

# The Nobel Prize

## A Very Brief Overview

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The Nobel Prize is the only scientific prize that has achieved worldwide recognition among the general public. Each year announcement of the prizes is covered by the national news media, countries and universities brag about how many Nobel Prize winners they have, and historians and sociologists of science have now made the prizes the subject of detailed academic study (1-8). All of this is rather curious since scientific societies have been awarding prizes for outstanding scientific achievement since at least the late 18th century, yet none of these older prizes has ever succeeded in capturing the public's attention like the Nobel prize. Perhaps it is the royal pomp that accompanies the awards ceremony, which involves the King and Queen of Sweden, or the magnitude of the cash prize, which is now well over a million dollars, that accounts for its publicity success.

As I am sure most members of the audience know, the Nobel Prizes were established by the Swedish explosives tycoon, Alfred Nobel (figure 1), in his will, which, upon his death in 1896, made provision for the awarding of annual prizes for that person or persons who had "conferred the greatest benefit on mankind over the previous year" in the fields of literature, medicine, physics, chemistry, and peace (9). In 1968 Sweden's Central Bank funded yet a 6th Nobel Prize in the field of economics. Strictly speaking this is not a true Nobel Prize and to differentiate it from the original prizes, it carries the qualifying title of the "Nobel Memorial Prize." Nevertheless, like the original prizes in physics and chemistry, it is administered by the Royal Swedish Academy of Sciences, is announced at the same time as the other awards, and the awardees attend the same awards ceremony. However, the Nobel Foundation has decided, since accepting this addition, that it will not allow the establishment of any further new prizes.

### Administration and Presentation of the Prizes

Though the finances of the prize are administered by the Nobel Foundation, which was organized in 1900, the actual selection of awardees is governed by several different organizations. These include, as already stated,



Figure 1. Alfred Nobel  
(1833 -1896)

the Royal Swedish Academy of Sciences in the case of the prizes in physics, chemistry, and economics, the Karolinska Institute in the case of the prize in medicine, the Swedish Academy in the case of the prize in literature, and the Norwegian Nobel Committee in the case of the peace prize.

The first prizes were awarded in 1901, or five years after Nobel's death. They are presented at an annual awards ceremony held in Stockholm on 10 December, the anniversary of Nobel's death, followed by a banquet held in the Blue Hall at Stockholm City Hall (10). The sole exception is the Nobel Peace Prize, which is awarded on the same date, but in a separate ceremony held in Oslo. The prize itself consists of a gold medal (figure 2), a diploma (figure 3), and a cash award, which, as already mentioned, now exceeds over a million dollars. In return, each recipient is expected to give an acceptance lecture on the work or discovery



Figure 2. The gold medal given to winners of a Nobel Prize.

for which the prize was given (11).

### Nominations and Restrictions

To the best of my knowledge, anybody can nominate anybody for a Nobel Prize, but to streamline the process and eliminate nut cases, the various organizations responsible for awarding the prize now send out around 3000 nomination forms per year to selected individuals considered leaders in their respective fields. Each of these organizations has its own Nobel committee and if one or more of the resulting nominees has accumulated sufficient nominations to merit serious attention, a member of this committee is assigned the task of preparing a summary evaluation of the candidate's accomplishments and a recommendation for the committee to vote on. Nominations are good for one year but may be resubmitted in subsequent years.

The original awards had only three restrictions: 1) the award should be given for work done in the previ-

ous year, 2) the award cannot be given posthumously, 3) the award cannot be shared by more than three persons. The first of these restrictions accounts for why Mendeleev was never given a Nobel Prize for his discovery of the periodic law, since this work was done 32 years before the awarding of the first prize in chemistry. However, this restriction had to eventually be discarded as the Committees soon learned that a year was far too short a period to accurately assess the lasting value of a discovery or invention. Indeed, this criterion led to one of the most embarrassing incidents in the history of the award when the prize in medicine was given to Joseph Fibiger in 1926 for his supposed discovery of a parasite that caused cancer, only to find subsequently that none of Fibiger's work could be verified.

### The Chemistry Award

Moving on from these general considerations to the more specific case of the Nobel Prize in Chemistry: as already stated, this was first awarded in 1901 and was given to the Dutch chemist, Jacobus Henricus van't Hoff



Figure 4. Jacobus Henricus van't Hoff (1852-1911)

Hoff (figure 4), for his "discovery of the laws of chemical dynamics and osmotic pressure in solutions."

As of 2015 172 individuals have received the award in chemistry (12). Since 1929 30 of the awards have been shared by two or three individuals, with the vast majority of the shared awards occurring in the last two decades. Only four of the awards have gone to women, possibly reflecting both their more recent en-



Figure 2. An example of the diploma given to winners of a Nobel Prize. This particular example belonged to Fritz Haber who won the prize in chemistry for 1918.

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Table 1. Number of individuals winning the Nobel Prize in Chemistry by county or region.

Category	Number	Percent
United States	62	36%
Continental Europe	60	35%
Great Britain	25	14.5%
Other	25	14.5%
Total	172	100%

trance into the field of chemistry and the fact that the vast majority of women in science tend to gravitate toward the biological sciences for which there is no separate Nobel prize. Only one recipient (Frederick Sanger) has received a second Nobel prize in chemistry, whereas two others (Marie Curie and Linus Pauling) have received a second Nobel Prize in another field. For a variety of reasons, there have been eight years during which no Nobel Prize in Chemistry was awarded.

There have been criticisms of the Nobel Prize in Literature for being too Eurocentric and of the Peace Prize for being too overtly political (recall the award to President Obama for what it was hoped he would do for world peace rather than for what he had already done). The science prizes, on the other hand, have been relatively free of such criticisms. Distribution of the number of individuals receiving the award in chemistry by country (Table 1) shows that, to date, the Americans and continental Europeans are virtually tied at 62 and 60 individuals respectively, followed by a tie of 25 individuals each between Great Britain and those countries lumped into the category of “other,” which include Canada, Japan, Israel, Mexico, Argentina, Egypt, etc. But far more revealing is how this distribution has changed with time. Prior to World War II, the prize was totally dominated by Europeans. The rise to prominence of the Americans is largely a postwar phenomenon, and the rise of the various countries in the “other”

Table 2. Number of individuals winning a Nobel Prize in Chemistry in a given subdiscipline of chemistry.

Category	Number	Percent
Biochemistry	65	37.8%
Physical	42	24.4%
Pure Organic	30	17.4%
Inorganic	23	13.4%
Analytical	12	7.0%
Total	172	100%

category is largely a phenomenon of the past four decades.

It is also of interest to look at the distribution of the award over the basic subdivisions of chemistry (Table 2). This shows that 65 of the individuals have received the prize in chemistry for work related in some way to biochemistry, 42 for work considered physical chemistry, 30 for work considered pure organic chemistry, 23 for work considered inorganic chemistry, and 12 for work considered part of analytical chemistry. Unambiguously categorizing each prize is sometimes difficult and the above counts reflect

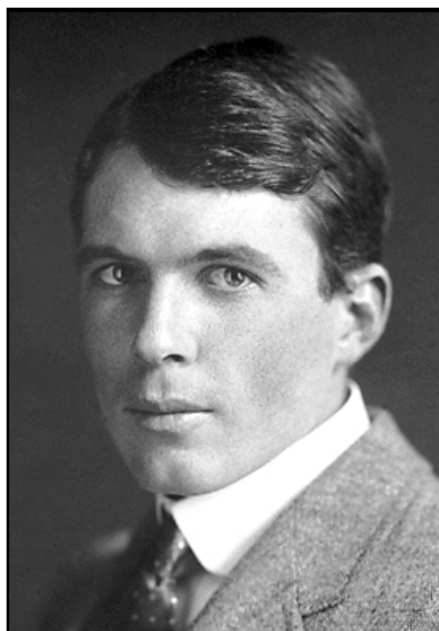


Figure 5. William Lawrence Bragg (1890-1971)

value judgments on the part of the author of this talk. Thus, for example, many of the early biochemical examples were studies of the structure and chemistry of biologically significant molecules, such as chlorophyll, plant pigments and steroids, done by individuals who are usually classified as traditional organic chemists. Likewise, some work in the field of radioactivity falls into the inorganic category, whereas other work falls into the field of physical chemistry.

### A Few Myths

One consequence of the publicity surrounding the prize is that the general public has come to believe that its recipients are “one of a kind” geniuses in their respective fields, who stand head and shoulders above their colleagues when it comes to scientific acumen. In fact,





Figure 6. Richard Willstätter  
(1872-1942)

most winners have had relatively undistinguished – or, perhaps one should say, relatively uneventful careers – subsequent to receiving the prize. Our favorite example is William Lawrence Bragg (figure 5), who, at age 25, shared the 1915 Prize in Physics with his father, and whose subsequent career was, as a result, rather anticlimactic, to say the least (13).

In yet other cases, winners have gone on to champion work that was subsequently proven wrong or even worthless. Thus Richard Willstätter (figure 6), who received the 1915 prize in chemistry for his work on plant pigments and chlorophyll, subsequently did work on enzymes which seemed to prove that they were not proteins. Likewise, Charles Barkla (figure 7), who won the 1917 prize in physics for his discovery of the characteristic X-ray radiation associated with each element, wasted his later career trying to prove the existence of a new type of radiation called “J-radiation,” though his results were never accepted by the physics community at large (14).

Another myth believed by the public is that winners of the Nobel Prizes in science are so famous that they are known worldwide and especially to their fellow scientists. Yet looking to professional chemists, rather than the general public, I would hazard the guess that the vast majority would be unable to identify most past winners of the Nobel prize in chemistry if their names are not also associated with some equation, law,

or reaction taught as part of the standard chemistry curriculum. Indeed, I suspect that most chemists do not even recognize the names of current winners if they happen to work in a field of chemistry different from their own. Modern chemistry is simply too diverse and its practitioners too specialized. Though an individual chemist may be on top of the literature in their chosen specialty and admire the work of someone in that specialty, extending the same level of awareness to other specialties is simply beyond most of us. And this brings us to the topic of today’s seminar in which the various speakers will argue the case for a Nobel prize for various chemists of the past whose work they admire but who never received a Nobel Prize during their lifetime.

### References and Notes

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Figure 7. Charles Glover Barkla  
(1877-1944)

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13. See the comments on Bragg in J. D. Watson, *The Double Helix: A Personal Account of the Discovery of the Structure of DNA*, Atheneum: New York, NY, 1968.

14. For more on Barkla, see the chapter by Virginia Trimble in this volume.

### Publication History

First published in T. Strom, V. Mainz, Eds., *The Posthumous Nobel Prize in Chemistry: Correcting the Errors and Oversights of the Nobel Prize Committee*, ACS Books: Washington, DC, 2017, pp.1-8. The published version was seriously compromised by fights over images and a silly ACS policy on references that was at odds with the requirements of good historical writing.