

What's in a name: wither Irish potato famine pathogen?

The common vernacular names of the organisms we study are important for communicating science to a wider audience. But what if the name we select irritates some people?

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or have Monsanto's products got a completely clean bill of health. of Sophie Kamoun, director of the Sainsbury plant science lab in Cambridge, points out that the combination of Roundup and Ranger Pro in the US case is not scientifically equivalent to glyphosate even though it is their main ingredient. "I think that we scientists should acknowledge that even if glyphosate is safe there is little data to conclude that Roundup and Ranger Pro are safe," she says.

he said, he said. Prof. Sophie Kamoun of Cambridge as related by the Financial Times.

Naming stuff is critical for communicating in a clear and comprehensible manner. We name our kids, our pets, our cities, our genes and back in the old days when we had fewer computers around my lab, we even gave the machines their own personal funny names so we could easily identify them in server networks and booking systems.

Names are important for unambiguous identification but the choice of the name can cause confusion or over-emphasize a particular feature of the named entity. For instance, given that my parents decided to spell out my first name in a rather atypical way for the Arabic Sufian or Sufyan, I'm regularly confused for a woman named Sophie. The professional wrestler turned actor Dwayne Johnson hesitated in keeping his ring name "The Rock" when he moved to a full-time career as a Hollywood star. Indeed, his nickname, which certainly reflects his impressive muscular physique, doesn't necessarily convey his many artistic talents nor his impressive activism and philanthropy given prevailing stereotypes about people with muscular bodies. Also, by now you must have heard that Facebook was rebranded as meta, a term supposed to evoke a certain digital world but which may very well become a synonym of fake news or fake experience given how Facebook regularly distorts our vision of reality. Indeed a name can contribute to twisting the facts or reinforcing biases and stereotypes. It's rarely a neutral proposition.



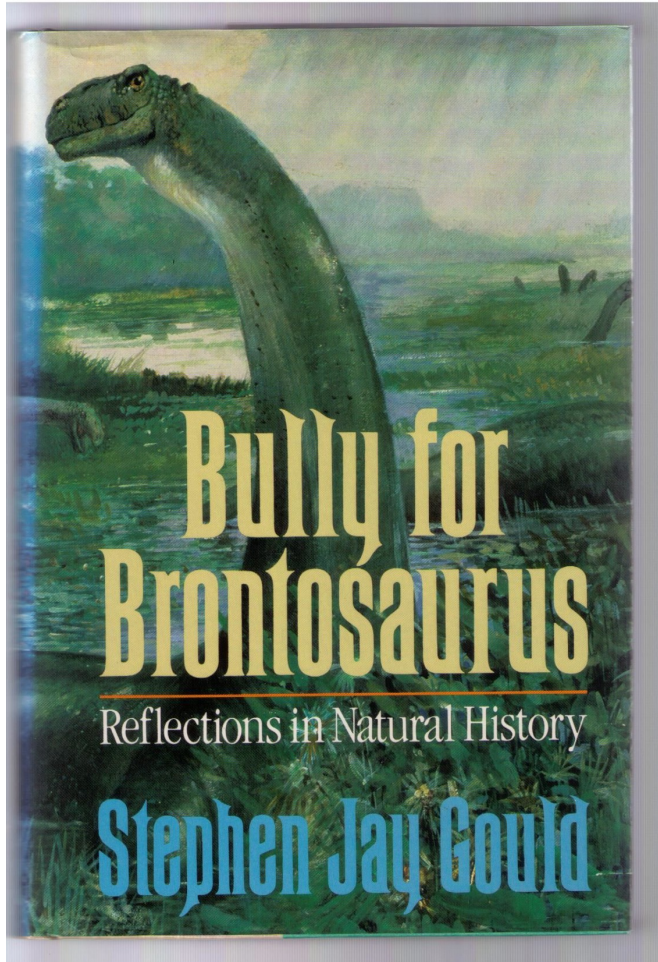
The splendid tiger beetle *Cicindela splendida*.

Biologists assign to organisms scientific latin names but also like to give them common names, also known as vernacular names. In their wonderful “A Field Guide to the Tiger Beetles of the United States and Canada”—perhaps my favorite natural history guide—the authors David Pearson, C. Barry Knisley and Charles J. Kazilek went through the trouble of giving each of the 107 beetles they describe a common

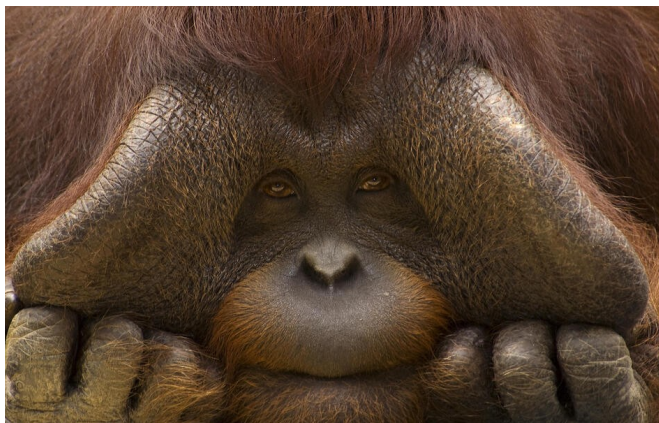
name. *Cicindela splendida* becomes predictably the splendid tiger beetle, reflecting the awe with which the original scientific name was given to these colorful insects. Still, common names for tiger beetles make sense given that one aim of the field guide was to encourage amateur naturalists to go “beetle watching” in a way analogous to bird watching. Common names help make science and the natural world more accessible to the general public. It makes sense to use them because scientific names are neither easily memorized nor understandable unless you are a Latinist or a taxonomist.

Scientific names of organisms follow the cumbersome Linnean binomial system of genus and species name, written in italics with the first letter of the genus capitalized. They follow arcane and complicated rules that require some knowledge of latin and are set in the encyclopedic International Codes of Nomenclature. Years ago, Stephen Jay Gould, in his classic essay “Bully for Brontosaurus”, wrote about how confusing scientific names can be, especially when taxonomists keep changing them. Gould came in favor of the US Post Office, which were criticized by dinosaur taxonomists for emitting a dinosaur stamp on *Brontosaurus*. The reason for the uproar was that according to nomenclature rules, the technically correct name for the popular Brontosaurus should be *Apatosaurus*. That’s despite the fact that every kid knows what a Brontosaurus is, and one of the main reasons we name stuff is for immediate recognition.

Also, scientific latin names are rarely self-explanatory for a member of the general public. You, dear readers, are *Homo sapiens*, a species related to—not descended from as you might read elsewhere—its sister species



Gould's Bully for Brontosaurus.



The Bornean orangutan Pongo pygmaeus.

Pan troglodytes (common name: chimpanzee). You can already see what the issue is. *Pan troglodytes* doesn't conjure up much in the mind of most people. I suppose you could easily guess that *Gorilla gorilla* is... yes, the gorilla!, but only a few among you would know that *Pongo pygmaeus* is the Bornean orangutan. Latin may have been commonly studied back in the 18th century of Carl Linnaeus, but in today's world, scientific or otherwise, English dominates so it can be a struggle for your average person to make any sense of these scientific names.

And it's not just amateur naturalists who struggle. For most of my career, I have worked on the plant pathogen *Phytophthora infestans*. Now, try to remember how to spell that. For many years, I had to rely on the mnemonic of the three Hs, the number of times the letter H is in *Phytophthora*. Lucky me. Others apparently never learned this trick. Years ago, I caught a misspelling of *Phytophthora* in the title of a major grant proposal that my collaborator was about to submit to the National Science Foundation. "Last minute save by Sophie," was his reply. My friend and colleague Sebastian Schornack—Twitter handle @dromius, another gorgeous beetle—went through the trouble of

counting how often *Phytophthora* got misspelled in the literature. While the correct *Phytophthora* got 1.8 million hits, *Phytophtora* had a whopping 130,000, *Phytopthora* 59,300, *Pytophthora* 6,640, even the rather weirdly sanitized *Pytoptora* got a 115 hits.

Phytophthora infestans, the plant destroyer.
 JM potato field, not treated with fungicides. Picture 1:
 10 weeks ago, Picture 2: two days ago.



Phytophthora infestans, the most heavily misspelled plant pathogen?



Wheat blast, here in a field in Zambia, is caused by a pathogen called
 Magnaporthe oryzae.

These days, my lab studies the blast fungus *Magnaporthe oryzae*. Two problems. The first is that the community has struggled to settle on a genus name. Whereas *Magnaporthe* is now the formal name, many still prefer the more traditional *Pyricularia*, which some scientists spelled as *Piricularia* resulting in the convention for naming blast resistance genes Pi-xx as in the Pik gene and Pikobodies tech we just published about. Second problem, *oryzae* stands for rice or rice-infecting fungus. Indeed, plant pathologists have this terrible habit of giving scientific names after a common host species, often an important crop plant. The thing is, *Magnaporthe oryzae* infects over 50 grass species. Recently, this pathogen became famous for causing a pandemic on wheat resulting in silly statements like *Magnaporthe oryzae* is a pathogen of **wheat**. The familiar taxonomic wars ensued, and I had the honor to contribute to the epic article titled “*Pyricularia graminis-tritici* is not the

correct species name for the wheat blast fungus.” Funny thing is everyone agrees on the common name “wheat blast fungus.” Popular reports on wheat blast that use the common name are clear and unambiguous unlike some of the scientific literature. So at the end of the day these naming debates come across more like an ivory tower food fight than anything worthy of your time or mine.

LETTERS

Genome sequence and analysis of the Irish potato famine pathogen *Phytophthora infestans*

What's in a name? Is the "Irish potato famine pathogen" an appropriate common name for *Phytophthora infestans*?

Now back to *Phytophthora infestans* and the incident that triggered this post. This pathogen causes the destructive late blight disease of potato and, therefore, can be commonly referred to as the potato late blight pathogen (note that it also causes disease on tomato but somehow plant pathologists arbitrarily decided that tomato will just be second fiddle to the mighty spud). However, what *Phytophthora infestans* is particularly infamous for is its role in the Irish potato famine. When it reached Ireland in the 1840s, it triggered a series of events that led to the great famine and the human tragedy of one million people dead and another million forced to leave the island. Therefore, we and others often refer to this microbe as the Irish potato famine pathogen. And that's where the trouble starts. Some of our colleagues have taken offense at this name. Most recently, Rob Fagan, a microbiologist from Sheffield University, tweeted that we should drop the Irish famine reference. He felt that this vernacular name for the pathogen “glosses over the real causes” of the great famine and “winds up a lot of people, including myself.” He wasn't the first to raise the point. A few months back, James McInerney, Chair of the Evolutionary Biology at the University of Nottingham, also tweeted that the tragedy wasn't due to an oomycete—the group of organisms that *Phytophthora* belongs to—but to “the London government.” He wrote “Ireland always produced enough food to feed its people.”

I'm sympathetic to these and similar comments. It is evident from the history books that socioeconomic factors played a huge role in causing the tragedy. There are incredibly heartbreaking reports of grain and food being shipped by greedy merchants out of Irish ports just as people were starving. My colleagues and I became aware of this complex historical context early during our work on the pathogen and we gave much thought to how best to report on the link between the microbe and the famine. After long discussions, we settled on writing that “*Phytophthora infestans* **triggered** the Irish potato famine.” I regularly cross off “caused



Although the potato crop failed, the country was still producing and exporting more than enough grain crops to feed the population. But that was a 'money crop' and not a 'food crop' and could not be interfered with."

the famine" when I review and edit reports and papers. We hope that this minor textual tweak at least conveys the fact that we are in no way trying to gloss over the political factors that caused the famine.

This said, after further thoughts and despite my initial reaction to Rob's tweet, I'm not ready to drop the vernacular "Irish potato famine pathogen." This is why.

First, as far as I understand the historical context, it is clear that the potato blight was an important contributing factor besides the grim political aspects. The disease also spread throughout Europe in the 1840s and is estimated to have caused 100,000 deaths outside Ireland.

Clearly, potato blight was responsible, at least in part, for a lot of death and misery.



The Paris massacre of 1961.

Second, remembrance of tragic historical events is critical for healing and moving forward. By referring to the Irish potato famine, we reinforce in the readers mind the importance of this historical tragedy rather than dismiss the events as insignificant or gloss over the complex historical context. I grew up in Tunisia, a country in the Maghreb region that only emerged from colonialism about 50 years ago. I'm acutely aware of

how tragic events can be buried and downplayed by ex-colonial powers. Sometimes, people can't even organize a peaceful vigil to commemorate certain events just like what happened a couple of weeks ago in Paris where a group of Algerians were prevented by the police to access a

bridge. They were there to commemorate the tragic events of 17 October 1961 during which a peaceful march ended up with the French police killing over 100 protesters, many of whom got dumped in the Seine river. The worst that can happen for any tragedy of this sort is that it will be forgotten, that the flame of remembrance blows out.



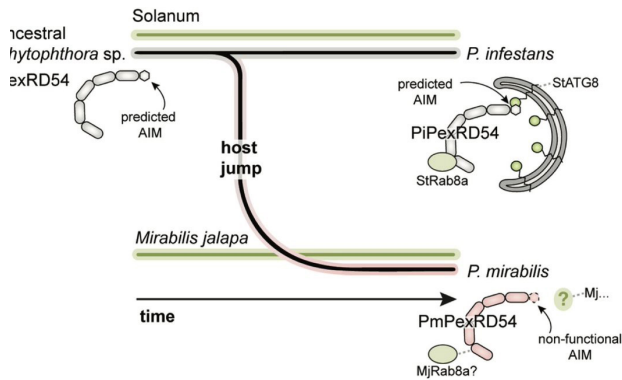
Anton de Bary and the birth of plant pathology as a science.

Third, the 19th century debate about the cause of the potato murrain, as it was called, resulted in the birth of plant pathology as a science. Our knowledge of this pathogen and our appreciation of the terrible disease it causes trace their roots directly to the spread of that potato disease in Europe in the 19th century and its association with the great famine. And as tragic as those events were, they also gave birth to a new science that has ever since helped improve the lives of millions of people around the

globe.

Fourth, we must keep in mind the issue of plant blindness, the inability of many people, notably biomedical scientists, to appreciate the importance of plants in the biosphere and in human affairs. The moniker “Irish potato famine pathogen” serves as a reminder that plant pathogens are indeed important, a point that we, plant pathologists, often struggle to get across to our colleagues in other fields of biology. The tragic events of the 19th century can help us better communicate how plant disease can impact mankind. This is precisely why with my colleagues Kentaro Yoshida, Detlef Weigel, and Hernan Burbano we sequenced the genome of the pathogen from blighted potato leaves collected in Ireland in the mid-19th century. We want to understand the past to better prepare for the future.

Finally, I am ambiguous about calling plant pathogens by their host names and thus remain somewhat uncomfortable with the alternative common name of “potato late blight pathogen”. As I wrote above, *Phytophthora infestans* infects tomato too, so potato blight is misleading to start with. Also, the paper that irked Rob is about the host range of



Zess et al. study on regressive evolution of a virulence gene in the Irish potato famine pathogen (aka *Phytophthora infestans*) lineage.

Phytophthora infestans and its sister pathogen species, which infect the host plant *Mirabilis jalapa* (common name four o'clock flower). Replacing Irish potato famine lineage in the title of this paper with potato blight lineage would be confusing. In fact, the potato itself is only a relatively recent host plant for *Phytophthora infestans* given that this pathogen originates from wild species of *Solanum* that grow in central Mexico and that these native host plants are

not the progenitors of the cultivated potato.

To sum up, and with all due respect to anyone who has ever felt offended, our usage of Irish potato famine pathogen is perhaps justified. We want to communicate our science to a broad audience, not just to expert plant pathologists. *Phytophthora infestans* wouldn't convey much meaning to non-experts, in the same way that *Pongo pygmaeus* wouldn't evoke an orang utan in most people's mind. By sticking with Irish potato famine pathogen, we are communicating our science to a wider audience of scientists and non-scientists alike. We hope that non-experts readers would connect our new papers to previous work they may have read or heard about. Vernacular names of biological organisms—although unofficial in the case of plant pathogens—tend to highlight their most salient features. It's hard to argue otherwise in the case of the Irish potato famine pathogen.

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