Abuse and Misconduct in Science

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ABSTRACTS

David L. Goodstein
Scientific Fraud

Scientific fraud is always an abuse of the scientific method, never an attempt to insert an untruth in the scientific record. The U.S. government has finally come up with an acceptable definition of scientific misconduct after a long, loud fight over the matter.

Scientific fraud is almost always biomedical fraud, and that observation leads us to a list of danger factors. However, two recent cases in physics provide a severe test of our theory. Before the recent spate of cases we were not prepared, but we must not be prepared in a way that interferes with normal progress in science.

David L. Goodstein, b. 1939 in Brooklyn, N.Y., is vice provost, and professor of physics and applied physics at the California Institute of Technology in Pasadena, where he has been on the faculty for more the 35 years. In 1995 he was named the Frank J. Gilloon Distinguished Teaching and Service Professor. He was educated at Brooklyn College (B.S., 1960) and at the University of Washington, Seattle (Ph.D., 1965). His research, in experimental condensed matter physics, has dealt with phases and phase transitions in adsorbed, two-dimensional matter, ballistic phonons in solids, superfluidity in liquid helium, and critical point phenomena. In 1999, Dr Goodstein was awarded the Oersted Medal of the American Association of Physics Teachers, and in 2000, the John P. McGovern Medal of the Sigma Xi Society. He has served on and chaired numerous scientific and academic panels, including the National Advisory Committee to the Mathematical and Physical Sciences Directorate of the National Science Foundation. He is a founding member of the Board of Directors of the California Council on Science and Technology. His books include States of Matter (Prentice hall, 1975, Dover, 1985) and Feynman's Lost Lecture (Norton, 1996), written with his wife, Dr. Judith Goodstein. In the 1980's he was director and host of The Mechanical Universe, an educational television series that has been used by millions of students all over the world.

In recent times, while continuing to teach and conduct research in experimental condensed matter physics, Dr Goodstein has turned his attention to issues related to science and society. In articles, speeches and colloquia he has addressed conduct and misconduct in science, the end of exponential growth of the scientific enterprise, and issues related to fossil fuel and the climate of Planet Earth. His most recent book is "Out of Gas: The end of the age of oil" (Norton 2004).

Prompted by the need to compose a set of regulations governing possible misconduct at Caltech, he has developed an academic sub-specialty in this area, writing and speaking about it in a variety of forums. Together with his colleague, Professor of Philosophy James Woodward, he has developed a course, Research Ethics, which has been taught each year at Caltech since the early 1990's.

Stig Strömholm
Copyright and plagiarism

The main subject of the lecture is to define copyright as a legal position with its own particular features and to demonstrate the difference between copyright and legally protected rights in inventions (patents) and from such claims to rights in ideas or in knowledge about facts as are not protected by legal provisions but respected by virtue of the moral principles of the scholarly community.

Professor emeritus **Stig Strömholm**, b. 1931, was professor of jurisprudence, later in private international law, in the University of Uppsala between 1969 and 1997. In the years 1989-1997 he was the Vice-Chancellor (President) of that university. He was President of the Royal Swedish Academy of Letters, History and Antiquities 1985-1993, of the Royal Uppsala Academy of Arts and Sciences 1978-2002 and of the Academia Europaea in London 1997-2002. He has written several books in French, English and German on international copyright and historical jurisprudence.

Jan Hult

From Newton's fudge factor to Cold War plagiarism

Two cases , relevant to this symposium, will be reviewed to illustrate two different kinds of problems. The first case is well known, but has been given varying interpretations; the other has so far received much less attention.

Close reading of Isaac Newton's *Principia*, ca. 300 years after its publication in 1687, has made it appear that Newton corrected certain data so as to make celestial observations agree more closely with predictions of his theory. His biographer Richard Westfall in 1973 described this as the deliberate use of a "fudge factor". I shall explain why I do not consider it a case of fraud.

A case of extremely severe plagiarism – an entire textbook copied word by word – which occurred in the Cold War era, was revealed a few years later. The inability to handle this situation shown by the publishers, the university involved and the international scientific community will be presented and discussed.

Jan Hult, b. 1927, is emeritus professor of solid mechanics at Chalmers University of Technology in Göteborg. After graduating from the Royal Institute of Technology in Stockholm in 1950, he transferred in 1955 to the Massachusetts Institute of Technology in Cambridge, MA, where he received the ScD degree in 1957. During the years 1962-92 he occupied a chair in solid mechanics at Chalmers. Upon retirement he was reappointed to head, during 1992-99, a new Chalmers unit for the history of technology and industry.

In 1990, he started a series of lectures on research ethics, given to students and faculty at Chalmers. He was a member, from its start in 1990, of the autonomous Centre for Research Ethics, founded by the Royal Society of Arts and Sciences in Göteborg. During the years 1991-93 he was also responsible, within the Executive Board of the International Council of Scientific Unions (ICSU), for keeping track of research ethics problems and bringing them to the attention of the Board.

Ian S. Osborne

How can a journal like Science handle misconduct?

Science magazine now receives over 11000 submissions of original research annually, 800 of which are published. A two-tier evaluation process is in use at Science whereby papers are initially evaluated by members of our Board of Reviewing Editors. A small fraction, typically 20-30%, is then selected for in depth peer review. Such a process may be expected to remove the more obvious and more readily identifiable instances of misconduct e.g. duplicate submissions, plagiarism, unsubstantiated claims etc.

However, recent examples, in both the physical and life sciences, serve to highlight that cases of the most serious instance of scientific misconduct, data fabrication and manipulation, can and do get through the net. I will overview the evaluation procedures at Science and the mechanisms set in place to first identify and then to deal with the instances of misconduct that do get through the evaluation process.

Ian S. Osborne completed his PhD in 1992 at the University of Dundee investigating the switching mechanism of amorphous silicon memory devices in the laboratory of Professors Walter Spear and Peter LeComber. He was then awarded a two year Science and Technology Agency research fellowship at the Electrotechnical Laboratory in Tsukuba, Japan, characterizing and depositing hydrogenated amorphous silicon by plasma chemical vapor deposition. He then spent 3 years in industry at Sharp Corporation's Energy Conversion Laboratories in Nara, Japan, developing thin film amorphous and microcrystalline silicon solar cells. He has been with Science since 1998 and handles papers in the fields of physics and applied physics.

Siegfried Grossmann

Safeguarding good scientific practice - The response of the Deutsche Forschungsgemeinschaft (DFG) to misconduct in science.

The DFG measures to safeguard good scientific practice shall be reviewed in the light of the experience as an Ombudsman, of the DFG as well as of my home university. The Ombudsman's independence is well respected by DFG and universities, and therefore he can be and indeed he is approached by those who are hit by misconduct. The idea and role of the DFG Ombudsman shall be discussed, furthermore some most typical ways of misconduct that we have met, the limits of Ombudsman action, the difficult relations between ethical ideals and legal possibilities. Sufficient protection of usually very dependent whistleblowers has turned out to be a serious problem, although it is at the heart of becoming informed about abuse, fraud, etc. The role of the media shall be commented, which the DFG Ombudsman experienced as supportive. The talk will then elaborate on the different views of the DFG and University concerning the cooperation between Ombudsman and facts-determining-committees, which latter have to decide on sanctions.

At DFG not only malpractice in research is taken very seriously but also malpractice in funding applications. If either the referees or the decision makers in DFG become aware that there are unsupported claims in an application, insufficient references to previous work of others, even conscious misrepresentations of prior work, such applications for funding will fail, no money is granted. Depending on the particular case it may also be forbidden for some (limited) time to apply at DFG again. The main problem however is, how the relevant people become aware of such misconduct. We had a case of plagiarized application and could act since we became informed by somebody who was hit by that misconduct. After checking within our Committee of Ombudsmen (there were three of us) we conveyed the case to the DFG because only DFG can sanction.

Professor emeritus Dr. Dr. h. c. **Siegfried Grossmann** is a theoretical physicist in the Department of Physics, Philipps-University of Marburg. Born in 1930 near Königsberg, East Prussia, he was educated at the Pädagogische Hochschule and at the Freie Universität, Berlin (Ph.D.1960). His Habilitation 1962 was on quantum transport theory. His research has been in manybody and statistical physics, nonlinear and chaotic dynamics (e.g. period doubling), turbulent fluid flow, phase transitions and laser physics. He is a member of the Berlin-Brandenburgische Akademie der Wissenschaften (BBAW), of the Deutsche Akademie der Naturforscher Leopoldina, and of the European Academy of Sciences and Arts. He has been on the advisory board of several research centers, government agencies, DFG and Max-Planck Society. His interest in teaching has resulted in two textbooks for mathematical methods in physics (Funktionalanalysis, 4 editions; Mathematische Hilfsmittel für die Physik, now 9th Edition). Dr Grossmann was the Ombudsman of the DFG from 1999-2005 and has the same function at the Philipps-University since 2005.

Christine Wennerås
Nepotism and sexism in science

Agnes Wold and I proved scientifically that a real-life peer review process, that of the Swedish Medical Research Council, was biased against women and favored applicants with ties to the evaluators (Wennerås and Wold, Nature, 1997). Examples from the US, England, Denmark and Italy confirm that women academics are treated more severely by the academic system, and thus, have poorer career outcomes compared to their male colleagues. The current trend to concentrate research grants on a few conglomerates, so called "scientific networks of excellence" or "strong research environments", is detrimental for female scientists in general but also strikes against creative researchers outside of the established scientific community. It is of the utmost importance to try to minimize the effects of sexism and nepotism in the evaluation of scientists, in order to ensure that restricted funds are fairly distributed based on merit and innovative ideas. Moreover, efforts aimed at achieving fairness will hopefully restore the credibility of academia in the eyes of the public, which has been strained lately by repeated reports of fraud, nepotism, "old boys' networks" and the lack of transparency which continues to permeate the scientific community.

Christine Wennerås, b. 1963 in Trondheim, Norway, is an MD, PhD. She works as a medical doctor at the Sahlgrenska University Hospital, and splits her time between the Dept. of Clinical Bacteriology and the Dept. of Hematology. She is an associate professor and heads a research group currently consisting of two PhD students, one laboratory technician and one technical assistant. Her research is within the field of immunology, and focuses on a white blood cell called the eosinophilic granulocyte. In addition, she studies immune responses and microbial infections in immunocompromised patients.

Sven T. Lagerwall

The laissez-faire style of dealing with problems of misconduct and with unhealthy tendencies in grant applications or in peer review.

In the first part of this talk I will review some recent cases of academic misconduct in Sweden and describe the reaction they provoked within the academic community. I will contrast them with some similar cases taken from abroad.

The second part will discuss practices that are more seldom considered as misconduct or fraud and some that cannot be considered to belong to either category although definitely unfair and improper. They often touch the limits of honest behavior and, may very well indirectly have contributed to the recent increase in the number of detected cases of fraud.

Sven T. Lagerwall, b.1934, is emeritus professor of physics at Chalmers University of Technology, Göteborg. After graduating from Chalmers in 1958 he started his doctoral studies at the Hahn-Meitner Institute for Nuclear Research, Berlin, leading to a PhD from the Technical University of Berlin in 1964. In 1972 he changed his research interest to condensed matter, in particular liquid crystals, and spent a year with one of the groups headed by P.G. de Gennes at the University of Paris in Orsay. During many years he was very active, together with B. Stebler, in developing lecture demonstrations in physics at Chalmers and Göteborg University. He has given several lecture series at the University of California in Berkeley as well as the University of Colorado in Boulder, and he is the author of several textbooks. Dr Lagerwall has received numerous national and international awards, e.g. the Gold Medal of the Royal Swedish Academy of Engineering Sciences (1992) and the Westrup Prize from the Royal Physiographic Society, Lund (1998). In 2003 he was awarded the Frederiks Medal from the Russian Liquid Crystal Society and in 2004 he was elected Honorary Member of the International Liquid Crystal Society. Since long he has a strong interest in the history of physics and in ethical questions in science.

Bengt Stebler
When the system fails – or when there is no system

Each university somehow, and somewhere in official documents, expects its faculty to follow ethical principles in all its activities. Mostly, reasonable definitions of ethical conduct in science are given. But how should a university administration act and react when, nevertheless, questionable practices appear within the university's walls?

There are, as an outlook into some European and US institutions shows, good examples of rules concerning the correct handling in such a case. Too often, though, rules are entirely missing or very unsatisfactory, as a case study involving two Swedish universities will show. No rules existing, the risk is obvious that the academic leadership might prefer to avoid a thorough investigation, even if it means that individuals and, indeed, whole research groups, are sacrificed. It seems that the institutions feel their image is at stake, should the allegations become public and proven true.

Bengt Stebler, b. 1936, is emeritus professor of physics at Chalmers University of Technology, Göteborg. He graduated from Stockholm University and received his PhD from Göteborg University, following research in solid state physics, in particular on magnetic phase transitions, investigated by electron microscopy and neutron scattering at Chalmers, at the Cavendish Laboratory, University of Cambridge, and at the Nuclear Research Institute in Risö, Denmark.

From 1975 he joined Sven T. Lagerwall, with whom he for a decade had shared experimental physics teaching efforts, in his research on liquid crystals. In later years he deepened his interest in the organization of higher education and research, with particular focus on academic freedom and on fair competition. He was, for a number of years, a member of the National Board of the Swedish Association of University Teachers and of the Chalmers Committee on Ethical Matters. At present he is the graduate students' Ombudsman – counsel – at Chalmers.

Håkan Hydén
Abuse in Science – A Socio-Legal Perspective

In my contribution to the conference I will scrutinize the Swedish legal system for treating misconduct in science. I will do that starting with the Christoper Gillberg versus Eva Kärfve controversy. This case displays most dimensions of the role of law. It also exposes the dependence of the application of legal rules to social norms. The quasi-legal construction of a system for dealing with accusations of abuse in science is something leading to a situation without justice. It creates a lose-lose situation.

Håkan Hydén, b. 1945, is professor in sociology of law and associate professor (docent) in civil law at Lund University. Hydén has developed a Norm Science where norms are regarded both as something existing, guiding human behaviour and actions, as well as an analytical tool in order to understand the driving forces behind human activities on a societal level. The concept of norm is also used as a synthesizing tool that makes it possible to integrate and put together fragmented knowledge from different specialized fields and thereby create new and more adequate knowledge. Norm Science is also important for understanding the underlying norms influencing and competing with legal rules.

Dennis Töllborg
Science for sale – build or criticize science as trademark?

In the secularized welfare state it seems like science has replaced religion as the most important "truth-teller", in the fight of defending established positions. This raises the question "Who are our clients, and to whom are we to be loyal: Socrates, the State or the Market?", and what does the answer imply regarding the scientists' ethical responsibility when facing anomalies.

In the new world order the question also arises if it is even possible to conduct qualitative science in a feudal democracy, characterized by a hegemonic dictatorship with stability as the supreme norm? Is pragmatism an allowed, or maybe ethically necessary, position to take? I will raise these questions, exemplifying with some startling Swedish cases.

Dennis Töllborg, b. 1953, is professor of legal science at the Göteborg Research Institute (GRI), University of Göteborg. He graduated in 1978 as master of law at the University of Lund where in 1986 he became a doctor of law. In 1987 he was appointed associate professor (docent) of legal science in the Faculty of Law, University of Lund. Since 1980 he had been active in teaching in Lund as well as in the then recently created new Department of Law at Göteborg University, and in 1996 he was appointed professor of legal science in that department. Early this year he left the department, for ethical reasons, and moved to the Göteborg Research Institute, which is an entity within the university that focuses on interdisciplinary research. Dr Töllborg is a member of the Committee for Ethical Questions at the University of Göteborg, a committee that however, for the last two years has never met. Töllborg's specialties in research are pro-active policing and intelligence, but he has also done extensive writing in labour law and legal theory.