



NATIONAL SCIENCE FOUNDATION
OFFICE OF INSPECTOR GENERAL
OFFICE OF INVESTIGATIONS

CLOSEOUT MEMORANDUM

Case Number: A07120069

Page 1 of 1

Our investigation determined that the Subject¹ knowingly fabricated figures in a publication describing NSF-supported research and in her Ph.D. dissertation. The Subject's acts were a significant departure from accepted standards, and constituted research misconduct. NSF took the following actions: made a finding of research misconduct by the Subject; sent a letter of reprimand to the Subject; debarred the Subject for 3 years; required the Subject to submit certifications to the Assistant Inspector General for Investigations (AIGI), NSF OIG for 3 years after debarment ends; required the Subject's employer to submit assurances to the AIGI of NSF OIG for 3 years after debarment ends; prohibited the Subject from serving as a reviewer of NSF proposals for 6 years; and required the Subject to provide certification to the AIGI that she has completed a course in ethics training within one year of the finding of research misconduct.

This memo, the attached Report of Investigation, and the Deputy Director's letters constitute the case closeout. Accordingly, this case is closed.

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National Science Foundation Office of Inspector General



Confidential
Report of Investigation
Case Number A07120069



This Confidential Report of Investigation is the property of the NSF OIG and may be disclosed outside NSF only by OIG under the Freedom of Information and Privacy Acts, 5 U.S.C. §§ 552, 552a.

Executive Summary

Allegation:

We received an allegation that the Subject had fabricated images in a publication and in her Ph.D. dissertation.

The University's investigation established that:

- the Subject falsified images that appeared in a publication and in her Ph.D. dissertation;
- the Subject acted purposefully; and
- the Subject committed research misconduct.

OIG concludes that:

- **Act:** The Subject falsified images representing scans of gel blots and thin-layer chromatograms.
- **Intent:** The Subject acted purposefully.
- **Significant Departure:** The Subject's acts were a significant departure from accepted practices of her research community.
- **Standard of Proof:** A preponderance of the evidence supports a finding that the Subject committed research misconduct.

OIG recommends that NSF:

- make a finding of research misconduct by the Subject;
- send a letter of reprimand to the Subject;
- debar the Subject for 3 years;
- require the Subject to submit certifications to the Assistant Inspector General for Investigations (AIGI), NSF OIG for 3 years after debarment ends;
- require the Subject's employer to submit assurances to the AIGI of NSF OIG for 3 years after debarment ends;
- prohibit the Subject from serving as a reviewer of NSF proposals for 6 years; and
- require the Subject to provide certification to the AIGI that she has completed a course in ethics training within one year of the finding of research misconduct.

Case Initiation

We received an allegation that the Subject¹ had improperly manipulated images in a publication² that acknowledged NSF support.³ We referred an inquiry to the University;⁴ the inquiry⁵ established substance to the allegation. We subsequently referred an investigation to the University, which conducted an investigation.⁶

University's Investigation

We received a copy of the University Investigative Committee's (IC) report and supporting documents and exhibits.⁷ As a part of its investigation, the IC interviewed the Subject, the Subject's faculty advisor, her laboratory colleagues, and examined computer records and laboratory notebooks. Additionally, the IC reviewed individual images that appeared in the publication⁸ and the Subject's Ph.D. dissertation,⁹ and examined the supporting records for those images.

The IC examined the images with image software and identified image manipulation that "went well beyond what most scientists would consider reasonable."¹⁰ The IC concluded, by a preponderance of the evidence, that the Subject intentionally falsified Figures 1A, 1B, 3B, 3C, 4A, and 4C in the publication. The IC concluded that corresponding images appearing within Chapters 4 and 6, and the Appendix, of the Subject's Ph.D. dissertation also were intentionally falsified.

The IC examined additional images in the Subject's Ph.D. dissertation, and supporting records for those images. The IC concluded, by a preponderance of the evidence, that the Subject intentionally falsified Figure 3 (left panel), Figure 3 (right top panel), Figure 3 (right bottom panel), Figure 4 (top panel), Figure 4B (Appendix), Figure 4E (Appendix), and Figure 6 (Appendix) in her dissertation. The IC examined all supporting records provided by the Subject for each image. The Subject was unable to provide the original data file for multiple figures for which the IC had concerns. The IC report stated:¹¹

[The Subject] could not identify original films for Figs. 3 or 4 in Chapter 6 of her dissertation, and yet she identified films for Figs 4C, 5A, and 6B in the Appendix, for which the Committee expressed no concerns. This

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The publication (attached at Tab 1) acknowledges NSF support to

We referred an inquiry to because the University was in a better position to make a definitive assessment of substance.

⁵ The university's inquiry report is at Tab 3.

⁶ Our referral of investigation letter is at Tab 4.

⁷ The IC report is at Tab 5.

⁸ Tab 1.

⁹ The Subject's Ph.D. dissertation is included at Tab 6.

¹⁰ IC report, Items 1-5, pages 4, 5 (Tab 5).

¹¹ IC report, page 8 (Tab 5).

strengthened the Committee's concerns that [the Subject's] ability to find particular films was inversely related to the committee's interest in them. That is, she continued to find films for images that were of no concern, but failed to find films for suspect images.

The IC also noted that the Subject was unable to provide original data for Figure 2A, Figure 2B (lane 2), Figure 3A, Figure 3C (lane 1), Figure 4B, and Figure 4D in the publication. The IC concluded that the inability to produce the original source files would also be considered unreasonable by most scientists.

Prior to her final interview with the IC, and after initial evaluation of the images had been completed by the IC, the Subject provided original film records for some of the images. Although these originals had previously been requested, the Subject did not provide them at that time. The IC examined the newly provided films and compared them to the manipulated images in the Subject's dissertation. The IC concluded that some of the films did not correspond to the questioned images. However, the IC concluded that the Subject improperly manipulated the scanning process when she removed artifacts from several of these images, and that this constituted intentional falsification of the image by the Subject.

The Subject responded to each of the IC's findings regarding the falsified images. In some instances, the Subject admitted to sloppiness, but the Subject steadfastly denied intentional falsification of the images. In a final interview, the IC asked the Subject if cutting and pasting of the images had occurred. The Subject responded:¹²

They must have been. I mean, I can't argue – some of the – some of the films I can put my hands on I can show that those alterations were not done. But there are things that look like the films were altered or the files were altered. And I did not do them. And I have no explanation for that. But I – I understand that in the end that these are things that I represented as my data, and that is completely wrong.

The IC concluded that the Subject's intentional falsification constituted research misconduct. The Subject's manipulation of images involved cut-and-paste operations from several graphics files, and the repositioning of the copied image at a desired position in the final falsified image. In other instances, smaller images were flipped horizontally or vertically and then copied into a larger image.¹³ These image manipulations are clearly intentional.

The IC recommended retraction of the publication in which the falsified images appeared, and retraction of Chapter 4, Chapter 6, and the Appendix of the Ph.D. dissertation. The IC concluded that the decision as to whether the Ph.D. degree awarded to the Subject should

¹² IC report, page 8 (Tab 5).

¹³ The IC report provides the detail for the fabrication and falsification of each separate image. For instance, the IC determined that Figures 1A, 3B, 3C, 4A, and 4C in the publication were fabricated by compiling a series of smaller independent images, and that Figure 1B was falsified because that same image appears twice but with different descriptions. Additional instances of manipulation of figures in the publication and the Subject's dissertation are detailed in the IC report.

be revoked resided with the Graduate School. Finally, the IC recommended public disclosure of the Subject's research misconduct.

The University Provost (Tab 7) concurred with the report of the IC, and took action to revoke the Subject's Ph.D. degree and retract the dissertation.¹⁴ A retraction of the publication appeared in [REDACTED] (also at Tab 7).

OIG's Assessment

On receipt of the University's investigation report, we resumed our investigation, and so informed the subject. We also invited the Subject to comment on the University IC report. The Subject did not respond.

We concluded that the IC report was accurate and complete, and that the University followed reasonable procedures. OIG accepts the report in lieu of its own investigation. Exhibits included with the report¹⁵ convincingly show that images in the publication and in the Subject's Ph.D. dissertation were composites from several separate image files. The Subject denied falsifying the images, and the faculty advisor claimed (at first)¹⁶ that only acceptable manipulations of contrast and brightness were completed, but the evidence clearly indicates otherwise.

A finding of research misconduct by NSF requires that 1) there be a significant departure from accepted practices of the relevant research community, that 2) the research misconduct be committed intentionally, or knowingly, or recklessly, and that 3) the allegation be proved by a preponderance of the evidence.¹⁷

Acts that are a significant departure

The Subject falsified multiple images in both a publication acknowledging NSF support, and in her Ph.D. dissertation. The Subject's falsified images appeared in a research publication¹⁸ for which the manuscript submission guidelines are specific:

While image manipulation is often desirable for clarity and/or brevity of presentation, manipulation for deceptive purposes either to unfairly enhance or eliminate or otherwise obscure data is misconduct and will be resolved according to Journal policy. For graphic material, we have adopted a policy taken from The Journal of Cell Biology.

No specific feature within an image may be enhanced, obscured, moved, removed, or introduced. The groupings of images from different parts of

¹⁴ The University is also considering possible sanctions for the faculty advisor [REDACTED] however, no actions were taken as of the time of this report.

¹⁵ Appendix K in the IC report.

¹⁶ An undated letter from the Subject's faculty advisor is included in the Inquiry Report as "To Whom It May Concern" (Tab 3).

¹⁷ 45 C.F.R. §689.2(c).

¹⁸ [REDACTED]

the same gel, or from different gels, fields or exposures must be made explicit by the arrangement of the figure (e.g. using dividing lines) and in the text of the figure legend. Adjustments of brightness, contrast, or color balance are acceptable if and as long as they do not obscure or eliminate any information present in the original. Nonlinear adjustments (e.g. changes to gamma settings) must be disclosed in the figure legend.¹⁹

The Subject's acts are a clear and significant departure from this consensus policy of her research community.

Intent

We agree with the University IC that the Subject's actions were purposeful. The Subject's manipulation of images involved cut-and-paste operations from several graphics files, and the positioning of the copied images at the desired position in the final falsified images. In other instances, smaller images were flipped horizontally or vertically to attain the desired appearance and then copied into larger images. These image manipulations are clearly purposeful.

Standard of Proof

The IC examined the allegedly falsified images and (when available) the original image files, and reconstructed the steps involved in the falsifications.²⁰ The Subject agreed that falsification had occurred in some images in both the publication and in her dissertation, but denied doing so herself. However, the Subject was solely responsible for creation of the figures in her dissertation. The IC concluded that the preponderance of evidence shows that the falsification was completed by the Subject, and we concur.

We therefore conclude that the Subject's purposeful acts of falsification constitute research misconduct.

OIG's Recommendations

When deciding what appropriate action to take upon a finding of misconduct, NSF must consider: 1) how serious the misconduct was; 2) the degree to which the misconduct was reckless, knowing, or intentional; 3) whether it was an isolated event or part of a pattern; 4) whether it had a significant impact on the research record, research subjects, other researchers, institutions or the public welfare; and 5) other relevant circumstances.²¹

Seriousness

Falsification of images undermines the core of research integrity, subverting not only immediate research conclusions, but also creating a false foundation for subsequent research. The IC report stated²² that the Subject's research misconduct:

¹⁹ The guidelines are at: [REDACTED]

²⁰ Appendix K in the IC report provides many details of the image manipulation and the tools used to expose it.

²¹ 45 C.F.R. §689.3(b).

undermines the scientific reputation of her advisor, the department, the college, and the university. Moreover, it betrays public confidence and trust in the scientific and academic institutions. Each revelation of misconduct begs the question among our peers and our constituents: how many more remain to be uncovered?

Accordingly, the Subject's numerous falsification of images in this case rises to a seriousness that justifies debarment.

Degree to which the Act was Purposeful

The Subject falsified numerous images in the publication and in her Ph.D. dissertation. This action requires both a willingness to accomplish this deceit, as well as an understanding of what results the images should support, and the premeditated plan to falsify the images to achieve that end. Her actions were distinctly purposeful.

Pattern

The Subject exhibited a pattern of research misconduct through multiple image falsifications from the time of submission of the publication, through its acceptance and publication, through to the preparation of her Ph.D. dissertation, and finally her defense of it before the faculty of her University.

Impact on the research record

The publication in which the falsified image appeared has been cited 6 times.²³ The University Provost has decided that the publication should be retracted. The University is separately considering what actions to take with respect to the subject's Ph.D. dissertation, which remains available online.

Subject's Response to the Draft Investigation Report

We sent a draft copy of this report to the subject for comments. We received no response.

Recommendation

Based on the evidence in this case, NSF OIG recommends that NSF:

- Make a finding of research misconduct;
- Send a letter of reprimand to the Subject;²⁴
- Debar the Subject for a period of 3 years;²⁵

²² IC report, page 9.

²³ Citations to this publication are tabulated in the Science Citation Index.

²⁴ This is listed as a Group I action, 45 C.F.R. § 689.3(a)(1)(i).

- Require the Subject to submit certifications to the Assistant Inspector General for Investigations (AIGI), NSF OIG for 3 years after debarment ends;²⁶
- Require the Subject's employer to submit assurances to the AIGI of NSF OIG for 3 years after debarment ends;²⁷
- Prohibit the Subject from serving as a reviewer of NSF proposals for 6 years;²⁸ and
- Require the Subject to provide certification to the AIGI that she has completed a course in ethics training within one year of the finding of research misconduct.²⁹

²⁵ Debarment is a Group III action, 45 C.F.R. § 689.3(a)(3)(iii).

²⁶ A certification is similar to Group I actions, 45 C.F.R. § 689.3(a)(1).

²⁷ This is a Group I action, 45 C.F.R. § 689.3(a)(1)(iii).

²⁸ This is a Group III action, 45 C.F.R. § 689.3(a)(3)(ii).

²⁹ Ethics training is similar to Group I actions, 45 C.F.R. § 689.3(a)(1).

NATIONAL SCIENCE FOUNDATION
4201 WILSON BOULEVARD
ARLINGTON, VIRGINIA 22230



OFFICE OF THE
DEPUTY DIRECTOR

CERTIFIED MAIL --RETURN RECEIPT REQUESTED

*Re: Notice of Proposed Debarment and Notice of Research Misconduct
Determination*

Dear [REDACTED]

In 2007, you published an article in the [REDACTED]

[REDACTED] In addition, in 2007, you submitted a dissertation to the Graduate Faculty of [REDACTED] in support of your pursuit of a doctorate degree. As documented in the attached investigative report, you knowingly falsified images that appeared in the publication and your dissertation.

In light of your misconduct, this letter serves as formal notice that the National Science Foundation ("NSF") is proposing to debar you from directly or indirectly obtaining the benefits of Federal grants for a period of three years. During your period of debarment, you will be precluded from receiving Federal financial and non-financial assistance and benefits under non-procurement Federal programs and activities. In addition, you will be prohibited from receiving any Federal contracts or approved subcontracts under the Federal Acquisition Regulations ("FAR"). Lastly, during your debarment period, you will be barred from having supervisory responsibility, primary management, substantive control over, or critical influence on, a grant, contract, or cooperative agreement with any agency of the Executive Branch of the Federal Government.

In addition to proposing your debarment, I am prohibiting you from serving as an NSF reviewer, advisor, or consultant until [REDACTED]. Furthermore, for three years after the period of debarment expires, I am requiring that you submit certifications, and that a responsible official of your employer submit assurances, that any proposals or reports that you submit to NSF do not

contain plagiarized, falsified, or fabricated material. Lastly, you must complete an ethics training course on research misconduct no later than [REDACTED], and certify in writing to the OIG that you have done so.

Research Misconduct and Sanctions other than Debarment

Under NSF's regulations, "research misconduct" is defined as "fabrication, falsification, or plagiarism in proposing or performing research funded by NSF ..." 45 CFR 689.1(a). Falsification is defined as "manipulating research materials, equipment, or processes, or changing or omitting data or results such that the research is not accurately represented in the research record." 45 CFR 689.1(a)(2). A finding of research misconduct requires that:

- (1) There be a significant departure from accepted practices of the relevant research community; and
- (2) The research misconduct be committed intentionally, or knowingly, or recklessly; and
- (3) The allegation be proven by a preponderance of evidence.

45 CFR 689.2(c).

As the OIG's report demonstrates, you falsified images representing scans of gel blots and thin-layer chromatograms. These falsified images appeared in the article published in the [REDACTED], as well as your Ph.D. dissertation. Thus, your conduct unquestionably constitutes falsification. I therefore conclude that your actions meet the applicable definition of "research misconduct" set forth in NSF's regulations.

Pursuant to NSF's regulations, the Foundation must also determine whether to make a *finding of misconduct* based on a preponderance of the evidence. 45 CFR 689.2(c). After reviewing the Investigative Report, NSF has determined that, based on a preponderance of the evidence, your falsification was committed intentionally and constituted a significant departure from accepted practices of the relevant research community. I am, therefore, issuing a finding of research misconduct against you.

NSF's regulations establish three categories of actions (Group I, II, and III) that can be taken in response to a finding of misconduct. 45 CFR 689.3(a). Group I actions include issuing a letter of reprimand; conditioning awards on prior approval of particular activities from NSF; requiring that an institution or individual obtain special prior approval of particular activities from NSF; and requiring that an institutional representative certify as to the accuracy of reports or certifications of compliance with particular requirements. 45 CFR 689.3(a)(1). Group II actions include award suspension or restrictions on designated activities or expenditures; requiring special reviews of requests for funding; and requiring correction to the research record. 45 CFR 689.3(a)(2). Group III actions include suspension or termination of awards; prohibitions on participation as NSF reviewers, advisors or consultants; and debarment or suspension from

participation in NSF programs. 45 CFR 689.3(a)(3).

In determining the severity of the sanction to impose for research misconduct, I have considered the seriousness of the misconduct; our determination that it was committed intentionally; the impact your misconduct had on the research record; and the determination that it was part of a pattern of misconduct. I have also considered other relevant circumstances. 45 CFR 689.3(b).

I, therefore, take the following actions:

- For three years after the expiration of your debarment period, you are required to submit certifications that any proposals or reports you submit to NSF do not contain plagiarized, falsified, or fabricated material.
- For three years after the expiration of your debarment period, you are required to submit assurances by a responsible official of your employer that any proposals or reports you submit to NSF do not contain plagiarized, falsified, or fabricated material.
- From the date of this letter through [REDACTED], you are prohibited from serving as an NSF reviewer, advisor, or consultant.
- You are required to complete an ethics training course on research misconduct no later than [REDACTED]. You must certify in writing to the OIG that such training has been completed.

All certifications and assurances should be submitted in writing to the Office of Inspector General, Associate Inspector General for Investigations, 4201 Wilson Boulevard, Arlington, Virginia, 22230.

Debarment

Regulatory Basis for Debarment

Pursuant to 2 CFR 180.800, debarment may be imposed for:

- (b) Violation of the terms of a public agreement or transaction so serious as to affect the integrity of an agency program, such as --
 - (1) A willful failure to perform in accordance with the terms of one or more public agreements or transactions; or

- ...
- (3) A willful violation of a statutory or regulatory provision or requirement applicable to a public agreement or transaction.

In any debarment action, the government must establish the cause for debarment by a preponderance of the evidence. 2 CFR 180.850. In this case, you knowingly falsified images such that the research was not accurately represented in the research record. Thus, your actions support a cause for debarment under 2 CFR 180.800(b).

Length of Debarment

Debarment must be for a period commensurate with the seriousness of the causes upon which an individual's debarment is based. 2 CFR 180.865. Generally, a period of debarment should not exceed three years but, where circumstances warrant, a longer period may be imposed. 2 CFR 180.865. Having considered the seriousness of your actions, as well as the relevant aggravating and mitigating factors set forth in 2 CFR 180.860, we are proposing your debarment for three years.

Appeal Procedures for Finding of Research Misconduct and Procedures Governing Proposed Debarment

Appeal Procedures for Finding of Research Misconduct

Under NSF's regulations, you have 30 days after receipt of this letter to submit an appeal of this finding, in writing, to the Director of the Foundation. 45 CFR 689.10(a). Any appeal should be addressed to the Director at the National Science Foundation, 4201 Wilson Boulevard, Arlington, Virginia 22230. If we do not receive your appeal within the 30-day period, the decision on the finding of research misconduct will become final. For your information, we are attaching a copy of the applicable regulations.

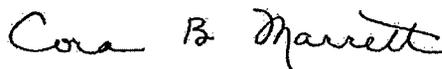
Procedures Governing Proposed Debarment

The provisions of 2 CFR Sections 180.800 through 180.885 govern debarment procedures and decision-making. Under these regulations, you have 30 days after receipt of this notice to submit, in person or in writing, or through a representative, information and argument in opposition to this debarment. 2 CFR 180.820. Comments submitted within the 30-day period will receive full consideration and may lead to a revision of the recommended disposition. If NSF does not receive a response to this notice within the 30-day period, this debarment will become final.

Any response should be addressed to Lawrence Rudolph, General Counsel, National Science Foundation, Office of the General Counsel, 4201 Wilson Boulevard, Room 1265, Arlington, Virginia 22230. For your information, we are attaching a copy of the Foundation's regulations on non-procurement debarment and FAR Subpart 9.4.

Should you have any questions about the foregoing, please contact [REDACTED], Assistant General Counsel, at [REDACTED].

Sincerely,



Cora B. Marrett
Acting Deputy Director

Enclosures:
Investigative Report
Nonprocurement Debarment Regulations
FAR Regulations
45 CFR Part 689

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NATIONAL SCIENCE FOUNDATION
4201 WILSON BOULEVARD
ARLINGTON, VIRGINIA 22230



OFFICE OF THE
DEPUTY DIRECTOR

[REDACTED]

VIA CERTIFIED MAIL/RETURN RECEIPT REQUESTED

[REDACTED]

Re: Notice of Debarment

Dear [REDACTED]

On [REDACTED], the National Science Foundation ("NSF") issued to you a Notice of Proposed Debarment ("Notice"), in which NSF proposed to debar you from directly or indirectly obtaining the benefits of Federal grants for a period of three years. As reflected in the Notice, NSF proposed your debarment for including falsified images in an article published in a scientific journal, as well as a dissertation submitted to your university's faculty in pursuit of your doctorate degree. In addition, NSF took additional administrative actions against you in accordance with NSF's regulations governing research misconduct. In that Notice, NSF provided you with thirty days to respond to the proposed debarment.

Over thirty days have elapsed and NSF has not received a response. Accordingly, you are debarred until [REDACTED]. Debarment precludes you from receiving Federal financial and non-financial assistance and benefits under non-procurement Federal programs and activities unless an agency head or authorized designee makes a determination to grant an exception in accordance with 2 CFR 180.135. Non-procurement transactions include grants, cooperative agreements, scholarships, fellowships, contracts of assistance, loans, loan guarantees, subsidies, insurance, payments for specified use, and donation agreements.

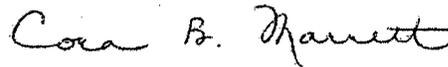
In addition, you are prohibited from receiving Federal contracts or approved subcontracts under the Federal Acquisition Regulations at 48 CFR Subpart 9.4 for the period of this debarment. 2 CFR 180.925. During the debarment period, you may not have supervisory responsibility, primary management, substantive control over, or critical influence on, a grant, contract, or cooperative agreement with any agency of the Executive Branch of the Federal Government.

Lastly, please note that, in the [REDACTED] Notice, NSF also took the following actions against you, which continue to remain in effect:

- From the end of your debarment period through [REDACTED] you are required to submit certifications to NSF's Office of Inspector General that any proposals or reports you submit to NSF do not contain plagiarized, falsified, or fabricated material.
- From the end of your debarment period through [REDACTED], you are required to submit assurances by a responsible official of your employer that any proposals or reports you submit to NSF do not contain plagiarized, falsified, or fabricated material. These assurances must be submitted to NSF's Office of Inspector General.
- You are prohibited from serving as an NSF reviewer, advisor, or consultant until [REDACTED].
- ~~You are required to complete an ethics training course on plagiarism no later than [REDACTED].~~ You must certify in writing to NSF's Office of Inspector General that such training has been completed.

Should you have any questions regarding the foregoing, please contact [REDACTED], Assistant General Counsel, at [REDACTED].

Sincerely,



Cora B. Marrett
Acting Deputy Director