a leftist supporter of Darwinism, his wife Meral, also a biologist, joked: "Aykut, I've known you for 30 years, and you never told me that you were a Maoist." Kence chuckled: He subscribes to Darwin's theories, but hardly to Mao's.

It was no joke, however, when Kence and five other Turkish scientists became targets in a campaign to promote creationism and discredit Darwinism spearheaded by the Istanbul-based Bilim Araştırma Vakfı (BAV), which translates as the innocuous-sounding "Science Research Foundation." After being "outed" as Darwinists, Kence, a professor at Middle East Technical University here, and his colleagues began receiving anonymous threats, and they responded by suing BAV for defamation. They won: In 1999, Ankara Civil Court awarded them \$4000 each in damages.

Although heartened by that legal victory, many scientists here fear they are losing ground to Turkish creationists in the wider court of public opinion—especially in provinces where Islamic fundamentalism is strongest. The defamation case and an unrelated investigation of key BAV members have not stopped the group's vigorous crusade—experts call it the best organized and financed in the Islamic world—to discredit the teaching of evolution. The group's few hundred active members, mostly volunteers, have developed a Web site and enlisted speakers from U.S.-based creationist organizations to appear at antievolution events across Turkey. They've also swamped the country with sophisticated books such as *The Evolution De-*

ceit and *The Dark Face of Darwinism* (both published under the pseudonym Harun Yahya), which some scientists complain have become more influential than textbooks in certain parts of the country.

Nor is BAV the only face of Turkish creationism. A medical professor and member of parliament, Ali Gören, recently launched a legislative drive to drop the teaching of Darwin's evolution theory in



Creating a stir. Books like *The Evolution Deceit* appear to be gaining readership.

secondary schools. Labeling Darwinism a "scientific fraud," Gören—whose Virtue Party, the third-largest in parliament, has Islamic ties—urged fellow legislators this spring to protect high-school students from evolution theory's "adverse affects," which he claims encourages "atheism and separatism."

Although many scientists deride Gören's initiative as doomed to fail in the current parliament, they worry that Turkey's mounting economic woes could give right-wing nationalist and Islamic fundamentalist parties—both of which tend to support creationism—a boost in the next elections. "The creationists have access to lots of money, and the political situation is in turmoil," says conservation biologist C. Can Bilgin of Middle East Technical University. "We can't take anything for granted." Echoing his concern are medical geneticist Isik Bökesoy of Ankara University—who has been lambasted in fundamentalist publications for her defense of evolution theory—and Kence, who received an anonymous e-mail last month suggesting that he "enjoy [his] final days."

Such venom has only served to harden the researchers' resolve to protect the fragile status of evolutionary theory in Turkish schools. They are organizing public declarations and have rallied the Turkish Academy of Sciences to their cause. "I won't let them silence me," Kence says. "If knowledgeable people keep quiet, it only helps those who spread nonsense."

An evolving mindset

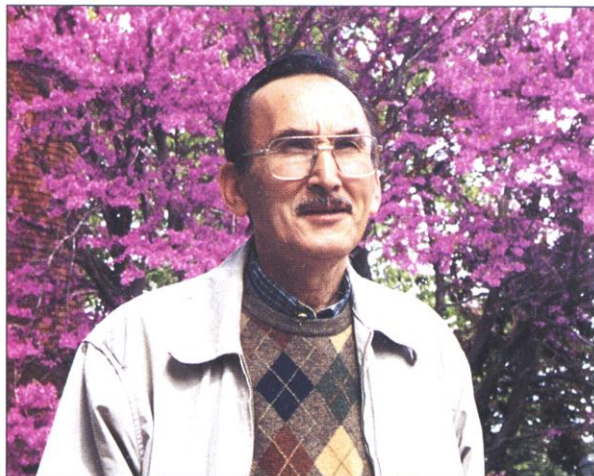
The debate over evolution and creationism is a microcosm of a wider battle—the struggle between secularism and Islam—that has raged ever since Kemal Atatürk created the secular Turkish Republic in 1922. Indeed, the emphasis on creationism in textbooks has waxed and waned with the fortunes of Islamic political parties.

Creationism first made its mark in Turkish schools in 1985, when then-Education Minister Vehbi Dincerier ordered a section on "scientific creationism" added to high-school textbooks. His ministry also decreed that Lamarckism be taught alongside Darwin's evolution theory—and that the texts include criticisms of both theories. Some biologists argue that playing up the largely discredited theory of 19th century French naturalist Jean-Baptiste Lamarck—who asserted that evolution occurs when parents pass on to their offspring characteristics acquired during their lifetimes—casts a poor light on evolutionary science in general.

Over the next decade, Kence and his al-

NEWS FOCUS

lies tried to get the textbooks changed. They were stymied until after the fall of the short-lived (1996–97) government of former Prime Minister Necmettin Erbakan, a leader of the now-banned Welfare Party who backed Islamic creationism. Not until a new education minister, Hikmet Ulugbay, was appointed did Kence's group win a partial victory: High-school biology texts issued since 1998—while mentioning creationism and Lamarckism—give a more balanced



Die-hard Darwinist. Aykut Kence has been vilified for defending the teaching of evolution theory.

presentation to Darwin's theories.

Those textbook changes infuriated BAV and its backers, who mobilized by organizing seminars across Turkey in 1998–99 and giving away thousands of Yahya's Darwin-bashing tracts. Antievolution groups "have tried a number of times to drop the teaching of evolution at public schools," says zoologist Dincer Gülen, dean of the science faculty at Istanbul University. "They think they are making scientific arguments, but in fact it is theological philosophy, and unfortunately some scientists believe in that as well." Yet BAV does not appear to be a bastion for gray beards or backward zealots. "The BAV members I met were mainly young professionals who described themselves as Islamic moderates who are trying to harmonize the Koran with science," says science historian Ronald Numbers of the University of Wisconsin, Madison, author of *The Creationists*. He's one of the few U.S. experts who has interviewed the group's "honorary president," Adnan Oktar, who according to BAV writes the Yahya books—many of which have been translated into English.

BAV did not create a movement from scratch. It has borrowed heavily from the playbook of like-minded U.S. groups, says neurologist Umit Sayin of the University of Wisconsin, Madison, who has analyzed Turkish creationism. One organization with ties to Turkey is the Institute for Creation

Research in Santee, California. The institute's John D. Morris—who has visited Turkey on expeditions in search of Noah's ark on Mount Ararat—told *Science* that his outfit had supported the Turkish cause mainly by sending information. "They have read our material and restated it in the Turkish context," says Morris, who along with several other U.S. creationists has spoken at BAV-sponsored seminars.

Although both Christian and Islamic takes on creationism contend that evolution theory can be disproved by scientific evidence, there are some differences in the approaches. The Koran, for instance, does not give a time frame for creation. Although Morris concedes that "Islam is not as explicit" in outlining creation, he says that Christian and Muslim creationism nevertheless "are compatible."

After a remarkable rise in influence, BAV suffered a big blow: In late 1999, Oktar and others with the group were arrested on blackmail charges unrelated to the creationist movement. Their leader's incarceration energized claims by Turkish creationists that they—rather than the pro-evolution scientists they criticize—are victims of persecution. "Our intellectual effort against materialism has created an unjust opposition to our foundation," claims a BAV spokesperson, Istanbul-based Internet businessman Mustafa Akyol. He blames Oktar's arrest and 9 months in prison before the leader's recent release on anti-BAV efforts by "evolutionists" and liberal newspapers.

Despite that setback, experts say BAV has developed one of the world's strongest antievolution movements outside of North America and has been making inroads in oth-

er Muslim nations. Says physicist Taner Edis of Truman State University in Kirksville, Missouri, who has written extensively on Turkish creationism: "From what I've seen, their international outreach has become a priority."

Evolution as a flash point

Kence and other scientists have tried to mount an organized response to the growing creationist sentiment. In 1998, Kence helped establish the Evolution Group, a handful of Turkish scientists who took it upon themselves to better explain to the public the scientific basis of evolution theory. After BAV organized more than 100 creationist seminars across Turkey in 1998 and 1999, the Evolution Group made two public declarations against antievolution arguments and gathered the signatures of more than 2000 university professors, scientists, and members of the Turkish Academy, which issued its own declaration in defense of evolution.

This summer, the academy plans to distribute 3000 copies of a new Turkish version of the U.S. National Academy of Sciences' educational booklet, "Science and Creationism." It will go to biology teachers, parliamentarians, and the media, says Sevkettin Ruacan, director of Hacettepe University's Institute of Oncology and the academy's point man on evolution education. "We will fight any effort to drop the teaching of evolution from our textbooks."

Despite such initiatives, rallying support for evolution has been difficult. Sayin, who was part of the group that sued BAV, contends that "the academics and universities are unfortunately very silent and sluggish." And with creationists represented in several parties in parliament, Turkey's Scientific and Technical Research Council, called TUBITAK, has steered clear of confrontations with evolution opponents. "When you consider the number of biologists in Turkey," says Bilgin, "you would expect a greater response to such creationist nonsense. But you don't hear from many of them. They are either afraid of speaking out, or they think the issue will fade away."

Kence is an exception. Two years ago, he convinced his university to put up a bronze bust of Darwin in front of the biology building. And this March he penned an open letter to parliament objecting to Gören's initiative to drop evolution from textbooks—a letter that sparked a slew of hostile e-mails. "I've gotten used to the threats," he says, nodding to a sign taped on his office wall: "To Avoid Criticism: Do Nothing, Say Nothing, Be Nothing."

—ROBERT KOENIG



Voice of reason. Like Kence, Isik Bökesoy has taken heat for defending Darwinism.