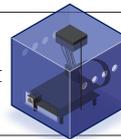


NEWS IN FOCUS

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NIKOLAS GEORGIOLU/DEMOTIX/CORBIS



University students in Athens protest against the government's plan for education and research reform.

POLITICS

Greek science haunted by hydra of problems

Leading researchers hang on despite austerity, but their Herculean efforts may not be enough.

BY ALISON ABBOTT

For chemical engineer Athanasios Konstandopoulos, it is as if all the myths of ancient Greece have come to life at once. The task of keeping up top-performing Greek labs such as his Aerosol and Particle Technology Laboratory (APTL) in Thessaloniki requires the strength of Hercules, he says, as well as the dogged persistence of Sisyphus, who was condemned for eternity to repeatedly roll a boulder up a hill and watch it roll down again.

Mortal power has so far maintained the scientific output of the APTL and other elite research centres in Greece, despite austerity

measures imposed in the wake of the nation's debt crisis in 2010. But five years on, with prolonged austerity pushing Greece into yet another political crisis, scientists are wondering how long that output can be kept up.

In 2014, budgets for research centres and universities in Greece were just one-quarter of their 2009 levels, and take-home salaries had been sliced by around one-third. This year begins with yet more cuts — even as the country implements a long-awaited law meant to reform the research landscape and make it more competitive. Qualified young professionals are leaving the country in unprecedented droves and researchers complain of being stifled by growing bureaucracy.

“The stress is building up for us,” says Nektarios Tavernarakis, director of the FORTH Institute of Molecular Biology and Biotechnology (IMBB) in Heraklion, Crete, which churns out high-impact papers.

Although the ‘troika’ of organizations behind the austerity measures — the European Commission, the European Central Bank and the International Monetary Fund — considers science fundamental to economic recovery, it did not exclude science from the austerity measures. However, it insisted that cuts be coupled to reforms aimed at rejuvenating the country's generally lacklustre research and university systems.

In November, the law reforming research ▶

► was passed, but it ended up being more conservative than researchers had hoped.

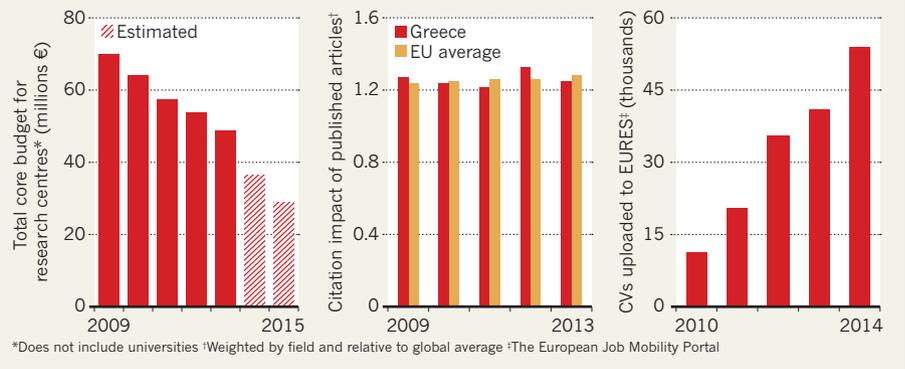
Its principle focus is on making it easier for scientists at universities and research centres to share facilities and to collaborate with industry, by removing bureaucratic obstacles. But researchers complain, for example, that the law did not create an independent grant agency to provide a source of regular support for basic research, akin to the US National Science Foundation or the UK research councils. Instead, Greek researchers depend almost entirely on external funders, such as the European Union, for grants.

Researchers also complain that they are subject to general public-sector rules for controlling public expenditure, even when that makes little sense. In one case that involved the centralization of payments within any public organization, the rules would have ended up costing the government money in grants lost. An appeal against those rules was successful. But the government then piled on extra bureaucracy: from January, researchers must report every expense higher than €1 (US\$1.2) into a centralized online system. “The rules come at you like the Hydra,” says Konstandopoulos. “You expend energy cutting off one of those heads, then another one grows back in its place.”

Theodore Fortsakis, rector of the University of Athens, the country’s largest university, says that if his budget is not increased, he will have to close some departments or centres in the second semester, which begins next month.

HEALTH OF GREEK SCIENCE IN NUMBERS

Government funding for research has plummeted (left) but scientists have maintained the quality of their research (middle). Still, qualified young people increasingly seek to leave (right).



The University of Crete is faced with a 2015 budget that is barely twice the institution’s 2014 electricity bill. Despite this, it came 48th in the *Times Higher Education* 2014 rankings of the world’s top 100 universities under 50 years old, and 5th for natural science in Europe in 2014 according to the CWTS Leiden Ranking of universities’ scientific performance.

Researchers say that the poor conditions are making it ever harder to recruit talented young scientists, even when positions arise. Economist Lois Labrianidis of the University of Macedonia in Thessaloniki has quantified the alarming rate at which qualified professionals are leaving the country. He calculates that 150,000 Greek professionals, including scientists, physicians and engineers — more than 50% of whom have a

PhD — now work in the rest of Europe and the United States. He says that the most qualified will not come back, and tens of thousands of others are actively seeking to leave (see ‘Health of Greek science in numbers’).

Not everyone has lost faith. Neurobiologist Marios Chatzigeorgiou last year accepted a group-leader position that will move him from the luxury of the MRC Laboratory of Molecular Biology in Cambridge, UK, to the IMBB. The uncertainty, he admits, is very worrying. But he believes that the multidisciplinary environment in Crete — which has a concentration of research institutes with diverse focuses ranging from marine science to computing — will be exciting. There, the spirit of Athena, goddess of wisdom, is alive and well. ■

GENETICS

End of cancer atlas prompts rethink

Geneticists debate whether focus should shift from sequencing genomes to analysing function.

BY HEIDI LEDFORD

A mammoth US effort to genetically profile 10,000 tumours has officially come to an end. Started in 2006 as a US\$100-million pilot, The Cancer Genome Atlas (TCGA) is now the biggest component of the International Cancer Genome Consortium, a collaboration of scientists from 16 nations that has discovered nearly 10 million cancer-related mutations.

The question is what to do next. Some researchers want to continue the focus on sequencing; others would rather expand their

work to explore how the mutations that have been identified influence the development and progression of cancer.

“TCGA should be completed and declared a victory,” says Bruce Stillman, president of Cold Spring Harbor Laboratory in New York. “There will always be new mutations found that are associated with a particular cancer. The question is: what is the cost–benefit ratio?”

Stillman was an early advocate for the project, even as some researchers feared that it would drain funds away from individual grants. Initially a three-year project, it was extended for five more years. In 2009, it received an

additional \$100 million from the US National Institutes of Health plus \$175 million from stimulus funding that was intended to spur the US economy during the global economic recession.

The project initially struggled. At the time, the sequencing technology worked only on fresh tissue that had been frozen rapidly. Yet most clinical biopsies are fixed in paraffin and stained for examination by pathologists. Finding and paying for fresh tissue samples became the programme’s largest expense, says Louis Staudt, director of the Office for Cancer Genomics at the National Cancer Institute (NCI) in Bethesda, Maryland.

Also a problem was the complexity of the data. Although a few ‘drivers’ stood out as likely contributors to the development of cancer, most of the mutations formed a bewildering hodgepodge of genetic oddities, with little commonality between tumours. Tests of drugs that targeted the drivers soon revealed another problem: cancers are often quick to become resistant, typically by activating different genes to bypass whatever cellular process is blocked by the treatment.

Despite those difficulties, nearly every aspect of cancer research has benefited from TCGA, says Bert Vogelstein, a cancer geneticist