RESEARCH POLICY

Science fortunes of Balkan neighbours diverge

Romanian researchers' prospects improve, whereas scientists in Bulgaria face a bleak future.

BY ALISON ABBOTT

When Bulgaria and Romania joined the European Union (EU) in 2007, ambitious scientists there hoped that it would swiftly disperse the lingering legacies of 40 years of communist rule. Science had been blighted by a lack of competition, minimal funding and an old guard so desperate to cling on to its privileges that fresh blood was denied the opportunity to build a research career.

Four years later, these neighbouring cash-strapped countries on the southeastern edge of the EU remain close neighbours at the bottom of EU league tables of research expenditure and research output statistics (see 'The spending gap'). But their scientific fates may be set to diverge dramatically.

Last year, Bulgaria slashed the budget of its Academy of Sciences by 38% to 75 million leva (US$50 million), forcing some scientists to take unpaid leave. It reportedly reduced the budget of its granting agency by more than half, and will maintain those funding levels in 2011. It is also poised to make organizational changes that scientists fear will foster mediocrity.

Over the same period, Romania has trimmed funding of its Academy of Sciences by just 3%, and increased the budget of its granting agency by 44% to 1.5 billion lei (US$0.5 billion). In a drive to improve the standard of Romanian science, the government last week approved a hard-won law that enforces strict quality control on universities and introduces tough rules for funding evaluation and peer review.

R. CHIRITA/MEDIAFAX FOTO

"Winning this battle was tougher than any chemical synthesis I have done."
Daniel Funeriu

Romanian scientists working outside the country say that the changes give them hope of some day being able to continue their research careers back home. Meanwhile, the Bulgarian diaspora despairs.

These opposing outlooks show how joining the EU does not guarantee a successful scientific transformation, despite the access it offers to outside money and expertise, and the EU's focus on innovation. For science to flourish, national political will is crucial.

Students at Sofia University have joined protests over Bulgaria's plans to cut research and education funds.

D. DILKOFF/AFP/GETTY

A TALE OF TWO COUNTRIES

After Bulgaria and Romania became democracies in 1990, both attempted to reform their research organizations and universities along Western lines. Early on in the process, they gave autonomy to their respective scientific academies, learned societies that also run extensive networks of research institutes and that were under state control in Soviet times. But little reform accompanied that autonomy, a matter of political concern for many years.

In November 2010, the Bulgarian science and education minister, Sergei Ignatov, proposed an amendment to the law governing the Bulgarian Academy of Sciences (BAS) that would bring its institutes back under the control of the ministry, with each institute funded separately, leaving the academy as a learned society. The amendment, expected to be approved in the next month or so, does not outline how the ministry would safeguard the scientific objectives of the institutes. Scientists fear that the institutes will be closed or deprived of the opportunity to do internationally relevant research.

Enraged BAS scientists were already reeling from the 38% annual budget cut, part of a government-wide austerity programme, which targeted science in particular. They took to the streets in weekly demonstrations, and have since launched an online petition, which has been signed by more than 7,000 scientists around the world, including eight Nobel laureates and five recipients of the mathematics Fields Medal. Peter Gruss, president of Germany's Max Planck Society, has written directly to the BAS president offering moral support.

"I worry most about keeping our young scientists," says Tsvetan Dachev, a space scientist at the BAS Space and Solar-Terrestrial Research Institute in Sofia. "They earn just €175 [US$227] a month, not enough to live on." Last year, 670 scientists left the academy and were not replaced — 460 retired and most

of the rest were young scientists who no longer see a future there.

Things are not much better at Bulgaria's universities, which will see an overall budget cut of 21% to €170 million this year compared with 2009. The large and research-intensive University of Sofia — which alone generates 30% of Bulgaria's scientific papers and patents — has to cope with a 23% cut in its 2009 budget to €18 million. "This is creating tensions between faculties, which are now fighting over tightened resources, and it's not pleasant," says Georgi Vayssilov, a chemist at Sofia. "Faculties such as chemistry and physics need more money for teaching, but our income is based on student number, so we are suffering a lot."

Vayssilov, like most of his colleagues, is also concerned about a law approved last month that allows universities to make their own rules for academic appointments and offers no guidelines or criteria. Consequently, one university might only appoint professors with strong publication lists, he says, whereas another might decide a couple of negligible publications would suffice, opening the door to cronyism.

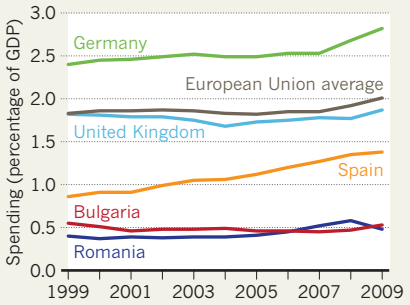
Meanwhile, the country's granting agency, the National Science Fund, put out no general calls for proposals last year, and funding of some ongoing projects has been stopped or reduced. No new calls are expected this year.

TOUGH BATTLE

Until recently, scientists in Romania were in similar despair. In 2008, the country slipped into recession, and the unstable coalition government slashed the 2009 research budget by nearly 50%. But the next coalition government, which came into power at the end of that year, took a different view: a huge budget hike this year comes close to returning research spending to 2008 levels. Unlike Bulgaria, Romania is continuing to bolster its research infrastructure, using EU structural funds for regional development.

THE SPENDING GAP

Research spending in both Romania and Bulgaria lags far behind that of other European nations. After a dip in 2009, Romania now looks set to boost investment in science.



GDP, gross domestic product

SOURCE: EUROSTAT

Crucially, the country is introducing legislation to ensure the new funding is spent well. Research and education minister Daniel Funeriu, a former research chemist who spent most of his adult life abroad, championed an extensive and detailed education law that brings nearly all aspects of university governance, academic hiring practices, evaluation and guidelines for good scientific practice — complete with penalties for academic misdemeanours — into line with other European countries.

The law expressly forbids nepotistic appointments, and also bars rectors from concurrently holding other positions of power that may pose a conflict of interest, such as being a member of parliament. "If these things didn't happen, we wouldn't have had to write them into the law," says Funeriu.

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For a Q&A with Daniel Funeriu see:
go.nature.com/f8uyn2

The draft law met huge resistance in parliament, in large part owing to the influence of several members who are also university rectors. The parliamentary education committee was particularly offended by a paragraph stating that the first round of quality assessment for universities must be done by foreign scientists. In the end, the government decided to force the bill through parliament with a vote of confidence, bypassing some of the parliamentary procedures that were blocking it. After being endorsed by the country's constitutional court on 4 January, the bill became law.

The government is now launching schemes to bring Romanian science into the international arena. In 2010 the country became a full member of CERN, the European particle-physics facility near Geneva, Switzerland, and also became a founding member of two major European facilities: the Extreme Light Infrastructure, which will develop the world's most intense lasers to study matter at high energies, and the particle accelerator Facility for Antiproton and Ion Research in Darmstadt, Germany. This year it is also planning to launch a twinning scheme, which would allow scientists working abroad to set up a parallel lab in Romania. That way they could contribute to science in Romania without having to risk leaving a good job elsewhere; and local staff would benefit from greater contact with international science.

Funeriu says that it has been a hard fight to get to this stage, but he is now optimistic for the future of Romanian science. "Winning this battle was tougher than any chemical synthesis I have done," he says. ■

PLANETARY SCIENCE

Space scope finds scorched super-Earth

Kepler's latest discovery is step closer to a true Earth analogue.

BY ADAM MANN

Kepler, the space telescope considered most likely over the next few years to identify an Earth-like planet orbiting another star, has struck solid ground, mission scientists say.

Most of the hundreds of extrasolar planets discovered to date — including the eight previously reported by Kepler — are at least as large as Neptune and are mainly gas giants. But astronomers hope that the mission will eventually yield a trove of terrestrial planets, including some orbiting their stars at a distance that would allow their surfaces to host liquid water, and possibly life.

Now the team is a step nearer to that goal. It has found a Sun-like star 173 parsecs away — relatively close by galactic standards — harbouring a planet that is just 40% larger than Earth, although it is uninhabitably hot. Supporting measurements of the planet's mass, gathered at the Keck Observatory on Mauna Kea, Hawaii, suggest that the planet's density is 1.6 times that of Earth, implying a rocky composition. Although other telescopes have already spotted a handful of similar 'super-Earths', the first confirmed rocky planet to fall within Kepler's sights is an encouraging sign for the mission.

"It's a milestone," says co-investigator Natalie Batalha, an astronomer at San José State University in California, who unveiled news of the discovery during a talk on 10 January at the American Astronomical Society's annual meeting in Seattle, Washington.

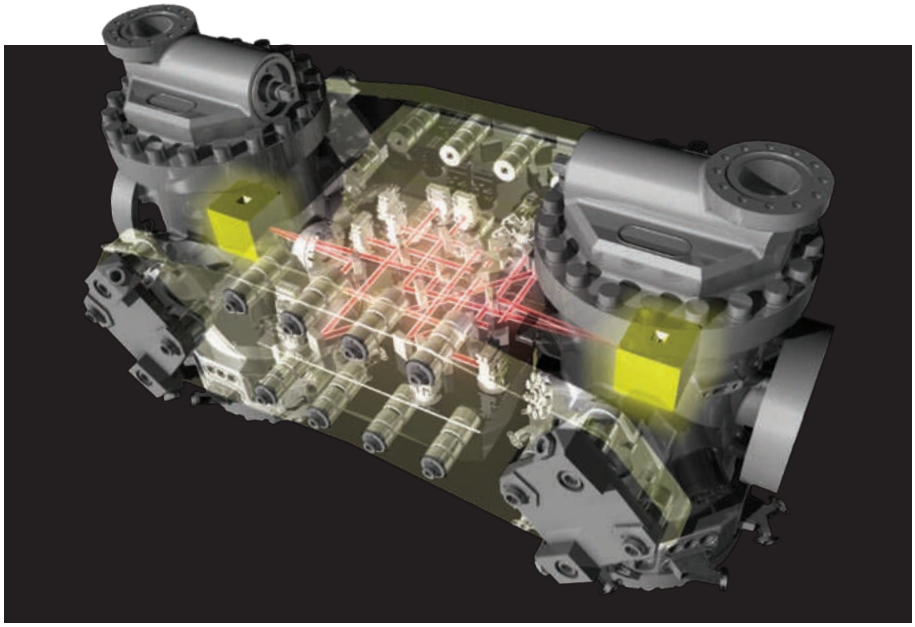
Launched by NASA in 2009, Kepler's strategy is to point at a patch of sky in the plane of the Milky Way, where it can continuously monitor more than 100,000 stars, and to look for slight, periodic changes in their luminosity. Such dips in brightness often indicate the presence of planets repeatedly crossing in ▶

ASTROPHYSICS

Missing part delays space mission

Schedule slips for European-led effort to blaze a trail for gravitational-wave detection.

BY EUGENIE SAMUEL REICH



ESA

The LISA Pathfinder is missing the mechanism to hold two masses (yellow cubes) in place during launch.

For Stefano Vitale, a principal investigator on the LISA Pathfinder mission, the situation is excruciating. Nearly all the instruments for the €300-million (US$400-million) spacecraft have been delivered for what was originally to have been a launch this year. But delays have pushed that target to 2013 and possibly later, with everything now held up by a small but crucial component. "All the rest is waiting for one part. It's heartbreaking," says Vitale, a physicist at the University of Trento in Italy.

It is a rougher-than-anticipated start for a mission that was created to find obstacles. LISA Pathfinder is a European-led test of the technology needed to run the Laser Interferometer Space Antenna (LISA), an ambitious effort to detect gravitational waves from sources in the distant Universe. Scientists hope that LISA can achieve this by measuring the precise separations between three pairs of masses free-floating inside three spacecraft positioned 5 million kilometres apart. The technical challenge along with the estimated cost of LISA (€1 billion to €2 billion) made a precursor mission a necessity. If LISA Pathfinder encounters significant problems it could sow doubts about the overall effort.

LISA Pathfinder is not expected to detect gravitational waves, but it must deploy and measure the relative positions of two test masses with sufficient precision for LISA to move forward. The missing piece of the mission is part of a 'caging mechanism' consisting of two sets of eight fingers that will hold the two 1.96-kilogram gold–platinum masses during launch, and then, once the spacecraft reaches its orbit at the L1 Lagrangian point where the gravitational pull of Earth and Sun are balanced, delicately release them. The masses will then float freely inside their separate compartments while the spacecraft uses electrical microthrusters to maintain its position so precisely that the masses do not hit the sides of their containers.

The exacting requirement for a mechanism that can hold the masses firmly enough to withstand a force of 2,000 newtons but still release them without imparting a velocity of more than 5 micrometres per second (18 millimetres an hour) lies at the heart of the delay. A first prototype of the motor powering the fingers failed key tests, prompting the European Space Agency (ESA) to set up a task force to look into the problem. The motor is now being redesigned from scratch. "Little by little, the launch date is slipping," says Pierre Binétruy of Paris Diderot University, a physicist on the LISA international science team.

Scientists on the mission say that the important thing is to learn from the delay, to avoid similar problems on LISA. With LISA Pathfinder, ESA initially followed a conventional model for managing space missions, assigning science research groups outside the space agency to design the payload — including the caging mechanism — while industrial partners designed the spacecraft itself. But designers found that the spacecraft was operationally indistinguishable from its science payload, because the positioning of the masses inside it is coupled closely to the craft's ability to keep its place in space using the microthrusters. ESA then took on the design of the caging mechanism together with a contractor, Thales Alenia Space in Milan, Italy, which was unable to comment before *Nature* went to print.

On 10 February, the ESA Science Programme Committee is expected to assess options for the new design and chart a path forwards.

Last August, the Astro2010 decadal survey of the US National Academy of Sciences ranked participation in LISA among its top priorities, above a competing project, the International X-ray Observatory (IXO). But that recommendation assumed a successful LISA Pathfinder. Xavier Barcons, a physicist at the Cantabria Institute of Physics in Santander, Spain, who works with IXO, says the problems on Pathfinder call into question the decision to rank it higher than his project. "We also have technical difficulties but we've mastered the basics. LISA is a completely new adventure," he says.

He says that it is not clear whether LISA can fly by 2025, as the decadal survey assumed. But Fabio Favata, head of ESA's science coordination office, says that by uncovering problems early, LISA Pathfinder could help LISA avoid delays. "The present situation, although unfortunate, does emphasize the importance of pathfinding," he says. ■

CORRECTIONS

The timeline in the News story 'Cancer trial errors revealed' (*Nature* **469,** 139–140; 2011) stated that Harold Varmus asked the Institute of Medicine to review Duke University's trials in June 2010. He made this request in July 2010.

The News story 'Tevatron faces final curtain' (*Nature* **469,** 141; 2011) states that the Mu2e experiment will study the decay of muons to electrons. In fact, it will look for evidence of neutrino-less conversion of muons to electrons.

The story 'Science fortunes of Balkan neighbours diverge' (*Nature* **469,** 142–143; 2011) wrongly referred to the Romanian Academy of Sciences — it should have said the Romanian Academy. Also Bulgaria cut the budget of its Academy of Sciences by 38% to 60 million leva (US$40 million), not 75 million leva as stated.