pernucleus's size, but also how its components interact with one another. "Nobody's been able to measure this with such high precision," says Millener, who hopes that understanding those interactions will shed light on so-far-obscure aspects of nuclear physics. "We don't really have a theory for these interactions." –CHARLES SEIFE

PHILANTHROPY

Russian Billionaires Launch Science Fund

MOSCOW—Two unlikely saviors have come to the rescue of Russia's impoverished scientists. Last month, a new foundation endowed with $1 million from a pair of young tycoons announced that more than 200 researchers will receive salary supplements of up to $10,000 this year—as much as 10 times their annual salary. While commending the so-called oligarchs for their generosity, some observers have complained about the secrecy of the selection process.

This is not the first time that a billionaire has bailed out Russian science. In the early 1990s, U.S. financier George Soros spent $120 million of his own fortune to endow the International Science Foundation (ISF), which doled out peer-reviewed grants to more than 30,000 scientists in the former Soviet Union. Then in 1995, one of the most notorious of Russia's oligarchs, Boris Berezovsky, gave $1.5 million to support travel grants for Russian scientists.

Now comes the Public Charity Foundation for the Support of National Science, funded entirely by Oleg Deripaska, the 32-year-old head of the megacompany Russian Aluminum, and Roman Abramovich, a 34-year-old oil industry executive and governor of the Chukotka region across the Bering Strait from Alaska. In setting up the foundation without fanfare last year, the two billionaires "did exactly the same as Soros had done: They gave money and kept themselves in the background," says Pavel Arsenyev, former executive director of ISF's Moscow office.

The new foundation's executive director, Maxim Kagan, says candidates for grants were chosen from among past winners of three academic competitions run by the Russian Academy of Sciences (RAS) and the office of Russian President Vladimir Putin. From this list of names, Kagan says that experts selected winners based on factors such as the number of citations their papers had received. The 2001 grants went to 10 prominent academicians—including Yuri Kagan, Maxim's father—who each will receive $10,000 this year; 200 young Ph.D.s and doctors (the highest academic degree in Russia) each get $3000 and $5000 respectively. The RAS will administer the awards for the charity, which reserved $100,000 for overhead.

The selection process was conducted in secrecy—the foundation has even refused to name the experts that helped select winners—and this has prompted some grumbling. "The atmosphere of secrecy may cause suspicion," says Arsenyev, who wonders if there even were any expert advisers. He also complains that only RAS scientists appear to have been eligible for the prizes. "If Soros were to do this," he says, "he would have begun with the scientific community en masse." The former head of the ISF's scientific council, Vladimir Skulachev, argues that it would have been more transparent had the prize money been distributed by the Russian Foundation for Basic Research, the country's main natural sciences granting agency.

According to Kagan, even if the new foundation can raise money to continue beyond 2001, the selection procedure is unlikely to become more transparent. He says that RAS president Yuri Osipov views the foundation as a Russian version of the Nobel Committee, which also keeps its deliberations secret.

Pocket change. Roman Abramovich (right) has followed the lead of Boris Berezovsky (left) in supporting Russian scientists.

In unveiling the foundation, Abramovich and Deripaska said they were moved to act by the parlous state of Russian science. It's also great PR in the power struggles between the oligarchs and Putin over taxes and privatization of state assets, notes Skulachev. A few years ago, Skulachev says, Berezovsky tried a similar tactic when he persuaded six other businessmen to help him create a $150 million science fund modeled after ISF. But the scheme fell apart before it got off the ground, says Skulachev. "If they had created the foundation," he says, "it would have been more difficult for Putin to struggle with them."

Whatever the political benefits, Abramovich and Deripaska certainly have won the hearts of at least 210 scientists.

–VLADIMIR POKROVSKY, ANDREY ALLAKHVERDOV, AND MARINA ASTVATSATURYAN

Vladimir Pokrovsky, Andrey Allakhverdov, and Marina Astvatsaturyan are writers in Moscow.

CHINA

Academician to Lead Science Ministry

BEIJING—A remote-sensing expert who has been in charge of promoting high-tech enterprises has been chosen to head China's Ministry of Science and Technology (MOST). Xu Guanhua succeeds Zhu Lilan, who assumes a top legislative post within the National People's Congress.

New minister. Xu Guanhua has promoted venture capital markets.

Xu, who has been Zhu's deputy, will direct a rapidly growing science and technology budget that reached $6.5 billion in 1999. He oversees state-run scientific institutes, including the Chinese Academy of Sciences (CAS), as well as funding for key basic research projects, high-technology development, scientific infrastructure, and international collaborations.

A native of Shanghai, the 60-year-old Xu was trained as a forestry scientist and spent 30 years working for the Chinese Academy of Agricultural and Forestry Sciences before moving to CAS. Named an academician in 1992, Xu is credited with helping to develop the country's remote-sensing industry using domestically made global information system instruments, as well as improving the research environment within CAS and nurturing young talent. "He was quite strict," says Niu Zheng, Xu's first doctoral student, who is now a research professor within the Institute of Remote Sensing Application. "But no matter how busy he was, he would always find time to discuss a scientific issue."

As executive vice minister of science and technology in charge of high-tech industries in the mid-1990s, Xu argued in a speech for "active measures to promote the venture capital market," including listing more high-tech enterprises on the country's stock exchange. He also lobbied for the application

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of information technology in a variety of fields, from medicine to transportation. At MOST, he built up a loyal following among scientists. "He is a man of action and principle who [has] an easygoing style," says Sun Chenbei, a former MOST staffer who is now China representative for a Canadian consulting company.

Zhu, a polymer chemist, has been named vice chair of the Education, Science, Culture, and Health Committee in the national legislature. **–DING YIMIN**

Ding Yimin writes for *China Features* in Beijing.

BEHAVIORAL GENETICS

Study Suggests Pitch Perception Is Inherited

Can't carry a tune? Chances are you can lay a lot of the blame for that on your genes, according to a report on page 1969. By studying twins' ability to perceive sour notes in familiar tunes, a U.S.–British team has concluded that the perception of relative pitch is highly heritable and is dependent on higher brain functions. And that, say geneticist Dennis Drayna of the National Institute on Deafness and Other Communication Disorders and colleagues, means that pitch perception may offer a window into brain processes that are also used in language.

The researchers administered a test, called the Distorted Tunes Test (DTT), to 284 pairs of female twins, about half of them identical and ranging in age from 18 to 74, from the St. Thomas' U.K. Adult Twin Registry. The DTT plays short snatches of 26 familiar melodies, from "Turkey in the Straw" to "Silent Night," most of them with one or more notes altered. Subjects indicate whether the tune sounds right. The distortions in the DTT are all obvious, with no pitch altered by less than a halftone. Some tunes are drastically altered (see sample from "America the Beautiful"). So anyone who gets more than three wrong is judged to be somewhat tune-deaf.

Because the identical twins' responses correlated far better than those of the fraternal twins—0.67 versus 0.44—Drayna's team believes that the trait is strongly influenced by genes. Indeed, the team estimated the heritability for tune deafness at 0.80. That's about as high as it ever gets for genetically complex traits, rivaling features such as height. "These results demonstrate for the first time the powerful influence of genes on the ability of humans to recognize correct pitch and melodies," says co-author Tim Spector, who heads the twin research unit at St. Thomas' Hospital in London.

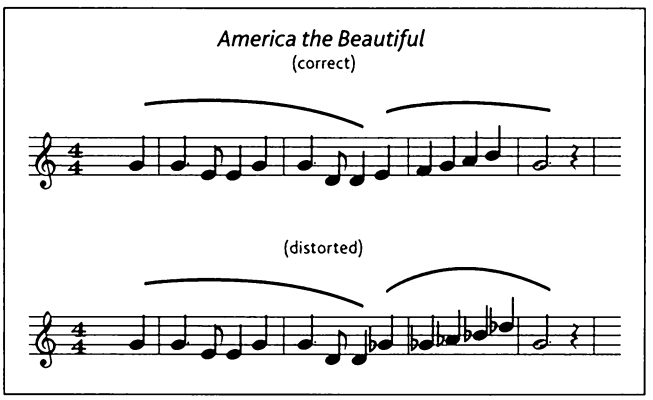
Brain researchers are fascinated by pitch perception, because it taps into cognitive functions, Drayna says. A person can do well on an audiological test and still flunk the DTT—and vice versa—showing that the "musical pitch perception is largely independent of peripheral hearing," the researchers conclude. And although absolute pitch (the ability to recognize an isolated note) is to some degree trainable, scores on tests of relative pitch perception "don't change appreciably over an individual's lifetime," says Drayna—a finding suggesting that, as with language, there's hard wiring involved.

Evan Balaban of The Neurosciences Institute in San Diego agrees that the study is an "important" one that "is looking at something very likely to be a central [brain] function." The study clearly demonstrates a biological basis for pitch discrimination, Balaban says. But he's reluctant to buy the heritability estimate, in part because twins are somewhat more prone than nontwins to developmental disabilities. As evidence, he points out that almost 40% of the twins showed some evidence of deficits in pitch recognition compared with 27% in the control population. The authors argue that their twins are no different from the general population, in which 5% have severe deficits in pitch recognition. They say cultural unfamiliarity with some of the tunes might have lowered the scores a bit.

Scientists hope the study of pitch will provide a lever for studying communication disorders. "The pitch contour of the voice communicates a lot of information about emotions, [so] to tell the difference between different pitch contours would use some of the same abilities" as are used in talking, notes Balaban. Severe defects in pitch perception therefore "could be a subtle indicator" of imperfections in wiring in language-related cortical areas. Drayna agrees, citing as "tantalizing evidence" anecdotal reports of severe tune deafness in people with certain speech and language disorders, such as a problem with processing spoken words known as "cluttering."

Other researchers are also in hot pursuit of brain clues offered by pitch perception. In a paper published in the January issue of *Developmental Psychology*, psychologist Jenny R. Saffran of the University of Wisconsin, Madison, reported that 8-month-old infants, "like many songbirds," may come equipped with absolute pitch—further evidence of the importance of pitch recognition for language learning, she says. Saffran speculates that this knack, which is rare in adults but can be enhanced by early training, is superseded by relative pitch perception as the brain develops. And that talent, which is both more useful and more cerebrally sophisticated, now appears to be primarily determined by the genes.

–CONSTANCE HOLDEN



Tin ears. About 5% of the population wouldn't have a clue which is the right version.

AIDS VACCINES

Long-Lasting Immunity Conferred in Monkeys

Faced with the lack of a critical reagent, Harriet Robinson of Emory University in Atlanta was forced to redesign an AIDS vaccine experiment. From that minor setback has emerged an impressive finding about the lasting power of her vaccine approach.

In a paper published online today by *Science* (www.sciencexpress.org), Robinson, Emory colleague Rama Rao Amara, the paper's first author, and others describe a two-step AIDS vaccine strategy they developed in collaboration with Bernard Moss of the National Institute of Allergy and Infectious Diseases (NIAID). In a large monkey experiment, this vaccine appears to have stimulated long-lasting immunity. "It's among the most exciting concepts that we've seen in this [monkey] model," says Peggy Johnston, head of NIAID's AIDS vaccine program.

Robinson, Amara, Moss, and co-workers built their experiment around a laboratory-made, hybrid virus called SHIV, which is part HIV and part SIV, a simian AIDS virus. They first injected 24 monkeys with a vaccine that contained several SHIV genes stitched into a circular piece of bacterial DNA. Following vaccination with this relatively easy-to-make "naked DNA," the researchers gave the animals a booster shot consisting of a variety pack of SHIV genes carried by recombinant modified vaccinia Ankara (MVA), a version of the virus used as the smallpox vaccine. Rather than raising antibodies that can derail the AIDS virus before it causes an infection, both the naked DNA and MVA vaccines primarily stimulate the immune system to target and eliminate already infected cells.