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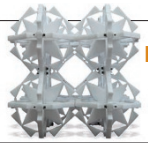

MATERIALS Hinges offer new stability for Teflon towers **p.327**

Forgotten foot soldiers of science

The story of CRISPR–Cas9 gene editing has tended to focus on a few key players. But, as with any area of basic research, it takes a small army of talented researchers to make a discovery.

"It is amazing what you can accomplish if you do not care who gets the credit." Harry Truman supposedly said that, and as the US president who dropped the atomic bomb, he had more reason than most to be amazed.

Science is a collective effort, but human nature — including that of people who sit on grant committees and decide prizes — tends to select and reward individuals. Hence the popular parlour game among scientists: speculating on who will get the Nobel prize for impressive discoveries.

They don't come much more impressive than a molecular-biology technique that has swept through laboratories in the past few years, accelerating genetic research and tantalizing the public with its potential to change how genetic diseases are treated. As a result, the scientists who helped establish the technique — which rewrites DNA using a bacterial immune system called CRISPR–Cas9 — have received accolades and awards, and ample coverage in the media.

But the researchers who did much of the work — the graduate students and postdocs who carried out the experiments — are rarely mentioned. In this week's *Nature*, we take a look at a small sample of those researchers and how their experience with CRISPR has affected their careers (see page 342).

Our article is an attempt to grant these junior investigators a little of the limelight, but it also shows how difficult it is to do so: owing to space limitations, many young scientists who made important contributions to the field were left out of the article. (It is a decision that journalists face all the time, but it was made all the more painful in this case.)

The fairest approach would perhaps have been to replace the article with a simple two-page list, in fine print, of key researchers. Even then, there would be missing entries. The development of CRISPR gene editing is basic research at its finest: a handful of researchers initially noticed an oddity in bacterial genomes and decided to investigate, and this small squad swelled into a global army of scientists investigating every aspect of the system and how it can best be applied to treat diseases and engineer transgenic plants and animals. It is impossible to adequately assign credit in any one article or documentary — or on one awards podium. And that means postdoctoral researchers and graduate students are largely left unrecognized.

The focus on senior figures is rational. They are more likely to have spent many years pioneering a field, and principal investigators set the tone and direction of their laboratories.

There are also benefits to staying out of the public eye, particularly for young investigators. The barrage of interview and speaking requests takes time away from the focus needed to launch a laboratory. And becoming famous for a particular advance, particularly a technological one, can pigeonhole a young investigator at a time when they would rather spread their wings and visit new fields.

But there is also a price. Aside from the ego boost, awards — particularly in the form of grants — bolster a career. Scientific fame that spreads outside one specific community has a greater chance of influencing review panels. This is particularly important for young investigators who are starting their careers in what suddenly becomes a highly competitive area. Senior investigators must ensure that they promote their best and brightest junior colleagues both inside and outside their field.

"Postdoctoral researchers and graduate students are largely left unrecognized."

The mentors featured in our article show that this can be done. They work hard to foster an atmosphere of independence and fearless exploration in their laboratories. They credit their graduate students and postdocs during talks, offer them opportunities to present at major conferences, and actively promote their careers — even long after their junior colleagues have moved on to other labs.

To achieve notoriety beyond scientific circles is a greater challenge, but still possible. Reporters often seek comment from celebrity scientists: the better known and more established, the better. In this case, reputation serves as a proxy for quality: given limited space, journalists seek to get the most credible comment that they can squeeze in. But good reporters sprinkle their articles with comments from younger investigators as well. Senior researchers can encourage this practice, and point journalists in the right direction.

Assigning scientific credit will never be entirely fair. But with consideration and support, wouldn't it be amazing if young investigators got a taste of the attention — and the career boost — they deserve? ■

Virtual taxonomy

People everywhere are catching Pokémon. Can they also catch real new species?

Millions of people have spent the past week walking around. Ostensibly, they are playing the online game *Pokémon Go* and hunting for critters in an 'augmented reality' world. But as gamers wander with their smartphones — through parks and neighbourhoods, and onto the occasional high-speed railway line — they are spotting other wildlife, too.

Scientists and conservationists have been quick to capitalize on the rare potential to reach a portion of the public usually hunched over consoles in darkened rooms, and have been encouraging Pokémon hunters to snap and share online images of the real-life creatures they find. The question has even been asked: how long

before the game prompts the discovery of a new species?

It's not out of the question: success is 90% perspiration after all, and millions of gamers peering around corners and under bushes across the world can create a very sweaty exercise indeed. By definition, each Pokémon hunter almost certainly holds a high-definition camera in their hands. And there is a precedent: earlier this year, scientists reported *Arulenus miae*, a new species of pygmy devil grasshopper, identified in the Philippines after a researcher saw an unfamiliar insect in a photo on Facebook (J. Skejo and J. H. S. Caballero *Zootaxa* **4067,** 383–393; 2016).

But *Pokémon Go* players beware. It is one thing to conquer a world of imaginary magical creatures with names like Eevee and Pidgey, and quite another to tangle with the historical complexity of the International Code of Zoological Nomenclature. So, say you do manage to snap a picture of something previously unknown to science — what then? Let *Nature* be your guide.

First, the good news — the Code (we'll call it that from now on to save on Twitter characters) is now officially with the times, and no longer reliant on the dead trees that were so popular before you were born. Despite grumbles from traditionalists, in 2012 the International Commission on Zoological Nomenclature, which hosts the Code, agreed to embrace online-only media. In doing so, it relaxed its rule that species could be officially named only in printed academic journals.

Now, the bad news — if your picture of an unusual butterfly or bird or hippopotamus does look to a friendly online biologist like a new species, then you'll probably have to go back and catch the beast. (Whisper it, but you might even have to kill it.)

If you think that sounds too difficult, then some (but not many) zoologists agree with you. What's in a name? To most biologists, it's still a fresh corpse — as two scientists discovered last year when they tried to identify and name a new species of bombyliid (bee fly) that they had caught and photographed in South Africa. Convention demands a reference sample called a holotype in exchange for a formal taxonomic listing, but — disaster! — the fly escaped before it could be killed and immortalized. Unwilling to chase it down again, the cheeky duo chanced their arm and showed the photographs alone as evidence, in the stead of their long-flown bee fly (S. A. Marshall and N. L. Evenhuis *ZooKeys* **525,** 117–127; 2015).

"Digital collectors" are fast outnumbering specimen collectors, the scientists warned, and new conservation rules are making it harder to collect and transport real species samples. The biodiversity community is going to have to move with the times, they said, and "adapt to growing numbers of new taxa recognized without benefit of dead, preserved type specimens". High-resolution photos, they added, rather unconvincingly, "can often provide enough information for a proper description".

"What's in a name? To most biologists, it's still a fresh corpse."

But rules is rules — and sometimes they are in place for a good reason. This month, zoologists from around the world came down on the idea like a tonne of pavement ants. A photo can't be prodded and turned over. It can't be dug out of storage and have its back legs gently stretched. It can't have its genitals re-examined. In other words, it can't have science done with it — not proper, verifiable, reproducible and falsifiable science. "The spirit of the International Code of Zoological Nomenclature is willfully violated by a description based only on a photograph," their report concluded (D. S. Amorim *et al. Zootaxa* **4137,** 121–128; 2016)

Still, hippos don't run that fast and can't be that hard to catch. Let's say our brave *Pokémon Go* player really does have a new species on their hands, and not just a high-resolution photo. What they want to know, of course, is can they name it after their mum? Here, the zoologists are remarkably relaxed. Unlike planets, chemical elements and human diseases, almost anything goes with wildlife. (Hence Dick Cheney, George W. Bush and Donald Rumsfeld each share their name with a slime-mould beetle.) Be prudent, though — your idol or hero may not appreciate the attention.

The ecologist Cheng-Bin Wang last month poetically named a new beetle after Chinese President Xi Jin-Ping to honour "his leadership making our motherland stronger and stronger" (C.-B. Wang *Zootaxa* **4126,** 287–294; 2016). Chinese censors responded with some augmented reality of their own, attempting to scrub all mentions of the beetle from the Internet. ■

Two wheels good

As cycling enjoys a popularity surge, science can help riders to get faster and stay safer.

As the Tour de France enters Paris this weekend, an increasing number of amateur cyclists are stretching their legs on two wheels, and stretching their Lycra as they do so. The resurgence in the popularity of cycling in many countries is a twenty-first-century success story, and one that offers some hope as the world searches for sustainable cities and transport systems.

Still, as we discuss in a News Feature on page 338, despite advances in materials and technology (and an obsession with shedding weight), the geometry of a bicycle frame this year looks, to a physicist at least, pretty much the same as last year, and as it almost always has.

Where is the innovation? The Ford Motor Company has patented an inflatable bicycle frame, although (not surprisingly) the invention tries more to tackle the problem of how a bicycle can be transported, say in the boot of a car, than how it can be ridden.

For raw speed, enthusiasts should head not to the peaks of France, but to Battle Mountain, Nevada, this September. On a 200-metre run of State Route 305 (closed to traffic), cyclists will compete to break the human-powered land-speed record. The annual event draws engineers and riders from across the globe, to roll machines that look from a distance like eggs along one of the world's straightest, flattest and smoothest roads. The current record is just under 135 kilometres per hour.

The frames of these speed machines do look different from your standard racer. For better aerodynamics, they are recumbent bicycles (prone bikes, on which the rider lies chest down, have also been built). And this is where the physics of cycling does have an important role — some teams are experimenting with rear-wheel steering, which offers a shorter, and so more efficient, chain.

Rear-wheel steering is less stable than front-wheel. Yet, as most people who have got upright on two wheels will recognize, bicycles in general are more stable than they look to non-riders and learners. Given a push, most will even stay upright without a rider. Sometimes, it takes a person trying to control a bike to make it fall over.

The majority of times that a rider and bike do fall over and cause injury, there is no one else involved. And often the problems come at the start or end of the journey, or when a rider is forced to stop en route — especially for older people. A paper this year in *Safety Science* found that 20% of injuries to older cyclists come when the riders are trying to get on or off (R. Dubbeldam *et al. Safety Sci.* http://doi.org/bmqf; 2016). This is where science can help. The study analysed the mounting and dismounting strategies of cyclists young and old, and saw that older people — perhaps because of how they were taught — tend to begin and brake with one foot hopping along the ground as the wheels turn, which is less stable than starting or stopping with both feet on the pedals. You never forget how to ride a bike. But some people need a refresher. ■