The Academy of
Natural Sciences
of DREXEL UNIVERSITY

August 14, 2018

Ms. Cara Ferrentino, Program Officer, Public Space, Creative Communities
William Penn Foundation
Two Logan Square, 11th Floor
100 North 18th Street
Philadelphia, PA 19103-2757
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Dear Ms. Ferrentino,

Thank you for the invitation to submit a full grant proposal for the Academy of Natural Science's **Meet Your Urban Wildlife Neighbors** project. Through the proposed project, we plan to enrich Philadelphia's public spaces by installing captivating scientific displays in a center city park and to engage underserved students with a unique educational opportunity that will develop their observational and critical thinking skills, and connectedness with their urban environment. The overarching goal of the project is to connect Philadelphians with their natural environment and to build the skills of local middle school students, which contribute to long-term success.

We believe that our program aligns with the mission of the William Penn Foundation to enhance education and civic life in the Greater Philadelphia region, and that it specifically aligns with two of the three main categories of themes that the foundation targets: Creative Communities and Great Learning. Thus, we request funding in the amount of $47,590 for the Meet Your Urban Wildlife Neighbors program, which will begin March 1, 2019 and conclude December 31, 2019.

Thank you for your consideration and if you have additional questions regarding the contents of the proposal, please call me at 215-299-1000.

Sincerely,

Isa Betancourt

Isa Betancourt
Program Director

Organization Name: The Academy of Natural Sciences
Project: Meet Your Urban Wildlife Neighbors
Amount Requested: $47,590
Activity Start/End Dates: March 1, 2019 to December 31, 2019
EIN: 20-1061394

Organizational Background

Founded in 1812, the Academy of Natural Sciences of Drexel University (ANS) in Philadelphia is a leading natural history museum dedicated to advancing research, education, and public engagement in biodiversity and environmental science. Visitors to the Academy have the opportunity to get face-to-face with towering dinosaurs, meet live animals, and explore a tropical garden filled with live butterflies. The museum offers surprises for all ages, from changing interactive science exhibits to a children's discovery center, a fossil dig, and opportunities to interact with real science experts. Academy educators lead hundreds of presentations each year for museum visitors and they also visit classrooms across the greater Philadelphia area.

Academy scientists spend their days focusing on critical global issues in biodiversity, evolution, and environmental science. In the field, Academy scientists have traveled as far as Vietnam to sample wild bird populations for emerging diseases such as avian influenza, and closer to home they have been studying the effects of natural gas drilling in the Marcellus Shale. These research endeavors and many others enable the Academy to provide accurate, real-time scientific information to the public on environmental and sustainability matters.

The Academy's natural history collections contain more than 18 million specimens and archival treasures and rate among the world's most significant in terms of geographic, biological, and historical depth and breadth. Many specimens in the Academy's collections predate the institution's founding and reflect the work of famous naturalists and scientists, including Thomas Jefferson, John James Audubon, Meriwether Lewis, and William Clark. This "library of life" records the extraordinary diversity of life on Earth and preserves a long-term record of environmental change.

Specifically, the Academy's Entomology Collection contains about 4 million insect specimens which represent over 100,000 species. Some specimens were collected as recently as this past week. Others are over 2 centuries old. Researchers use the collection to study how to tell different insects apart, to discover new species, to understand insect biology, ecology, evolution, and to understand changes in habitat and climate.

Since 2013, members of the ANSP Entomology Department have been collecting and preserving the dead insects from Philadelphia's iconic Swann Fountain as a way to gather information about the biodiversity and environment of center city. The samples are processed and preserved for research in the ANSP Entomology Collection. The specimens can be compared with specimens recorded in the past (The collection contains specimen that were collected in Philadelphia over 100 years ago!) and also with specimens documented in the future. The specimen data give us information about Philadelphia's changing environment and the evolutionary processes of local wildlife.

Statement of Need

Research has documented that rapidly changing land use is affecting the health of the environment and in turn negatively affecting human health. Despite this relationship, there appears to be a prominent disconnect between people and the environment. Many people do not understand the complex nature of environmental functions and the components that make up a healthy environment. Insects are an integral part of a healthy ecosystem and can serve as bioindicators; the presence or absence of certain types of insects can provide valuable information about the health of the environment. Yet, insects are poorly perceived and understood by the public. Many people think of only the pest species when they hear the word insect or bug. However, less than 1,000 species of the 1 million species described by scientists are regarded as serious pests. The remaining >99% do not bother humans and serve important roles in the environment like pollination and nutrient cycling (Meyer, 2006). Results from a recent survey of public understanding of bees exposed the gross lack of understanding of the magnitude of insect biodiversity. The survey found that although 99% of the 1,427 survey respondents thought that bees were important, the median number of bee species guessed by the participants was 50, when the actual number of US species is about 4,000 (Wilson et al, 2017). This disconnect may expand alongside the decline in the amount of time children spend outside (Clements, 2004). Such a disconnect might result in societal mismanagement of natural resources and consequently, a decline in the quality of life in Philadelphia and beyond. Therefore, this project aims to help bridge the gap in understanding the value of insects by implementing signage in center city Philadelphia where insects can be found, and also by implementing educational programing for all 50 middle school classes in the Philadelphia School District.

Not only will the project bridge the gap between Philadelphians and the natural environment, it will also bridge education gaps by providing many underserved and minority students with an enriching educational opportunity. Within the Philadelphia School District, approximately 79% of students live in poverty and 70% of the students are African American, a United States racial minority group. Middle school students are selected for this project because investing in disadvantaged members of society when they are young has shown to have economic and and societal benefits in comparison to intervention programs implemented when disadvantaged populations are older (Heckman, 2006). The education program is designed not only to connect the students with the natural environment but also to develop their critical thinking skills by facilitating an investigative research experience for the students. These skills, which include evaluating information, formulating hypotheses, solving problems, and communicating clearly, are important for academic and workplace success (Gasper and Gardner, 2013).

Purpose of Request

The Academy of Natural Sciences (ANS) requests a grant of $47,590 from the William Penn Foundation to launch the Meet Your Urban Wildlife Neighbors outreach program, which will operate from March 1, 2019 to December 31, 2019 and connect Philadelphians and visitors with urban wildlife.

Connecting Students:

ANSP will partner with 50 middle school biology classes from the School District of Philadelphia to collect, sort, and learn about the species present in center city Philadelphia and determine what their presence might indicate about Philadelphia's natural environment. Experienced insect specialists and educators will guide students through the process of learning about insect biology, handling and sorting insect specimens, and using both online and offline resources to learn more about the different species. The project will work with approximately 1,100 students. At the end of the project, the specimens will be accessioned into the historic research collection at ANSP.

There are three phases for the project and they will occur over the course of several weeks for each class.

> **Phase one** – **Orientation:** The class will spend an hour at the insect collection site, Logan Square, learning about history of Philadelphia's environment and receiving an introductory lesson on the ecology of the urban wildlife organisms. The class will receive an insect specimen sample. The specimens will be insects collected in Swann Fountain. Then the class will visit the ANS Entomology Collection for an hour-long tour led by the Entomology Collection Manager.
>
> **Phase two** – **Research:** The Insect Education Specialists will visit the class and will guide the students through a lesson on insect biology, taxonomy, ecology, and specimen handling. The students will begin to sort through the class insect specimen sample. Students select a species or a group of insects that is present in the class sample and begin to do research on the natural history of the insect and what it means for the environment. The educators will guide the students through the research methods of literature review, formulation of hypotheses, and methods for evaluating research questions.
>
> **Phase three** – **Presentations:** Students will give a 7 to 10 minute presentation to their peers about their selected insect species and the significance of its presence in Philadelphia.

Connecting the Public:

ANSP will work with the Fairmount Park organization to craft and install twelve (12) signs in Logan Square that will highlight the insect wildlife that public visitors can expect to find around the park. Each sign will feature a unique type of insect. The middle school students who are a part of the education part of this grant have the opportunity to submit the work on the insect species they researched during the program for consideration on the signs. The signs, which are designed to be informative yet aesthetically pleasing, seek to improve both the attraction of the public space and Philadelphians' connection with the natural urban environment.

The project coordinator will work with the school teachers to arrange the schedule, with the design and sign companies to install the signage, and with professional consultants to develop and implement evaluation design.

Anticipated Results and Learning

Since the project is focused on local insects, we hope that upon completion of the program, students will be inspired to look twice at the natural urban environment and think critically about their surroundings as they continue to navigate their city day-to-day. We also hope that the students will be able to use the skills they develop during this program in other aspects of their life. We hope that the signs at the park enable visitors to connect with the natural urban spaces at a deeper level so that they may achieve a greater level of connection, appreciation, and ultimately respect for the natural environment.

Upon completion of the three modules, we hope that the students are able to do the following:

- Understand and explain basic ecological concepts such as ecosystem services, nutrient cycling, the role of biodiversity, and the organization of trophic levels.
- Identify and share the natural history of at least 10 different local insects.
- Explain the importance and role of natural history collections in scientific research.
- Use various in-person and online library research tools to gather credible information to explore a research question.

We hope that the public signage increases the public's awareness, appreciation, knowledge, and interest in the natural urban environment.

Finally, we hope that the program increase the positive attitudes, perspectives and behaviors of the students and the public.

Evaluation:

Currently, we anticipate evaluating the student portion of the project through pre- and post-tests. A pre-test and post-test will assess the student's understanding of insect biology and ecology and also their attitudes, perspectives, and knowledge.

The public displays will have web addresses that link to additional information. Traffic to these webpages will be used to measure project success.

There will also be an observation period before the sign installation to collect data on how frequently and for how long visitors stop and observe plants and insects in the gardens of the target sections of the Fairmount park. After the signage is installed, the observations will be repeated and compared with the data collected prior to the installation. Additionally, feedback

box may be installed to collect findings and feedback from visitors.

Stewardship and Sustainability

Presently, there is not a plan to continue the project for a second year. However, depending on the evaluation of the project we would consider reapplying for funding and continuing the project.

Should the program continue for additional years, the costs will be primarily staffing costs since much of the equipment can be reused. Additionally, the cost for evaluation will be minimal since the evaluation techniques developed during the first year can be reused in sequential years.

BUDGET

Organization Name: The Academy of Natural Sciences
Project/Program Title: Meet Your Urban Wildlife Neighbors
Grant / Budget Dates: 01/01/19 - 12/30/19
Requested Amount: $47,590

Sources of Support

Revenue Categories **Only fill in lines that apply to your organization. Skip if the revenue line does not apply.*		**Committed Funds**	**Pending Funds**
Local Government		2,000	
Foundations	William Penn Foundation		47,590
Corporations	Peco Foundation	5,000	
	Wells Fargo Foundation	8,000	
	Wawa	1,100	
Individual Giving		5,000	
In-Kind Support (Dissection scope use)		1,000	
TOTAL		22,100	47,590

Costs

Expense Categories	Amount Requested from Funder		Total Expenses
Only fill in lines that apply to your organization. Skip if the expense line does not apply.			
Personnel/Salaries			
Project Coordinator	**6,080**		**6,080**
Insect Education Specialist	**6800**		**6800**
Insect Education Specialist	**6800**		**6800**
Entomology Collection Manager	1875		1875
Curatorial Assistant of Entomology	6800		6800
Fringe/Benefits (rate=29.7%)	8,421		8,421
Consultants and Professional Fees (Program Assessment)			4300
Travel (To and from the schools)			1000
Student Travel			2500
Equipment (forceps, safety glasses, petri dishes, archival pens, signs)			2250
Supplies (Lab coat, pins, vials, preservative)			4248
Overhead (building, internet, utilities, administration, etc) @ 20% of total minus fringe	10814.00		10814.00
Printing and copying			500
Public sign and installation (12 signs)			2500
Other (specify – add more lines if necessary)			
Total	47,590		64,888

Details:

Break down of personnel costs:			
Title	Annual Salary	Percent allocated to project	Funds for Project
Project Coordinator	**37,440**	16.24%	**6,080**
Insect Education Specialist	**35,360**	19.23%	**6,800**
Insect Education Specialist	**35,360**	19.23%	**6,800**
Entomology Collection Manager	52,000	3.60%	1,875
Curatorial Assistant of Entomology	35,360	19.23%	6,800

Budget Narrative

Organization Name: The Academy of Natural Sciences
Project/Program Title: Meet Your Urban Wildlife Neighbors
Grant / Budget Dates: 01/01/19 - 12/30/19
Requested Amount: $47,590

Budget Narrative:
Since the project targets students in the public school system, the local government is contributing $2,000 to this project. Our organization also has committed funds from individual giving, PECO Foundation, Wells Fargo Foundation, and Wawa. Approximately $1,000 of in-kind support is given to the project from the Academy of Natural Sciences in the form of dissection microscopes for student usage.

Project Personnel:
In expenses, two **Insect Education Specialists** (19.23% FTE) will lead the three class modules. Twenty-five of the 50 classes will be lead by one of the specialists and the other half by the second specialist. One **Project Coordinator** (16.24% FTE) will organize and schedule the class visits and also coordinate the public art installation part of the project. The **Entomology Collection Manager** (3.6%) will provide one-hour long entomology tours to visiting students. A half hour per class is added to the Collection Manager's time to account for preparation and cleanup time. A **Curatorial Assistant of Entomology** (19.23% FTE) will receive and process the specimens before and after they return from the classes. The Curatorial Assistant may also photograph images for use on the public signs as necessary. All of the personnel are full-time employees with benefits and the Academy of Natural Sciences of Drexel University's fringe rate is 29.7% resulting in a price of $8,421 for the all participating employee's fringe benefits.

Other Direct Costs:
The project has $4,300 committed funds for assessment of both the education and public display parts of the program. For transportation, $2,000 or $20 per class visit will cover the Insect Education Specialists' travel to and from the schools and $2,500 will cover student travel cost for for when they visit in part during part one of the three-part education program. A combination of $6,498 will cover the equipment and supply costs for archival, insect preparation, and lab safety wear, which are necessary for processing, archiving, and examining specimens. These costs have all been covered by the local government, PECO Foundation, Wells Fargo Foundation, Wawa, and individual giving.

Indirect Costs:
The Academy of Naturals Sciences needs $9,950 or 20% of the total costs to cover facility costs and administrative costs.

Final Notes:
The project benefits both 1,100 students and the public sign installation will reach thousands

more. Divided among the 1,100 students, the entire projects costs $58.20 per student or $19.40 per student for each of three education modules.

References:

Clements R. 2004. An investigation of the status of outdoor play. *Contemp Iss Early Child* 5:68-80.

Gasper BJ, Gardner SM. 2013. Engaging Students in Authentic Microbiology Research in an Introductory Biology Laboratory Course is Correlated with Gains in Student Understanding of the Nature of Authentic Research and Critical Thinking. *Journal of Microbiology & Biology Education : JMBE*. 14(1):25-34. doi:10.1128/jmbe.v14i1.460.

Heckman J.J. 2006. Skill formation and the economics of investing in disadvantaged children. *Science*. 312:1900–1902.

Meyer, John R. "Insects As Pests." *General Entomology: Tutorials*, Department of Enomology, NC State University, 7 Nov. 2007, projects.ncsu.edu/cals/course/ent425/text18/pestintro.html.

Wilson, J.S.; Forister, M.L.; Carril, O.M. 2017. Interest exceeds understanding in public support of bee conservation. *Front. Ecol. Environ. 15*, 460–466.

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