An Overview of Scientific Ethics

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by

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Abstract

Scientific training comprises several components. One that has recently drawn attention is ethical training—the codes on which the scientific society is based. The need to insure that future scientists are equipped with the skills needed to make educated ethical judgements is paramount. Vast changes occurring within the scientific community need to be addressed. Science is crossing into areas that less than a decade ago were considered science fiction. The Internet has allowed for scientific journals and other publications to reach millions in record time. Increased funding from public agencies has contributed to increased interest by society at large (Blumenstyk, 1989). Recent discoveries of scientific misconduct in mass media have raised calls for formal ethical education (Beardsley, 1991; Beauchamp, 1989; Glazer, 1997). The goal of this paper is to provide a reference for faculty and staff in natural resources to integrate scientific ethics into their respective classes.

Introduction

Science is defined as the art of discovering truth (Committee on Science, Engineering and Public Policy, 1995, 1997; Sigma Xi, 1982). Ethical behavior among scientists is considered science’s foundation. Our scientific understanding of the world is largely based on observations, experimentation and published results. Contributions to science can only be fully reaped with truthful reporting of findings. Hence, ethics cannot be addressed as a peripheral issue. The need for formal ethical training of future scientists is becoming more evident. Recent media coverage of scientific misconduct has caused the scientific community to take a closer look at how it handles ethical training. Universities, like the University of Minnesota, are mandating that every
unit (department) address ethics for their respective fields. Funding agencies, like the National Institute of Health (NIH), require graduate students and post doctorate fellows supported by NIH funding to have training in “responsible conduct of research” (Gifford 1994; NIH Guide for Grants and Contracts, 1989).

Currently ethics in natural resources is difficult to address. Natural resource studies usually are geographically specific with environmental fluctuations. These factors make replication difficult. Reproducing experiments has been a trusted method to verify results and detect misconduct (Broad, 1982). The difficulty in replicating natural resource studies heightens the responsibility to ensure understanding of ethical issues among peers. The objective of this paper is to facilitate faculty and staff in the University of Minnesota College of Natural Resources’ faculty and staff with integrating scientific ethics in current and future classes.

Definition

Charles Babbage, professor of mathematics at Cambridge University, wrote the first book addressing ethics in science, Reflections on the Decline of Science in England, in 1830 (Sigma Xi, 1982). He is given credit for starting the British Association for the Advancement of Science and influencing its international sister organizations (Sigma Xi, 1982). Since this first written concept of scientific ethics, many publications have addressed this issue. The plethora of definitions of scientific ethics is overwhelming. This is compounded by the scientific community’s conflict over the distinction between ‘morality’ and ‘ethics’, e.g., Duckett and Ryden in Moral Development in the Professions: Psychology and Applied Ethics use the terms
interchangeably noting no true difference. A growing number of professionals are realizing the interrelationships between social, religious and cultural views and ethical beliefs (Broad et al., 1982; Committee on Science, Engineering and Public Policy, 1995, 1997; Goul, 1993; Rest et al., 1986a). Even so, there are a few definitions that are useful natural resources in decision making. The Committee on Science, Engineering and Public Policy (1995) believe, “the use of power [is the] subject for ethics”. Ambiguity in the definitions of scientific misconduct caused the National Institute of Health’s Public Health Service to develop a committee to clarify definitions. The current definition for scientific misconduct is the, “fabrication, falsification, plagiarism, or other practices that seriously deviate from those that are commonly accepted within the scientific community for proposing, conducting, or reporting research. It does not include honest error or honest differences in interpretations or judgements of data” (Poon, 1995). This definition will be referred to throughout the paper.

Objectives and Purpose

Ethical training is an important aspect of learning to become a scientist. Science is more than technological knowledge and logical thinking; it is part of a society that has rules of conduct and responsibilities. Learning these is as important as the technology training. Recent exposure of scientific misconduct has questioned the effectiveness of scientific ethics training for future scientists. Lack of formal education of expectable conduct was lacking. This has incited the recent incorporation of formal education for future scientists. Federal agencies have taken the lead on enforcing education on ethical issues.

Many governmental agencies are requiring that grant applicants have formal ethical
training (Blumenstyk, 1998; Department of Health and Safety, Spring 1998; Friend, 1990). Congressional meetings have been held to determine, define, punish and prevent scientific misconduct. The National Institute of Health has sponsored research into academic misconduct to better understand its causes. Sigma Xi, the Committee on Science, Engineering and Public Policy and others organizations have produced literature on the guidelines of scientific ethics. Governing bodies, like the Office of Scientific Integrity, have been formed to specifically address issues of misconduct.

The call for increased awareness of scientific misconduct has to be answered by two groups, current scientists and future scientists. Current scientists answer by reviewing and updating ethical knowledge and future scientists with formal education. This paper is a tool to assist with the latter. The paper addresses key topics with an overview. Then historical cases are presented. These historical cases are real occurrences of misconduct within the scientific community. Case studies are provided. They can be used individually or collectively in interactive discussion group with students. It is important that educators note that telling students the ‘right’ answer defeats the purpose of the case studies. The case studies are designed for students to internalize, analyze and discuss the topics (Barden et al., 1997). Students should be encouraged to weigh the issues presented and formulate a decision on their own.
Definition and Overview of Ethics in Science

Conflict of Interest

Individual scientist and institutional responsibilities to granting agencies and companies are complex. Usually the concern is different objectives. Some granting agencies are now requiring that supported labs and universities abide by specific ethical codes and regulations. Since October 1995, the National Science Foundation and the National Institutes of Health have required that institutions have a conflict-of-interest policy (Blumenstyk, 1998). Violation by any member of a university causes the university to be investigated, put on probation, fined or a withdrawal of funds. However, the degree of conflict and what is required to be disclosed varies among institutions (Blumenstyk, 1998). Mildred K. Cho, associate professor of ethics University of Pennsylvania’s Center for Bioethics, said, “disclosure is all relative” (Blumenstyk, 1998). At some schools the conflict of interest is made public in public-record laws but at most public and private universities disclosures are not (Blumenstyk, 1998).

The University of California at San Francisco (UCSF) and the University of Washington Medical School require that professors make potential conflicts public in presentations and journal articles (Blumenstyk, 1998). At UCSF professors are forbidden to work on clinical trials if they have a conflict of interest with the drug or the device to be tested. The University of Washington may allow such arrangements, but only with approval. However, it has zero-tolerance in cases involving patients or human subjects. And all financial interest, even minor ones, must be disclosed. Harvard Medical School typically forbids professors, full and part-time,
to have sponsored-research grants from companies for which they hold equity. The University of Michigan limits consulting fees and testifying as expert witnesses for its medical school professors to 25 percent of their salaries. However, this only applies to full time faculty. Many governmental agencies require that applicants sign documentation acknowledging the rules and regulations before funds are released.

Fiscal responsibilities to the private sector differ in that confidentiality is usually a main interest. Companies are profit driven. They are extremely concerned about funding research to produce potentially profit gaining results. Universities were created to serve the public. Therefore informing the public of information is its goal (Martorana, 1998; Petrick et al., 1996). The Health Policy Research and Development Unit at Massachusetts General Hospital and the University of Minnesota conducted a written survey in 1994 and 1995 of 2,167 National Institutes of Health grant recipients life scientists. They found that forty-three percent of respondents said they had “received at least one research-related gift, independent of a grant or contract, during the previous three years”. Sixty-six percent said the gift was important to their research. Most of the gifts were biomaterials, twenty-four percent, fifteen percent were discretionary funds and eleven percent equipment or trips to meetings. Of the respondents thirty-two percent said their donor want to review articles or reports stemming from the use of the gifts before publication in exchange for the gift. The authors, based on their results, “suggest that companies, professors, or both may view gifts as a way to bypass’ institutional oversight of corporate donations” (Basinger, 1998).

According to the National Science Foundation about fifty-nine percent of university research spending in 1997 came from the federal government, about nineteen percent from within
universities, eight percent from other governmental organizations and seven percent from non-profit and seven percent from industry. Since industry provides such a small portion of overall funding, why are people concerned about industry’s possible influence on university research? When looking at research spending increases by source from 1990 to 1997, industry makes up forty-nine percent, the federal government forty-six percent and universities equaling non-profit groups with forty-four percent each. This increase in spending may be due to the desire to have neutral parities verify the success of products. Universities are sources of inexpensive labor, less expensive than consultants, and are often viewed by the public at large as independent (Blumenstyk, 1998).

Historical Case

Dr. John Najarian, the former University of Minnesota’s chairman of surgery and world-renowned surgeon, was investigated for eighteen felony counts of tax evasion, embezzlement and conspiring to deceive the U.S. Food and Drug Administration (FDA) (Blumenstyk, 1996; Nash, 1995). Dr. Najarian is an inventor of the drug Minnesota ALG, an immune system suppressant used when transplanting organs (Blumenstyk, 1996). The drug was used in 50,000 transplants in 175 transplant centers. It was sold for twenty years before the Food and Drug Administration put a stop to it. Minnesota ALG was purified in 1970 by Dr. Najarian and received an approval from the FDA. The initial proposal was sought to receive approval for experimental use and to charge for production cost. The FDA claims that it granted approval for experimental use, not for sale. The ambiguity of the approval was argument for his defense. In 1988, the FDA stopped sale of Minnesota ALG but then lifted the halt in 1989. In August 1989, FDA halted production.
Again in March 1989, the University's Board of Regent stopped production. During the sale of Minnesota ALG, some patients were not notified that the drug was experimental. Nor was the FDA made aware of any death, between three and five, that were directly related to drug use. Profits of the drug went to the department of surgery, the medical school and the A.L.G. program. Funds earned were so great that $12.5 million for a $23 million new medical building came directly from the ALG 'cache' fund. The University clams it was misled by Dr. Najarian and the director of the ALG program, Mr. Richard Condie. Mr. Condie and Mr. Bernard Ley, a surgery department administrator, both pleaded guilty to federal charges of conspiring to defraud the government and embezzling the University. Dr. Najarian denied any wrongdoing. A University internal investigation found him guilty of violating academic misconduct codes (Blumenstyk, 1996). Dr. Najarian is still employed at the University of Minnesota, however he is no longer head of surgery (Blumenstyk, 1996). He was acquitted in federal court of any wrongdoing (Associated Press, 1997). However, the Minnesota state Board of Medical Practices demanded that Najarian publicly accept responsibility for the case, take 60 hours of training on ethics and management and write a paper on the importance of ethics in exchange for not revoking his license. The U.S. Justice Department is suing the University of Minnesota on charges of alleging fraud and ill-gotten gains (Associated Press, 1997).

Data Cooking

To most scientists data cooking means any one of several types of data manipulations. For clarity, the definitions used by Sigma Xi are presented. Sigma Xi uses the following definitions, which are based largely on Babbage's 1830's definitions for data cooking (Sigma Xi, 1982):
trimming, "the smoothing of irregularities to make the data look extremely accurate and precise"; cooking, 'retaining only those results that fix [support] the theory and discarding others" and forging, "inventing some or all of the research data that are reported, and even reporting experiments to obtain those data that were never performed".

The line between trimming and removing a few insignificant data points is not clear. This makes trimming cases hard to prove. There is no strong agreement to that severity of removing data constitutes trimming. Twenty-two percent of faculty reported to "know of department members who have overlooked sloppy use of data" (Swazey et al., 1994). Six percent of faculty and nine percent of students reported knowledge of "data fabrication by faculty members" (Swazey et al., 1994). Relying on statistical tests of significance, double-blind studies, carefully phrasing survey questions and developing a hypothesis before the study are ways to help curtail bias (Committee on Science, Engineering and Public Policy, 1995).

Historical Cases

In 1981, Dr. John R. Darsee, a professor at Harvard University, was found guilty of data forging (Swazey et al., 1994). The Darsee case was exposed during the 1981 Congressional hearing on scientific misconduct (Broad et al, 1982, Hilts, 1992). Dr. Darsee was working under the leading cardiologist and physician-in-chief for two of Harvard's hospitals, Dr. Eugene Braunwald. Dr. Darsee was noted for his amazing young career. He published almost one hundred papers and abstracts on cardiovascular research. He was to be given a lab in the Harvard's Beth Israel Hospital. In May of 1981, Dr. Darsee was caught forging data. A colleague watched him bluntly forge raw data on an experiment for an upcoming paper. When
confronted, Dr. Darsee confessed and said that was an isolated incident. He did not withdraw the paper. The University’s internal investigation found him clear of any wrongdoing. However, he was stripped of his Harvard appointment, but permitted to continue his work on a prestigious NIH granted project. His colleagues protested to Braunwald to no avail (Hilts, 1992). Five months later, Dr. Darsee presented another set of results to NIH. NIH noticed something was wrong with the presented data. It was only after NIH became concerned that the dean of Harvard Medical school then assembled a blue-ribbon committee. The eight-member committee also found Dr. Darsee clear of any wrongdoing. It believed Dr. Darsee was justified in not notifying NIH or collaborators, or the scientific community of his falsifying data by withdrawing his paper (Broad et al., 1982).

Dr. Efraim Racker, Cornell University Albert Einstein Professor of Biochemistry, discovered a case of data forging in his very own lab. Mark Spector was considered a ‘superb experimenter’ while a doctoral candidate at Cornell University. He was invited to lecture by many including NIH. Spector worked with Dr. Ehrlich ascites tumor cells. Based on his past work he proposed a new method to explain how the tumor operates. The proposed method was in line with current ideas. Spector willingly showed gels, data and autoradiograms to fellow students and Dr. Racker. Spector’s results were even repeated by other scientists. Spector’s great results promoted Dr. Edward Scolnick, at NIH, to invite Spector to his lab to share his method. While at Dr. Scolnick’s lab, Spector could not reproduce his earlier results. He asked Dr. Racker to send him some enzymes from the lab under the pretext that the original enzymes did not survive the trip. With the samples from his home lab, Spector was able to reproduce his
earlier spectacular results. Dr. Volker Vogt, at Cornell University, was currently collaborating with Spector. While studying a gel made from samples supplied from Spector, Dr. Volker accidentally forgot to remove a glass plate from atop the gel. He proceed to take measurements of radioactivity, the monitor registered counts. This cannot occur if phosphate is the radioactive agent. Radioactive phosphate is a low-grade radioactive agent and cannot penetrate through glass. Dr. Volker tested the gel for the source of the radioactive. He found iodine. Iodine is not an agent that is used in such procedures. Dr. Scolnick later found iodine in his samples from the work done with Spector. With the suspicion that the samples were spiked with iodine, Dr. Racker confronted Spector. Spector denied any wrong doing and suggested that someone else may have spiked his samples. Spector was given three weeks to reproduce fresh enzymes, which would be given to Dr. Racker to assay. Spector did not comply. Meanwhile, other cases of data manipulations came to light. This caused Dr. Racher to ask Spector to leave the Ph.D. program. Spector initially refused. However, later Spector did leave (Racker, 1989).

Inhumane treatment of research animals

The first animal protection group and the beginning of the animal rights movement started in England during the early 1800's, with the Royal Society for the Prevention of Cruelty of Animals (Zak, 1989). The American Society for the Prevention of Cruelty to Animals, founded in 1866, was the first such organized movement in the United States (Philips, et al., 1989). The animal rights movement's largest argument is that animals have feeling and psychological awareness and this should prevent them from being instruments of science.
(Beauchamp, 1989; Zak, 1989). It is estimated that ten million U.S. citizens are members of an animal rights group (Zak, 1989). However, an Associated Press poll indicates that eighty percent of the public support animal use in medical research (Rozmiarek, 1987). The February 4, 1966 issue of Life magazine is given credit for initiating a huge onset of mail to Congress. This issue featured an article about laboratory animal dealers abusing dogs. Congress received more mail on this issue than on civil rights or the Vietnam War (Friend, 1990). Largely due to earlier animal rights protests, laws now exist guiding the use of animals in science (Beaucham, 1989; Friend, 1990; Philips, et al., 1989; Zak, 1989).

Great Britain was the first country to legally address animal rights issues with the 1876 Cruelty in Animals Act. It protects animals from misuse during experiments. It was followed by the Animal (Scientific Procedures) Act of 1986 which also regulates licensing and certification. This act added that the Secretary of State could not issue a license without full satisfaction that the applicant “has given adequate consideration to the feasibility of achieving the purpose of the programme to be specified in the license by means not involving the use of protected animals” (Zurol, et al., 1994). This is the first time scientists were required to justify the use of animals for their research.

The first United States legislation on animals, the “28 hour law” in 1873, regulates treatment of farm animals during transportation. The Laboratory Animal Welfare Act of 1966 regulated trade of animals for laboratory research. The law addresses animal care throughout the animals’ stay in a laboratory, but does not regulate care during experimental use. In 1970, the Act was amended and renamed the Animal Welfare Act. The amendment added the regulation of animal care during experiments. It is the responsibility of the U.S. Department of Agriculture's
Animal and Plant Health Inspection Service to enforce regulations. Research facilities are required to meet several requirements like passing USDA annual inspection(s), being federal and state registered, using animals from licensed animal dealers and submitting an annual report.

Accreditation by the American Association for Accreditation of Laboratory Animal Care (AAALAC) or institutional animal care and use committee is now required to receive animal research grants from governmental agencies. The 1985 amendment to the U.S. Animal Welfare Act established the Institutional Animal Care and Use Committees (IACUC) to “review all protocols for procedures involving live warm-blooded animals, whether or not pain or distress is likely to occur”. Only when procedures are accepted does the IAUC grant institutional approval needed to obtain federal grants. However, approval is conditional on annual inspections of facilities and evaluations of procedures (Zuroi, et al., 1994).

The Institutional Animal Care and Use Committee (IACUC) must approve all research involving animals at the University of Minnesota, in a laboratory or the field. The University’s Research Animal Resources center also performs unannounced inspections. The type of experiment determines the documentation needed. Non-observational field experiments need state approval through the state Department of Natural Resources. Study species, location, duration of study and extent of contact determines documentation required. The Principal Investigator is responsible for all occurrences with research with animals, even if responsibility has been delegated. Department chairs are responsible for the care of animals used for educational purposes (Department of Environmental Health and Safety, Spring 1988).
Historical Case

In 1995 the US National Aeronautics and Space Administration (NASA)'s Ames Research Center in California was allowed to resume animal experiments after a ten day suspension. The resignation letter of chief veterinarian, Dr. Sharon Vanderlip, promoted the investigation. In the letter, Dr. Vanderlip accused the center of not developing or documenting several federal procedures for the care and use of animals, the animal care and use committee of being ineffective, animal experiments not being properly conducted and records of faulty experiments being purged. William Berry, acting director of the space science, said that some of the problems were due to administrative “reconstructing”. A panel of four outside experts investigated Dr. Vanderlip’s allegations. They found that most of her claims were true. Kenneth Souza, assistant director for life sciences, says the center has since implemented a “corrective plan” (Dalton, 1995).

Inhumane treatment of research patients/humans

Most people in natural resources research would not consider the field in need of education about human research subjects issues because natural resources typically does not work directly with human subjects as patients. However, as part of the scientific community it is important to have knowledge of the issue. The Tuskegee Syphilis Study and other inhuman studies prompted Congress to pass the National Research Act in 1974. The act protects human subjects by mandating institutional review board approval for all federally funded research on humans. Until then approval outside of a researching agency was not needed (Gamble, 1997).
There is no case study for this topic.

Historical Case

In May 16, 1997, President William Clinton gave a national apology for the Tuskegee Syphilis Study. The U.S. Public Health Service funded the study That ran from 1932 to 1972 (Encyclopedia of Bioethics, 1995). During its activation 399 Black men from Macon County, Alabama were denied effective treatment for syphilis to document the natural development of the disease (Jones, 1993).

Compliance with environmental regulations-health and safety

According to the University of Minnesota Department of Environmental Health and Safety, the increase in experimentation and concern for environmental and personal health has caused at least "70 federal, state, and local laws, regulations, codes and ordinances" to now be a concern at the University of Minnesota. Universities once were exempt from many federal and local regulations, but not any more. Agencies like the Departments of Defense and Energy require grant applicants to have a "Certification of Environmental and Safety Compliance" "stating that the applicant is in compliance with applicable national, state and local environmental and safety laws and regulations" (Department of Environmental Health and Safety, 1998). The American Association for Accreditation of Laboratory Animal Care (AAALAC) and accrediting organizations require environmental and safety compliance when using animals. University of Minnesota's policy mandates that the Principal Investigator(s) is ultimately responsible for all safety issues for the work place s/he manages. The exception is radioactive materials, in which...
case the person who is the licensed Permit Holder, as defined under the Nuclear Regulatory Commission (NRC), is held responsible. All issues dealing with personal and environmental safety are to be addressed to the University's Department of Environmental Health and Safety. It is University policy that fines are paid by the unit (department) in which violation of policy incurs.

**Historical Case**

Harvard University was fined $2,500 by the Nuclear Regulatory Commission (NRC) for mistakes in the management of radioactive materials in 1986. Universities can be fined up to 5,000 dollars for such violations. Although there were twelve incidents cited, the overall control and oversight was sufficient, therefore the fine was not high. The university paid the fine without appeal and added two radiation health safety engineers with grant money. The University conducts its own unannounced inspections and had cancelled the licenses of two well-known laboratories for infractions like inadequate cleaning of spills (Collins, 1986).

**Copyright**

The misuse of copyright laws is possibly the most common ethical violation. When scientists do not adhere to copyrights regulations they violate federal law and participate in a form of plagiarism i.e., not giving credit for work done. Copyright is defined as the right granted by law to an author or other creator to control use of the work created (Association of American Publishers, et al., 1997). The law gives owners of work "the sole right to do or allow others to
do each of the following acts with regard to their copyrighted works: to reproduce all or part of
the work; to distribute copies; to prepare new (derivative) versions based on the original work;
and to perform and display the work publicly" (Association of American Publishers, et al., 1997).
The Copyright Act states that protection starts the moment the work is created. Registration
with the Copyright Office is not required to be protected under the law; however, it is before the

This includes works in the areas of literature, drama, music, choreographic, pictorial,
graphic, pantomimes, sound recording, sculptures, motion pictures, audio-visual reference works
(including dictionaries), videocassettes, computer programs and databases. Facts, ideas,
procedures, processes, systems, concepts, principles or discoveries are not protected under
copyright protection. However, they may be protected under patent or trade secret laws.
Although, "the literary or other form of expression and detailed organization of these ideas is
covered by copyright" (Association of American Publishers, et al., 1997). One can incur civil
and criminal penalties of copyright infringement (Association of American Publishers, et al.,
1997).

Educators often violate copyright law by misinterpreting the term 'fair use' (Association
copyright law, 'fair use' allows for limited use of portions of a copyrighted work without the
copyright owner's permission. The copied material can only be used for "criticism, comment,
news reporting, teaching, scholarship, or research" (Association of American Publishers, et al.,
1997). The following factors used to determine fair use are from the Questions and Answers on
Copyrights: For the Campus Community (Association of American Publishers, et al., 1997) and
is based on Section 107 of the Copyright Act:

1. The purpose and character of the use, including whether such use is of a commercial nature or is for non-profit educational purposes;

2. The nature of the copyrighted work;

3. The amount and substantiality of the portion used in relation to the copyrighted work as a whole; and

4. The effect of the use upon the potential market for or value of the copyrighted work.

All four factors must be met to qualify for 'fair use', even for educational purposes. Without permission, one copy of a completed work is permitted, except for software, for personal use. It is important to note that no response from an author does not mean permission has been granted (Association of American Publishers, et al., 1997).

'Fair use' does apply to computer programs. However, copying the entire program will not meet the factor of brevity and would need permission. An issue in copies of software is pirating, obtaining and distributing software for free (Association of American Publishers, et al., 1997; Gardner, 1997; Grossman, 1998; Haworth, 1997). When you buy software you also buying a license to use the material. The license is only valid for the person who purchases the software. Giving it to friends and colleagues is pirating and a violation of copyrights laws. However, selling of the original, not copies of the original, is allowed (Association of American Publishers, et al., 1997; Haworth, 1997). Universities are the largest pirates of software with freshman being the largest participants, according to Peter Beruk, director of the Software Publishers Association (Haworth, 1997). The organization is overwhelmed with reports of violations and currently only take actions against egregious cases. If a university is aware of a
student violating copyright laws and does not intervene, it and the student could be fined up to $100,000 each for every infringement. Universities can also be liable even if they are unaware of student’s violations and fined up to $20,000 (Haworth, 1997).

Due to the complexity of this topic it is recommended that the Questions and Answers on Copyrights: For the Campus Community Includes Software and Internet Issues, distributed by the Copyright Permissions Center be referenced for questions. All copyright permission issues dealing with the University of Minnesota can be handled through the University’s Copies on Campus or the Copyright Permissions Center.

Historical Cases

The misinterpretation of the term of ‘fair use’ was the basis for a lawsuit against Michigan Document Service (MDS). MDS and its owner James Smith were sued for violation of the fair use condition by copying information to create course packs (anthologies) without obtaining permission. Suits were filed by Princeton University Press, The Free Press and St. Martin’s under The Association of American Publishers (AAP) in 1992. The AAP was later joined in the suit by the Authors Guild, the American Society of Journalists and Authors and the Test and Academic Authors Association (Association of American Publishers, et al., 1997; Publishers Weekly, 1996). The Authors Registry, The Association of American University Presses and the Copyright Clearance Center filed separate briefs (Publishers Weekly, 1996). Lengths of seventeen to ninety-five pages and five percent to thirty percent of the material in question were used to construct course packets. The first ruling was in favor the publishing companies, stating that copyrights were violated (Association of American Publishers, et al.,
1997). However, in February of 1996 an appeal to a three-judge panel of the U.S. Court of Appeals for the 6th Circuit found in favor of MDS and Mr. Smith. The ruling was based the concept the course packets were used in an educational setting and therefore considered under fair use (Association of American Publishers, et al., 1997; Besek, 1996; Milliot, 1996; Slind-Flor, 1996). However, later appeals resulted in favorable rulings for the publishing companies and representatives (Publishers Weekly, 1996). The U.S. Court of Appeals for the 6th Circuit Judge David Nelson said that by not compensating publishers with use of their materials in course packets is a violation and the lack of compensation "can only have a deleterious effect upon the incentive to publish academic writings" (Publishers Weekly, 1996). The U.S. Supreme Court agreed. They denied requests to review the case due to agreement with the lower courts' judgements (Publishers Weekly, 1997).

A University of Puget Sound freshman was caught pirating software on his university supplied personal World Wide Web page by an employee of Emigre Inc., a software company. The unnamed student had over one hundred software programs on his web page for anyone to download. Some of the programs retail for $3,700 a piece. Emigre notified the Software Publishers Association, which notified the University of Puget Sound of the copyright violations. The University shut down the web site and punished the student for violation of their code of conduct. The Software Publishers Association decided that was not enough and negotiated an agreement. The student had to write a twenty page paper about computer piracy and copyright infringements at universities and perform fifty hours of community service. The community service was to help wire local schools for Internet access. Failure to comply would ensue a
$10,000 fine and Software Publishers Association could sue for copyright infringement

(Haworth, 1997).

Patents

Patenting in the United States began in 1790 when Congress created the Patent Commission. At the time the commission consisted only three members: the Secretary of War, the Attorney General and the Secretary of State, Thomas Jefferson. The only requirement to obtain a patent was a two-thirds favorable vote. Jefferson was the only member who was interested in the patents, so his contributions have shaped the current U.S. Patent and Trademark Office. Jefferson issued patents largely based on the idea that the patent allowed one to use inventions without “claim or complaint from anyone”. In 1793, to obtain a patent the inventor had to prove that the item was useful. The Patent and Trademark Office (PTO) is largely based on the Patent Commissioner which was implemented in 1836 (Blum, 1996).

Bayh-Dole and related legislation of the 1980’s has given universities intellectual property rights to inventions made by faculty and staff with federally funded research. This allowed universities to own and market their inventions. It has also caused universities to push faculty for more patents. The annual number of patents awarded to U.S. universities increased from 350-400 in early 1980s to 1,602 in 1993, totaling three percent of all U.S. patents (Petrick and Rischman, 1996). However, nineteen percent of scientists overall and thirty-two percent of those receiving biomaterials said corporate contributors expected ownership of all patentable results in which the gift was used (Basinger, 1998).
patented as human inventions” (Sagoff, 1998).

However, genes and organisms fall under the same patenting law. Their patents are also valid for twenty years after the submission of application. The marketing philosophy extends to genes and organisms.

In 1928 the courts denied the General Electric Company a patent on pure tungsten. The decision was based on tungsten not being invented but a “product of nature”. Although, tungsten is a natural chemical, the case defined natural products as unpatentable and defined legal use of the term ‘invention’. This ideology was upheld in 1948 when a patent for a mixture of bacteria was denied. The Supreme Court in the Funk Brothers Seed Company vs. Kalo Incoculant stated that the two strains of bacteria as a mixture did not occur in nature but that did not constitute an invention. “Patents cannot issue for the discovery of the phenomena of nature…[They] are part of the storehouse of knowledge of all men. They are manifestations of laws of nature, free to all men and reserved exclusively to none”, the Court reported.

Laws dealing with plants like the Plant Patent Act of 1930 and the Plant Variety Protection Act of 1970 only protected against unauthorized asexual and sexual reproduction, respectively of commercial breeding plants. Breeders were given a limited monopoly on the new plant breed; however, there was no mention of ownership and there were little objections. Then in 1980 the Supreme Court decided in favor of Chakrabarty in Diamond vs. Chakrabarty. Chakrabarty is a biologist who wanted to patent a hybridized bacterium. With that verdict the gates opened to biotechnology patents.

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patents for genes, gene fragments and sequences, human proteins, cell lines, and other naturally occurring compounds. For example, PTO issued a patent to Genetics Institute, Inc., for human erythropoietin (EPO), a protein of 165 amino acids that stimulate the production of red blood cells. Genetics Institute, Inc., never pretended to have ‘invented’ EPO. The company only extracted in tiny amounts from urine polymers (Sagoff, 1998).

The 1997 cloning of Dolly, a sheep, has also raised issues of human cloning and the patenting of clones (Feldbaum, 1995; Nature, 1997; Tsevdos et al., 1997). As of 1997 there were 1,500 patents of genes with 3,500 pending, and 37 patents for animals with 482 pending (Donlan, 1997).

Historical Case

Mr. John Moore had a rare disease, hairy-cell Leukemia. In 1987, he came to the University of California at Los Angeles with a spleen forty times the normal weight. Mr. Moore’s unique genes caused his body to make unusually large quantities of proteins, like interferon and interleukin, which stimulates the immune system. After his spleen was removed, his body used its overactive immunity to rid itself of the cancer cells. His doctor, Dr. David Golde, isolated and immortalized samples of cells from Moore’s discarded spleen. He then patented the cells. Dr. Golde then licensed the cell line to Sandoz, a Swiss pharmaceutical company. Sandoz was able to produce lucrative inventions. Mr. Moore took Dr. Golde to court claiming ownership of the cell line. Mr. Moore claims that he was misinformed about the purpose of the collection. Lower courts rejected Moor’s claim but the California Supreme Court suggested that a stronger issue of content is the clearness of the information Mr. Moore received. The case was settled
before it when back to trial (Blum, 1996).

Plagiarism

Plagiarism is the most discussed ethical violation. Most cases of plagiarism involve copying verbatim what someone else has written or said without citation. Another from of plagiarism that is not as widely addressed is the using of other's ideas without acknowledgement.

Swazey, et al found in their study of students (post doctorate and students) and faculty that eight percent of faculty and seven percent of students have observed or have other direct knowledge of plagiarism by faculty members within their department. Almost a third of faculty have first hand knowledge of student plagiarism (Swazey et al., 1994). The issue of plagiarism is evident enough to justify the US Public Health Service's Office of Research Integrity (ORI) and committees of the American Association for the Advancement of Science and the American Bar Association to meet in Washington to discus ways to end it (Maddox, 1995).

Historical Case

Dr. Elias Alsabti is a notorious case of plagiarism. He was a noted scientist, belonging to seven scientific societies and working in famous laboratories. He had copied, also most verbatim, at least seven articles which he published in infrequently read journals. In one case a paper was sent to a reviewer who had recently died. Dr. Alsabti took the manuscript from the reviewers mailbox, did a few minor adjustments, added his name and two fictitious authors. He
was able to publish the plagiarized article before the original author was able to (Broad et al., 1982).

Authorship, Attribution and Publishing

Most problems with authorship deal with whose name will appear, the ordering of names and justification for recognition. About a third of faculty surveyed in the Swazey, et al, study reported “cases of inappropriate credit given for authorship of research papers” (Swazey et al., 1994). The number of authors per article is an issue that is being widely discussed (Horton, 1998; McDonald, 1995; Regalado, 1995). The number of papers with more than 50 authors in 1981 was 49. In 1994 it was 407. The number with greater than 100 authors went from 1 to 182 during the same time period. And the number of papers citing more than 200 authors in 1988 was 1 and in 1994 grew to 98. The number with greater than 500 authors, first seen in 1989 with 1, was 18 as of 1994. Silvan Schweber, a Brandeis University professor of physics and history says, "It is a reflection of the complexity of the problem that people now must address". Physics has more authors per paper than any other discipline. The average number of authors per paper for all disciplines has risen to 1.7 from 1985 to 3.5 in 1995. For physics it was 5.6 percent in 1989 and 7.2 in 1995, a 28 percent increase in six years. The need for expensive equipment and large budgets in a time of low funding is the justification for the large collaborative efforts (McDonald, 1995; Regalado, 1995).

When working with companies the issue of ownership can control the publication date of a paper (Cho, 1997; Wheeler, 1997). An article in The Journal of the American Medical
Association surveyed 2,167 biomedical scientists at universities. The authors found that twenty percent of scientists had to stall publication of research findings for more than six months, to protect the commercial application of the work or to keep information from sponsors' competitors (Wheeler, 1997).

Ownership of data is also an issue when doing collaborative work. For the most part the person who 'owns' the data also owns the right to publish on it. The Institute of Scientific Information is reporting increases of more than 100 percent in the number of scientific papers published. More scientists are asking for clarity with ownership issues. The best way to avoid controversy is to discuss the issues before starting the work, even before dividing the work. People are more amenable before they start collecting data. Discuss who wants what data and for what purposes. Then decide on what amount of work, collection, writing, or obtaining equipment, will justify the ownership requested. And divide the work accordingly. When everyone understands their and the groups members expectations there is less misunderstanding with ownership.

Historical Cases

Dr. Paul Tipion was part of a team that discovered the top quark. This huge finding in physical science and the largest finding in his career was published in the April 3, 1995 issue of Physical Review Letters. Dr. Tipion was number 370 in alphabetical listing of 437 authors for the publication. It took two out of the paper's six pages to list the authors. With many authors it is difficult to discern the extent of anyone's' contribution. Dr. Tipion had to obtain recommendations from members of the team detailing his contributions to the finding as
significant for his career records (McDonald, 1995).

In 1995, Dr. Betty Dong, from the University of California at San Francisco (UCSF), had to pull her paper on drugs used to treat a thyroid condition from the *Journal of the American Medical Association*. Dr. Dong feared being sued by Boots Pharmaceuticals Inc. (now Know Pharmaceuticals Company) the sponsors of the research. Boots Pharmaceuticals Inc. invoked a clause that gave it the right to approve all possible publications. If the paper had been printed Dr. Dong could have been sued for breach of contract. The company claimed that it was just trying to protect its brand name drug, Synthroid which was used in the study. The study illustrated that Synthroid was no more effective than a less-expensive generic drug. The annual gross of Synthroid from its 8 million US users is $356 million. Dr. Dong noted the clause when she signed the contract that stated Boots Pharmaceuticals Inc., wanted to see any related articles before publication, but she did not take is seriously. Her signing of the contract was against university policy. UCSF told Dr. Dong that they could not guarantee her legal or financial protection if a lawsuit were to occur. Boots Pharmaceuticals Inc. wanted to suppress the paper permanently. Then *The Wall Street Journal* published an article on the case. It was only then, in 1997, that the company agreed to allow publication of the paper (Cho, 1997, Wheeler, 1997).

Whistleblowing

The fear of retaliation for whistleblowing, reporting misconduct, is large. More than half of the students (graduate and post doctorate) believed that if they reported misconduct by a faculty member they would be retaliated against. Twenty-nine percent of them expected
sanctions for reporting misconduct among students. Faculty members echo this concern. Sixty percent of faculty interviewed thought they could report misconduct among students; thirty-five percent believed they could report faculty misconduct without retaliation. Of the faculty and students who confronted people about or reported misconduct believe their concerns were ignored, they were penalized, or the incident was covered up (Swazey et al, 1994).

Retaliation against whistleblowers has promoted federal legislation to increase protection of them. Institutions are now required to protect the positions and reputations of whistleblowers whose allegations of misconduct are made with good faith, regardless if the allegations are proven true (Poon, 1995). The first and fourth Amendment to the U.S. Constitution and the Whistleblower Protection Act of 1989 protects against government retaliation. The Commission on Research Integrity gathered in 1996 to revise the scientific misconduct codes for the Department of Health and Human Services (DHHS). Added was the Bill of Rights for whistleblowers. It allows for legal disclosure of research misconduct without retaliation and “assures fair, objective and timely procedures for investigating complaints, disputes and allegations of misconduct” (Marwick, 1996). But there are questions to the enforcement of this and similar declarations (Fuchs et al., 1996; Poon, 1995). The National Institute of Health Revitalization Act of 1993 gives guidance for protecting whistleblowers. The University of Minnesota also protects against retaliation by punishing those who retaliate. It also disciplines those who make allegations of misconduct out malicious intent.

Sigma Xi and the Committee on Science, Engineering, and Public Policy have dedicated chapters on whistleblowing in their publications, *Honor in Science* and *On Being A Scientist* (Sigma Xi, 1982; Committee on Science, Engineering, and Public Policy, 1995). The chapters
explain the need to support reporting of misconduct. They also recognize how reporters of misconduct are ‘pushed’ into silence or silently ‘pushed’ out of science (Committee on Science, Engineering, and Public Policy, 1995; Broad, 1981; Sigma Xi, 1982). Both of these notions may account for the Baltimore case being one that clearly illustrates whistleblowing.

Historical Case

These reports are described in the well-known ‘Baltimore Case’. O’Toole was fired from her postdoctoral position after reporting a case of misconduct by her principle investigator, Dr. Thereza Imanishi-Kari. O’Toole’s allegations were latter proven. The scientific community at large rejected her, illustrated by her inability to find another science related job for five years (O’Toole, 1991). Even the NIH’s 1989 ‘final’ report of the case “conspicuously omitted” any praise for O’Toole’s actions and determination. A statement of ‘praise’ was later added to the NIH report. But when the praise was printed in Science no name was accredited for bringing to the magazine’s or NIH attention (Anonymous, 1991).

Controlling Ethical Violations

With the strong fear of retaliation, how can self-policing occur? Even though only thirty-five percent of faculty believed they could report colleagues for misconduct, ninety-four percent of them feel obligated to peers to report misconduct. The respondents view of their department has having a week commitment to handling misconduct. Only twenty-seven percent of the interviewed faculty believed their “departments actually exercise a great deal of responsibility for their students’ conduct”(Swazey et al., 1994). The issue of who should and how to police
science is one that has been drawing suggestions. Almost everyone in the scientific community believes that we need to do a better job. Some proposed methods include the use of peer-social pressure, increased regulations in societies and journals and additions to agency responsibility.

Peer Pressure

The use of peer pressure to control misconduct usually works through the fear of disgrace and isolation for violations from peers reporting misconduct. How effective has this been. For example, Dr. Thereza Imanishi-Kari was removed from her position at Tufts University. But Dr. Baltimore received a minor demotion and was allowed to stay on staff. Dr. O'Toole was unemployed for five years. Peer pressure was used in the University of Minnesota case of Dr. John Najarian, even though he was acquitted of federal charges. His punishment for misusing research funds was a demotion as department head, but he is still on staff.

Ms. G.K. Gunsalus, associate provost at the University of Illinois at Urbana-Champaign, says that interaction between colleagues ensures honesty. Based on her experience on several national committees on scientific integrity she believes, that someone doing “scholarchy, meaningless research” will not receive tenure or get promoted (Blumenstyk, 1998). However, in cases like Daress, Imanishi-Kari and Baltimore and others it was not “scholarchy” work that exposed their misconduct. On the contrary, it was the persistence of junior scientists that brought their misconduct to light. Dr. Racker, after experiencing misconduct in his own laboratory, believes supervision is the key, “not because of fear of fraud, but because it is part of our teaching responsibility to detect errors, [or] inappropriate controls” (Racker, 1989). Peer pressure can work negatively too. In the Baltimore Case, those who knew and respected Dr.
Baltimore wrote a series of letters to journals and other publications standing up for his reputation and denouncing Dr. O'Toole and Mr. Dingell (Baltimore, 1991).

**Journals Regulations**

Peer review is not designed to detect fraud, but to detect poor designs, interpretations, and poorly formed questions (Relman, 1989; Woodward, 1996). However, without the raw data, which are often not submitted with the paper, it is hard to detect fraud, unless "claims defy reason or violated well-established basic principles" (Broad, 1981; Relman, 1989). And the review process is based on the assumption that the paper is truthful (Relman, 1989). Dr. Recker points out that those who repeatedly disregard ethical rules without detection or question for a long period of time are smart. They know how to tailor their misconduct without drawing attention to their themselves (Relman, 1989; Siegal, 1991). Dr. Relman suggests that journals request that all co-authors accept full responsibility for the integrity of the research and its reporting (Relman, 1989).

*The Journal of the American Medical Association* requires its authors to disclose any possible conflicts. Dr. Drummond Rennie, a deputy editor believes, "If we think it's important, as often as not, we disclose it to the readers. I'm sure you'll find a whole lot of journals that don't" (Blumenstyk, 1998). However, Ms. G.K. Gunsalus, associate provost at the University of Illinois at Urbana-Champaign, believes that it is appropriate for research journals to publish disclosures. Other university officials agree. However, journal editors feel it is impractical to place the burden of policing on them. Dr. Drummond Rennie says, "We [journals] are not an enforcing organization. If people choose to lie, there's nothing we can do about it. We're not
the F.B.I.” (Blumenstyk, 1998).

Mr. Sheldon Krimsky, a Tufts professor, performed a 1996 study on journal disclosures with three colleagues. They investigated authors-industry relationships of nearly eight hundred scientific papers published in fourteen journals during 1992. In a third of the papers, at least one of the lead authors had a financial interest related to the research. In many of these cases the reader was not made aware of this possible conflict of interest (Blumenstyk, 1998; Cho, 1997). A New England Journal of Medicine article to investigate the influence of drug companies on academic science, found that ninety-five percent of the researchers that authored favorable articles about a controversial class of drugs for hypertension and angina treatment had financial ties with the maker of the drug. Of the seventy papers studied, only two had disclosed conflicts. Of the authors who wrote critical articles, thirty-seven percent had financial ties (Blumenstyk, 1998).

The International Committee of Journal Editors in 1997 recommended that journals instill a conflict of interest policy for all authors, reviewers, and editors. They also widened the view of conflict to include financial, “personal relationships, academic competition, and intellectual passion” (Blumenstyk, 1998). About five hundred journals claim to follow the committee’s general guidelines.

Thomas J. Moore, senior fellow in health policy at George Washington University Medical Center, says that acknowledgements are inadequate in they do not indicate amounts of money. He based this on the need for subconscious influences to be formally recognized, “the pressures may be too subtle for them (researchers) to realize’ and others agrees (Blumenstyk, 1998; Cho, 1997).
Historical Case

In August of 1996 Dr. Stuart Rich and colleagues published a paper in *The New England Journal of Medicine* stating the diet pill ‘fen-phen’ could cause a potentially fatal lung condition. The same journal issue contained a commentary by two other physicians. The commentary minimized Dr. Rich study’s conclusions about the dangerous side effects. However, the authors of the commentary did not disclose they were paid consultants to producers or distributors of similar drugs. The two authors did not inform *The New England Journal of Medicine* or the readers know of this information. The journal says that it would have avoided any question of bias, i.e., it would not have published, if it had been aware of the commentary authors being consultant agents. The commentary authors believed they had disclosed what was necessary. Since the ‘diet-pill case’ the journal has strengthened its policy on opinion articles to help insure they are not written by bias parities. It now requires that authors of commentaries and reviewers sign statement attesting that they, “have no current, recent past, or planned future financial associations (such as equity interest, consultancies, or major research) with a company that stands to gain from the use of a product (or its competitor) discussed in the editorial or review” (Blumenstyk, 1998).

Education

Two main reasons for scientific misconduct are flagrant disregard for rules and ignorance. Ignorance can be prevented through education. Education aids in detecting misconduct and
knowledge of methods to address it. Although education is an effective method of combating scientific misconduct, only recently has the subject been formally taught (Barden et al, 1997; Gunalsus, 1997a, 1997b). The interest in formal ethical training has been fueled by recent reports of misconduct and granting agencies formal ethical instruction requirements (Barden et al, 1997; Gunalsus, 1997a, 1997b). Many universities, like the University of Minnesota, are conducting workshops and mini courses on ethics for those needing documentation for grants and for the greater community.

Although the push for formal ethical training is largely from outside universities, eighty-eight percent of faculty and eighty-two percent of students believe ‘ethical preparedness’ training should be an important function of their academic department and universities”. However, only three percent of students and four percent of faculty in the study believe their departments “take a very active role in [ethical training]” (Swazey et al., 1994).

The surveyed participants did not see the discrepancy between importance and action. Both groups believe that the “most effective ways for students to learn professional values and ethical standards are by interacting with faculty members in research work” (Swazey et al., 1994). However, few survey respondents illustrated a strong confidence in the ethical conduct of peers or colleagues or a high confidence in freedom to report misconduct without retaliation (Swazey et al., 1994).

The consensus is that ethical training should occur along with technological training and is less effective when addressed separately. The lack of confidence in the ethical conduct of peers and their teaching of ethics to students has lead to proposals that ethical training is an individual responsibility. A responsibility that everyone takes on when entering the profession.
The reasons given for the views that ethical education is a personal pursuit are: colleagues detect most cases of ethical misconduct, possible misconduct should be initially addressed person to person, and being part of the scientific community obligates one to protect it against misconduct. Keeping informed about cases of misconduct, staying abreast of current issues, discussing ethical issues with colleagues and students, and taking an active role in graduate students work are the proposed methods. However, a combination of all of these; personal informing, formal training and learning from colleagues presents the most comprehensive approach and should be used to their fullest.
Case Studies

Conflict of Interest

1. Unix, a leading herbicide company that is funding Betty’s research is calling several times a day wanting to hear the results of the test. Betty is testing the environmental effects of the OUT, Unix’s main herbicide, on corn crops. One of her research assistants tested chemical residual on the corn seeds after normal processing. He found significantly high amounts of toxic chemical on the corn. The amounts were ten times higher than legally permitted. Betty has allowed the experiment to go forward because the seeds were readily available and overhead would be low. She has heard stories about funding not being renewed when unfavorable results are found. She has already received equipment that she ordered using other accounts expecting to replace them with next year’s Unix funding.

Should Betty report the chemical residual findings? What are the responsibilities of the research assistance? What University of Minnesota’s guidelines apply here? What are the consequences if Betty does nothing?

2. Nathan, a professor, is a consultant to a local paper company. They have come to an agreement as to his pay and time so that he is not violating university policy. Part of his consulting job involves a lot of travel. Ed it housed in the best hotels and given an elaborate travel budget. He is allowed to take is wife on many of his travels.
Should the perks of consulting be considered as 'payment'?

Data Cooking

1. The group had just turned in the abstract. They now have four months to construct the poster. Bill had to go out of town so Jim and Ellana did the last minute work. When Bill got a copy of the conference program he looked up their abstract. It was not what they discussed. There were claims to results on research that they had not even started. And the language strongly suggested how the conclusions would influence other areas of science.

What, if anything, should Bill do? Who should he go to first?

2. Marie was having difficulty with analyzing her data. She went to her advisor, Denise, for assistance. Denise told her to remove some of the points that were "just erroneous". Marie did as she was told. However, she still does not understand the justification for classifying some points as 'removable'.

Should Marie just go with what she was told? What could Marie do to clarify this? In the future what could Denise do?
Animal rights

1. Margaret's Master's thesis subject is the fish Walleye. She will be conducting collection and release measurements. The best way for her to collect the fish with the least amount of trauma is to shock them.

What guidelines does Margaret have to follow? Does she need to obtain permission? Who should she see at the university to answer these questions about the federal regulations that pertain to her?

2. Part of Bill's project involves monitoring the number of fish over 10 inches that travel through a narrow stream between ponds. He has a device that can count the number of fish from above the water. He plans to mount the device on a tree overlooking the stream.

Who does Bill have to seek approval from to conduct his experiment? Why or why not?

Copyright

1. Sarah taught a class winter quarter. It required her to place a lot of copied material on reserve in the library. Her major professor, May, is leaving to do some consulting work during part of the summer. May asked Sarah to teach the class. Sarah plans to use the same materials.

What may Sarah have to do other than dig out the old materials? Where should Sarah go
with any copyright questions?

2. It is Tyron’s turn to present a current paper at the weekly lab meeting. Tyron plans on making copies of the paper for each member in his lab for the lab meeting. While at the library he makes a copy of another article for himself.

Does he need to obtain copyright permission? If so for which publication, the paper or/and the article? How many pages can he copy without needing to obtain permission?

Plagiarism

1. While grading exams, Michael, the Teacher Assistant, runs across a paper that seems very familiar. Thinking that he may have two copies of the same paper he goes back through the pile on his desk. He finds that major sections of this paper are contained verbatim in another student’s paper.

What should Michael do? What is he obligated to do?

2. Mary had been having trouble getting the results she hoped for in her experiment. During a lab meeting she brought up her frustrations. Emily has done similar work in the past and offered to assist Mary. Several of the ideas about approach were the turning point in Mary’s work. After taking Emily’s suggestions everything started falling into place. However, when
Mary wrote the paper she did not acknowledge Emily at all.

Should Mary have acknowledged Emily’s assistant? Why or why not? If yes, then where should Mary do so?

Authorship, Attribution and Publishing

1. Ed is doing is Ph.D. work in fisheries at Flower Hill, which is owned by the ecology department. The work will build upon earlier studies done by his advisor and Sue, a colleague at other university. Sue is sending a student to Flower Hill to assist Ed and collect some data for his Master’s thesis. Ed plans on publishing the results when he has completed the study.

Who do you think owns the data? Does the ecology department have any claims? If the results of Ed’s study are published how should be first author? Should the other student be considered a co-author? How do you think Ed should handle this situation?

2. Evon is has finished writing her first scientific paper for publication. She has given it to her advisor to read over. When she got it back she noticed that her name was replaced as first author by her advisor’s. Evon was listed as second author. Evon does not think this is fair.

What can she do about this? How can she avoid this in the future?
Whistleblowing

1. Geralynn and Andrew have been working on a research project for a few months. Both are working towards their Master’s degrees. They have divided the tasks so that each is collecting data for different parts of the project. They met monthly to discuss progress in detail. During their last meeting Andrew was puzzled by Geralynn’s results. They seem to fit their hypothesis almost perfectly. When he inquired about how she was obtaining such clean results she changed the subject. Later, in informal settings he asked her again about her techniques. She avoided giving him a straight answer. At the next meeting Geralynn produced very clean results again. This time when Andrew asked about them she got angry. She accused him of calling her a liar and left the room. Andrew thesis is heavily tied into the work Geralynn is doing as is hers to his work.

What should Andrew do? Who should he see first?

2. Last week, Betty, Bob and Drew met with their department head. Betty suspects that Bob has been spiking samples to obtain favorable results. When she confronted him, he said it looks like spiking because she is a novice to the field. Betty, who is a new student to the lab, began asking others in the fields about their procedures. Their procedures did not resemble Bob’s. Fearing that Bob was spiking data, Betty went to their advisor, Drew. During their meeting Drew praised Bob for his hard work in the lab over the years and his solid results. Betty felt that her concerns were being ignored. She then reported the incident to their department.
head. Thus far Betty has followed the recommended procedure of deciding possible misconduct.

If the department head does not address the issue, who should Betty see next?
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