

**Testimony to the New York State Board of Regents Higher Education Committee on the  
2012–2020 Statewide Plan for Higher Education**

**Submitted by  
American Museum of Natural History**

**INTRODUCTION**

The American Museum of Natural History (AMNH) is pleased to provide this testimony to the New York State Board of Regents Higher Education Committee on the 2012-2020 Statewide Plan for Higher Education. As a member of the University of the State of New York and a leading research and education institution offering graduate degrees, AMNH has an important stake in the Regents Reform Agenda. It submits this statement with a specific focus on the opportunities to support the recruitment and preparation of effective teachers, the implementation of the Common Core Standards for P–12 schools, and the provision of effective pipeline mechanisms to support student achievement and college readiness. AMNH is committed to leveraging its wealth of scientific assets and deep experience to improve education for all New Yorkers.

**AMERICAN MUSEUM OF NATURAL HISTORY**

AMNH was founded and chartered in 1869 as a museum and library by a special act of the Legislature of the State of New York; in 1991, it was admitted into the University of the State of New York by the Board of Regents. AMNH’s mission is “to discover, interpret, and disseminate—through scientific research and education—knowledge about human cultures, the natural world, and the universe.” AMNH has a century-plus record of leadership in field science, theoretical science, and the professional training of scientists, and remains one of the world’s foremost centers of research and education in the natural sciences, the physical sciences, and anthropology. It welcomes approximately five million visitors annually on-site and millions more online.

AMNH’s scientific staff comprises more than 40 members of the curatorial faculty (equivalent to tenured or tenure-track faculty in a research university). These faculty members are engaged in ongoing scientific research and the professional training of scientists on more than 120 annual field expeditions around the world, in AMNH’s world-renowned collections of 32 million specimens and artifacts, and in many cutting-edge laboratories situated on the Museum campus. In addition to its core scientific divisions (Anthropology, Invertebrate Zoology, Paleontology, Physical Sciences, and Vertebrate Zoology), AMNH is home to two scientific centers: the Sackler Institute of Comparative Genomics, a preeminent center for research, collections, and training in the field of non-human comparative genomics, and the Center for Biodiversity and Conservation, which seeks to mitigate critical threats to global biological and cultural diversity through scientific research, the application of science to conservation practice and public policy, capacity building, and public outreach.

In 2006, AMNH was authorized by the New York State Board of Regents as the first American museum authorized to grant the Ph.D. degree. With this, the Museum launched the Richard Gilder Graduate School, which both embraces a new doctoral program in comparative biology and maintains the Museum's longstanding graduate training partnerships with such universities as Columbia, Cornell, New York University, and City University of New York. The Ph.D. program in comparative biology has now admitted five classes of students and is fully accredited.

AMNH's robust scientific enterprise provides the foundation for a wide range of public outreach and educational initiatives. Led by a staff of doctoral-level education experts, its Education Department employs an interdisciplinary team of accomplished educators, scientists, and program developers with broad capacities in learning and teaching, professional development, informal science education, curriculum development and delivery, and instructional media and technology. AMNH annually serves close to 500,000 students and teachers through school group visits and lab classes; over 4,000 teachers through on-site and online professional development opportunities; roughly 2,000 students who participate in out-of-school time programs; in addition to hundreds of thousands of visitors who benefit from the Museum's public programs.

Through these programs, AMNH is pioneering a new and more active role for science and cultural institutions in leveraging their resources in structural partnerships with schools, higher education institutions, and science cultural institutions to improve the teaching and learning of science and student outcomes.

## **AMNH CONTRIBUTIONS TO REGENTS REFORM AGENDA**

AMNH is uniquely positioned to support the Regents Reform Agenda, in particular as it relates to strengthening connections between higher education and P-12 education. The following strategic education initiatives and programs exemplify AMNH's key contributions to New York State reform efforts.

### **Teacher Preparation and Professional Development**

AMNH has a longstanding commitment to teacher development in New York City and beyond, beginning in 1880 with the "Bickmore Lectures" for New York City teachers. Today, AMNH offers a wide range of programs (on-site and online) focused on supporting science teaching and learning among educators and within the K-12 educational system. Through a rigorous and collaborative process of development, evaluation, implementation, and revision, AMNH has developed unique instructional approaches that focus on both content knowledge and inquiry-based approaches to teaching that take place in and beyond the classroom. These approaches feature co-teaching by scientists and educators, extensive use of the Museum exhibits and online resources, orientation to the importance and purpose of the Museum's scientific collections, and coaching and mentoring for content competency tests, thesis, or dissertation development.

- **Master of Arts in Teaching Program**

In June 2012, AMNH launched a pioneering Master of Arts in Teaching (MAT) program to prepare 50 candidates to teach Earth science in grades 7-12 in high-needs public schools during its initial pilot period. The program was selected by the New York State Education Department

(NYSED) as part of the federal Race to the Top (RTTT) competition to spur innovation in K–12 education, marking the first time a science cultural institution was chosen to take a leading role in the formal preparation of teachers. The MAT program leverages AMNH’s expertise and its powerful combination of resources—working scientists, world-renowned collections, exhibitions, and deep experience in professional development and youth education—for an innovative approach to improving science teaching and meeting the critical need of certified Earth science teachers in New York State.

Designed and implemented in partnership with five middle and high schools, the AMNH MAT is an innovative 15-month program that integrates theory with practice, specifically focused on high-needs and/or urban schools with diverse student populations including English Language Learners and students with special needs. Co-taught by scientists and educators, the 36-credit program combines coursework in pedagogy, science content, and content-specific pedagogy, all of which include applications to the clinical components. It also includes a mentored Museum Teaching Residency at AMNH; a mentored Science Practicum Residency at AMNH; and two five-month Host School Residencies in public schools in the NYC metropolitan region, including rotations in ELL and Special Needs. To support candidates and strengthen retention, the AMNH MAT program includes significant mentoring, as well as a two-year Induction Program.

The AMNH MAT builds on AMNH’s successful track record as in science education, engaging a diverse population of children and teachers, partnering with schools, developing programs collaboratively with working scientists and master educators, and integrating data, assessment, and technology to create pioneering education programs that bring science to life for teachers and students. MAT key staff also participate in the New York State Teaching Standards Workgroup to develop the standards for preparing, selecting, developing, and retaining teachers who are effective in improving learning for all students.

- **Teacher Education Partnerships and Professional Development Programs—On-site and Online**

The MAT program builds on AMNH’s extended and successful history of higher education partnerships. AMNH works with some 200 teacher candidates annually (including Teach for America candidates, NYC Teaching Fellows, Teacher Opportunity Program candidates, and candidates following traditional routes), in teacher education programs offered through its higher education partnerships with degree-granting programs including those at Bank Street College of Education; Teachers College, Columbia University; Barnard College; City University of New York (CUNY); and New York University (NYU).

AMNH also is a leader in professional development of primary and secondary school teachers providing institutes, courses, and programs—both on-site and online—to some 4,000 teachers a year, offering direct contact with scientists and content specialists; inquiry-based, hands-on learning experiences; and standards-aligned resources. All programs are developed by scientist-educator teams and many offer graduate credit. Examples of such programs and their impact include:

- **Seminars on Science** is an award-winning program of six-week long online courses that targets K–12 teachers at both the pre-service and in-service levels. Launched in 1999,

Seminars on Science connects practicing scientists with educators through a well-designed, content-rich, asynchronous program. Unlike many professional development courses, the semester-equivalent, graduate-level Seminars on Science courses focus on content and pedagogy simultaneously through an instructional model that pairs AMNH research scientists, as well those from other institutions, with master science educators to lead the courses. In addition to the specific topic content, the courses focus on scientists, the questions they ask, the ways they investigate questions, the knowledge that scientists have and gain, the scientific method and the meaning of scientific ideas in society. Annually, Seminars on Science offers fee-based courses to close to 1,100 teachers, with graduate credit offered through partnerships with eight colleges and universities, including two in New York State (Bank Street College of Education and City University of New York). Since launching in 2000, Seminars on Science counted more than 7,500 enrollments from across the country and around the world.

- **Teacher Renewal for Urban Science Teaching (TRUST) Summer Institutes** are two-week long intensive professional development programs that help teachers prepare for state certification examinations in two subject areas: Earth Science with a focus on astronomy, geology, and climate change and Life Science with a focus on biological evolution and biodiversity. Launched in 2003 as a partnership between AMNH and Brooklyn, Lehman, and Hunter Colleges, TRUST Summer Institutes annually serve some 30 teachers in an intensive small group setting that includes lab work, inquiry-based activities, scientist-led hall visits, Museum scientist talks, team project work, and time for reflection and feedback.

### **Strategic Partnerships with the P–12 Education System**

AMNH, and other science cultural institutions are active participants and partners in improving education at the P–12 level. AMNH maintains extensive partnerships with the New York City school system and schools nationwide. It is the most-visited field trip destination for New York City public schoolchildren, who visit the Museum free of charge. Each year, close to 500,000 children visit in organized class or camp groups. Visiting groups and their teachers are supported with a wide range of pre- and post-visit resources.

In 2004, AMNH launched the Urban Advantage (UA) middle school science initiative, a groundbreaking public-private partnership with seven other New York City science-rich cultural institutions (Brooklyn Botanic Garden, New York Botanical Garden, New York Hall of Science, Queens Botanical Garden, Staten Island Zoological Society, and the Wildlife Conservation Society's Bronx Zoo and New York Aquarium) and the New York City Department of Education (NYCDOE) that seeks to increase student achievement in science by supporting middle school science teachers' use of inquiry-based instructional strategies.

Based on the notion that urban settings often have a wealth of educational resources in the assets of the local science-based cultural institutions that schools could more effectively draw upon, UA incorporates professional development for teachers; classroom resources; laboratories and equipment for schools; access to the assets of the partner institutions for teachers, students, and families; educational outreach that specifically engages families; capacity building with lead

teachers, school leadership and demonstration schools; and, importantly, ongoing assessment of program goals, student learning, and systems of delivery.

UA is continuously innovating its instructional approaches. In response to national and local reform efforts requiring the integration of nonfiction reading and writing with science content, in the coming year UA will pilot new professional development supports and resources to help middle school teachers and their schools make this transition. Working in school-based teams, teachers will develop inquiry-based, literacy-focused science instructional units that will be submitted to the NYCDOE's Common Core Library, a new online resource repository created to support teachers' implementation of the *Common Core State Standards* in both ELA and Mathematics.

UA has increased in scope and reach each year since it was piloted in 2004. It began with 60 teachers and 35 schools and now, in its ninth year, supports over 380 teachers in close to 130 middle schools—almost one-quarter of all New York City public middle schools—and serves more than 33,750 New York City students. With support from AMNH, science-rich cultural institutions and school districts in other cities have taken steps to implement the program, with a UA program launched in 2010 in Denver.

An external evaluation by NYU's Institute for Education and Social Policy (IESP) has found that participation in UA improves student performance on the New York State 8<sup>th</sup> grade science exam, and that the magnitude of the difference between UA and non-UA schools is statistically meaningful and increases over time, with exploratory analyses further suggesting that the impact is largest among African-American students. IESP also found that UA contributes to post-8<sup>th</sup> grade outcomes, with students who attended a UA school in 8<sup>th</sup> grade more likely to take the Learning Environment Regents in 8<sup>th</sup> or 9<sup>th</sup> grade; and that attending a UA school increased the likelihood of passing the Living Environment or Earth Science Regents and attending a STEM (science, technology, engineering, and mathematics) high school.

### **Youth Education and College Readiness Supports**

AMNH offers a range of opportunities and multiple entry points for urban youth to develop an interest in science and an identity and confidence as science learners—opportunities that foster college and career readiness. Reaching some 2,000 pre-school to high school students annually, this Science Generation pipeline of programs has a particular focus on engaging youth from groups historically underrepresented in science. Between 50–80 percent of students in the Museum's youth programs are minorities, women, and persons with disabilities; between 45–65 percent attend schools with large concentrations of low-income students and either receive fee waivers or pay on a sliding scale.

The goal is to provide the resources and training for students to become successful science “doers” and ultimately graduate into further science education and STEM careers. Equally important, for those who will not pursue scientific careers, the programs provide the critical grounding in science and scientific inquiry necessary to succeed academically, build a secure future, and become scientifically literate citizens.

Providing a sequence of experiences from engagement to immersion in authentic research, all programs utilize the Museum's unique resources—its one-of-a-kind exhibitions, collections of

approximately 32 million specimens and artifacts, access to world-renowned scientists and their labs, scientific equipment, and digital technologies.

One highlight of the pipeline is the Science Research Mentoring Program (SRMP), a three-year program providing high school students with two years of coursework and advisories co-designed and co-taught by research scientists and educators, followed by a third year of research mentored by Museum scientists. Launched with support from the National Science Foundation and National Aeronautics and Space Administration, SRMP provides college- and career-readiness supports designed to motivate and prepare diverse students to become interested in and develop the competencies to pursue science.

SRMP has been extraordinarily successful. All students who completed the program as high school seniors have continued on to four-year colleges or universities, including such highly competitive schools as Cornell, Columbia, and New York University. Preliminary results from an evaluation of AMNH youth program alumni now in college demonstrate that compared with students who participated in other, less intense after-school programming, SRMP alumni have higher grades in math and science, take more advanced courses in math and science even as freshmen and sophomores, report having stronger writing skills and scientific lab skills, and participate in science-related extracurricular activities at a greater rate than the comparison group. Importantly, compared with non-SRMP respondents, a higher proportion of SRMP alumni select majors in the biological sciences.

In the coming year, AMNH expects to launch a new partnership of New York City science research and informal science institutions designed to expand research opportunities for underserved high school students aligned along the SRMP model. With AMNH as the hub, this consortium will strengthen the relationships, resources, and infrastructure needed to support achievement in science and college readiness among diverse students across New York City.

## **CONCLUSION**

AMNH appreciates this opportunity to submit testimony on the 2012–2020 Statewide Plan for Higher Education. Science cultural institutions such as AMNH are vital members the State’s higher education community, deeply engaged in various aspects of the Regents Reform Agenda and the topics of concern and deeply committed to bringing their assets to bear in achieving excellence in education for all New Yorkers.