

The creativity of immigrants

Countries that have benefitted from immigration to dominate the scientific research landscape cannot expect to maintain their lead after they close their borders. Nations aspiring to lead in the knowledge economy must not only be open, but also need to respect freedom of communication and free expression of ideas.

Like the economic progress it nurtures, scientific research depends upon the migration of people looking to better their lot. This applies equally to refugees looking to hold onto their lives and economic migrants looking for a better job. By definition, research and innovation require significant improvement over the status quo. New approaches often require an outsider perspective and levels of risk-taking incompatible with locally established conventions. Existing communities are stimulated to new thinking by exchange with incomers.

That science is a reasonable way for people of different cultures to interact to generate knowledge and prosperity is a deeply held value for this editorial team comprising both immigrant and US-born scientists with immigrant immediate families. It is also demonstrable in our practice, as from 2009–2013 about 60% of papers in this journal were international collaborations (<http://www.scimagojr.com/>). Typically, in 2011, in most countries over half of all scientists with a doctorate had international experience. In the United States and UK, over a third of scientists were foreign born (*Nat. Biotechnol.* **30**, 1250–1253, 2012). In one study, the papers published by those who moved country had a higher bibliometric performance than papers from those who remained in their country of origin (http://www.nber.org/workinggroups/ipe/ipe_researchproject.html). For the future, we note that a Pew Research Center analysis showed that overseas students gained more than half of the degrees awarded by US universities in many science, technology, engineering and mathematics (STEM) disciplines (<http://www.pewresearch.org/fact-tank/2015/06/18/growth-from-asia-drives-surge-in-u-s-foreign-students/>).

Consequently, disgraceful populist border-closing convulsions such as the UK's 'Brexit' and the 45th US President's rushed attempt to ban immigration from seven Muslim-majority nations look short-sighted and counterproductive for migration that is the future of science, prosperity and rational values. We note that many experts have begun to feel the need to speak out to preserve the opportunities for their nation to make use of the talents of immigrants (<https://notoimmigrationban.com/>).

It is no accident that the United States historically benefitted from attracting researchers who had been the victims of tyranny and oppression while countries that persecuted their talent declined. But, today, where in the world will be the best places for scientists to gather to exchange ideas, to freely publish their findings, to travel for training, to immigrate to start a lab? These will be thriving economies built on knowledge and technology, which provide fair visa and naturalization opportunities, but which also respect free expression of unorthodox ideas.

We are lucky to work in the global field of genetics, secure in the knowledge that every person in the world contains key information for understanding the function of our shared genome. We are excited to see our discipline spread throughout the affluent and developing world, bringing shared understanding of heritage, health and disease. Borders will not block reason and comprehension while we can still build international networks of shared expertise. We celebrate the creativity of our immigrant colleagues and their ability to tap deeply into that greatest wellspring of human energy that comes from the existential challenge of being suddenly plunged into an unfamiliar environment. ■