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The Evaluation of Basic Science

Attendance at several recent confrontations between laboratory scientists and economists has suggested to this writer that the basic conflict is, in large part, semantic. Some economists would have us believe that the words "price" and "value" are essentially identical, that the value of any object or service is determined by its price in the free marketplace, and even that a man's value is measured accurately by the wages he earns in the job market.

To most scientists, "value" and "price" have quite different connotations. We often find that even material objects are overpriced or underpriced, which points up the discrepancy between price and true value. A man's wage would approximate his value only in the event that he selected his employment on the basis of wage and wage alone. Whereas this may be approximately true in some lines of endeavor, the scientist typically is influenced in his choice of job by a host of other factors, such as freedom of operation, availability of laboratory and library facilities, the nature of his colleagues and students, and institutional and titular prestige. We measure the value of our colleagues in terms of their contributions to the progress of their science, and ignorance of their salaries in no way precludes such judgments.

Price may be a useful means of estimating the value of defined material objects, such as cars or apples. It gives at best a very inaccurate assessment of the value of a man, as the scientist uses the phrase. Where price completely fails as a measure of value is in the realm of ideas, and basic science, in contrast to invention, deals largely in ideas. Consider for the moment Archimedes' demonstration of the relationship of the radius of a sphere to its volume, Mendel's conclusions concerning genetic transmission, or Gibbs's discovery of phase rule. The cost of each of these was doubtless trivial (the cash benefits are not susceptible of ready estimate), yet the value of each of these discoveries to the world of science has been enormous. In this context, there appears to be a complete dissociation between value and price.

There are several consequences of this dissociation. Prominent among them is the futility of the cost-benefit type of analysis in the area of basic sciences. Ideas are not like apples, which may be counted and sold, hopefully before they rot. Ideas, if sound, are among the most enduring of our assets and may continue to yield benefits for very long periods of time. This fact alone severely limits the usefulness of cost-benefit studies.

If, indeed, the economist is unable to divorce price from value, then it must follow that economics is an inappropriate instrument with which to measure basic science. A new and distinct discipline must then be invented, one that is concerned with "value" as the scientist sees it. When we can more accurately define this quantity we can hope to measure the value of the scientist and of his product. Until and unless this is done, the basic scientist will remain dissatisfied with outside evaluations of his work.—DEWITT STETTEN, JR., Director, *National Institute of General Medical Sciences, Bethesda, Md. 20014*