BOLD SCIENCE A scientist's move from a devastating loss to a 'brain in a dish' **p.283**

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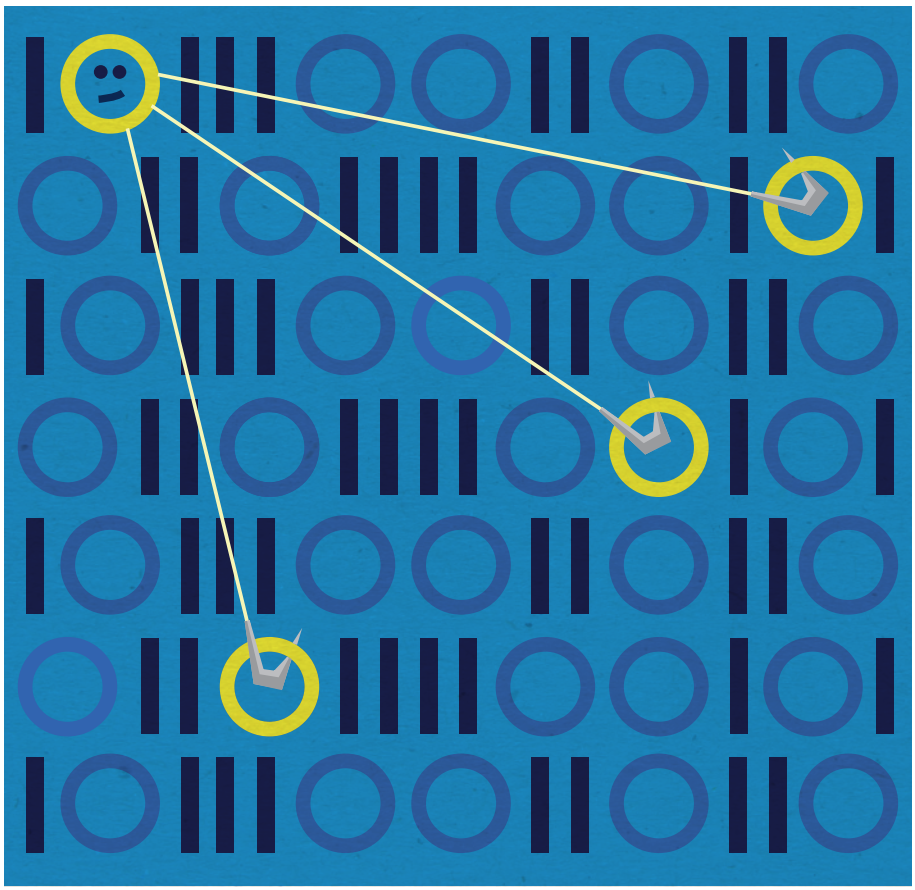


RESEARCH PROFILES

A tag of one's own

Digital identifiers can sort out different scientists with the same names, and create a lifelong record of their work.

BY QUIRIN SCHIERMEIER

Jee-Hyub Kim knows his way around the scientific literature. The South Korean computer scientist spends his days tracking information and visualizing data drawn from published work in genetics and biomedicine.

Kim works at the European Bioinformatics Institute (EBI) in Hinxton, UK, and knows firsthand what a faceless affair the world's fast-growing scholarly record is. When he searches for his surname in Europe PubMed Central, a chief information resource for biomedical and health researchers, he gets no fewer than 400,000 hits. If he includes his initials in the search, the system still yields some 15,000 articles — yet only 11 are his.

This ambiguity is hardly surprising. 'Kim' is the most common family name in North and South Korea, and it is a popular given name in other countries. In the global profession of science, similarity between authors' names makes distinguishing researchers difficult for librarians, publishers, funders and administrators. But there is a remedy: the Open Researcher and Contributor Identification (ORCID) project, a community-driven non-profit collaboration launched in 2012. ORCID provides researchers and scientific contributors with a unique digital identifier that will remain associated with them throughout their lives — even if they change their name or professional affiliation.

Worried about the countless 'false positives' produced by online searches for his research record, Kim did not hesitate to sign up on ORCID last year when he first heard about it. But it wasn't just the ambiguity of his name that prompted him to register: once assigned, the digital identifier allows researchers to manage a record of their activities. Kim's personal ORCID ID thus enables him to link his name not just to papers, but also to other achievements and projects that he has been involved in. "ORCID just makes me and my research profile more visible," he says. "And when I apply for grants or jobs, it is so handy to have all my output filed under one system."

TECHNICAL FINESSE

ORCID is an electronic hub that connects researchers with their research across database profiles, manuscript submissions, grant and patent applications and other such uses. The system's user registry is free, and provides an interface that supports system-to-system communication and authentication.

The platform can, for example, automatically import records from other research-tracking systems, such as Europe PubMed Central and Elsevier's literature database Scopus. This tool allows users to easily collate their publications and make their professional pursuits traceable for potential collaborators, funders, reviewers, employers and colleagues.

Institutions are quickly beginning to see ORCID's value. At the European Bioinformatics Institute, a division of the European Molecular Biology Laboratory, administrators strongly encourage newly hired researchers to sign up for an ID during the induction process. ORCID's ability to facilitate research management and track scientists' output is of considerable value to funders and employers, notes Johanna McEntyre, head of literature services at the EBI.

ORCID is particularly useful to early-career scientists who are seeking to get funded and advance their careers. It makes unpublished yet creditable work more visible. "As modern science gets more and more collaborative, people tend to do a lot of work for which they don't get due credit," McEntyre says. "Results of high-throughput sequencing you have done for genome studies may never get published, ▶

for example. On ORCID, you can claim that data, and draw attention to any other contributions to collaborative research that may help raise your profile."

To creative minds, assigning a number might conjure up Orwellian associations. But ORCID users have a lot of control. They can choose different levels of privacy for their digital content, and change these settings at any time. They can make some records publicly available and others visible only to trusted parties. And if they wish to list specific works, data or funding sources solely for their own reference, the information can be entirely hidden.

"ORCID is an opt-in system," says Laurel Haak, the system's executive director in Bethesda, Maryland. "We do not collect any private information other than e-mail addresses, which the researcher can set as private so that it is not shared." Privacy concerns have not been a barrier to ORCID's adoption at the EBI, says McEntyre. "If I really want to find out about you, I just google your name," she says. "A digital ID doesn't tell you a lot."

DUAL DIRECTIONS

For the purpose of authentication, ORCID records do display the source — if available — of claimed professional affiliations. If a scientist says that she or he is employed by the University of Oxford, UK, for example, and the university has in turn verified that the individual works for them, that is visible in the system.

With millions of researchers worldwide, and so many similar names, allowing institutions to confirm researcher affiliations helps to ward off concerns that someone could take advantage of name ambiguity. But Josh Brown, ORCID's regional director for Europe, says that if researchers were tempted to claim papers or data that they didn't actually produce, it would hardly go unnoticed. "The idea is that ORCID data that is shared between systems is open for validation and cross-checking by those systems," he says. "By displaying provenance and by the nature of the data itself — which tends to be publicly available or verifiable — any misuse can be detected by the people best placed to do so."

All 500 or so staff scientists at the EBI have signed up for an ID. So have most scientists at other branches of the European Molecular Biology Laboratory, located in the United Kingdom, Germany, France and Italy. In turn, many science journals (including *Nature*, which partners with ORCID) encourage its use, with the goal of optimizing the manuscript-submission process.

Funding agencies are following suit. To streamline the handling of grant applications, the Wellcome Trust in London has required all applicants since 1 August to provide an ORCID ID. Similarly, the European Research Council, run by the European Commission, has begun asking grant applicants for their IDs — although providing one is not mandatory — so that reviewers can better gauge their skills and contributions to science. And the US National Institutes of Health is testing ORCID's efficacy for linking researchers and their outputs.

ORCID is rapidly becoming the default global research-management system, says Liz Allen, head of evaluation at the Wellcome Trust. She thinks that scientists should sign up for an ID early in their career and strive to keep their profiles up to date (see 'Tips for profile growth').

"ORCID helps young scientists arrive and settle in the research ecosystem," says Allen. "It allows you to distinguish your skills from those of co-authors and competitors. And it helps you spend more time doing research and find people to collaborate with, rather than filling out personal information on countless forms."

Creating a profile is simple. Once a researcher provides a name and an e-mail address, that individual is assigned a 16-digit number. The ORCID ID is then expressed as a web address to which any publications and personal details can be posted or imported from data repositories.

"It took virtually no time to register," says Nadarajen Veerapen, a software developer at the University of Stirling, UK, who specializes in process optimization. "Once you're linked to different systems, ORCID is very practical and easy to handle. But you should really use your ID and not just leave it idle."

Researchers generally have to maintain an ORCID profile manually. Whether it is acceptable for employers to create ORCID profiles for their staff and feed the system with data from in-house publication databases is still under discussion. "From our point of view, it would make a lot of sense. But there are technical and legal issues that need to be addressed," says Bernhard Mittermaier, a librarian at the Jülich Research Centre in Germany.

GLOBAL WAVE

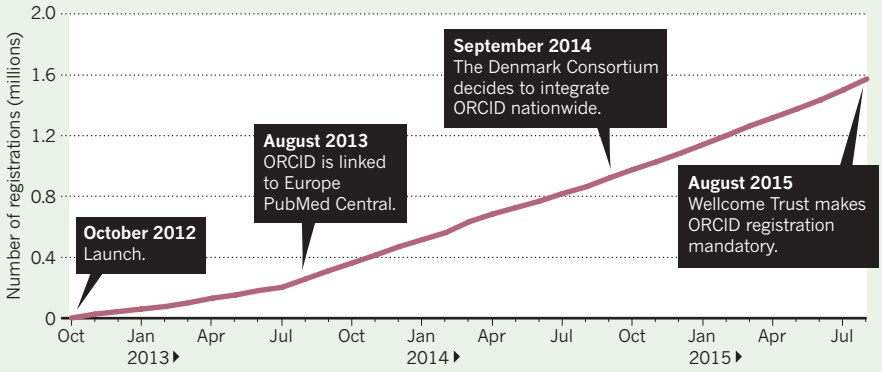
ORCID stretches across all disciplines and continents. Worldwide, more than 1.5 million users have signed up since its launch (see 'Now 1.5 million strong and growing').

Not everyone maintains their profiles diligently — in fact, many ORCID users list no output at all. But as the facility gets better known and more widely accepted, the value of its information will increase. As of August, more than 400,000 of the 3.3-million full-text articles listed on Europe PubMed Central were linked to at least one ORCID ID. Some multi-author articles are claimed by several dozen ORCID IDs. And prolific authors and users, such as EBI genome researcher Nick Goldman, have co-written nearly 100 ORCID-claimed papers.

As more people sign up, Allen says, ORCID promises to become a powerful tool for tracking and maximizing the research value of grants, avoiding duplicate funding and identifying opportunities for collaborative research. In June, the British Library in London started to include ORCID IDs in its national thesis service, which provides free access to doctoral theses done at

NOW 1.5 MILLION STRONG AND GROWING

ORCID's digital identifiers link scientists with publications and contributions. Sign-ups have increased by more than 50,000 a month since the beginning of 2015.



SOURCE: LAUREL HAAK/ORCID

ORCID BLOOM

Tips for profile growth

- In your profile, list all variations and abbreviations (including initials) of your name, and any previous iterations used in a professional context.
- Carefully choose the privacy settings that best suit your needs.
- Link ORCID with other identifiers and research profiles that you use. For example, if you have a Researcher ID or Scopus Author ID, you can import information from those systems into your ORCID record.
- ORCID can handle a large variety of scholarly output other than scientific articles. Check out what data sets and figures you can link to your profile.
- Make sure to keep your record updated.
- Provide your ORCID ID when submitting manuscripts and applying for grants. Include it in your e-mail signature and CV, and add it to your social-media accounts. Q.S.

UK higher-education institutes. In the same month, a group of Italian research organizations announced that it would implement ORCID nationwide, aiming for 80% of Italian researchers to have an ID by 2016.

The system is still developing. To recognize scientists' peer-review activities — time-consuming work that tends to remain invisible — ORCID is discussing with publishers ways to enable scientists to add reviews to their profiles. "We don't get acknowledged" for such work, says Veerapen. "It would be really good if funders and employers were able to check what service I'm doing for science in that respect, too."

There are downsides to using ORCID. The web interface is not perfect, and it is still inconvenient to search, says McEntyre. Others note that ORCID's connectivity with research-tracking systems and databases could be improved. And still missing, Kim says, is a format for registering the software products that often emerge from data-generating research such as his. Haak says that such technical issues will be tackled in consultation with ORCID's 350 or so member organizations, most of which are in Europe, Asia and North America.

But ORCID's strengths — author-name disambiguation and the opportunity to specify unpublished contributions to science — appeal all the same to scientists and research agencies in other parts of the world.

"ORCID is ideal for developing science markets," says Matthew Buys, ORCID's regional director for Africa and the Middle East. "It sits really well with the community in Africa — not just because there are many shared names there, but because funders, publishers and institutions understand that they need to connect to bring high-quality research to Africa."

"ORCID helps young scientists arrive and settle in the research ecosystem."

With 4,500 assigned IDs, South Africa is the best-represented country on its continent. But excitement about ORCID's value is growing in Africa and in the Middle East, Buys says. ORCID's outreach workshops in developing countries — such as one held in July in Nairobi — are well attended.

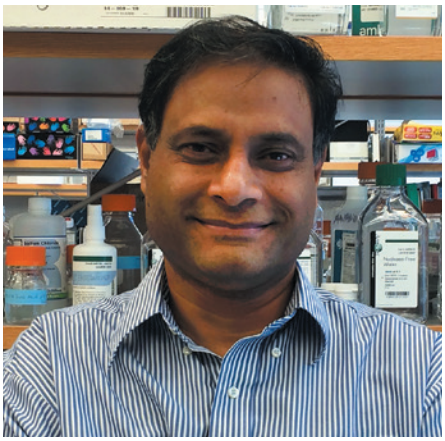
Ayodele Alonge, a PhD student at the University of Nairobi's School of Journalism and an emerging-technology librarian at the University of Ibadan in Nigeria, signed up for ORCID immediately after learning about it in May. "ORCID enhances my visibility as an upcoming researcher," he says. "And I hope it'll help me get recognized for what I'm doing." ■

Quirin Schiermeier *is* Nature*'s Germany correspondent.*

SUSAN MCKAY

TURNING POINT
René Anand

After Hurricane Katrina destroyed his lab at Louisiana State University in 2005, René Anand embraced high-risk research — projects that might win big or fail completely. Anand tells Nature *how that decision led him to create what he considers the most-advanced brain model developed so far.*



You began a career doing molecular biology. What sparked your interest in neuroscience?
When I got my PhD at Ohio State University in 1989, I was investigating how genes recombine. I moved on to a postdoc at the Salk Institute for Biological Studies in La Jolla, California, where my informal training in neuroscience started. It was the obvious next frontier in science.

How did Hurricane Katrina affect your lab?
Katrina destroyed the lab itself. The building was flooded with water for a month — the whole system closed down. I lived on the outskirts of town, relying on food from aid organizations and writing grants. A lot of people, mostly clinicians, lost their jobs. Those dark days lasted a year. We chose to move mostly for family reasons — schools were disruptive — not because we didn't foresee recovery. But it was scary to think that something like this could derail us again. Science is already demanding enough. I went back to Ohio State in 2007 — I wanted something familiar and to be part of an interdisciplinary campus.

In 2010, you got a US National Institutes of Health grant. Was that a game-changer?
Yes — I was rewarded for being a risk-taker. The EUREKA (Exceptional, Unconventional Research Enabling Knowledge Acceleration) grant was designed to help investigators to pursue innovative ideas. I wanted to understand at the genomic level how an electric eel's membrane proteins work, so that we could study human diseases involving similar proteins. Getting that grant played a big part in my attempt to turn stem cells into a brain organoid.

How did you decide to create a brain model?
It grew out of my fundraising work with Autism Speaks, a US charity that supports basic research. Year after year, I sat with families and listened to them talk about how much it mattered to them what scientists do. I developed a very personal connection that drove me to take risks. At the time, I was doing research in rodents that failed miserably. I had to find another way, so that I could work in a species that could give us more insight. Using stem cells as the basis for an organoid offered that bridge. We were fortunate to find two risk-taking funders that gave us roughly US$140,000. We spent four years producing a stem-cell-based brain organoid using adult human skin cells.

What was the reaction to this 'brain in a dish'?
I should be clear that this 'brain' models early-developmental tissue and is roughly 2–3 millimetres long. It expresses more than 98% of the genes present in a human brain at 5 weeks of development. We are not capable of addressing higher-order function, such as memory, learning or cognition. But we can see structures of the brain, and perhaps use the model to see how it responds to drugs. The organoid might be useful for high-throughput screening for therapeutic-drug discovery or toxicity testing. We are working through legal issues, such as intellectual-property rights. I have the paper ready to submit as soon as we get the business concerns addressed. I didn't realize that the world of commercialization is as challenging to navigate as the science.

How did word about the model get out if the paper is not yet published?
We finished the project in April 2014. As we grew more confident in our results, I shared them at conferences, including an invited talk at the Wellcome Trust in London last July. But it didn't receive press attention until I gave a talk at the Military Health System Research Symposium in Fort Lauderdale, Florida, in August, and my university put out a press release. There are caveats. Although my group has replicated the research, it has not been through peer review. The truth will become the truth once it has been replicated in another lab. ■

INTERVIEW BY VIRGINIA GEWIN

This interview has been edited for length and clarity.