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EDITORIAL

Nobel Prizes: Hits, Misses and Fouls

'...it appears that the Nobel prize as an institution gets high marks in its efforts to identify good science and to honor good scientists. But it has been far less effective in taking into account the vast changes in the cognitive map of science that have taken place since the prize was first instituted... Far less is known than we need to know in order to assess the actual effects of the prize on the advancement of scientific knowledge and on the quality of scientific life. We have yet to discover, whether in an ironic turnabout, the prize has diminished rather than augmented the legitimacy of the reward system in science.'

— Harriet Zuckerman

Scientific Elite, The Free Press, 1977, p. 248

'Whether all these laureled "discoveries, inventions, and improvements" have proved themselves contributions "most materially of benefit to mankind" – to quote Alfred Nobel – remains an entirely open question. Science's contributions to war, pollution, social blight, and other problems have prompted a decline in the so-called religion of science. Literature's benefit to the world now often seems confined to a few rather than the multitude: film became by far the dominant popular art in the twentieth century. As for peace, little needs to be said about civilization's success in reining back war and armies. The Nobel's own influence – whether beneficial or corrupting to science, literature and peace – is also entirely unsettled.'

— Burton Feldman

The Nobel Prize

Arcade Publishing, New York, 2000, p. 23

October begins with an observation of the International Day for Older People, declared by the United Nations. In India, the first day of the month marks 'Elders Day', with the obligatory rallies, seminars and advertisements drawing attention to the problems of an increasing population of the elderly. Despite a little cursory research, I was unable to find the age at which one joins the international community of 'older people'; although, I suspect, 60 years seemed a reasonably good guess. The first half of October is also dominated by the Nobel prizes, announced every year in dramatic fashion in Stockholm, following an elaborate selection process, shrouded in secrecy. The 'elderly' did very well in this year's awards. The physics laureates, Alexei Abrikosov (75), Vitaly Ginzburg (87) and Anthony Leggett (65) and the winners for medicine Paul Lauterbur (74) and Peter Mansfield (70) had cer-

tainly reached a mature age. The laureates for chemistry seemed surprisingly young; Peter Agre (54) and Roderick MacKinnon (47), sharing the award for their high impact work on protein channels in cell membranes. The chemistry prize appears to cast a wider net than the physics award, encompassing many areas of modern biology. The medicine award which recognized rather belatedly, the enormous medical importance of magnetic resonance imaging, honours advances in the area of magnetic resonance, which might, with some justification, be considered a domain of physicists. But, disciplinary labels can often be misleading; Ernest Rutherford, who was famously dismissive of chemistry as a science, was awarded the 1908 Nobel prize for chemistry. Burton Feldman in his extensive analysis of the Nobel prizes concludes that the prizes in chemistry 'cover a field that is rich, sprawling, and not a little untidy.... Its details are overwhelming.... Coping with such a prodigality of topics has bred more and more specialities, and kept the Nobel chemistry jury busy from its start' (p. 202).

Feldman's analysis has a little section entitled, 'Notes on How to Win the Nobel Prize in Science', a tongue-in-cheek prescription for would-be laureates. His advice is simple: 'First come from or emigrate to the US, Britain or Germany: they did and still do dominate the prizes'. Feldman dwells upon pedigree, mentors, persistence and luck but finally concludes: 'Live to a very old age. They may finally catch up with you'. Many of the recent Nobel awards point to the importance of patience, persistence and longevity. Age, despite widely held perception, is no bar to scientific discovery in many fields; the elimination of mandatory retirement in the United States has permitted many productive scientists to continue their research, enhancing their chances of contributing decisively to the solution of important scientific problems. Both analysts of the Nobel prizes, Zuckerman (p. 164) and Feldman (p. 131) quote a famous piece of verse, ascribed to an icon of theoretical physics, Paul Dirac:

*Age is, of course, a fever chill
That every physicist must fear
He's better dead than living still
When once he's past his thirtieth year*

Feldman, for good measure also attributes to T. H. Huxley a statement 'recommending strangling scientists at sixty, as too fixed in their thinking' (Note 12, p. 423). But times have changed since Huxley's 19th century and the early decades of the 20th century, when Dirac

worked; the myth that science is exclusively the preserve of youth may no longer be tenable.

The juries that decide awards always face an enormously difficult task; the task of making distinctions between individual scientists and diverse contributions is never easy. Often, personal prejudices of committee members and their advisers play a major role; dispassionate, objective judgements are only theoretically possible. In the case of Nobel prizes the stakes are so high and the public scrutiny so unremitting, the awarding committees face an almost impossibly difficult task. Even in the cases of the most deserving awards, there is a difference in the reactions of the scientific community to cases where prizes are awarded for a single important discovery and those which appear to be given for 'lifetime achievement' in a respectable area of science. Sometimes the award winners for 'discoveries' and 'inventions' do not appear to be mainstream scientists, although their work is of enormous impact in the world of science. The examples of Kary Mullis, who introduced the polymerase chain reaction (PCR) into molecular biology (Chemistry, 1993) and Koichi Tanaka (Chemistry, 2002), who invented the matrix-assisted laser desorption ionization (MALDI) method, which has revolutionized the biological applications of mass spectrometry, immediately spring to mind. 'Lifetime awards' are always less controversial because the laureates occupy a prominent position, within the structure of the 'scientific elite'. There is an analogous situation in Hollywood. Actors and actresses who may never have won an Oscar for a specific role, may nevertheless be honoured with the prestigious lifetime achievement award.

The Nobel prizes have achieved an enormous public prestige; testimony to the remarkable calibre of the laureates over a period of a century. While controversy and skepticism often follow the Peace and Literature prizes, the awards in science have generally gone to scientists of undisputed accomplishment. The Nobel memorial prize instituted in Economics in 1968 is slated to become more controversial with each passing year: its credibility dimmed by repeated awards to economists, who owe allegiance to the conservative school at the University of Chicago, resulting in what Feldman terms as a 'self-perpetuating effect'. Despite their undoubted eminence, the science prizes have been dogged by their share of controversy. This year's award of the medicine prize for magnetic resonance imaging has been publicly challenged in a series of press advertisements by Raymond Damadian, who believes he deserves credit for inventing the method. Damadian, a medical scientist, turned businessman and entrepreneur in 1978, when he founded the Fonar Corporation to convert laboratory experiments into practical imaging machines. Damadian is a highly visible, controversial, but well recognized figure in the area of MRI. He shared the US National Medal of Technology with this year's Nobel, Paul Lauterbur in 1988 and was inducted into the National Inventors Hall of Fame in 1989 and more recently, received the MIT-Levenson Lifetime achievement award for inventors in 2000. Damadian was indeed the first person to suggest that 'nuclear magnetic resonance (NMR) techniques combine

many of the desirable features of an external probe for the detection of internal cancer' (*Science*, 1971, 171, 1151). Medical imaging of course traces its roots to Paul Lauterbur's paper in *Nature* (1973, 242, 190), which introduced the method of image formation and proposed the name 'zeugmatography'. Damadian, recognized the potential for medical imaging, coined the term MRI (hiding the fearsome prefix 'nuclear', which would have undoubtedly frightened patients) and made practical application a reality. As a digression I must note that while Lauterbur's seminal 1973 paper makes a passing reference to 'variations in water content and proton relaxation times among biological tissues' and holds out the possibility of 'selectively picturing the various soft structures and tissues', there is no reference to Damadian's 1971 paper. Omissions in the Nobel awards are fairly common; famous examples include Lise Meitner who should have shared the Nobel prize in 1944 with Otto Hahn for the discovery of nuclear fission. The prize for the discovery of the double helical structure of DNA in 1962, included Maurice Wilkins in addition to James Watson and Francis Crick. Another potential candidate, Rosalind Franklin died prematurely in 1958. In his analysis, Feldman (p. 262) notes that Wilkins' inclusion was due entirely to the pressures exerted by Lawrence Bragg. Evidently, both inclusions and omissions can result from the many external and internal pressures that build during the process of Nobel judgement.

The Nobel committees do a difficult job and they are certainly not infallible. In the past they have also been, on occasion, poorly informed. A celebrated case is the award of the medicine prize in 1952 to Selman Waksman for the discovery of streptomycin. The antibiotic was discovered by Albert Schatz working in Waksman's laboratory, with little direct contribution from the latter. Curiously, the Nobel committee seems to have been unaware of Schatz at that time, although he and Waksman had been publicly involved in a dispute over the streptomycin patent which was filed in 1945 and granted in 1948. There are also cases where the awards are hard to justify, even acknowledging that the later generations of analysts have the benefit of hindsight. Two awards in medicine appear as glaring examples of misjudgement. In 1927, Julius Wagner-Jauregg received the prize for treating patients 'suffering from insanity caused by syphilitic infection' by inducing fevers by inoculating them with malarial parasites. A little over two decades later Egaz Moniz, a Portuguese neurologist received the prize in 1949 for introducing a surgical procedure, then known as prefrontal leukotomy (now, lobotomy), for treatment of schizophrenia. While no treatments were available at that time for schizophrenia, it is still difficult to rationalize the Nobel committee's rush to judgement.

With the range of scientific activity rapidly expanding and with the growing importance of team effort in solving major problems, Nobel judgements will become increasingly difficult. Given the track record of the juries in Stockholm we can be sure of many hits, a few misses and some fouls.

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