

NATIONAL SCIENCE FOUNDATION
OFFICE OF INSPECTOR GENERAL
OFFICE OF INVESTIGATIONS

CLOSEOUT MEMORANDUM

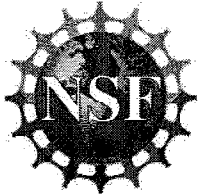
Case Number: A11100066

Page 1 of 2

NSF OIG received allegations that an associate professor¹ at a university² fabricated and falsified data. Some of the alleged fabricated and falsified data were included in two NSF proposals,³ one of which was awarded and the same data was published in a manuscript.⁴ The university's investigation determined the associate professor, at varying levels of intent, committed fabrication and falsification in numerous data figures. The university's investigation also identified data fabrication and falsification in a submitted manuscript⁵ that was subsequently declined for publication. Additional acts of data fabrication and falsification identified by the university's investigation had a connection to grant support from another federal agency⁶ and are being investigated by another federal entity.⁷ The university issued a research misconduct finding and the associate professor separated from the university. After receiving the university's investigation findings, the journal⁸ retracted the published manuscript in addition to another publication⁹ that did not have a nexus to NSF. Two other journals¹⁰ also retracted publications¹¹ that did not have a nexus to NSF.

We concurred with the university's findings. We concluded that the former associate professor intentionally fabricated and falsified data material and that his actions constituted a significant departure from accepted practices of the relevant research community. NSF concurred

- 1 [REDACTED]
2 [REDACTED]
3 NSF Proposal [REDACTED]
[REDACTED]
NSF Award [REDACTED]
4 Publication entitled [REDACTED]
[REDACTED]
5 Manuscript entitled [REDACTED]
[REDACTED]
6 [REDACTED]
7 [REDACTED]
8 [REDACTED]
9 Publication entitled [REDACTED]
[REDACTED]
10 [REDACTED]
11 Publication entitled [REDACTED]
[REDACTED]
Publication entitled [REDACTED]
[REDACTED]



NATIONAL SCIENCE FOUNDATION
OFFICE OF INSPECTOR GENERAL
OFFICE OF INVESTIGATIONS

CLOSEOUT MEMORANDUM

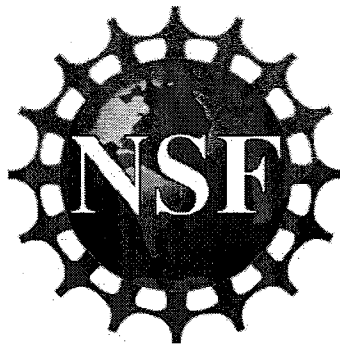
Case Number: A11100066

Page 2 of 2

with recommendations in our Report of Investigation (ROI) and made a finding of research misconduct and a proposed debarment. However, contrary to our recommendations, the agency did not impose requirements following the debarment period in the submission of certifications and assurances as well as certifications of adherence to a data management plan. After considerations of an appeal from the former associate professor, the agency finalized the debarment for a period of five years. In addition, NSF prohibited him from participating as a peer reviewer, advisor, or consultant for the five year debarment period and required that he complete a course in the responsible conduct of research within one year.

This memo, the attached ROI and the letters from the Office of the Director on the notice of research misconduct determination with a proposed debarment and the final debarment notice constitute the case closeout. Accordingly, this case is closed.

National Science Foundation Office of Inspector General



Report of Investigation Case Number A11100066

August 19, 2014

**This Report of Investigation is provided to you
FOR OFFICIAL USE ONLY.**

It contains protected personal information, the unauthorized disclosure of which may result in personal criminal liability under the Privacy Act, 5 U.S.C. § 552a. This report may be further disclosed within NSF *only* to individuals who *must* have knowledge of its contents to facilitate NSF's assessment and resolution of this matter. This report may be disclosed outside NSF *only* under the Freedom of Information and Privacy Acts, 5 U.S.C. §§ 552 & 552a. Please take appropriate precautions handling this report of investigation.

Executive Summary

Allegation: An associate professor intentionally fabricated and falsified material that was included in a NSF proposal, an NSF awarded proposal, a published manuscript and a submitted manuscript.

University

Investigation: The Investigation Committee concluded, based on the preponderance of the evidence, that the Subject, at varying levels of intent, committed fabrication and falsification in numerous data figures. The Investigation Committee concluded the Subject's research misconduct acts constituted a significant departure from accepted practices of the research community. After the University administrative proceedings, the Subject separated from the University.

OIG

Assessment: OIG concurred with the University's conclusion.

- **The Act:** The Subject fabricated and falsified data material.
- **Intent:** The Subject acted intentionally.
- **Standard of Proof:** A preponderance of evidence supports a finding of research misconduct.
- **Significant Departure:** The Subject's actions represent a significant departure from accepted practices.
- **Pattern:** The Subject exhibited a pattern as the fabrication and falsification of results and data were found in numerous figures in a publication and a draft manuscript.

OIG Recommends:

- Make a finding of research misconduct.
- Send a letter of reprimand.
- Require certification of responsible conduct of research training within 1 year of NSF's finding.
- Debar the Subject from receiving federal funds or participating in any federally-funded project for a period of 5 years.

Additionally for a period of 5 years immediately following the debarment period:

- Bar the Subject from participating as a peer reviewer, advisor, or consultant for NSF.
- Require certifications and assurances.
- Require submission of a detailed data management plan with annual certifications of adherence.

University's Inquiry

The University¹ conducted an Inquiry into allegations that an Associate Professor (Subject)² fabricated and falsified data in eight publications.³ The allegations specified that the images of experimental results such as protein bands, DNA bands and RNA localization data were manipulated within numerous figures of the eight publications. The Subject conducted research that was funded by NSF and other funding entities but the eight publications only acknowledged grant support from the other funding entities.⁴ The allegations were listed in a letter⁵ that was sent to the university officials, journal editors and the funding agencies.

In accordance with the University's research misconduct policies,⁶ the University conducted a Preliminary Analysis which then determined to proceed with a formal Inquiry. The Research Integrity Officer (RIO)⁷ proceeded with an initial interview of the Subject while data, materials and computer files associated with the eight publications were sequestered⁸ from the Subject's laboratory and office. The Inquiry Committee performed an initial assessment of the evidence obtained by the university. The evidence included analyses of images provided by the journals⁹ or performed by the external computer forensics expert,¹⁰ which included the identification of numerous other figures suspected of fabrication or falsification. The additional evidence brought the total number of alleged fabrications/falsifications to twelve. Some of the

[illegible]

Tab 1: Allegation letter dated

⁶ Tab 2: University's Policy and Procedures

The RIO with assistance from the computer forensics expert

The RIO contacted the journals- [REDACTED] requesting an analysis of the images that were submitted by the Subject upon manuscript submission.

101

alleged fabricated and falsified data were included in the Previous Results section in two NSF proposals (Proposal 1 and Award 1),¹¹ one of which was awarded. That same data was published in a manuscript (Article 1)¹². Article 1 was also listed as a submitted manuscript¹³ or a publication¹⁴ in Proposal 1 and Award 1, respectively.

In the Inquiry Report,¹⁵ the specific¹⁶ acts of data manipulation in the figures in Article 1 are analogous to the figures in NSF Proposal 1 and NSF Award 1 in the following manner:

Table 1

Figure in Article 1	Figure in NSF Proposal 1	Figure in NSF Award 1
1C (top)	2B (top)	1B (top)
1E (bottom half)	-	1C
3A	3A	2A
3C	3B	-
3D	-	2D
4B	-	3D (partial)
4D	-	4F (partial)

Only the allegations that refer to the alleged fabricated or falsified data with the above nexus to the NSF proposal and award are detailed in this report. The allegation letter detailed that it was “suspect[ed] that protein bands in [Figures 1C and 3D of Article 1] were heavily manipulated”.¹⁷ The Inquiry Report contained¹⁸ the analyses done by the journal,¹⁹ indicating the solid white backgrounds in the images (top panel of Figure 1C and both panels of Figure 1E) raised suspicions. The journal also identified²⁰ portions of Figure 3 of Article 1 as appearing to be falsified as: “solid white backgrounds” were identified in the images in Figure 3A (top) and 3C (top); “possible splicing” in Figure 3C (bottom); “unusually flat and even” backgrounds and “unusual halos” around the protein gel bands in Figure 3D. As the allegation letter also detailed suspicions “that DNA bands in Figs. 4B and 4D [of Article 1] were heavily manipulated”.²¹ The

¹¹ Tab 3: Proposal 1.

Tab 4: Award 1.

Tab 5: Article 1 entitled

Tab 3, pg 24.

¹⁴ Tab 4, pg 25.

¹⁵ Tab 6: Inquiry Report received

¹⁶ Suspected data fabrication and/or falsification was also identified in Figures of Article 1 but figures corresponding to those were not present in Proposal 1 or Award 1.

Tab 1, pg 5.

¹⁸ Tab 6, pg 12.

¹⁹

²⁰ Tab 6, pgs 14-15.

²¹ Tab 1, pg 5.

Inquiry Report contained²² the analyses performed by the journal,²³ indicating the appearance of spliced bands that were pasted into the gel image. For Article 1, the Subject was unable²⁴ to locate any data materials related to Figures 1 and 3 but may have located original data related to Figures 4B and 4D. The Subject provided additional image and data materials related to the figures referred to in the allegations but the Inquiry Committee did not review this information prior to the conclusion of the final meeting.²⁵

The Inquiry Committee determined that there was sufficient substance to the allegations²⁶ against the Subject to warrant a formal investigation.

Subject's Response to University's Inquiry Report

The Subject was provided with the Inquiry Report and was given the opportunity to submit comments. The Subject responded in a letter²⁷ and asserted that he hasn't "fabricate[d], tampered, and/or manipulated [the] data in any way that violate[d] the codes of publications as implemented by the different scientific journals." The Subject contended the same for his former employees or collaborators. The Subject also asserted that he would not be able to provide some original data that are no longer in his possession such as missing laboratory notebooks from two former laboratory members²⁸ or "gels containing radioactive proteins, DNA, or RNA"²⁹ that were prepared either in Germany or at the University and were most likely disposed of.

University's Investigation

The Inquiry Committee reviewed³⁰ the Subject's response letter and agreed that it did not alter their finding that a formal investigation was warranted. We referred³¹ the matter to the University pending their investigation.

The Investigative Committee (IC) assessed multiple allegations of research misconduct by the Subject in their finalized Investigative Report.³² This included additional allegations

²² Tab 6, pg 18.

²³ [REDACTED]

²⁴ Discussion with Subject summarized in Tab 6, pgs 17 and 19 and in pgs 1, 2 and 3 of Tab 7: [REDACTED]

pg 4 of Tab 8: Complete version of Inquiry Report. [REDACTED]

For the allegations that did not pertain to data included in NSF Proposal 1 and Award 1, the Inquiry Committee [REDACTED]

[REDACTED] some allegations
merited further analyses of the data to be conducted during the investigation. [REDACTED]

Tab 9: Subject's response to University's Inquiry Report dated [REDACTED]

²⁸ [REDACTED]

Tab 9, pgs 2-3.

³⁰ Tab 10: University's letter to NSF OIG dated [REDACTED]

³¹ Tab 11: Investigation Referral letter to University dated [REDACTED]

raised by a journal³³ and other instances identified by the IC. The IC interviewed the Subject and co-authors of the Subject's manuscripts including members of the Subject's laboratory and a former collaborator. Out of the 33 total allegations, the IC determined that 20 met the definition of research misconduct (falsification and/or fabrication) and 13 were dismissed.³⁴

The IC dismissed allegations regarding Figures 1C, 1E, 3A and 3D in Article 1³⁵ based upon the analyses conducted by the computer forensics expert³⁶ on the digital files provided by the Subject as images of the original scan were not available.

The IC concluded Figures 3C, 4B, 4D and S5C in Article 1 were fabricated/falsified based upon the analyses conducted by the journal³⁷ and by the computer forensics expert³⁸ on the digital files provided by the Subject. For Article 1, only the allegations with a nexus to NSF are addressed below and are summarized on Table 2.

Table 2

Figure in Article 1	IC's finding	IC's explanation	level of intent found by IC	Figure in NSF Proposal 1	Figure in NSF Award 1
1C (top)	allegation dismissed	No evidence of splicing		2B (top)	1B (top)
1E (bottom)	allegation dismissed	No evidence of splicing		-	1C
3A	allegation dismissed	No evidence of splicing and no appearance of artifacts		3A	2A
3C (bottom)	falsification	Gel with spliced in band and no disclosure of splicing	reckless	3B (right panel)	-
3D	allegation dismissed	Insufficient evidence		-	2D
4B	falsification & fabrication	Gel with spliced in bands and no disclosure of splicing	intentionally & knowingly	-	3D (partial)
4D	falsification & fabrication	Gel with spliced in bands and no disclosure of splicing	intentionally & knowingly	-	4F (partial)

³² Tab 12: Letter from University and Final Research Misconduct Investigation Report dated [REDACTED]

³³ [REDACTED]

³⁴ See summary Table 1 on pg 3 of Tab 12. (Note: throughout this report, page numbers noted in Tab 12 refer to the page numbers as enumerated on the bottom right hand corner of the Investigation Report). [REDACTED]

Refer to Table 1 or 2 on which figures in Article 1 analyzed by the IC are analogous to the figures in NSF Proposal 1 and Award 1.

³⁶ See footnote #10.

³⁷ [REDACTED]

³⁸ See footnote #10.

S5C	falsification & fabrication	Gel with spliced in bands and no disclosure of splicing	intentionally & knowingly	-	-
-----	--------------------------------	---	------------------------------	---	---

For Figure 3C (bottom), the IC concluded there was sufficient evidence that a selection tool was used “to select the band and make some sort of alteration to the gel image” as there was a “sharp edge to [the] band as if this ha[d] been cut out”.³⁹ For Figure 4B, the IC determined that “every band appear[ed] as if it ha[d] been spliced into the resulting image” and from comparing the digital files, three background artifactual white spots appeared to have been replicated and shifted and “[i]t [was] clear [] that the resulting figure was comprised of data that was spliced together.”⁴⁰ In Figure 4D, for the fourth band (fifth lane position) in the top panel, the first and second (fourth lane position) bands in the third panel and the first band in the fourth panel, the IC concluded the evidence indicated that “a selection tool [was used] to cut out bands and insert them on top of another gel to alter [] the gel images”.⁴¹ The IC had the same conclusion⁴² regarding the insertion of five out of the six bands in Figure S5C and although Figure S5C was not used in either NSF Proposal 1 or Award 1, the IC determined that “the whole or part of the same background was used to paste bands onto [it]”⁴³ in order to alter Figures 4D and S5C of Article 1.

The IC also identified additional manipulated images in a submitted manuscript (Manuscript 1)⁴⁴ that was subsequently declined for publication. The manuscript acknowledged⁴⁵ grant support from NSF. The RIO⁴⁶ obtained the submitted manuscript and the referee’s comments from the journal.⁴⁷ Referee #2 had “serious concerns about some of the data shown” and pointed out that “the embryo shape and staining in Figure 2a appear[ed] to be identical to the embryo shown in the top panel in Figure 4C” of Article 1 and “the nine bands in Figure 2i and nine of the bands in Figure 3e (all but the first) are identical in shape and in order from left to right” which included duplication of “a random spot that appear[ed] above the bands in lane 3 of Figure 2i and lane 4 of Figure 3e”.⁴⁸ As summarized in Table 3, Figures 2a, 2i and 3e in Manuscript 1 are analogous to the figures in draft manuscripts that were embedded in the Findings section in the annual reports and final report⁴⁹ of Award 1.

³⁹ Tab 12, pg 37.

⁴⁰ Tab 12, pg 41.

⁴¹ Tab 12, pg 48.

⁴² Tab 12, pg 40.

⁴³ Tab 12, pg 42.

⁴⁴ Tab 13: Manuscript 1. [REDACTED]

See footnote #7.

⁴⁷ [REDACTED]

⁴⁸ pg 2 of Tab 14: Comments from Referees of Manuscript 1- Journal's email to University dated [REDACTED]

⁴⁹ pgs 2, 17, 29 and 73 of Tab 15: Compiled Annual Reports of NSF Award [REDACTED]

Table 3

Figure in Manuscript 1	Figure in Article 1	IC's finding	IC's explanation	level of intent found by IC	Figure in Annual Reports of Award 1
2a	4C top panel	fabrication	Same image re-used	intentionally & knowingly	4C of AR3 ⁵⁰ and 4C of FR ⁵¹
2i and 3e	n.p.	falsification & fabrication	Same images used for different figures	intentionally & knowingly	3E and 3J of AR1 ⁵² , 4H of AR3 ⁵³ and FR ⁵⁴

(n.p. is not present, AR is Annual Report, FR is Final Report)

For Figure 2a in Manuscript 1, the IC concluded that, as compared to Figure 4C top panel in Article 1, the images of RNA localization in mutant *Drosophila* embryos “are identical based on the shape of the major and background staining”⁵⁵ which constituted “fabrication of data”.⁵⁶ For Figures 2i and 3e, the IC determined “these [nine] gel bands are identical except that the 2nd band to the right in Fig 2i [was] shifted left one lane in Fig 3e”⁵⁷ which constituted “falsification and fabrication of data”.⁵⁸

The IC determined that “[b]ased on the statements made by [the Subject] and all the witnesses interviewed by the Committee it [was] clear that the final assembly of all figures and their preparation for submission to journals was done by [the Subject]. The practice was for his lab staff to provide [the Subject] with several replicates of the experiments from which [the Subject] would choose the images to be used in the final figure.”⁵⁹

Overall, the IC found, based on the preponderance of the evidence, that for Figures 3C, 4B, 4D and S5C of Article 1 and for Figures 2a, 2i and 3e of Manuscript 1, the Subject's acts constituted research misconduct and represented a significant departure from the accepted practices of the Subject's research community. The IC found that for Figure 3C of Article 1, the act was committed recklessly. For Figures 4B, 4D and S5C of Article 1 and for Figures 2a, 2i and 3e of Manuscript 1, the IC found the acts were committed intentionally and knowingly.

⁵⁰ pg 62 of Tab 15, data included as a draft manuscript in Annual Report [REDACTED]

⁵¹ pg 112 of Tab 15, data included as a draft manuscript in Final Report submitted [REDACTED]

⁵² pg 6 of Tab 15, data reported as findings included in Annual Report [REDACTED]

⁵³ See footnote #50.

⁵⁴ See footnote #51.

⁵⁵ Tab 12, pg 75.

⁵⁶ Tab 12, pg 76.

⁵⁷ Tab 12, pg 75.

⁵⁸ Tab 12, pg 76.

⁵⁹ Tab 12, pgs 104-105. The witnesses interviewed were either former or current lab members [REDACTED]

Subject's Response to Investigation Report and IC's Review

The Subject's response⁶⁰ to the investigation report was analyzed⁶¹ by the IC. The IC noted that the Subject repeatedly described print versions of other images that he purportedly used as the final versions of figures. However, these images were not the images provided to and analyzed by the journals, were not previously provided to the IC during sequestration and represented the Subject's continual "pattern of belatedly locating data that [was] required by policy⁶² to be readily available, and then producing it in an untimely manner."⁶³ The IC rejected the Subject's various explanations because "the explanations he provid[ed] fail[ed] to explain how the apparent duplication of images in a number of the findings of research misconduct could have occurred".⁶⁴ Furthermore, the IC discounted the Subject's repeated proclamation to be "ready and willing to repeat any and all experiments in question to verify the experimental results"⁶⁵ as it did not address his manipulation of images. The IC did not change their conclusion that the Subject "alone was responsible for multiple instances of research misconduct in which he falsified and fabricated research data".⁶⁶

University Adjudication

Through the University's administrative disciplinary proceedings, the Subject "was found responsible for research misconduct, and subsequently separated from the University." Furthermore, the University and the Subject "have requested retractions of the affected journal articles."⁶⁷

OIG's Investigation and Assessment

We assessed the University's policies⁶⁸ and its actions and reviewed the University's Investigation Report for accuracy and completeness. We concluded the University followed reasonable procedures. We asked⁶⁹ the Subject if he had additional comments on the Investigation Report. In his response,⁷⁰ the Subject reiterated his claim of possessing "original" data for the images despite their dubious origin. The IC had concerns about the provenance of the data because it was not provided during the sequestration process and was only much later provided⁷¹ via a third party⁷² to the RIO. The IC reviewed the data "despite its untimely submission and concerns about its reliability."⁷³ Given that the Subject was required to provide

⁶⁰ Tab 16: Subject's response to University's Investigation Report dated [REDACTED]

⁶¹ Tab 17: Investigation Committee's Review of Subject's response dated [REDACTED]

⁶² Tab 2, pg 7, [REDACTED]

⁶³ Tab 17, pg 1.

⁶⁴ Tab 17, pg 2.

⁶⁵ Tab 16, pg 2.

⁶⁶ Tab 17, pg 9.

⁶⁷ Tab 18: Letter from University Counsel to OIG dated [REDACTED]

⁶⁸ Tab 2.

⁶⁹ Tab 19: OIG Letter to Subject dated [REDACTED]

⁷⁰ Tab 20: Subject's letter to OIG dated [REDACTED]

⁷¹ A condensed timeline given in Tab 17, pg 10 with a previous, more detailed timeline given in Tab 12, pgs 15-22.

⁷² [REDACTED]

⁷³ Tab 17, pg 1.

all pertinent and original materials during sequestration according to the University's policy,⁷⁴ the IC questioned the provenance and authenticity of the material (such as a very low resolution digital image of an apparent photocopied image pertinent to Figure 3C of Article 1)⁷⁵ and had no assurances that the files were the original images used for the figures. We agree that the timing of the release of data created substantial suspicion regarding its veracity.

The University's policies⁷⁶ on the investigation of allegations of research misconduct takes in consideration the Subject's failure to maintain records and to produce them in a timely manner. Moreover, the Subject's failure to maintain research data records is a violation of NSF general grant conditions (GC-1) as "Financial records, supporting documents, statistical records, and other records pertinent to this award shall be retained by the grantee for a period of three years from submission of the final project and expenditure reports".⁷⁷ The failure to maintain records within that timeframe⁷⁸ is considered a departure from accepted research practices of the research community.

We disagree with the IC's assessment that the reuse of Article 1's Figure 4C top panel as Figure 2a in Manuscript 1 constituted fabrication. Although the figure legend⁷⁹ failed to explicitly state and clearly distinguish that the presented figure was previously published, the Results section describing Figure 2 in Manuscript 1 did provide Article 1 as a citation.⁸⁰ We deemed that this one instance of failing to disclose that the material was copied from his previous publication did not constitute an act of research misconduct.

A finding of research misconduct by NSF requires that (1) there be a significant departure from accepted practices of the relevant research community, (2) the research misconduct be committed intentionally, or knowingly, or recklessly, and (3) the allegation be proven by a preponderance of the evidence.⁸¹

The Acts

We determined that the Subject:

1. Falsified the bottom panel of Figure 3C in Article 1 by altering the shape of a band in an image of a blot containing proteins separated by gel electrophoresis and probed with an antibody.

⁷⁴ Tab 2, pg 7, [REDACTED]

⁷⁵ Tab 12, pg 37.

⁷⁶ Tab 2, pg 13, [REDACTED]

⁷⁷ GC-1 Article 23, version dated July 1, 2002. <http://www.nsf.gov/pubs/2002/gc102/gc102.pdf> Similar language is found in the NSF Research Terms and Conditions §53.

⁷⁸ Award 1, [REDACTED]

Tab 13, pg 16.

⁸⁰ As reference #8 footnoted in Tab 13, pg 5.

⁸¹ 45 C.F.R. § 689.2(c).

2. Fabricated the results of the top row of Figure 4B in Article 1 by falsifying all of the bands in an image of an agarose gel containing PCR⁸² generated products of DNA separated by gel electrophoresis. The image was a composite of bands spliced onto separate lanes.
3. Fabricated the results of Figure 4D of Article 1 by falsifying four bands in an image of an agarose gel containing PCR generated products of DNA separated by gel electrophoresis. Bands were spliced onto the fifth lane of the top panel, first and fourth lanes of the third panel and the first lane of the fourth panel in the composite image which shared the same background image as Figure 5SC.
4. Fabricated the results of Figure S5C of Article 1 by falsifying five bands in an image of an agarose gel containing PCR generated products of DNA separated by gel electrophoresis. Bands were spliced onto the third, fifth, seventh, eighth and ninth lanes in the composite image which shared the same background image as Figure 4D.
5. Fabricated the results of Figure 2i of Manuscript 1 by falsifying nine bands in an image of an agarose gel containing PCR generated products of DNA separated by gel electrophoresis.
6. Fabricated the results of Figure 3e of Manuscript 1 by falsifying nine bands in an image of an agarose gel containing PCR generated products of DNA separated by gel electrophoresis. Bands in lanes #1, 2, 3, 4, 5, 6, 7, 9 and 10 in Figure 2i were found to be identical to the bands in lanes #2, 3, 4, 5, 6, 7, 8, 9 and 11 in Figure 3e, respectively.

The Subject's actions meet the definition of research misconduct and were conclusively a significant departure from accepted practices of the research community.

Intent

The IC concluded that the falsification in Act #1 was committed recklessly and Acts #2-6 were committed both knowingly and intentionally. We find it untenable to find that any actions by the Subject to alter the presentation of data to produce a desired result could be considered anything but intentional. The act of splicing bands in figures is a purposeful intent to lead a reader to specific conclusions that the raw data would not have accomplished. As such, we conclude the Subject's actions were intentional.

Standard of Proof

Based on the documented evidence, the IC found by a preponderance of the evidence that the Subject falsified and fabricated data material, which constituted a significant departure from accepted practices. The Subject fabricated and falsified material that was included in an NSF proposal (Proposal 1), an NSF awarded proposal (Award 1), a published manuscript (Article 1) and a submitted manuscript (Manuscript 1). We concur with the IC and concluded that the

⁸² Polymerase chain reaction.

Subject intentionally fabricated and falsified results and data, thereby committing acts of research misconduct.⁸³

OIG's Recommended Disposition

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 knowing, intentional, or reckless; (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.⁸⁴

Seriousness

The Subject's actions of fabrication and falsification are a severe violation of the standards of research integrity and ethics. The manipulation of images in the figures altered the interpretation of the experimental results. For Act #1, the band in the bottom panel of Figure 3C in Article 1 represented a specific protein⁸⁵ present in a certain cellular fraction,⁸⁶ signifying an important cellular event and result in Article 1. For Acts #2 through 6, the bands in the figures (4B, 4D and S5C in Article 1; 2i and 3e in Manuscript 1) represented specific PCR products⁸⁷ indicating the correlation of activity⁸⁸ of the corresponding DNA with various proteins under different cellular conditions or in different genetic backgrounds, signifying key results⁸⁹ and conclusions in Article 1 and Manuscript 1.

Degree of Intent

We found no evidence to mitigate our conclusion that the Subject intentionally fabricated and falsified results and data. The alteration of a band in an image and the pasting or substitution of other bands represented an intentional act of masking the underlying image in the false representation of an overall figure for the fabrication of results. The deliberate alterations and additions to an image are intentional acts to misrepresent the results of the experiments and to alter conclusions. The Subject's actions were an intentional violation of research integrity as he deceived the Journal and reviewers who reviewed Article 1 and Manuscript 1 by not providing the accurate account of the experimental results obtained. As an Associate Professor, he violated the basic expectations of faculty behavior in conducting and reporting research at a university. The Subject's actions indicate a failure to uphold the ethical and professional standards research integrity.

⁸³ 45 C.F.R. part 689.

⁸⁴ 45 C.F.R. § 689.3(b).

⁸⁵

⁸⁶

⁸⁷

⁸⁸

⁸⁹

⁸⁹

Pattern of Behavior

The IC determined the Subject committed numerous⁹⁰ acts of research misconduct (data falsification and/or fabrication). We noted four as summarized in Table 2. We also noted an additional two, instead of three, as summarized in Table 3 as we determined the re-use of a figure was not explicitly an act of research misconduct although a departure from accepted practices of the research community. The six total acts partially defined the Subject's continuing pattern of data fabrication and falsification as the acts of research misconduct occurred in Article 1 and Manuscript 1. The other⁹¹ acts identified by the IC did not have a direct connection to NSF proposals or awards but signified the greater extent and ongoing pattern of the Subject's research misconduct in multiple publications that spanned many years.

Impact on the Research Record and Community

The fabricated and falsified results and data in Manuscript 1 did not have a measurable impact in the literature as the manuscript was not ultimately accepted for publication. However, it is noteworthy that the second reviewer of Manuscript 1 had serious concerns on three of the figures, questioning the integrity of the data.

Article 1 has been cited⁹² by 32 publications, 28 of which were not authored by the Subject or other authors of Article 1. Thus the fabricated and falsified data material in Article 1 had an impact in the literature. Prior to receiving the Subject's response to our draft investigation report, the journal⁹³ that published Article 1 issued a retraction notice⁹⁴ for Article 1⁹⁵ and an additional publication⁹⁶ that was originally alleged to contain falsified and fabricated data. The retraction notice letter from the journal's Editor in Chief was a result of receiving the University's investigation findings, as the journal's letter stated that "the data, results, and conclusions in the papers are clearly not reliable. [The Journal] is hereby retracting the papers, at the request of [the University] and [the Subject]". The Subject's actions adversely affected his immediate research community by potentially harming the reputation of the journal, the University, the Subject's lab members and co-authors of the manuscript and published articles.

Other Concerns

As an Associate Professor at a university, the basic scholarly expectations would include the honest representation of research data and the proper management of research data records.

⁹⁰ Twenty total, see Table 3 of pg 5 of Tab 12.

⁹¹ Fifteen. These included acts of falsification and/or fabrication in several figures of the following publications listed in footnote #3: the [REDACTED] publication, the [REDACTED] publication, the [REDACTED] publication and other figures in Article 1 that were not analogous to figures in NSF Proposal 1 or Award 1. The nature of the fabrication and falsification was the splicing in of bands in gel images, the replication of bands in lanes of the gel image, the pasting of blank sections onto gel images and the replication of images displaying RNA localization in *Drosophila* larvae that were supposed from two different experimental conditions.

⁹² Tab 21: Web of Knowledge database- Publications that cite Article 1.

⁹³ Science.

⁹⁴ Tab 22: Retraction notice in [REDACTED]

⁹⁵ See Tab 5.

⁹⁶ Entitled [REDACTED]

As the PI on the NSF Award 1, the Subject led research conducted by multiple lab members such as undergraduate and graduate students, technicians, a post-doctoral fellow and a research associate. Furthermore, the Subject taught molecular biology courses to undergraduate and graduate students and performed outreach at nearby elementary, middle and high schools.⁹⁷ The Subject's lack of scientific integrity is of particular concern as he was training and leading younger scientists in a university setting.

Subject's Response to Draft Report

In the Subject's 147 page response⁹⁸ to our draft investigation report,⁹⁹ he reiterated comments that were conveyed in his response to the University's Investigation Report.¹⁰⁰ Despite repeated claims of possessing "original" data, the Subject did not adequately address how the data figures analyzed by the journals or the IC displayed signs of manipulation, and instead dismissed those detected image manipulations as "artifacts" or aberrations introduced during figure preparation. We conclude that the Subject's response does not alter our original determinations and recommendations.

Recommendations

Based on the evidence, OIG recommends NSF take the following actions:

- Send the Subject a letter of reprimand notifying him that NSF has made a finding of research misconduct.¹⁰¹
- Require the Subject to certify to the Assistant Inspector General for Investigations (AIGI) his completion of a responsible conduct of research training program and provide documentation of the program's content within 1 year of NSF's finding.¹⁰² The instruction should be in an interactive format (e.g., an instructor-led course) and specifically include data fabrication and falsification.
- Debar the Subject for five years.¹⁰³

For a period of five years immediately following the debarment period:

- Bar the Subject from participating as a peer reviewer, advisor, or consultant for NSF.¹⁰⁴

⁹⁷ Tab 15, pgs 1-2, 16-17, 28-29 and 71-73.

⁹⁸ Tab 23: Response from Subject dated [REDACTED]

⁹⁹ Tab 24: Letters to Subject with Draft ROI dated [REDACTED]

¹⁰⁰ See Tab 20.

¹⁰¹ A Group I action 45 C.F.R. 689.3(a)(1)(i).

¹⁰² This action is similar to Group I actions 45 C.F.R. 689.3(a)(1).

¹⁰³ A Group III action 45 C.F.R. 689.3(a)(3)(iii).

¹⁰⁴ A Group III action 45 C.F.R. 689.3(a)(3)(ii).

- Require for each document (proposal, report, etc.) to which the Subject contributes for submission to NSF (directly or through an institution),
 - the Subject submit a contemporaneous certification to the AIGI that the document does not contain plagiarism, falsification, or fabrication.¹⁰⁵
 - the Subject submit contemporaneous assurances from a responsible official of his employer to the AIGI that the document does not contain plagiarism, falsification, or fabrication.¹⁰⁶
- Require the Subject to submit to the AIGI for each NSF proposal a detailed data management plan including requirements for notebooks and data archiving to be adhered to during the course of any resulting award, and to provide annual certifications that this plan is being implemented.¹⁰⁷

¹⁰⁵ This action is similar to 45 C.F.R. 689.3(a)(1)(iii).

¹⁰⁶ A Group I action 45 C.F.R. 689.3(a)(1)(iii).

¹⁰⁷ This action is similar to a Group II action 45 C.F.R. 689.3(a)(2)(ii).

NATIONAL SCIENCE FOUNDATION
4201 WILSON BOULEVARD
ARLINGTON, VIRGINIA 22230



OFFICE OF THE
DIRECTOR

APR 06 2015

CERTIFIED MAIL--RETURN RECEIPT REQUESTED

[REDACTED]
[REDACTED]
[REDACTED]

Re: Notice of Research Misconduct Determination and Proposed Debarment

Dear [REDACTED]:

While you were an associate professor at the [REDACTED] ("University"), you intentionally fabricated and falsified material that was included in two NSF proposals, one of which was awarded, and two manuscripts that resulted from NSF funding, one of which was published. Your misconduct is documented in the attached Investigative Report prepared by NSF's Office of Inspector General ("OIG").

Research Misconduct

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). Specifically, NSF defines fabrication as "making up data or results and recording or reporting them," and falsification 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)(1)(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 documented in the OIG Investigative Report, the University convened an Inquiry Committee ("IC") to investigate the allegations of fabrication and falsification in this case. It was alleged that you manipulated and altered images of experimental results such as protein bands, DNA bands, and RNA localization data. As part of the IC inquiry, data, materials and computer files associated with eight publications, in which falsification and fabrication was suspected, were sequestered from your laboratory and office. The IC reviewed the evidence it collected, as well as independent analyses of the images done by the journals -- [REDACTED], and [REDACTED] -- to which you submitted manuscripts containing falsified and fabricated images. In addition, an analysis was conducted by an external computer forensics expert. The IC concluded that of the 33 allegations of fabrication and falsification investigated, 20 met the definition of research misconduct.

The NSF OIG investigation focused on six of the instances of falsification and fabrication that were previously examined by the IC, and which involved NSF awards. In these six instances, the falsified and fabricated material was included in two NSF proposals, one of which was awarded, and two manuscripts, one of which was published, which resulted from the funded NSF award. In response to the NSF OIG investigation, you submitted purported "original" data for the images that was not provided at the time the material was sequestered from your laboratory and office by the IC. The timing of the submission of this "original" data creates substantial suspicion regarding its veracity. Further, you failed to adequately address the findings of the external computer forensics expert who found evidence that images had been fabricated and falsified. The data fabrication and falsification, as well as your failure to maintain records and produce them in a timely manner (i.e. at the time of the sequestration) constitute a departure from accepted research practices in the research community.

Pursuant to NSF's regulations, the Foundation must also determine whether to make a *finding* of research misconduct based on a preponderance of the evidence. 45 CFR § 689.2(c). Based on information in both the OIG Investigative Report and the University investigation, it is clear that you were responsible for the final assembly of all of the images that were submitted as part of the NSF proposals and journal articles. Further, the deliberate alteration of these images is an intentional act. Accordingly, based on a preponderance of evidence, the data fabrication and falsification was committed knowingly 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; 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 review 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 action to impose for research misconduct, I have considered the seriousness of your misconduct in which you knowingly falsified and fabricated images and then submitted those images in NSF proposals and as part of research publications resulting from NSF funding. I have also considered your pattern of data fabrication and falsification, which occurred in six separate instances solely related to NSF grants, as well as multiple other instances that were investigated by the IC. I have also considered other relevant circumstances such as your submission of purported "original" data outside of the IC sequestration. See 45 CFR § 689.3(b).

Based on the foregoing, I am imposing the following actions on you:

- You are required to complete a comprehensive responsible conduct of research training course within one year from the date that the research misconduct determination becomes final, and provide documentation of the program's content. The instruction should be in an interactive format (e.g., an instructor-led course, workshop, etc.) and should include a discussion of plagiarism.
- For a period of five years from the date that the research misconduct determination becomes final, you are prohibited from participating as a peer reviewer, advisor, or consultant for NSF.

All training documentation should be submitted in writing to the following e-mail address: sanctions@nsf.gov.

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 the agency program, such as –
 - (1) A willful failure to perform in accordance with the terms of one or more public agreements or transactions;
 - ...
 - (3) A willful violation of a statutory or regulatory provision or requirement applicable to a public agreement or transaction; or

- (d) Any other cause of so serious or compelling a nature that it affects your present responsibility.

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, the OIG Investigative Report and the University investigation support a finding that you intentionally fabricated and falsified data by altering and manipulating six separate images associated with NSF grants. Thus, your action supports a cause for debarment under 2 CFR §§ 180.800(d).

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. Having considered the seriousness of your actions, as well as the relevant aggravating and mitigating factors set forth in 2 CFR § 180.860, NSF proposes debarring you for five 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 our 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, I am 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 (703) 292-[REDACTED].

Sincerely,

A handwritten signature in dark ink, appearing to read "Richard O. Buckius".

Richard O. Buckius
Chief Operating Officer

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

NATIONAL SCIENCE FOUNDATION
4201 WILSON BOULEVARD
ARLINGTON, VIRGINIA 22230



OFFICE OF THE
DIRECTOR

CERTIFIED MAIL--RETURN RECEIPT REQUESTED

[REDACTED]

Re: Research Misconduct Determination and Notice of Debarment

Dear [REDACTED]:

On April 6, 2015, the National Science Foundation ("NSF") issued you a Notice of Research Misconduct Determination and Proposed Debarment ("Notice"). As reflected in the Notice, NSF proposed to debar you for five years¹ for intentionally fabricating and falsifying material that was included in two NSF proposals, one of which was awarded, and two manuscripts that resulted from NSF funding, one of which was published. In that Notice, NSF provided you with thirty days to respond to appeal the research misconduct determination and to oppose the proposed debarment. On May 7, 2015, you submitted information appealing the research misconduct determination and in opposition to the proposed debarment. On May 17, 2015, you presented additional information at NSF. In consideration of the information you submitted on appeal of the research misconduct determination and in opposition to the proposed debarment, we have determined that the research misconduct determination is final and a debarment period of five years is appropriate.

Pursuant to 45 C.F.R. § 689.3(b), NSF should consider the following relevant factors in deciding what final action to take:

- (1) How serious the misconduct was;
- (2) The degree to which the misconduct was knowing, intentional, or reckless;
- (3) Whether it was an isolated event or part of a pattern;

¹ NSF also proposed that you complete a comprehensive responsible conduct of research training course.

- (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.

In addition, a debarring official may consider factors similar to those listed above and additional mitigating and aggravating factors in making a debarment decision. *See* 2 C.F.R. § 180.860.

Unfortunately, your appeal and opposition did not provide information to support mitigating the proposed actions under these factors. The information you provided in appeal of the research misconduct and in opposition to the proposed debarment repeated the information you had provided to the [REDACTED] and to the NSF's Office of Inspector General ("OIG") during the OIG investigation. In fact, when questioned at your oral presentation on May 17, 2015, you had no additional information to provide and could provide no explanation for the fabricated and falsified material. Thus, insufficient evidence was presented to NSF to mitigate the research misconduct determination or to oppose the proposed debarment.

Research Misconduct and Debarment Actions

As a result of your research misconduct determination and debarment:

- For five years you are prohibited from acting as a participant in federal agency transactions that are covered transactions unless an exception applies, and prohibited from acting as a principal of a participant in those covered transactions. *See* 2 C.F.R. §§180.130, 180.200, and 180.980.
- For five years you are prohibited from participating in certain non-procurement transactions throughout the Executive Branch of the Federal Government which include but are not limited to grants (including serving as a reviewer), cooperative agreements, scholarships, fellowships, contracts of assistance, loans, loan guarantees, subsidies, insurances, payments for specified uses, and donation agreements. *See* 2 C.F.R. § 180.970. No agency in the Executive Branch shall enter into, renew, or extend, primary or lower-tier covered transactions in which you are either a participant or principal, unless the head of the agency grants an exception in writing.
- In addition, you are prohibited from receiving federal contracts or approved subcontracts under the Federal Acquisition Regulations at 48 C.F.R. subpart 9.4 for the period of this debarment. 2 C.F.R. § 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.

- During the length of your debarment, your name will be published in the General Services Administration's web-based System for Award Management (SAM), containing the names of contractors debarred, suspended, proposed for debarment, or declared ineligible by any federal agency; this information is referred to in 2 C.F.R. § 180 as the Excluded Parties Listing System (EPLS).²
- Finally, within one year you are required to complete a comprehensive responsible conduct of research training course, and provide documentation of the program's content. The instruction should be in an interactive format (e.g., an instructor-led course, workshop, etc.) and should include a discussion of fabrication and falsification.

Should you have any questions about the foregoing, please contact [REDACTED], Assistant General Counsel, at (703) 292-[REDACTED].

Sincerely,



Richard O. Buckius
Chief Operating Officer

² EPLS has transitioned to the new system SAM, accessible at www.sam.gov. See 77 Fed. Reg. 120 (June 21, 2013). It is anticipated that in the future 2 C.F.R. § 180 will be revised to reflect that the name of the EPLS has been changed to SAM.