

An Evaluation of the Future Female Scientists Program
at the
National Museum of Natural History
Smithsonian Institution

Office of Policy and Analysis
May, 2007

Director's Preface

A pilot program, Future Female Scientists, was implemented at the National Museum of Natural History in March 2007 to encourage high school girls to pursue careers in the sciences. This evaluation report examines the vision, tools and processes and activities related to this new initiative and present participants' perspectives on the short term program. In particular, their insights on the positive and negative aspects of the program should strengthen similar programs if the museum decides to offer the program again.

The study was designed by Zahava Doering. Andrew Pekarik conducted interviews, performed the analysis and wrote the report. Three Office of Policy and Analysis (OP&A) interns, Marilyn Reis, Bianca Yip and Alison Drury, conducted interviews and tabulated the survey data. Mollie Oremland and Amy Bolton conceived, designed and organized the program with a grant from the Smithsonian Women's Committee. I thank them as well as the participants who shared their insights and explored their interests in majoring in science and in pursuing science careers in museums.

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Director
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Table of Contents

Director’s Preface	1
Table of Contents	2
Background	3
Methods	3
Content of This Report	3
Findings	4
Expectations	4
Science in College	4
Science After College	5
Science Careers in Museums or Applied Science	6
The Impact of Gender on Science Careers	7
Program Rating	7
Program Outcomes	8
Outcome Ratings	9
Criticisms and Suggestions	10
Conclusion	12
Appendix A: Program Schedule	13
Appendix B: Survey Results	14
Appendix C: Interview Guides	19
Appendix D: Additional Interview Excerpts	20

Future Female Scientists

An Evaluation of a New Program at the National Museum of Natural History

Background

On March 8 and 9, 2007, the National Museum of Natural History (NMNH) presented a pilot program for 23 local 11th and 12th grade high school girls interested in science.¹ Recognizing that women are underrepresented in science fields, the program had two main goals: to provide information about careers in the sciences at the Smithsonian Institution as a way of expanding young women's understanding of what is possible; and to encourage their interest in science careers by providing personal interaction with female scientists. The program was funded by the Smithsonian Women's Committee, and the organizing staff for the program, Mollie Oremland and Amy Bolton, asked the Office of Policy and Analysis (OP&A) to conduct an evaluation. The evaluation will help the museum to determine whether or how the program might be offered again in the future, and, if so, how it might be improved.

Methods

The OP&A study team utilized two interconnected methods: a survey of all participants at the start of the program and at the end of the program; and brief interviews with participants in person as they first arrived at the museum, and by telephone one to two weeks after the program. All but one participant was surveyed, 21 of the 23 girls were interviewed at the start and 14 of the 21 were interviewed in the follow-up.

Content of This Report

The next section of this report presents the findings of the evaluation study, drawing on both the survey data and the interviews with participants. This is followed by a discussion of some of the implications of the findings, and by four appendices. Appendix A presents the program schedule. Appendix B presents the results to each survey question, Appendix C lists the interview questions, and Appendix D provides some additional excerpts from the interviews.

¹ Although 23 girls participated, only 22 filled out both surveys, because of the anticipated absence of one participant.

Findings

Expectations

Participants began the program expecting that they would learn about the daily life of a scientist, meet scientists, engage in hands-on activities/experiments, and learn about new science fields. They developed this expectation from what they read on the website for the program and from the options and information on the forms they filled out in advance. All but one of them had been recommended to the program by a science or math teacher.

After the program, when participants spoke about their expectations, two responses dominated:

- 1) the program provided closer contact with scientists than expected, and
- 2) unexpectedly the program offered a behind-the-scenes look at the Smithsonian.

As one participant said,

I didn't realize how much goes on behind the scenes of the Smithsonian. What I expected was just a tour or something, but it turned out to be so much more -- meeting all the women that work there and all the research that was being conducted.

Science in College

Before they started the program most of the girls (18 of 22) were very interested in taking science courses in college beyond what is required. As the interviews made clear, these young women enjoy science, are good at it, and are eager to develop that interest. Fewer of them, however, were very interested in majoring in a science field (13 of 22) when they began this program. The majority view was expressed by the participant who, when asked if she was going to study physics in college said, "Definitely study it. I don't know how I'll do, but I'm definitely going to take classes."

At the end of the program, all 22 of the girls were very interested in taking science courses in college beyond what is required. More of them were also very interested in majoring in science. At the end of the program 16 of 22 wanted to major in science. (See Figures 1 and 2.) For some, as indicated by the follow-up interviews, the exposure to new fields of science increased their interest in taking more science in college ("It was a lot of fun. I really enjoyed it. There are probably more college courses I want to take."). For others the program changed their thinking in a substantial way, as with the student who said,

At the beginning [of the program] I was interested in science, but I wasn't planning on pursuing it as a job. It was just an interest or hobby, but now I'm actually thinking about joint anthropology and that sort of thing. It really got me more interested in the subject, knowing what was out there, basically.

Figure 1
Interest in Taking Science Courses in College
Beyond What's Required
(Number of participants=22)

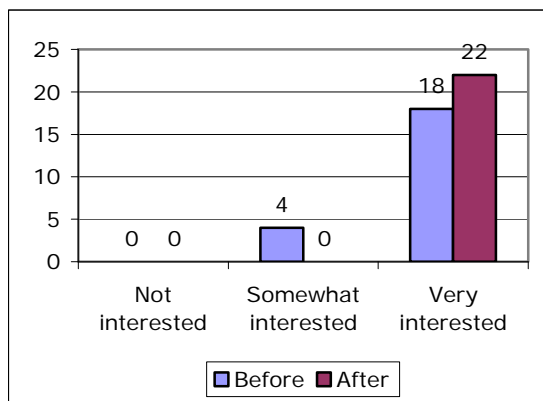
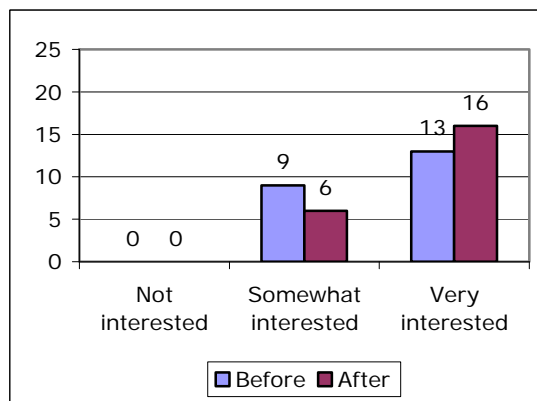


Figure 2
Interest in Majoring in a Field
of Science in College
(Number of participants=22)

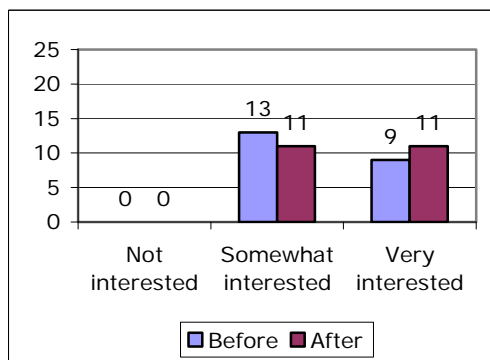


Science after College

At the beginning of the program, few of the participants (9 of 22) were very interested in a career in science research. As one participant said, “I have no idea what I’ll be studying after college. I’m open to anything right now.” A few, however, were already looking beyond college to their future career, “I want to be a doctor....My specialization will be anesthesiology.”

At the end of the program the number of participants who were very interested in a science research career was slightly higher than at the beginning. In the second survey 11 of 22 wanted a science career. See Figure 3.

Figure 3
Interest in a Career in Science Research
(Number of participants=22)



A number of follow-up interviewees spoke about how the program had expanded their understanding of what scientists actually do in the world.

Before I went [to the program], I always knew that I liked biology, but I had never met someone who's actually into biology and not a doctor. And so I just assumed that being a

doctor would be the best thing to do, but I realize now that I could venture into something else.

* *

[The program] really shows that there is so much that you can do with a degree in that field or even if you don't have one – lots of opportunities present themselves to you, even in a museum atmosphere. There are different jobs you can take and different aspects of research you can do. There's a whole bunch of things you can actually use with that education that I would never have dreamed of.

Some participants remained uncertain about their future in science after college, as they were still uncertain about their futures overall.

I got to see a broader range of stuff – which is what I wanted to see, since I'm not that specific about anything. But I'm still not at the point where I know specifically what I want to do at all.

Science Careers in Museums or Applied Science

A few students (2 in 22) started the program very interested in a career in museums, but by the end of the program 7 of 22 were very interested. The program had minimal effect on those who were very interested in a career in an applied science. (See Figures 4 and 5.)

Figure 4
Interest in a Career in a Museum
(Number of participants=22)

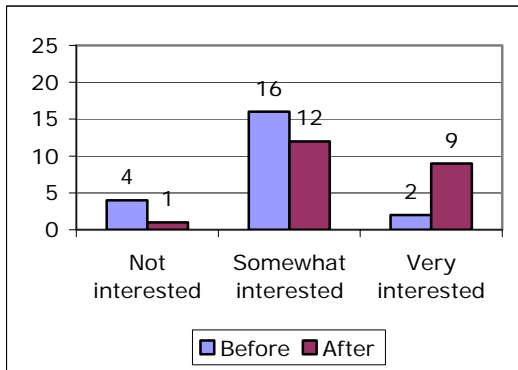
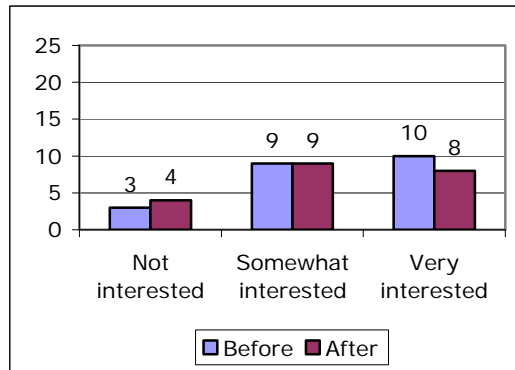


Figure 5
Interest in a Career in Applied Science
(Number of participants=22)



One discovery about museum work noted by a number of follow-up interviewees was the realization that many museum scientists travel extensively.

I never realized how much traveling the scientists do. I always thought they just sat in the back and do research, but really they travel all around the world and do their own experiments and studies. It really was a lot deeper than I ever imagined.

The background of these women supports a strong interest in science. For 13 of the 22 participants, at least one parent works in a science field. Of the remaining nine, two have

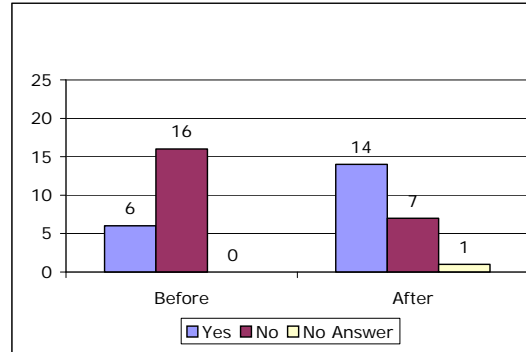
a father or mother working as a computer programmer or computer consultant and their parents want them to pursue scientific careers, and six most admire a man or woman working in a field of science.

The Impact of Gender on Science Careers

At the start of the program 6 of the 22 participants believed that gender affected science careers. This is reasonable in view of the fact that their most admired men and women had approximately equal numbers of scientists among them. Among the adult females they most admire, 11 are scientists; among the adult males, 13 are scientists.

At the end of the program 14 of the 22 participants believed that gender affects science careers. (See Figure 6.)

Figure 6
Does Gender Affect Science Careers?
(Number of participants=22)



On the survey at the end of the program, participants were asked what they now thought about gender and science careers. **Their responses show that they were optimistic and determined that the gender barrier could be overcome.** In particular they said that

- **the problem was larger than they had realized** (4 students)
e.g., *It seems like a much larger impact than what I originally thought or knew.*
- **the problem was exaggerated** (1 student)
e.g., *I think they were overreacting.*
- **the situation was changing already** (5 students)
e.g., *I believe females are becoming very effective and successful and scientists are overcoming gender boundaries.*
- **such obstacles could be overcome by personal effort** (10 students)
e.g., *If you try hard and pursue what you want to do you will be able to do it even if it is male-dominated.*

Program Rating

The participants were asked at the start of the program how they thought they might rate it at the end, and then, at the end, they were asked to rate it. The rating options were “Poor,” “Fair,” “Good,” “Excellent,” and “Superior.” No one selected “Poor” or “Fair,” either at

the start or at the end. Half of the girls chose “Excellent” as both their anticipated and actual rating. As shown in Figure 7, **except for three of the girls, participants gave the same rating after the program as they imagined that they would before the program.** Two of the three dropped from “Excellent” to “Good,” and the other one moved up from “Excellent” to “Superior.” **For two-thirds of participants, the program was better than they expected** (see Figure 8). Most of those who said that the program was better than expected also rated it as “Superior.”

Figure 7
Anticipated and Actual Rating

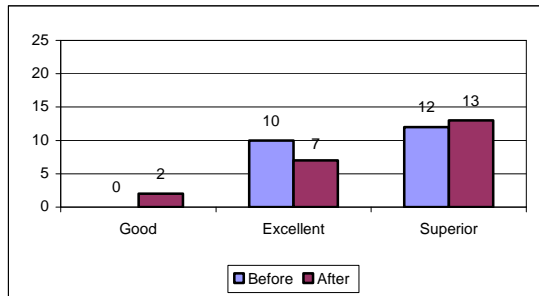
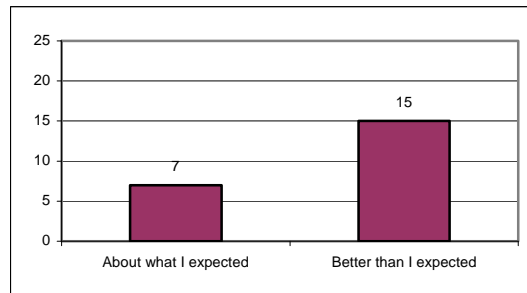


Figure 8
Comparison to Expectation



All of the participants said that they would recommend the program to someone like themselves. Their reasons stressed learning (e.g., “The program allows kids to get so much more info about things.”) and opportunity (e.g., “A way to really open you up to new opportunities/jobs/interests.”).

Program Outcomes

Participants were asked in the survey at the end of the program what they got out of the program. There were three major themes in their answers:

- **Learned**
 - about particular science subjects
e.g., *I learned about anthropology.*
 - about science careers
e.g., *I learned a lot about the paths a woman interested in science can take.*
 - about the museum
e.g., *I saw all of the things people do here and I am awed by my experience.*
- **Met scientists**
e.g., *--I met so many amazing women who were very passionate about what they do. It was very inspirational.*
--I thought it was amazing to be around women who are so passionate about what they do and I learned...how they interact with each other and how it works behind the scenes and just the whole system. They were just so involved, and it was amazing.
--You would never believe that people could be passionate about rocks but they made it seem so interesting and made you get into what they were doing. They'd just show you all these things and give you a back-story to them that just made it really just amazing, how you can make something so ordinary so fascinating. That's what I liked a lot and they were really just nice people too. I loved them.

- **Changed**

e.g., --*I learned that I can be a scientist if I wanted to – I thought it was an esoteric job for a select few.*

-- *My decision about majors changed.*

Participants were also asked how they planned to make use of their experience in the program. **Three-quarters of the participants (17 of 22) wrote that they wanted to volunteer or intern at the museum.** The enthusiasm that participants felt for the museum and an opportunity to intern or volunteer was reflected also in the interviews. One student, for example, said,

I liked the first day when I was in the Smithsonian museum, how everyone was really nice and it was a very good environment and a good place for me to want to do my internship and volunteer at.

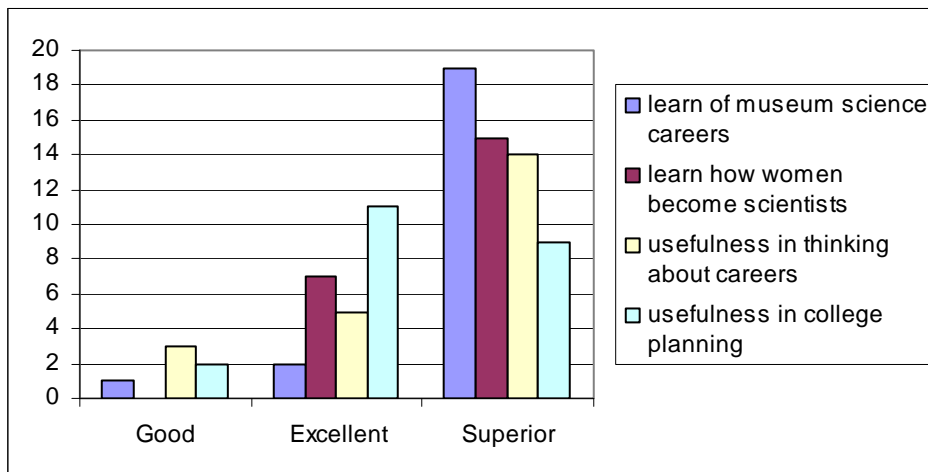
Outcome Ratings

Participants were asked on the survey at the end of the program to use the Poor-Fair-Good-Excellent-Superior scale to rate four specific outcomes of the program:

- their learning about different science careers in museums,
- their learning about different ways that women become scientists,
- the program’s overall usefulness in their planning for college, and
- the program’s overall usefulness in their thinking about careers.

As shown in Figure 9, the **program was most effective in helping students learn about different science careers in museums.**

Figure 9
Ratings of Specific Learning Goals and Usefulness Aims



Criticisms and Suggestions

Participants were very positive about specific features of the program. In particular, they noted how much **they liked**

- **the one-on-one sessions with scientists**, (e.g., *My favorite part was going to the specific departments rather than the museum support center. We actually got to talk to the people in small groups and it was easier to talk to them. It was interesting to talk to everyone.*)
- **the panel**, (e.g., *At the end, when they had the forum when the scientists answered questions, it was really good. It made you feel like you could do anything the way they talked. It was so personal and really inspiring.*)
- **going behind the scenes** (e.g., *Just getting to tour the museums was really amazing because I had no idea about all the laboratories and specimens that are stored back there. I didn't know how big it was.*)
- **the hands-on activities**, (e.g., *Her intern took me to the room in the museum [where] they brush off the fossils and people in the museum can watch you, and she let me do that, and I thought that that was awesome.*)
- **the IMAX film** (e.g., *I also liked the movie and it was nice they extended that and that we could invite our family.*)
- **tours of the labs** (e.g., *The tours of the labs are really interesting. Like paleobiology was really cool and that's something I think I want to explore later.*)
- **meeting students with similar interests**, (e.g., *Whenever I go to a camp or something I like to look for people like me, because honestly at my school I don't feel like everyone is as dedicated as the people I met at the program.*)

Participants also offered **criticisms and suggestions** for specific elements in the program. These included:

- **clearer description of the program** (e.g., *I thought that it was going to be more of a hands-on thing. [From the description I expected] 'shadowing' and I thought we would be seeing them do more work, but it was mostly touring. So it was enjoyable; it wasn't bad; but it would be better to describe it that way.*)
- **not enough time** (e.g., *That was my only gripe about the program, that it was so short.*)
- **more one-on-one** (e.g., *On the first day when I was just with another girl and the teacher I was comfortable, because I like just a few people, but when we were all together I really didn't feel like talking.*)
- **more hands-on** (e.g., *While the tours were interesting, I expected more hands-on work.*)
- **more groups** (e.g., *if we had more time I would have liked the group activities more because there are more people there, and more questions to be asked, and more people to interact with.*)
- **less talking** (e.g., *The program was a lot of sitting and discussing. The lack of hands-on was a major problem. It's hard to be young with a lot of energy, and they gave us a lot of food before they sent us off, and sitting for [what felt like] three hours listening about how men take over the industry is really boring. It's a big problem, but we're young, and we haven't experienced it yet, so we're not experienced in the conversation, and it's more talking at us than with us, and again, it's what the*

program is about, but maybe they should highlight it throughout the program rather than three hours at the end.)

- **longer days** (e.g., *If it had lasted longer and started at 9 and ended at 7, I don't think that anyone would have had a problem with that, because I think that either way we are missing school, and so if it just went longer in the day, it would have enabled us to see more.*)
- **shorter days** (e.g., *The first day was kind of draining, because it was a full day. It went from 9:30 or 10 until 7:00 and that is a lot longer than a school day. And then if they didn't have such long days, maybe [it should be] three short days.*)
- **more girls involved** (e.g., *I think it would be better if there were more girls involved since there were only twenty five and it was really fun and nice to be in a small group, but I think it would be nice if more people could experience it as well.*)
- **closer to my interests** (e.g., *I really wish that ... if you were only interested in a couple of specific areas that they could get into it a little more. I noticed they had a lot more people from certain categories, and a lot of girls weren't from those categories. If they specify, they can match you up better.*)
- **better food** (e.g., *Sandwiches were not amazing. And more water bottles -- instead of so much coke -- would be nice.*)

Conclusion

The first goal of this program was to provide information about careers in the sciences at the Smithsonian Institution as a way of expanding young women's understanding of what is possible. This goal was clearly achieved. Nearly all of the girls (20 of 23) rated their learning of museum science careers as "Superior."

The second goal was to encourage their interest in science careers by providing personal interaction with female scientists. The evidence here is that the program increased interest in a career in a museum. At the start of the program only two students were very interested in museum careers and at the end nine were, but the program did not significantly affect interest in a career in scientific research or applied science. The post-program interviews reflected the impact of meeting women scientists at the museum. As their comments make clear, a number of participants were very excited by what they saw and wanted to be part of it. The "behind-the-scenes" aspect of the program was particularly engaging and effective.

The girls who signed up for this program were already very interested in science (and had been told about the program primarily by their science teachers). Most of them also entered the program very interested in taking science courses in college beyond what is required and over half were very interested in majoring in a field of science in college. They entered with reasonably accurate expectations of what the program was going to be about. Overall they seem to have gotten what they anticipated, even as the program on the whole exceeded their expectations.

The largest change that took place in the program was the shift in their understanding of the impact of gender on science careers. At the start, one-third felt that gender affects science careers; at the end two-thirds of them felt that gender affects science careers. Although the participants came to feel that gender matters, their remarks suggest that most of them are not intimidated by this fact, and that they see the gender issue as a situation that is changing and that can be further altered by their own efforts. They expressed confidence in themselves and a determination to succeed.

When the students were asked at the end how they would use their experiences in the program, they revealed the positive impact of the program in the fact that so many of them (three out of four) mentioned either volunteering or interning in the museum. Although a few students had mentioned in their first interviews that they had a personal attraction to the museum, most did not realize the extent to which the museum is a center for scientific research, a point that became clear and compelling in the course of the program.

The responses of these students, in addition to revealing the ways that this program was effective, also point to possibilities for other programs. In particular, regular behind-the-scenes tours for science-minded high-school students, a clearer and more public articulation of the museum's research role, and wider promotion of volunteer and intern possibilities would be some ways that the museum could positively influence much larger numbers of area students interested in science.

Appendix A: Program Schedule

FUTURE FEMALE SCIENTISTS SCHEDULE

Agenda: Thursday, March 8

- 9:30-10:00 a.m. Participant arrival and registration
- 10:00-11:00 a.m. Opening session & breakfast (provided)
- 11:00 a.m.-12:30 p.m. Workshop with scientist sponsor #1
- 12:30 p.m.-1:30 p.m. Lunch (provided)
- 1:30-3:00 p.m. Workshop with scientist sponsor #2
- 3:00-5:00 p.m. Hands-on activities
- 5:00-5:30 p.m. Afternoon snack break in Johnson IMAX® theater lobby
- 5:45-7:00 p.m. Screening of *Galapagos 3D* IMAX® film
- 7:00 p.m. Conclusion of Day 1

Agenda: Friday, March 9

- 9:00-9:45 a.m. Participant arrival and breakfast (provided)
- 9:45-10:30 a.m. Participant shuttle to Museum Support Center in Suitland, MD
- 10:30 a.m. -12:30 p.m. Tours and activities at Museum Support Center
- 12:27-1:00 p.m. Return shuttle to National Museum of Natural History
- 1:00-2:00 p.m. Lunch (provided)
- 2:00-3:00 p.m. Pathways and careers workshop
- 3:00-4:00 p.m. Closing session
- 4:00 p.m. Conclusion of Program

Appendix B: Survey Results

National Museum of Natural History --- Future Female Scientists *Survey at the Start*

Hi! Welcome to the FIRST *Future Female Scientists* program at the National Museum of Natural History. To help us plan the next program PLEASE fill out this form. There are NO right answers. We're interested in YOU!

1. Who recommended you to the program? [CHOOSE ONE OR MORE]

School counselor **20** Science teacher Home room teacher **1** Other: Parent

2. Where did you read about it? [CHOOSE ONE OR MORE]

4 Poster **13** Webpage **5** Other: email

3. What was the main reason you decided to apply?

It's local, free, and interesting. * I love science. * I love science. * Learn about different fields of science. * I've always enjoyed science programs and liked the fact that this was just for girls. * Interests in scientific career. * To learn about the diversity of areas in science and get a feel for what I want to do. * I thought it sounded like too good an opportunity to pass up. * To get an insiders perspective on the field of science. * I am really interested in science and I wanted to be exposed to the occupations associated with science. * Exploration of future interests/majors and love of the museum. * To have fun while learning new stuff. * One of the choices was genetics and that's my interest. * Meet scientists in the field. * For fun. * I enjoy science. * It sounded interesting. * To become more knowledgeable about science in real life.

4. In ONE or TWO sentences: What do you EXPECT to get out of this program?

Meet interesting scientists and learn what they do. * Get a better understanding of different branches of science, and perhaps a new interest. * Broaden my interests in science in order to find out exactly what I want to do. * Find a mentor. * Gain knowledge about different careers. * Learn about the different jobs involved in science. * A day in the life of a scientist. * Get a greater sense of whether or not I want to continue in science. * Meet some female scientists and explore their lives in their work area. * A better idea of what goes on behind the scenes at the museum. * Insight into the "current events" in science. * To learn and soak in more of the world. * See a lot of interesting things. * Meet scientists who have lots of experience and learn from their research that they share. * Learn about how these women got into their career.

5. How do you think you will rate this program when it's over?

Poor Fair Good **10** Excellent **12** Superior

6. How interested are you in

	Not interested	Somewhat interested	Very interested
taking science courses in college beyond what's required	<input type="radio"/>	4	18
majoring in a field of science in college	<input type="radio"/>	9	13
a career in science research	<input type="radio"/>	13	9
a career in a museum	4	16	2
a career in applied science [e.g., medicine, dentistry, lab tech, etc.]	3	9	10

7. In your opinion, does gender affect science careers?

6 Yes. **7a. In what way?**

A positive way because companies are looking for females in science careers. * Certain positions are more male-dominated and thus closed to women (especially in surgery). * Somewhat – it is easier to feel comfortable with peers of both genders rather than a majority of one. * Expectations and remnant discrimination. * Unsurmountable gender gaps. * You might have to make a special effort to reach your goals.

16 No.

8. What is your father's/male guardian's occupation?

Union representative. * Criminal justice outreach program. * Computer security. * Computer scientist. * Engineer. * National defense consultant. * HVAC. * Physician. * State Department. * EPA. * GSA. * Federal Government. * Economist. * Retired oral surgeon. * Lobbyist. * Motel owner. * Aerospace engineer. * Marine chemist/professor. * General contractor.

9. What is your mother's/female guardian's occupation?

Nurse. * Math teacher. * Computer program consultant. * Veterans Affairs. * Programming engineer. * Editor/prgorammer. * Elementary teacher. * Vet. * Art professor. * Secretary librarian. * EPA. * Gynecologist. * Computer consultant. * Orthodontist. * Housewife. * Auditor. * Technical writer. * Biotech manager. * Research contractor (NH). * Linguist.

10. What occupation/career do your parents/guardians want you to pursue?

They don't care. * Engineering. * Medicine. * Anything and everything. * NPR reporter/mathematician. * Lawyer. * Author and scientist. * Science/law. * Engineering (biomedical). * Environmental science. * Lawyer/business major.

11. What is the occupation of the adult female whom you most admire?

Psychologist. * Librarian. * Librarian (Mother). * BioMedical Engineer. * H.S. science teacher. * Computer scientist (Mother). * Chemistry teacher. * Mathematician. * Botany professor (Aunt). * Flute teacher. * Astronaut. * Microbiologist (Cousin). * Teacher (Mother). * Orthodontist (Mother). * Biochemistry lab director (Aunt). * Housewife (Mother). * Auditor (Mother). * Former Ambassador (Godmother). * Geneticist. * Math teacher.

11a. Is she related to you?

11 Yes. 11b. What is her relationship to you? (see parentheses above)

9 No.

12. What is the occupation of the adult male whom you most admire?

Minister. * Ballet teacher. * Physician. * Computer security (Father). * Computer engineer/scientist (Father). * Physics teacher. * Pathologist (Father). * Physics professor. * Scientist. * Federal Government (Father). * Economist (Father). * Oral surgeon (Father). * Lobbyist (Father). * Motel owner (Father). * Aerospace engineer (Father). * Jonas Salk. * Lawyer.

12a. Is he related to you?

10 Yes. 12b. What is his relationship to you? (see parentheses above)

10 No.

13. If you could instantly have any occupation or career you wanted, what would that be?

[IT DOES NOT HAVE TO BE SCIENCE-RELATED]

Genetic counselor. * Science writer. * OBGYN. * Field biologist/herpetologist. * Anesthesiologist. * Fashion designer. * Mathematician. * Genetic research. * Traveling biologist. * Novelist. * Lawyer. * Actress on Broadway. * Biomedical engineer. * Not sure. * Something in design. * A mom. * Ninja. * Research in oncology/genetics. * Humanitarian studies. * Physicist. * Biologist in the tropics or national Geographic photographer. * Engineer.

THANKS FOR HELPING US. GOOD LUCK TO YOU!

National Museum of Natural History --- Future Female Scientists *Survey at the End*

Hi! Thanks for participating in the FIRST *Future Female Scientists* program. To help us plan the next program, share your experience with us. PLEASE fill out this form this afternoon. There are NO right answers. We're interested in YOUR HONEST OPINION!

1. How would you rate this program overall?

Poor Fair 2 Good 7 Excellent 13 Superior

2. How did this program compare to your expectations?

Not as good as I expected 7 About what I expected 15 Better than I expected

3. Would you recommend this program to someone like you?

22 Yes. **3a. Why?**

A way to really open you up to new opportunities/jobs/interests. * An excellent experience and I myself want to come back. * Provides insight into science careers. Opens your eyes to all the different aspects of science. * I got a lot of info about different careers. * Good opportunity to meet scientists/get inspiration. * Allows kids to get so much more info about things. * Everyone is so generous with their enthusiasm and stories of inspiration. * I thought the best thing was how a specific mission wasn't forced, every scientist did not have an identical purpose in their communications and I learned a diversity of info, and it wasn't repetitive. * Tremendously helpful. It was really fascinating to see what a scientist actually does. * It is a once-in-a-lifetime experience that is extremely beneficial in exposing females to future careers. * This can help them out as well. * It was fun, and definitely inspiring. * Very informative, fun, miss school.

No. **3b. Why not?**

4. In ONE or TWO sentences: What did you GET out of the program?

A glimpse of what goes on behind the scenes, as well as to be exposed to things I had seen from a distance but had never experienced before. * I saw all of the things people do here and I am awed by my experience. It was worth it to miss school for this program. * I learned a lot about the paths that a woman interested in science can take. * I really got a lot out of the advice the scientists gave us about careers. * It was amazing to see all the 'hidden' behind the scenes part of the museum. * I found more I really admired in a field and want to pursue. * A day in the life, college advice, career advice, and my decision about majors changed. * I learned that I can be a scientist if I wanted to. I thought it was an esoteric job for a select few. * I met so many amazing women who were very passionate about what they do. It was very inspirational. * I made connections with geneticists and botanists, learned about internships, and met other young ladies who like science. * Networking, opportunity to ask questions about life in science. * Seeing all the different things that you could do with science that I never knew existed. * I learned a lot about the many options available in the field of science. * I also learned about all the fantastic job opportunities at the Smithsonian. I saw different backgrounds of science. * I've experienced a scientist's work life. * I want to be a researcher. Hope to see you guys in 10 years! * I'm more interested in archaeology now and I'm more inclined to volunteer here in the future. * It also changed how I feel about the museum. * I developed a new interest in wildlife forensics, based on my experience in the feather identification lab. I also developed a lesser interest in botany. * Learned about anthropology. * More insight into what natural history is really about. * I've realized how many different/unique job opportunities and projects there are.

5. How do you plan to make USE of your experience in this program?

I can take action to pursue my career in science. * I plan to start by interning with a female scientist. * Use it to gain more experience through internships with scientists I met. * In my planning for college and beyond. * Use the info/inspiration I got to get an internship. * Contact some scientists for volunteer/internship opportunities. * Intern here, volunteer, make friends, and eventually work here.

*** Become a scientist, be confident. * Take internships and stay connected. * I want to intern here and keep in contact with these people. * I plan to find a mentor and get an internship. * To hopefully get an internship and have a better idea of what I want to do. * I plan to investigate some new fields of science and also apply for many internships and hopefully a job. * I will take advantage of all the information given to me. * Emailing the scientists! I'm going to volunteer. * Hopefully volunteer! * I plan to explore these new interests through studies and internships.**

6. Please rate this program with respect to ...

Your learning about different science careers in museums
 Poor Fair Good Excellent Superior

Your learning about different ways that women become scientists
 Poor Fair Good Excellent Superior

The program's overall usefulness in your planning for college
 Poor Fair Good Excellent Superior

The program's overall usefulness in your thinking about careers
 Poor Fair Good Excellent Superior

7. How interested are you in	Not interested	Somewhat interested	Very interested
taking science courses in college beyond what's required	<input type="radio"/> O	<input type="radio"/> O	<input checked="" type="radio"/> 22
majoring in a field of science in college	<input type="radio"/> O	<input checked="" type="radio"/> 6	<input checked="" type="radio"/> 16
a career in science research	<input type="radio"/> O	<input checked="" type="radio"/> 11	<input checked="" type="radio"/> 11
a career in a museum	<input checked="" type="radio"/> 1	<input checked="" type="radio"/> 12	<input checked="" type="radio"/> 9
a career in applied science [e.g., medicine, dentistry, lab tech, etc.]	<input checked="" type="radio"/> 4	<input checked="" type="radio"/> 9	<input checked="" type="radio"/> 8

8. What thoughts do you now have about how gender affects science careers?

I believe there are no boundaries as before. With the right determination and a great education nothing can permanently bar you from your dreams. * Gender doesn't really make a difference in science careers because nowadays women are beginning to move up in society, well...they have been. * I saw that although it takes hard work to pursue a career for a female, it is definitely possible. * I think that although women may have a disadvantage when it comes to entering the field of science, it is completely possible to be a woman who is involved in science. * I'm glad that science is becoming less of a male dominated field. * Can have an effect, but can be neutralized. * I believe females are becoming very effective and successful and scientists are overcoming gender boundaries. * Gender is definitely an issue in getting a job and pursuing a career but in the end determination and hard work trump all. * Women started a revolution and I hope to continue it and end the "male scientist" stereotype. * I see that gender differences in how many obstacles it can encounter- more than I realized. * It appears to be an obstacle, but all obstacles can be overcome. * It seems like a much larger impact than what I originally thought or knew. * Now I think that it presents some special challenges for women pursuing careers in science. * I know that it's possible to overcome gender boundaries. * If you try hard and pursue what you want to do you will be able to do it even if it is male dominated. * Women are still a minority in the fields of science and we have the opportunity to change that statistic. * Although gender discrimination still plays a large role in most work places, I can still do what I please. * Women are best. * I think we need more women in higher offices because it seems as though men still occupy the high spot on the totem pole. * Being a woman in science may be difficult, but those who stick with it really seem to enjoy what they are doing. * I think they were overreacting. *

9. Please share any additional comments about the program that may help us improve it! For example: sessions you liked or disliked, suggested additions to the program, topics to be covered, elements that should be left out or done differently, etc.

I basically liked everything and wouldn't suggest anything else because for a first time this program was perfect. (However, I was hoping to cover more courses and it would have been better to have the program during the weekends.) * My favorite part of the program was when we met with one scientist per two students because it enabled us to have a personal conversation with the scientists to learn about them and their work. Also in this kind of environment I felt more comfortable asking for assistance and advice. * I would have enjoyed more 1-on-1 time with the scientists rather than the group hands-on sessions. * The program was awesome! It was so well planned and coordinated. The 1-on-1 closeness was really appreciated. Thank you so much!! * Seeing the storage areas was very interesting and unique. Some of the 'hands-on' activities were just lectures. * Info about internships really helped. Hearing women talk about careers was helpful/encouraging. * I wish there was more time for the sessions. Everything felt rushed, which is understandable because of the variety of experiences offered, but it would have been great to spend more time with the scientists. * This program was an 11 out of 10 and should definitely be repeated. * Please! This program was so wonderful! The only modification I would make is to make it longer! * MORE TIME!- if possible! Sandwiches were not amazing and more water bottles (as in instead of so much coke) would be nice. * Loved the panel. Perhaps the days could be more fine-tuned to individual wants, but everything was amazing anyways. * I wish it was longer; I would have liked to see more departments for longer periods of time. * I think hands on activities should be longer and tours of dead things should be shorter. * I loved the mineral science session and the panel of female scientists. * Overall a great experience, really interesting and unlike anything else. * Loved seeing the different scientists and what they did. * I wish there was more info about other science jobs besides specific subjects and research, such as doctors or forensics, etc. * My first activity with Linda Cole was my favorite and the best experience of the program. She really encouraged me and did a fantastic job showing me around the facility. * Some of the activities with the scientists were not very fun filled but they were all educational. * The smaller group activities were the most beneficial and fun. Overall it was a FANTASTIC PROGRAM that should be continued! Also the program should be longer because there are so many more things to see that I didn't have a chance to experience. * I enjoyed everything! Please don't change. * The sessions where it was 2 girls to a scientist and walking through their day/lab/work was amazing. Thank you! * I think the heads (Mollie&Amy) should review what the scientists have planned because some of the presentations were a bit boring. I hope future participants get to do actual shadowing because while the tours were interesting, I expected more hands-on work. On a more informal note, I suggest getting pizza for lunch. * This was an amazing program. I really appreciated being a part of it. * I placed genetics first on my list of interests; I learned about it in two different locations. However, I learned pretty much the same thing both times. The same thing happened when I visited the bird lab twice. * Focus more on what the girls are interested in. Like I wanted to learn more about anthropology, the rest bored me. Also allow us to ask most of the questions.

THANKS FOR PARTICIPATING. GOOD LUCK TO YOU!

Appendix C: Interview Guides

Guide for Personal Interview at the Start

BACKGROUND

How did you find out about the program?

Are you especially interested in science? Which one? [Probe]

FUTURE CAREER

What do you think you would like to do after you finish college?

When or how did you get interested in that field ?

EXPECTATIONS

As you think about the next two days, what do you expect to get out of the experience? What do you think it will be like?

We'd like to call you after the program to get your impressions of it. Would that be o.k. with you? When would be a good time to call? Which number should we use?

Guide for Phone Interview at the End

OVERALL IMPRESSION

As you think back about the two day program, what did you get out of the experience?

EXPECTATION

How similar or different was it from what you expected?

HIGH POINT

Was there any aspect of the program that REALLY grabbed you? What was that?

What did you think of the other parts of the program?

SCIENTISTS

Was there someone that you met that you'd like to meet again? Why? What did that scientist do?

IMPROVEMENT

What could have been done to make the program better, in your opinion?

THANKS!

Appendix D: Additional Interview Excerpts

BEFORE THE PROGRAM

EXPECTATIONS

What do you think you'll get out of the program?

I don't know. I just want to be able to talk to the people. Like I know it's going to be good to be able to meet women who went through college doing science. You can like ask them questions about how they got into it, what they did in college, stuff like that.

Do you have any sense of what's going to happen these two days?

Well, they just said that we are going to be calling on people, scientists, and there's going to be an IMAX thing tonight, and tomorrow we're going out to somewhere in Maryland. I forgot the name. And that's about all.

What do you think about the program? What are you expecting from it?

Well, I actually don't know what to expect at all. I'm a little bit nervous, but I'm thinking, from the information that I was given, that mostly it's just going to be other women who have careers in science. And I think it is really exciting that this program is just for girls.

What do you think is going to happen in these next two days?

Hopefully I'll meet some people. We have a project. Our research practicum project at school, where we need mentors and things.

I want to learn more about the different studies and I think it'd be cool to meet female scientists and see more of the museum and everything that's going on in today's field in science

I'm looking forward to see scientists, see what their jobs are like, see how their social life is. I'm not sure I'm going to be stuck in a lab all day. I just want to look into it.

I have no idea what to expect. I just looked at the schedule and we're doing experiments and hands on stuff and like, I'm excited about meeting the different scientists. But other than that I don't know what to expect. I know it's going to be a lot of fun.

I'm hoping to get to know the museum a bit better and interact with people in the field of science. So I'm really excited to get an interested, kind of, feel.

What do you expect to get out of the program/experience?
Meet other girls interested in science and have fun

What do you expect to get out of the program/experience?
Learning about all the other areas of science and natural history.

What do you expect to get out of the program/experience?
More of a feel of science professions to see what goes on.

What do you expect to get out of the program/experience?
I've always been interested in this museum and would like to see more about how it works.

What do you expect to get out of the program/experience?
Hopefully a better understanding of the world and my role in it. I don't really know what the program entails but I think it will be really fun.

What do you expect to get out of the program/experience?
A day in the life of a scientist and whether I really want to pursue the sciences or not.

So what do you hope to get out of the experience?
Well since it helps us look at different fields then yeah, since I am not sure what particular field I want to go into, get a taste for the different fields and have the chance to meet different scientists.

AFTER THE PROGRAM

COMPARISON TO EXPECTATIONS

The program was a little different than what I expected. Like, I expected there to be, like I didn't know all the scientists were going to be through the Smithsonian. So I didn't expect to be able to see offices and all the artifacts that we don't get to see in the museum, but I like that better, like being able to run through the collection and open the drawers and see what's in them, I thought that that was a lot of fun. I also didn't expect to go to Maryland. Like, I knew we were going somewhere but I didn't know exactly what it was. That, I thought was going to be a lot better personally. Like, I heard about this box with a beetle in it, and you could stick a dead bird in it and watch the beetle eat it. It was really gross, but it was still kinda cool to watch it do the natural thing. Like, we didn't get to do that as much, we mostly sat around and watched people talk at us.

How was your experience similar or different from what you expected it to be?

I expected to do a show and tell with the ladies. I don't know it really connected with one of the scientists and we exchanged emails so I might intern with her in the spring.

Was this what you expected out of the program? What was similar or different from what you expected?

I expected to just go back and look at what the scientists are doing. I think that I did actually do a lot more than that. I not only saw what they were doing but how different areas have benefited from what they were doing and how the Smithsonian works in general. I thought it was a really good experience.

Was the program different from what you expected?

Yeah, actually I was surprised we got to spend so much time with so many scientists and I was really impressed that it was pretty much a one-on-one experience, because there were just two students for one scientist and I wasn't expecting that.

Was it not exactly as good as you expected?

NO! It was really good I really liked it! It was really cool.

Tell me a little bit about the program and what you think you got out of it.

Basically I went into the program thinking that I would get a better glimpse into a possible career in science, or biology, or even a museum. I got a really good idea of what goes on behind the scenes, and what goes into all the experiments and exhibits, and just a better idea of the deeper aspects of the museum and of the field. So, I really was exposed to it in a way that I wanted to be.

Was the program all you expected?

Yes and more. I didn't think I'd get that much out of it, but I did.

What did you get out of it specifically? What did you learn that you didn't know that you were going to? I didn't know about how few female scientists there were, and I was unaware about how many jobs there were available for women, and the diversity of fields you can study.

COLLEGE AND CAREER

It was a lot of fun, I really enjoyed me. There probably more college courses I wanna take.

What other careers did you learn about? Are you interested in any of them?

Generally I'm interested in the sciences but I'm still not at the point where I know anything specific about what I want to do.

I know before you said you were interested in genetics, did you get to learn any more about that?

Not really, but I don't know if I want to be in genetics anymore.

Really? Why is that? What did you find out?

I just didn't think all those other subjects would be interesting but I found them to be more interesting than sitting in a lab doing genetics. I could go travel and do something else like entomology or study birds or something.

Ok. Do you think now that you are definitely headed into a career in the sciences?

Yes.

INTEREST IN NMNH

Out of all the scientists that you talked to or anyone you met, is there anyone you'd like to meet with again?

Yeah, I was thinking to ask an internship later on or come and spend a day with some of them.

Would you want an internship more because of the research that they are doing or because you like the Natural History Museum?

Both, the museum is my favorite museum that I most like on my free time to look around, but working under a scientist would... I would want to do that because of the research involved.

Have you visited NMNH before the program? Yeah. I had no idea that there were all those collections of stuff inside the museum and this program gave me a whole new perspective of museum life, a whole new respect for it.

Can you tell me more about that? What did you not know before that you really liked? I had no clue that it was such a huge research institution. Just the fact that it has some of the biggest collections in the world and that so many people put so much time into doing so much research that it's just so awesome and just make my respect for the museum go up so much and that people are actually working there and they are actually making progress.

Paleontology was ok. [laughter] I mean I thought that this is pointless, but I really liked the mineral sciences. I liked my group leaders a lot in the mineral sciences and I think that I might ask one of them for an internship.

You say they told you to go for internships. Are you interested in getting an internship at NMNH?

Yeah, actually I'm probably going to ask some of the scientists I worked with if I could do one over the summer. I'm just not sure. I'm just waiting for some of the vacation plans actually, so I'm planning on working with them because it was really interesting.

What did you get out of the experience?

I really liked what I saw and it was really interesting and because of the... I'm thinking about maybe interning there or volunteering

FAVORITE PARTS OF THE PROGRAM

THE SCIENTISTS

She was the head botanist at the museum, and she was the first person I toured with. She was just really nice and personable, and I felt like I could ask her questions, and I mean, um, I thought it would be really cool to meet her again. I mean, plants aren't my favorite thing but she made it seem really interesting. And she was really easy to get along with and I like her a lot.

The woman who worked in the Cook Islands, I would definitely want to meet her. I didn't get to work with her during the program, which was a shame, but I definitely will be calling her

While I was there I met with a geneticist and she was working on the barcode project where they're trying to figure out the DNA of all the organisms that we have on earth today. And it was just her project was so interesting to see all that she's working for. And then she took us down to look at the machinery that she's working with and that was really cool.

They all were willing to help us...even in the future if we had questions or even interested in volunteering and internship stuff, they were all very willing to help us.

What was your favorite part?

Hmm, that's a tough question. I think going around with the various scientists was the most informative. However, there were some things that I didn't learn as much from as others.

Did you have more fun doing things 1 on 1 with the scientists or doing things with other girls?

Both of them are different. With the one-on-one you tend to ask more questions and find out a lot more, but if it is in big groups you get the diversity of everyone because everyone throws their questions in. So it's different with both of them but I liked both of them too.

Anything that really stands out to you that you had fun doing?

Maybe just meeting the scientists and just talking to them.

When we talked earlier you said you went to after school programs and such. How did this program compare to those?

I thought it was a lot better because I worked with real scientists that actually worked there at the Smithsonian and did research and stuff. So I guess that just inspired me more than an after school program.

MEETING PEOPLE

What was your favorite part of the program?

I definitely liked meeting other people. The first day was more socially awkward but towards the end of it we all got kind of comfortable and we all started talking. It was cool meeting other people with similar interests, besides maybe the scientists who were all very generous and friendly.

So I know if there was more time given I would have definitely been able to forge some more bonds, and I'm always looking for people like me. That would have been a really nice place. I did get to meet some very nice people, but ya know give it a few more days and it really would have gone somewhere. So, that would have been really nice.

LEARNING

What were some of the things you got to see them do?

I actually, the one I liked the most was a paleobiologist and also she worked with birds and with bird skeletons and what she would do is trace the evolution of the birds to the skeletons and then she would see how the different species varied from one so like the parent bird. Then she would categorize it by that and that was really interesting. And she was working on one island in Hawaii, and to see there were so many birds that came off - that was really cool.

What did you like the most/what did u like the most during the program?

It was anthropology and fishing.

Why is that? What did you learn?

Basically because of what I saw, like in anthropology I saw mummies and stuff and in fishing I saw skeletons and a 5-foot fish.

What's so interesting about the mummies and skeletons? What makes you want to learn about those?

Well on TV we see mummies and they're always portrayed as scary and stuff but when I looked at it real close, it really wasn't all that scary. And those are actually interesting because there's one mummy called the soap man because he died and then he was put in a pond, and then in the pond it made the fat in his body turn into soap. Yeah, that was really interesting, like the chemistry aspect to anthropology.

What was the most you got out of it?

I learned what it was like to be a scientist in a museum. I didn't really know how much scientific research was going on in a museum. I thought I was mostly visitor stuff but there was so much like priming stuff to do before they make an exhibit.

There were a couple things that were really interesting and a lot of fun. But I was reading the bios of the scientists and there was one, especially, that studied cannibalism in the Cook Islands, and I know it's really kinda grotesque, but it interested me. And it's like, studying stuff that like, I guess I knew people studied it, but I didn't think you could have a job based on it. I think it would be really interesting to go down there and study the people, some that are still living, and their cultures, and I really think that

I never realized how many different opportunities and employments there are in the field of science. I didn't realize that there was such specification. There were jobs in all areas. The problems that there can be and how there can be a specific job just to like identify birds that live around airplane areas or that had crashed into airplanes, things like that.

What was your overall impression of the program or what did you get out of the experience?

Umm I learned a lot about how science is applied in the real world and up until now it has just been about concepts in school and we haven't really looked into what people do for a living in the different areas of science and it helped me realize the importance of how we rely on science everyday.

What did you learn about?

I didn't know that in anthropology, one of the scientists that works in anthropology from the forensic anthropology department, she looks at the pathological causes of diseases which kind of has to do with medical stuff that I was interested in earlier, and so maybe I could do that instead of becoming a doctor, or doing forensics that way. Also, I didn't know there would be so much traveling involved in the different fields and I like traveling so that also made it more interesting.

What were some of the things you got to see them do?

I actually, the one I liked the most was a paleobiologist and also she worked with birds and with bird skeletons and what she would do is trace the evolution of the birds to the skeletons and then she would see how the different species varied from one so like the parent bird. Then she would categorize it by that and that was really interesting. And she was working on one island in Hawaii, and to see there were so many birds that came off that was really cool.

What else did you learn during the program?

I learned more of what scientists do, what kind of careers are like, different new things they are learning about.

BEHIND THE SCENES

Just getting to tour the museums was really amazing because I had no idea about all the laboratories and specimens that are stored back there. I didn't know how big it was....It was just the magnitude of the whole thing, not any particular specimens that stuck out in my mind. Just walking around and seeing all the bones and plants and everything they had. I mean, like, uh, the gorilla collection, of Diane Fosse. I saw that collection and thought that it was really cool.

Was there something in the program that really just caught your attention or really was meaningful to you? That really stood out amongst the other parts of the program?

I think the program was really well put together, but being able to see the collection and taking (choosing) different floors of all the specimens at the museum, that was mind-blowing, to see everything that was there.

What did you get out of the program?

The biggest thing when I came back was that I never knew how much stuff was in the museum, like when you go to see the museum. So I came back and I was talking to everybody about all the different stuff that I saw when I was back there like the big storage rooms and all the labs and stuff. It was really just cool to see what scientists do, the everyday stuff of the museum.

What were some of those things you got to see?

Lots of storage and things that aren't on display but that you know is back there, you just never knew what was back there. You see warehouses full of all these things and you knew they were there but you could never even imagine how many things there were. The collections and just the diversity of everything they have back there. It was really looking behind the scenes; that was what amazed me the most.

What were your favorite parts of the program?

I always liked the museum ever since I first went there when I was little and I wondered...I've been told that there's been extra stuff behind the scenes that no one could imagine, that most of it is behind the scenes, but I could never even begin to think about

what it was. Just seeing it, just seeing it, these warehouses full of things and the collections and everything was kind of mind blowing, just thinking how much bigger the museum was than I thought. Also, just meeting people like myself, ya know, people that were really looking into careers in science, or at least the same area, or at least have the same personality as me. That was nice.

OTHER

What did you think about other things you did during the program? Weren't there some activities that were more group oriented?

Yeah, there was something with the scientist lady that did scientific drawings, so a group of eight, we all went there and then we all drew the way that she did. It was really fun.

Did you have a high point in the program? Was there something that really moved you or something that stuck in your mind?

I think the panel at the end of the program. I think eating lunch on the first day and scientists came and talked to us about what they do and it was on a personal level. They were like this is where I work and this is what I do.

Did you have a specific aspect of the program that just grabbed you or a high point?

Mineral sciences definitely but I also liked how on the second day there were a panel of women and they just talked about their experiences working with the Smithsonian and the difficulties that they ran into being a woman and just balancing family and I thought that was really insightful.

What other aspect of the program really inspired you or caught your interest? At the end when they had the forum when the scientists answered questions it was really good. It made you feel like you could do anything the way they talked it was so personal and really inspiring

What all did they talk to you about what was inspiring? They talked pretty much about everything, how you can do anything you want to do and how just to go for all the internships you can and not let anything stop you. They even talked about funny stories that had happened to them when they were in the science field and stuff like that. It was very relatable.
