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Fraud in Science

Fraud in scientific research is unacceptable and inevitable. It is unacceptable because the entire procedure of publishing and advancing knowledge is based on trust—that the literature reports accurate measurements of actual experiments. If each researcher had to go back and repeat the literature, the enormously productive rush of modern science would slow to a snail's pace. Even good intentions are not enough. Sloppy experimentation and poor scholarship are condemned. Outright fraud is intolerable.

Nevertheless, some fraud will exist as long as human beings are doing the experiments. Any system in which advancement, fame, and fortune await a successful practitioner will tempt a certain number of individuals to cut corners. That number may well be smaller in science than in other fields, not because scientists are more moral than others, but because the cumulative nature of science means inevitable exposure, usually in a rather short time.

An oversimplified admonition might be, "You may escape detection by falsifying an insignificant finding, but there will be no reward. You may falsify an important finding, but then it will surely form the basis for subsequent experiments and become exposed." Therefore, there is little percentage in falsifying science, and the speed with which recent examples of this unfortunate human frailty have been revealed is an indication of the pace of modern science. Some newspaper reporters have used recent fraud cases to imply that the structure of science is crumbling or that there is a cover-up, forgetting that the extent of the scientific enterprise has grown a thousandfold since the 1800s. We would expect a greater number of cases of fraud today, but there is no evidence of an increased percentage. And there is no modern equivalent of Piltdown man, a fraud that took years to uncover. Still, it is important that scientists be ever vigilant, and the rash of recent frauds does suggest some dangers in modern science.

One danger arises from the nature of interdisciplinary research. Many papers have numerous authors: investigators in a laboratory that has cloning expertise collaborate with others in a laboratory that has expertise in physical instrumentation and another laboratory that does animal tests to publish a joint paper. The results of this kind of collaboration have had spectacular success, in the main, and no one would wish to limit such joint efforts. Yet when no one person has expertise in all aspects of the research, there can be dangers. A second problem arises when busy scientists, who have too many projects and too little time, supervise projects in which they have infrequent contact with those doing the experiments. Finally, the competitive world of modern science fosters some entrepreneurs who are so intent on the next grant or the big success that they forget that every good experimenter must be his own devil's advocate. A principal investigator must not only devise critical tests for his findings, but must also generate an atmosphere that encourages co-workers to report the bad news as well as the good news.

The procedures recently established by the National Institutes of Health and various universities to deal with fraud seem admirable and appropriate. The punishments for offenders are severe: usually, total derailment of a career. Because the repercussions associated with fraud are so serious, some investigations of such charges take long periods of time, but fairness to the accused is essential. Once guilt is ascertained, the loss of a career in science seems appropriate in many cases. Restitution in some form for the wasted time of those who based further experiments on the false report might be considered appropriate as well. The larger the group, the more interdisciplinary the research, the more competitive the area, the more is the need for watchful skepticism.

Having acknowledged that, we must recognize that 99.9999 percent of reports are accurate and truthful, often in rapidly advancing frontiers where data are hard to collect. There is no evidence that the small number of cases that have surfaced require a fundamental change in procedures that have produced so much good science. To continue the great advances that are being made, we must accept that perfect behavior is a desirable but unattainable goal. Vigilance? Yes. Timidity? No.—DANIEL E. KOSHLAND, JR.