**Editorial**

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# Is it time to abandon the Nobel Prize?

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This October, and every other October, a few hundred scientists will lose sleep, hoping to get a telephone call from the Swedish Academy, announcing they have reached what is considered the pinnacle of scientific achievement: they have won the Nobel Prize. Does this coveted prize benefit society and encourage innovation or does it create tension in the scientific community by only crediting at most three recipients? In this commentary, we make the case that it is time to abandon the Nobel Prize in favor of alternative recognitions which encompass the collaborative nature of modern science.

Is the Nobel Prize a major influential factor in scientific progress? We believe it is not. Nobel laureates are recognized for work done 10, 20 or even 30 years ago, when the investigator(s) did not know their research would have a Nobel Prize worthy impact. Consequently, the work would have been done anyway.

Winning a Nobel Prize is not the same as receiving any other award, and the sole beneficiary is the winner. Nobel laureates become instant celebrities; universally perceived as extremely smart and extraordinarily creative. They become "immortal" (whatever that means), are treated with the utmost respect and offered positions on prestigious boards in industry and government. They also secure a full-page obituary in both *Nature* and *Science* magazines.

While many Nobel laureates use their prestige to influence science policy and other high-level activities, it is questionable how big this impact really is. On numerous occasions, Nobel laureates have sailed in the wrong direction, by undertaking work in fields outside their Nobel-winning specialty they know little about. This hurts scientific progress as their fame makes their (incorrect) conclusions harder to discredit and encourages others to investigate dead end fields. Linus Pauling, winner of the Nobel Prize for Chemistry in 1954, began proclaiming the cancer- curing benefits of mega doses of vitamin C near the end of his career. Not only did this erroneous conclusion not do patients any good, years were wasted discrediting this theory. As we commented elsewhere, the Nobel Prize inflates laureates' perception of their scientific prowess, leading to the damaging belief that their engagement in any project will lead to success, regardless of its relation to their prize winning contribution. Some Nobel laureates go on to develop "Hubris syndrome", an affliction characterized by megalomania, narcissism and a craving for power which, as described by Owens and Davidson, could lead to dangerous behaviors [1]. We recently described a syndrome coined "Nobelitis" (affecting exclusively Nobel laureates!) which has many similarities to Hubris [2].

Is it reasonable to conclude that winning a Nobel is an individual's single most important personal achievement? And does the process of winning the prize commensurates with our values as modern scientists? The Nobel rewards discoveries with a major impact on society, such as a new therapy, diagnostic procedure, methodology, etc. However, the reality is all these discoveries were going to be made anyway, probably with a little (1–10 year) delay. Scientists are obsessed by being the first to discover something, but in most cases their discoveries, or improved versions, are destined to also be made by others. For example, the new DNA sequencing techniques discovered by Sanger and Gilbert in the 1970s led to their 1980 Nobel Prize, but Gilbert's method was never used widely and Sanger's technique has already been replaced by new technologies which are thousands of times faster and cheaper. Moreover, discoveries are frequently made simultaneously in several laboratories. One wonders how important it is for a new technology to be discovered 1, 2 or 10 years earlier. Humans lived without smart phones for centuries. Could they have afforded living without cellphones for a few more years?

We are not disputing that making a discovery first has some value but overzealous efforts may have deleterious side effects. For example, this obsession can lead to unethical behaviors. Watson and Crick, winners of the 1962 Nobel Prize after discovering the double helix structure of DNA are thought to have stolen fundamental data from rival scientist Rosalind Franklin. There are numerous (known and unknown) examples, where scientists used unethical practices to publish something first, analogous to how doped athletes cheat in athletic competitions.

Some discoveries, especially in the area of molecular biology, are so powerful that those who find them believe that they can play God. For example, the revolutionary CRISPR technology led two co-investigators

to write a book with the rather pompous title "A crack in creation" [3]. However, we should be aware that most of these discoveries represent "reverse engineering" of ingenious systems developed in bacteria, viruses and other organisms. The scientists who discovered them try to understand how these systems work and tweak their properties for new applications. If Nobel Prizes were to be awarded for inventions, then, the embryo developing in the womb would be a stellar contender for every physiology or medicine Nobel Prize that was ever given, or will be given.

A major problem with discoveries leading to Nobel Prizes is we often do not know precisely who made the discovery. In most cases it is not clear as the discoveries are the product of collective effort. In recent years, we have witnessed numerous disputes over who discovered first and who were the major players among principal investigators, postdoctoral fellows, graduate students and skilled technicians. While the Nobel committee recognizes one, two or a maximum of three individuals, discoveries, especially these days of big data and international collaboration, require collective, multidisciplinary effort. There are almost as many disputed cases as the Nobel Prizes themselves! (https://en.wikipedia.org/wiki/Nobel_Prize_controversies). Despite the way science is performed today has changed dramatically since Alfred Nobel established the awards in 1895, the maximum number of laureates is still three. We have not seen a concerted effort to pressure the Nobel committee to change the rules. The simplest way to achieve this is to let the committee know that if they do not change the rules, future laureates will not accept the awards. However, this is unlikely as most new laureates rush to give press conferences and reap the rewards of their celebrity as soon as the awards are announced, not caring about those who complain.

This commentary was inspired by the current discussion about the CRISPR technology which is (justifiably) now up for a Nobel Prize. One highly influential scientist published a perspective in 2016 describing "the heroes of CRISPR" [4]. This was taken by many as a preemptive strike, aiming to influence the Nobel committee as one of the co-discoverers comes from his institution. In what appeared to be a response, another co-discoverer, wrote a book with her own version of the events (https://en.wikipedia.org/wiki/Nobel_Prize_controversies). Would the other four or five "heroes" or designates, write their own versions too? This Nobel-prompted squabbling is not in line with scientific ethos, which is supposed to promote collegiality and collaboration. The scientists involved should show humility and generosity instead.

So, who is going to win the Nobel Prize for the discovery of the CRISPR technology or for other breakthroughs? It does not really matter. Those who co-discovered the system should be proud of being members of the team. We suggest to the co-discoverers, and all other Nobel-worthy discoverers, should not argue so much on who did what but humbly acknowledge the contributions of others who have helped science progress.

We conclude that it is likely better to abandon this highly prestigious award in favor of an alternative reward system which promotes collegiality, collaboration and humbleness.

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