AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE
150 YEARS • 1848-1998

NOBEL: ALWAYS THE WINNERS, NEVER THE LOSERS

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For most of the nearly 100 years of their existence, the Nobel prizes have been regarded as the supreme reward for scientific achievement. Past and present Nobel laureates have received an extraordinary degree of attention as a result of the iconic status of these prizes. This is not likely to change in the near future. On the contrary, with the coming centenary of the first award ceremony in 2001—to be celebrated, among other things, by the opening of both virtual and real Nobel museums—the prizes and laureates will probably receive even more attention. One measure of current interest is the more than 18 million visits to the Nobel website (www.nobel.se) since it opened in 1995.

Nobel intended his prizes to encourage promising young scientists, so it would no doubt be a surprise for him to see them become the standards for the highest achievements of modern science. Yet, in 1906, only 5 years after the first awards, their prestige was already such that *Cosmopolitan* magazine wrote: "The history of modern science might be written without going outside the names of the Nobel prizes for beneficent discoveries in physics, chemistry and medicine." This notion has persisted to the present. Unfortunately it ignores the fact that the award fields within physics, chemistry, and physiology or medicine cover only a small part of modern science. For instance, it leaves out fields coupling science and technology—transportation, communications, and war-making—that have been responsible for the transformation of both science and its impact on society. Other fields of modern science that have been neglected, although they could have been included under physics broadly defined, are astronomy, astrophysics, and much of geophysics (for example, geology, meteorology, and oceanography). Similarly, psychiatry has been neglected when it comes to the prize in physiology or medicine. In this sense whole areas of investigation can be held to have been losers in the Nobel prize competitions. Among the individuals who were duly nominated during the first 50 years of the prizes but ended up as losers we find inventors such as Thomas Edison and the brothers Wright, astrophysicists such as G. E. Hale and Arthur Eddington, Vilhelm Bjerknes, the "father" of modern meteorology, and, of course, Sigmund Freud.

The way that attention has always focused on the prize winners—never on the candidates—is, to my mind, one reason for the extraordinary success of the prizes. Another is the wholesale acceptance of the prize awarders' justification for their choice. True, the prize awarders have not missed the major discoveries (although they have pretty consistently excluded junior collaborators when rewarding the discoverers), but such discoveries occur only a few times in a century. For the most part they have been engaged in the rather humdrum business of choosing among works produced by what the late Thomas Kuhn called "normal science." In view of this, it is surprising that the creation of a Nobel laureate has come to have the trappings of an ancient rite. He (rarely she) springs from anonymity into stardom through a decision seemingly handed down from above, untouched by human hands. With the limelight turned on the prize winners, it is easily forgotten that they were chosen from a pool of hundreds of candidates put forth by thousands of specially invited nominators.

From the beginning secrecy has been at the heart of this system. The statutes of the Nobel Foundation adopted in 1901 stipulated that no part of the prize deliberations could be made public, nor could a prize decision be appealed. This rule was originally instituted to protect the prestige of the prizes from the adverse publicity that might result if disgruntled nonwinners were allowed access to the records to plead their cases. But as the fame of the prizes grew, secrecy also proved useful in protecting those charged with the difficult task of selecting prize winners. And, of course, with only the names of the winners, not the losers, being made public, it was natural that attention should focus on the laureates.

In view of this long tradition of secrecy, it was truly amazing that in 1974 the statutes of the Nobel Foundation were changed to authorize the four institutions that award Nobel prizes to permit access to archival documents at least 50 years old for purposes of historical research. I had the privilege of being the first historian of science to carry out extensive research in the Nobel archives at the Royal Swedish Academy of Sciences and to produce a book charting the course of the Nobel institution during its early years. Since then I have seen historical work based on the archives at the Academy and the Karolinska Institute grow from a solo operation to a minor cottage industry.

What have we learned about the history of the prizes from this work? The documents in the archives tell us a little bit more than what was already known or surmised about the decisions to award prizes for the great discoveries of our century. We now know that had it not been for the intervention of her husband Pierre and her nomination (the only one she received that year) by a certain doctor Bouchard, Marie Curie would probably not

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*E. Crawford, J. L. Heilbron, R. Ullrich, *The Nobel Population 1901-1937: A Census of the Nominators and Nominees for the Prizes in Physics and Chemistry* (Office for the History of Science and Technology, Univ. of California, Berkeley; Office for History of Science, Uppsala Univ., Uppsala, 1987).

have shared in the 1903 physics prize; that Einstein's award of the physics prize of 1921 for his discovery of the law of the photoelectric effect rather than for his theory of special relativity was due to the incapacity of members of the Nobel Committee for Physics to grapple with theoretical physics and their reluctance to reward "speculations" such as relativity theory; that letting John J. R. Macleod share the 1923 prize in physiology or medicine with Frederick Banting for the discovery of insulin, long considered one of the worst errors of commission in the history of the prizes because Macleod was on vacation when the discovery was made, was based on the testimony of a prominent nominator who visited the scene of the discovery and interviewed its authors; and that Lise Meitner's exclusion from the 1944 chemistry prize awarded Otto Hahn for the discovery of nuclear fission resulted from a complex set of circumstances in which the chemistry committee's difficulty of evaluating an interdisciplinary discovery, Sweden's scientific and political isolation during the Second World War, and a lack of sensitivity to the ravages of racial persecution all figured prominently.

But these and other "revelations" still concern mainly the prize winners and prize decisions, not the candidates. Learning the names of the candidates and of those who nominated them as well as the specific scientific work for which they were put forth provides much information not only about what was considered scientific achievement in the first half of the 20th century, but also about who were considered the important scientists and the relations between them. In 1987 the Academy of Sciences authorized the publication of the first census of nominators and nominees for the prizes in physics and chemistry (1901 to 1937) in the book *The Nobel Population*, edited by myself, John Heilbron and Rebecca Ullrich.* The census has been updated regularly so that it now covers 1901 to1945. It enables us to appreciate the large number of losers, for it shows that the 92 prize winners during this period were chosen from some 500 candidates put forth by more than 1000 nominators. The fact that there were 4000 nominations in all indicates that on the average a candidate, whether winning or losing, was nominated eight times. However, this figure masks the much higher number of nominations accumulated by perennial losers such as the physicists Arnold Sommerfeld (74), Vilhelm Bjerknes (54) and Friedrich Paschen (45), and the chemist Gilbert Newton Lewis (42).

With so many candidates and so few prize winners, what criteria did the committees use to recommend one candidate or a set of candidates rather than another? Research in the Nobel archives has shown that committee members' own ideas about the kind of scientific work that should be honored with awards played a major role. In this they were guided both by their own research interests and by prior prize decisions. In the physical sciences, they preferred basic research over applied research or engineering, experiment over theory, and the microcosmos of atomic and nuclear physics and chemistry over the macrocosmos of astronomy or geophysics. In medicine, the laboratory prevailed over the clinic. This was possible because in his will Nobel stated only, and in the vaguest of terms, that rewards should go for work—referred to interchangeably as "discovery," "invention," or "improvement"—that would be of "benefit to mankind." Of the three, discovery has predominated in the award decisions and citations.

Discovery is the facet of the prizes that points most directly to their 19th-century origins when the experimentalist method triumphed because it revealed such new and unsuspected phenomena as x-rays and radioactivity. From the beginning this squared with the empiricist and positivist philosophy of both the nominators and prize awarders, and the priority they assigned to the experimental method. It also forged the public image of Nobel prize winners as lone scientists wrenching secrets from Nature against terrible odds, with the Curies as the paragons of such labors. As science has evolved, so has the prize awarders' definitions of what constitutes work meriting the prize. The biggest change, no doubt, occurred in the 1920s, when the prize awarders admitted, following the battles over the awards to Planck, Einstein, and Bohr, that theoreticians merited prizes as much as experimentalists did. However, this change came too late for the theoreticians who had been nominated for the physics and chemistry prizes early in the century. Thus, Ludwig Boltzmann, Wolcott Gibbs, Oliver Heaviside, and Henri Poincaré can all be counted as losers in the Nobel sweepstakes. However, irrespective of the changes in the criteria of prize selection—and one could give many more examples—the idea of the lone discoverer lingers on as myth.

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Myths are necessary for the cohesion of institutions and groups. The myth of the Nobel laureate as the lone discoverer may appear to be one that preserves some of the innocence of science in an age when the cost of research projects rewarded by the prize runs into millions, if not billions, of dollars, and the research teams conducting them number hundreds of members. But the myth is not that innocent when the Nobel prize masks this reality by vastly enlarging the influence of a single scientist, when it ignores elements as crucial to the current scientific enterprise as the raising and allocation of funds and the group-oriented nature of setting research priorities. The winner-take-all mentality should be questioned because it masks the realities of doing science in the late 20th century.

What are the remedies? The statutory rule that limits the number of persons sharing the prize to three at the most is not likely to be changed. Extending the precedence of awarding prizes to organizations—as is done by the awarders of the peace prize—to the science prizes might help to "depersonalize" them. Even more important, perhaps, is to bear in mind that prize winners are chosen from a large pool of worthy candidates, and that the choices are conditioned not only by the predilections of the Swedish prize awarders discussed above, but also by their ties to international networks that so far have centered almost exclusively on Europe and North America, allowing for few prize winners residing in Russia, India, and Japan, and none in China.

The opening of the Nobel and other archives for research is of great value to historians of science and others, for it allows insight into how the choice of prize winners has been influenced not only by science but also by politics and culture, and provides the opportunity and challenge to reflect on the values underlying yesterday's and today's scientific world.

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