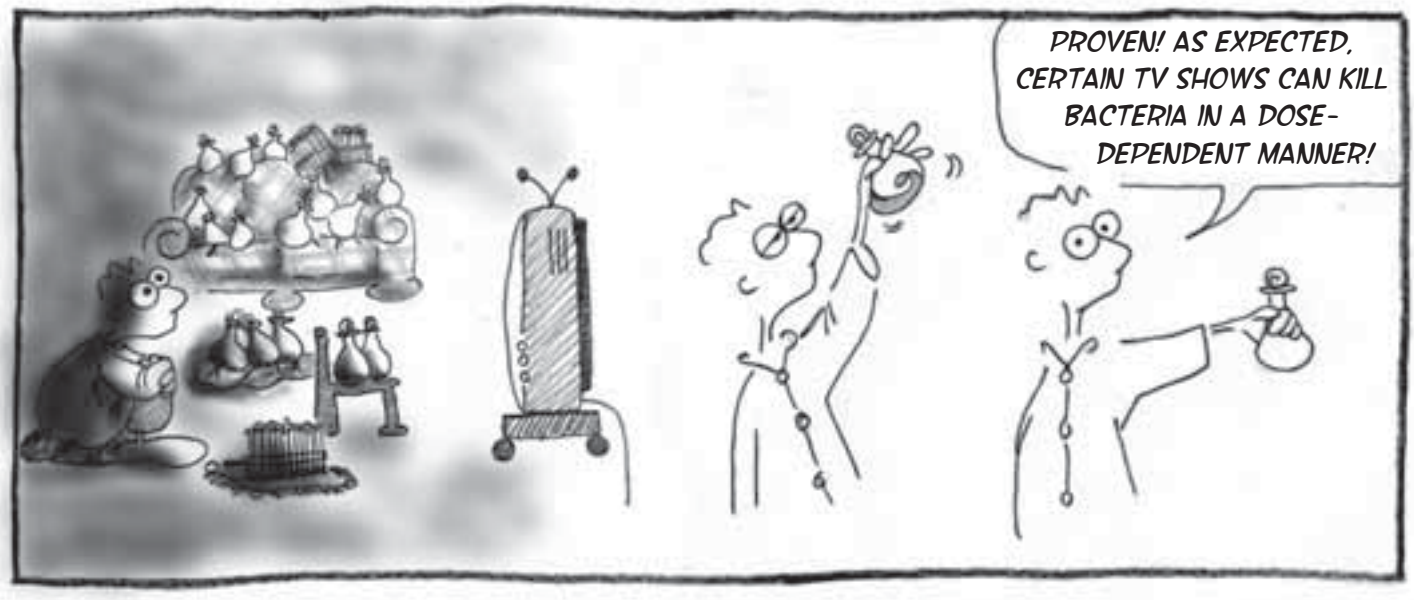
*Picture of the Issue*

## It's a Small World

Once again the Nikon Small World Photomicrography Competition gathered the most impressive microscopic pictures from researchers worldwide (*www.nikonsmallworld.com*). Viktor Sykora from the Institute of Pathophysiology of the Charles University in Prague didn't win the contest (he placed 5th) but his bird of paradise (*Strelitzia reginae*) seed looks at least as beautiful as the winner's entry (Jonas King's mosquito heart). Darkfield, 10x.

## PAUL THE POSTDOC

BY RAFAEL FLORÉS



*World university rankings*

# UK Europe's Best

Every year, universities world-wide take part in a prestigious race to the scientific top. Who's the crème-de-la-crème of science this year? University rankings are there to assess exactly that but every ranking employs different indicators for their final score. Thus, they never come to the same conclusion. Intriguingly, however, a couple of names pop up, no matter which ranking you choose to believe. So, how did European institutions of higher education perform according to three recently published rankings?

The Quacquarelli Symonds (QS) World University Ranking, previously in cooperation with Times Higher Education, is the most discussed one, as 40% of its final score is comprised of an opinion survey of academic peers. According to the QS Ranking the best university in life sciences and medicine is the Harvard University followed by two European universities, Cambridge and Oxford. Among the Top 100 were 36 European universities, UK institutes were the most numerous (14), followed by institutes in Germany (5), Sweden (4), the Netherlands (3), France and Switzerland (2). The QS European Top 10: 1. Cambridge, 2. Oxford, 3. Imperial College London, 4. University College London, 5. University of Edinburgh, 6. Karolinska Institute Stockholm, 7. King's College London, 8. Swiss Federal Institute of Technology Zürich, 9. University of Manchester ,10. University of Heidelberg.

The Times Higher Education (THE) World University Ranking is a newcomer this year. Being unsatisfied with the methodology of their former collaborators, Quacquarelli Symonds, THE developed their own ranking, including 13 separate performance indicators. In contrast to QS in the field of life sciences, the THE ranking found the Massachusetts Institute of Technology to be the best, followed by Harvard and Stanford. European research takes up 4th (Oxford) and 6th (Cambridge) position. Among the Top 50 were altogether 13 European universities, eight from the UK and one each from Sweden, Switzerland, France, Spain and Germany. The THE European Top 10 (not so different from the QS ranking after all): 1. Oxford, 2. Cambridge, 3. Imperial College London, 4. University College London, 5. University of Edinburgh, 6. Karolinska Institute Stockholm, 7. Swiss Federal Institute of Technology Zürich, 8. University of York, 9. University of Dundee, 10. University of Barcelona.

Until now, the "most influential" ranking, the Academic Ranking of World Universities (ARWU), has come from the Shanghai Jiatong University. According to its originators, the ranking was created to "find out the gap between Chinese universities and world-class universities". In line with QS, Harvard University has taken the title of "best university" in the Life and Agriculture Sciences field, followed by the University of California, San Francisco and the Massachusetts Institute of Technology. Europe's research flagships Cambridge (6th) and Oxford (8th) once again made the top ten. The top 100 includes 31 European universities; ten stand on UK soil, six on German, four on Swiss and three on Dutch as well as on Belgian. The Euro Top 10 according to the gospel of ARWU: 1. Cambridge, 2. Oxford, 3. Karolinska Institute Stockholm, 4. University College London, 5. University Zürich, 6. University Wageningen, 7. University Basel, 8. University Edinburgh, 9. Imperial College London, 10. Swiss Federal Institute of Technology Zürich.

Photo: Wikimedia Commons/ Dan Taylor

**And the award goes to...**

Even though the rankings don't quite agree on all positions, top ranks are occupied by mostly the same names. In Europe, the UK has once more proven to be **the** place to be when it comes to quality research. Cambridge, Oxford, the University of Edinburgh, the Imperial College and the University College London, all of them made the EU top ten in all three rankings. However, with recent budget cuts looming over UK research, this position might be in danger in the coming years. Besides the UK, Europe's best universities are located in Sweden (Karolinska Institute) and Switzerland (Swiss Federal Institute of Technology).

KATHLEEN GRANSALKE

*Research publication*

# On the Fast Track

Biomedical researchers have recently received an e-mail with a very tempting, novel invitation to publish their research, "Guaranteed publication of your research within 48 hours of submission. No pre-publication screening. Peer review takes place post publication in an open and transparent manner. No cost to authors or readers. Regards, The WebmedCentral Team." It all sounds so easy. But who are WebmedCentral (WMC) and is their offer too good to be true?

On their website, WMC say they are an independent group of medical, management and financial industry professionals with no affiliation to any biomedical publishing group. Furthermore, they have "no links to the pharmaceutical, traditional publishing or any other industry". However, they do object to the existing way in which biomedical research is published. This is expressed in their "philosophy", "Biomedical publishing in its conventional form needs to evolve. In current times of unlimited publishing capacity, barriers to publishing need to be reduced and every scientist should have an opportunity to contribute."

WMC claim to provide an alternative to the "time consuming and cost intensive exercise" of the existing publication process. And they place a lot of blame on peer review, "The conventional peer review system hinders transparent scientific communication, delays the publication process and adds to the cost of publishing. There is a possibility of inherent bias in the system leaving manuscripts at the mercy of editors and reviewers."

No doubt many scientists have been exasperated at the existing options when publishing in peer-reviewed journals but what does WMC propose instead?

It offers an online publication service, where you can publish almost any research report "in virtually every biomedical discipline" almost immediately. You can even publish articles that you've already published elsewhere "as long as it does not infringe any existing copyright".

In essence, WMC claim to have "full faith in the honesty and integrity of the scientific community". This means that they are prepared to openly accept any submission in biomedical research and put it online "within 48 hours, at no cost to authors or readers". But you will still need to have your research article reviewed, albeit **after** publication. The authors provide details of three reviewers when submitting, WMC ▶▶

▶▶ then contacts them. If three reviews are not received within four weeks, WMC prod the authors to suggest other reviewers. If reviews are still missing after three months, they propose to use their own "team of scholarly reviewers" – which can be any recognised researcher who has registered with WMC and listed their fields of interest.

All reviews appear online and authors can respond to them. But once an article has been published, it cannot be modified. Instead, authors can submit revised versions that will be cross-linked to the original. Authors retain copyright on their work but grant a licence to publish.

Everything is completely free for both authors and readers – costs are kept low with a fully automated service and any revenue will be sought through industry sponsorship. So, what are their chances of success? As usual, there are fears that WMC won't have the necessary "impact factor" - for the moment, it is only indexed on Google Scholar. WMC say they will not publish anything that is obviously irrelevant or unscientific.

Some commentators have noted that physics and maths have had a similar online service for 20 years: "arXiv" was set up in 1991 as a repository for preprints – it now has over 500,000 articles, many of which are original publications. In fact, it is considered such an important resource that some major results were first published there, notably the solution to the Poincare conjecture in 2002.

Perhaps WMC could become a repository for some of the masses of experimental data that biologists can't be bothered to send elsewhere precisely because the existing peer-review system is so time-consuming and costly.

*Plant taxonomy*

# Deleting 600,000

How many plant species are there on earth? Usually, this question is based on what is known plus estimates of the number of species that remain to be discovered. However, it turns out there has been a lot of confusion about just what is known, with databases overestimating the real number of plant species by a factor of three!

Much of the problem has been due to a duplication of names – the same plant may have different names in different countries, often because scientists were simply not aware of other published work or because of confusion caused by superficial differences, such as different sized leaves in different climates. Database information on a plant with several different names has often been overlooked or misinterpreted.

Whatever the reason, this situation cannot continue. "Without accurate names, authoritatively determined, our understanding and communication about global plant life would descend into inefficient chaos, costing vast sums of money and literally threatening lives in the case of plants used for food or medicine," intones Stephen Hopper, Director of the Royal Botanic Gardens at Kew, London. Over the last 16 years, the systematists at Kew Gardens, together with a network of 132 specialists from 25 countries, have been developing the World Checklist of Selected Plant Families that includes 151 seed plant families.

However, an increasing international awareness of the problems of plant conservation and biodiversity loss have added an extra impetus to this work, expanding it to cover all known plants in the aptly named "Plant List." In 1999, the Global Strategy for Plant Conservation called for 'a working list of all known plant species as a step towards a complete world flora' to be made available by 2010. In 2002, this was also identified as 'Target 1' by the Convention on Biological Diversity, with its 193 government signatories. There were concerns that without this work, it would be impossible to work out how many plants were under threat and how successful conservationists were in saving them.

Nevertheless, the declining numbers of botanical taxonomists worldwide limited their progress and it seemed unlikely the goal would be achieved this year until Kew began a novel collaboration with the Missouri Botanical Garden in 2008. The US researchers had been developing their own database, Tropicos, since 1982. It contained over a million plant names with synonymy, protologues, types, distributions, references, high resolution images and four million cross-referenced specimen records.

Following an automated rules-based approach, the Kew records have been combined with Tropicos and both teams have since attempted to search existing plant lists using names and synonymy relationships from nearly 20 regional floras and checklists, to work out an "accepted" name for each species and then to list all known variations.

So far, the researchers have found 301,000 accepted species and 480,000 alternative names, with 240,000 names left to assess. Alan Paton, from the Herbarium at Kew, said they now believe that the true number of flowering plant species previously covered by over a million scientific names will be closer to 400,000, "You can't give an absolute number of names, but we have narrowed the possibility."

Photo: Wikimedia Commons/alpsdake

**No confusion with the one and only *Paris japonica*, recently also hailed as the plant with the largest genome by Kew Garden botanists.**

The Plant List should be accessible via the internet by the end of 2010. Its coverage of monocots is comprehensive and fairly consistent but the completeness and accuracy of the synonymy information for other flowering plants is variable. Furthermore, there is still no coverage of ferns and fern allies (10-15,000 species), nor of algae (perhaps 30,000 known species). They also note that their coverage is probably weakest for South-East Asia and "for genera commencing with letters in the latter half of the alphabet". JEREMY GARWOOD

*Stem cell research*

# Funky Accusations

The whole stem cell research world was recently shaken to its core – triggered by two emails. In these mails, a group called "Stem Cell Watch" accused two groups of scientific misconduct – the group of Johan Ericson and Thomas Perlmann from the Karolinska Institute in Stockholm and Kon- ▶▶

rad Hochedlinger's group at the Harvard Stem Cell Institute in Boston, USA. Both had recently published papers in *PNAS* (*PNAS* 106, 7613-8) and *Nature (Nature* 460, 1145-8*)*.The funky thing about it, though, is that the accusations were made anonymously and were sent not only to the researchers involved but to basically everyone who might be the slightest bit interested, including publishers and the press.

The Watch group found fault exclusively with images in the two papers. In the *PNAS* publication of the Swedish group, they were nagging about some artificial coloration, and that the same cells were used. Hochedlinger was found guilty of having used the same embryo for control and actual staining. Perlmann and Ericson replied immediately in an open email that "the anonymous accusations are false".

No-one knows exactly who's behind the Stem Cell Watch, when being asked by *Nature*, the only reply was that they are a bunch of students studying biology.

Even if this were true, how can such "unexperienced" students know how to "do" research. Apparently, they do not. According to Perlmann and Ericson, they did triple immunohistochemistry, which, as everyone who has only been working in a lab for one day knows, is done with the same cells to demonstrate different proteins. Hochedlinger subsequently collected more original photos of his embryos to prove his innocence. Meanwhile, the Watch Group is probably laughing up its sleeve!

Most researchers, however, agree that anonymous accusations should be ignored; some even speculate that a political force might be fuelling them, "if they had succeeded in convincing a large portion of the public that the allegations were well founded, it would have been a 'stem-cell-gate'." Luckily, it didn't come to this.

-KG-

# Mapping Out The Human Being

Gigantic project gets to the bottom of human variation.

As is commonly known, 99.9% of DNA is the same between anyone of us. It's the final 0.1%, consisting of genetic variations, that makes all the difference. Back in 2002, the HapMap project was launched to investigate the role of these inherited genetic variants in human evolution and disease. Since then, sequencing technologies have advanced and costs have sunk tremendously. So, in 2008, a new project, the 1000 Genomes Project, came into being. It's only goal is to create "the most complete map of genetic variants". Participants in the project come from over 70 institutes and companies from around the world, including several labs in the UK and Germany, as well as groups from Copenhagen, Helsinki, Leiden, Geneva and Evry. Spokesperson for the project, which has now concluded its pilot phase, is Richard Durbin (Wellcome Trust Sanger Institute, UK.)

Photo: Wikimedia Commons/Melvin "Buddy" Baker

**SNP-rich Nigerian drummers**

According to their recently published paper (*Nature* 467:1061-73), the 1000 Genomes Project Consortium discovered over 95% of the "currently accessible variants found in any individual". Sequencing samples (DNA isolated from immortalised lymphoblastoid cell lines) were obtained from the extended HapMap Project repository and included samples from several ethnic groups like the Yoruba people from Nigeria, the Toscani from Italy and the Chinese living in Metropolitan Denver, USA.

The project tested three different approaches to find the most efficient option: low-coverage whole-genome sequencing of 179 people's DNA, high-coverage sequencing of two mother-father-daughter families and exon-targeted sequencing of samples from 697 people. Every method had its advantages and disadvantages but they all, more or less, yielded the same results.

Using the low coverage sequencing method, the project found in total 15 million single nucleotide polymorphisms (SNPs), a nucleotide switch occurring in at least 1% of the population. More than half of all those SNPs were novel findings. The highest number was found in the Yoruba group from West Africa, the lowest number in Chinese and Japanese populations. Similar results were obtained for short insertion/deletion variants. Three million so-called, indels, were discovered, the highest amount of almost one million being in the Yoruba samples. The authors attribute that to the "greater diversity in African populations". Additionally, 20,000 of the larger structural variants were found, such as deletions, duplications or mobile element insertions; 90% of these duplications were novel findings.

Furthermore, the 1000 Genomes Project estimated the numbers of "potentially functional gene variants" per person. About 12,000 synonymous SNPs (no effect on protein sequence) and 11,000 non-synonymous SNPs (leading to differences in protein sequence) were calculated. Of those, only a small number, about 400, were found to be "putative loss-of-function variants". Those variants included premature stops, splice-site disruptions and frame shifts, which could affect about 300 genes. The family samples were meant to shed light on the base pair mutation rate from one generation to the next. It was found to be $1.2 \times 10^{-8}$ in people of European descent and $1.0 \times 10^{-8}$ in the Yoruba.

The project will shortly be entering its full phase. Samples are scaled up to cover 2,500 people's DNA, getting analysed by low-coverage whole-genome sequencing, array-based genotyping and deep-targeted sequencing of all coding regions. All the results are available for free in a public reference database (*www.1000genomes.org*).

In related news, the human proteome has now been completely mapped, too. Researchers led by Ruedi Aebersold from the ETH in Zürich used mass spectrometry to identify all 20,300 human proteins. The results are freely available in the ISB/ETH SRMatlas (*www.srmatlas.org*).

KATHLEEN GRANSALKE

(More research results from European labs on pp. 36-41)