

Sir Peter B. Medawar:
Consummate Scientific Professional,
Accomplished Literary Amateur

Number 46, November 14, 1977

I am often embarrassed by the relative poverty of my education in the classics, literature and the arts. Nevertheless, many people, especially foreigners, assume that I am able to converse on the arts and sciences with equal facility. I confess that a poem, a piece of music or a painting can bring tears to my eyes. But more often I am deeply moved by the beauty I find in the clear expression of scientific ideas, perhaps because I know how hard it is to achieve such clarity. So when remarkable lucidity and beauty of expression are combined, I am both emotionally and professionally impressed. I had this rare feeling recently while reading a book review by Sir Peter B. Medawar, the British biologist and philosopher.¹ This is not the first time I've experienced such a profound sensation while reading Medawar's work. Like Lewis Thomas,² the late Jacob Bronowski,³ and a few others, Medawar combines the acumen of a scientist with the literary talent of a great writer. And lest you suspect I'm promoting a friend, I regret to report that I've never had the pleasure of meeting or even corresponding with Sir Peter.

People like Medawar, Thomas, and Bronowski provide the bridge between science and the public which is so important to a popular appreciation of science. We cannot encourage such persons enough in the pursuit of their work. Those of us who believe that basic research deserves public support should remember that one great literary or journalistic work by a scientist can do more to enhance the image of science than one hundred research projects designed to prove that basic research makes technology possible.

Medawar himself is a uniquely talented person. In 1960 he received the Nobel Prize for research on acquired immunological tolerance. But his interests are certainly not limited to medicine or biology. An examination of the select bibliography of Medawar's publications presented on the following pages indicates that his interests and expertise range from medicine to philosophy, from biology to psychology and sociology, and from the most narrow, highly specific research questions to the widest, most basic, and most urgent questions facing science.

Of course, years of research by a scientist like Peter Medawar don't go unnoticed. He has written over 150 articles and six books; seven of his articles and one of his books have been cited over one hundred times each. According to data from both the *Science Citation Index*[®] and the *Social Sciences Citation Index*[™], Medawar has been cited more than 2,700 times from 1961 to 1976. On our highly-cited author list, based on total citations received by primary authors from 1961 to 1975, only about 800 names rank above Medawar's, while more than 56,000 rank below him. This does not prove the importance of his work, but surely illustrates its impact. It will be interesting to see how Medawar's citation record is affected when we complete our first all-author ranking, which will be based on citations not just to primary authors but to all co-authors. However, as Medawar himself argues in *The Uniqueness of the Individual*,⁴ no single measurement or indicator can properly illuminate the whole of an individual's personality or achievements. So I will discuss some of Medawar's accomplishments and try to give readers an idea of his personality by presenting a few brief excerpts from his writings.

As an Oxford University undergraduate in zoology, Medawar did research on factors controlling growth in tissue cultures. After graduation in 1939, the outbreak of World War II caused him to focus his research on the replacement of skin lost because of severe burns, a pressing medical problem during

the war. Surgeons found that most skin grafts were promptly rejected by the recipient. But why? And how could the rejection mechanism be neutralized or broken down? The British Medical Research Council supported Medawar's research on graft rejection.

In experimentation on rabbits Medawar found that the chief factor controlling acceptance or rejection of skin grafts was the genetic relationship between donor and recipient. Medawar and his research team also demonstrated that inoculation of fetal mice with living cells from a future donor made them tolerant of grafts from that donor later in life. These discoveries held enormous implications for solving the problem of tissue rejection in human beings.

Through the discovery of acquired tolerance, transplantation immunology became a major branch of experimental and clinical biology. Many people are alive today because of skin and organ transplants.

As a result of his research in tissue rejection, Medawar's scientific reputation grew rapidly. At the age of 34, the Royal Society elected him a Fellow. He became a professor of zoology, first at the University of Birmingham, and then at University College, London. In 1962 he was appointed Director of Britain's National Institute for Medical Research. In spite of a serious stroke in 1969, Medawar continued as Director until 1971. He has since made an excellent recovery, and says that his life has "picked up and has started getting good again."⁵ Medawar still works

for the Medical Research Council, and now has become well known as a philosopher of science, and as a student of the behavior of scientists.

For example, in 1968 Medawar addressed the American Philosophical Society on the subject of what scientists really do. He said in part,

We all know in rough outline what lawyers do, or clergymen, physicians, accountants, and civil servants; we have a vague idea of the codes of practice they must abide by if they are to succeed in their professional duties, and if we were to learn more about them we should be edified, no doubt, but not surprised. But what are scientists like as professional men, and how do they set about to enlarge our understanding of the world around us? There seems to be no one answer. The layman's interpretation of scientific practice contains two elements which seem to be unrelated and all but impossible to reconcile. In the one conception the scientist is a discoverer, an innovator, an adventurer into the domain of what is not yet known or not yet understood. Such a man must be speculative, surely, at least in the sense of being able to envisage what *might* happen or what could be true. In the other conception the scientist is a critical man, a skeptic, hard to satisfy; a questioner of received beliefs. Scientists (in this second view) are men of facts and not of fancies, and science is antithetical to, perhaps even an antidote

to, imaginative activity in all its forms⁶ (p. 2).

Medawar reconciled these two views by noting that

an imaginative or inspirational process enters into *all* scientific reasoning at every level: it is not confined to "great" discoveries, as the more simple-minded inductivists have supposed.

Scientists are usually too proud or too shy to speak about creativity and "creative imagination"; they feel it to be incompatible with their conception of themselves as "men of facts" and rigorous inductive judgments. The role of creativity has always been acknowledged by inventors, because inventors are often simple unpretentious people who do not give themselves airs, whose education has not been dignified by courses on scientific method. Innovators speak unaffectedly about brain waves and inspirations: and what, after all, is a mechanical invention if not a solid hypothesis, the literal embodiment of a belief or opinion of which mechanical working is the test?⁶ (p. 55).

He concluded,

Imaginativeness and a critical temper are both necessary at all times, but neither is sufficient. The most imaginative scientists are by no means the most effective; at their worst, uncensored, they are cranks. Nor are the most critically minded. The man notorious for his dismiss-

sive criticisms, strenuous in the pursuit of error, is often unproductive, as if he had scared himself out of his own wits—unless indeed his critical cast of mind was the consequence rather than the cause of his infertility.⁶ (p. 58).

Medawar displayed his own critical temper—and a bit of biting sarcasm as well—by distinguishing between the natural sciences and what he calls the “unnatural sciences.” He wrote,

If a broad line of demarcation is drawn between the natural sciences and what can only be described as the *unnatural sciences*, it will at once be recognized as a distinguishing mark of the latter that their practitioners try most painstakingly to imitate what they believe—quite wrongly, alas for them—to be the distinctive manners and observances of the natural sciences. Among these are: (a) the belief that measurement and numeration are intrinsically praiseworthy activities (the worship, indeed, of what Ernst Gombrich calls *idola quantitatis*); (b) the whole discredited farrago of inductivism—especially the belief that *facts* are prior to ideas and that a sufficiently voluminous compilation of facts can be processed by a calculus of discovery in such a way as to yield general principles and natural-seeming laws; (c) another distinguishing mark of unnatural scientists is their faith in the efficacy of statistical formulas, particularly

when processed by a computer—the use of which is in itself interpreted as a mark of scientific manhood.¹

The tendency to quantify for the sake of quantification sometimes occurs in my own field of information science, and particularly in citation analysis. One needs a degree in mathematics to understand half the papers published in certain journals of information science. That is why one of the sensible terms associated with the quantification work going on in scientometrics these days is “indicators.”⁷ What I and others have been trying to stress is that citation data should not be viewed in isolation. It is useful and meaningful when its limitations are properly understood, and when it is viewed in the context of other indicators. As Medawar says, the evaluation of the individual is a complex process. And it is particularly when evaluating individual scientists that I have urged the utmost caution in using citation data.

Medawar's writings have also addressed the topic of science's impact on society. Recently, in collaboration with his wife, a botanist, he has produced a remarkable survey of modern biology and its social implications. *The Life Science*⁸ is a concise and lucid look at current biological thought, in which the Medawars make some thought-provoking points about the human race.

In the following excerpt the Medawars recommend a balance between professionalism and amateurism. No one better exemplifies this type of balance than Sir Peter



Sir Peter and Lady Medawar

Caroline Garland

Medawar himself, the consummate scientific professional, the accomplished literary amateur, and the perennial optimist.

People often wonder whether human beings are capable of further evolution. Leaving open the question of whether any such evolution will occur or not, the answer is assuredly 'Yes'. Human beings have a vast reservoir of inborn diversity and an open or 'wild type' breeding system which would make it possible for that diversity to be

fully exploited; they have no extreme specialization such as the anteater's snout or the fly trap of an insectivorous plant—no specializations that commit them to one particular kind of life. Indeed, from an evolutionary point of view man is the great amateur among animals. A merely professional animal would probably have committed itself by structure or function to a bondage it could not now escape.

It is, however, very unlikely

that any major evolutionary change will come about during the future life of man on earth....

Our reasons for thinking that no major evolutionary change will occur are twofold. In the first place the exercise of any artificial selection over very many generations would require acquiescence in the rule of a long dynasty of tyrants, and although such a tyranny is not inconceivable, such consistency of policy assuredly is. In the second place ordinary or endosomatic evolution is no longer a principal agency for securing fitness in human populations....

Another way in which human beings are amateurs in a professional world is that not all human activities have survival as their principal purpose. Even though our extra curricular activities are those that make life worth living—Mozart's piano sonatas and the paintings in the Uffizi Gallery amplify the human spirit and not human DNA—nothing will reconvert human beings from amateurs into pros more quickly than the imminence of mortal danger. In this context, being professional may imply submitting again to the tyrannical philosophy of reproductive advantage that has brought us this long way already. Clearly some compromise between the amateur and the professional is called for.

Recently, Medawar commented on the controversy surrounding genetic engineering.⁹ His review of

three new books on the subject contains incisive, cutting observations on the public appreciation of science and scientists. For instance, he comments,

For their excess of fearfulness, laymen have only themselves to blame and their nightmares are a judgment upon them for a deep-seated scientific illiteracy which manifests itself in two ways.

In the first place the public deserve nothing but contempt for allowing themselves to be dupes of that form of science fiction which is our modern equivalent of the Gothic romances of Mary Shelley and Mrs. Ann Radcliffe; for being taken in, that is to say, by that trusty serio-comic character, the mad scientist, who to the accompaniment of peals of maniacal laughter cries out with a strong Central European accent, "Soon ze whole world vill be in my power."

The second reason for their excess of fearfulness is this: That because imaginative writing is the only form of creative activity most people know, even educated laymen have no idea of the width of the gap between conception and execution in science. A writer who hits on a good idea—or even a composer who thinks of or, like Sullivan, overhears a good tune—can take up pencil and paper and write it down; he does not have to sue for bench space in a laboratory or send in five copies of an application explaining

what his poem is going to be about, how many sheets of paper it will occupy, what imagery it is going to be clothed in, or how mankind will benefit by its completion.

Like the rest of his writing, Medawar's final comment on the genetic engineering controversy is clear, direct, and compelling:

I find it difficult to excuse the lack of confidence that otherwise quite sensible people have

in the scientific profession, among whom sanity is much more widely diffused than seems to be generally realized. Scientists want to do good—and very often do. Short of abolishing the profession altogether no legislation can ever effectively be enforced that will seriously impede the scientists' determination to come to a deeper understanding of the material world.⁹

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