# THE EDITORS' COLUMN

A THOUGHT-PROVOKING article by Ian Morris in the December 1966 issue of *Science Journal* (pp. 76–80) explores a question of very fundamental nature: "Is science really 'scientific' "? We quote some excerpts, hoping we are not destroying the flavor and balance of Dr. Morris' superbly written prose.

The author described the so-called "scientific method" thus: "Briefly, the process of scientific investigation is thought to begin with a preparatory period during which the scientist studies past work on related topics so that his questions can be correctly posed. Also, during this period, proposed techniques are tested and shown to be valid and sufficiently specific and sensitive. This preparatory period is then supposedly followed by one of observation and experimentation. This stage is thought to involve critical and accurate measurement and observation and during it the scientist is thought not to have preconceived ideas which might influence his observations. There then follows a period when generalizations are made, hypotheses are erected and (based on the latter) predictions are made. These predictions are then tested by a further period of experimentation after which the hypotheses might require modification. Superimposed on this are less predictable factors such as chance, intuition and imagination, all features of scientific investigation usually greatly underestimated."

The author goes on to explain how this picture is grossly oversimplified and how it is necessary to introduce an element of doubt into such a straightforward method of investigation, particularly with regard to the time and manner at

which the "hypothesis" is introduced. It is suggested that most scientists propose hypotheses after having made only a minimum number of necessary observations, and even in empirical fields there are "ideas which initiate and control the direction of the investigation."

In addition, the imaginative, intuitive, and creative factors and their role in scientific discovery are explored in detail. Madame Curie's discovery of radium is cited as an example, in that at the time she had observed only an amount of radioactivity that was stronger than could have arisen from known radioactive elements, she was convinced that the unknown radioactivity emanated from a new element.

In this vein the author states that "Most of the examples used to illustrate the inspirational factor are the major discoveries by men of genius. The vast majority of working scientists are not of comparable stature, their fields of study are much more restricted, their advances less fundamental and their hypotheses more likely to be small scale extensions within an acceptable framework. The role of reason in the elucidation of such hypotheses is probably greater than in the major scientific discoveries and the part played by insight less." Dr. Morris then goes on to explain that scientific discovery depends to a great extent on the "ripeness" of the problem and of the mind of the scientist—and that frequently major discoveries are not made by scientists trained in the field of discovery, because their minds are fettered by lines of thought that prevail in that field.

The entire article is as stimulating as these brief excerpts, and the editors heartily urge reading of this evaluation of the "scientific method." As Dr. Morris has pointed out, he would like to see the practice of science (or scientists) for what it is—"a complex paradoxical activity combining both imagination and inspiration with objectivity and rigorous logic."