



## Overview and Summary of Recent Initiatives

Life sciences are among several sectors targeted in the strategic plan maintained by the **New York State Office of Science, Technology and Academic Research (NYSTAR)**, which operates the state's programs for technology-based economic development. NYSTAR also coordinates with separately budgeted life science initiatives such as the **Center of Excellence in Bioinformatics and Life Sciences** and other bioscience capital grants through the Generating Employment Through New York State Science (Gen\*NY\*sis) initiative.

Since the last BIO report, a new bioscience research park in New York City entered development, wet-lab incubation space expanded statewide, and state law was changed to reconstitute NYSTAR as a public-benefit corporation to be known as the **New York State Foundation for Science, Technology and Innovation**. Existing programs would be continued and 10 regional councils created. The same law also dramatically expanded the state's **Qualified Emerging Technology Company (QETC)** tax credit program to include refundable tax credits up to \$250,000 a year per firm for a wide variety of expenses undertaken by research-based companies, including research and development, "soft" costs involved in fund-raising or commercialization, facilities, and training. Finally, this law expanded the Empire Zones, until then a conventional enterprise zone program, to convey benefits to noncontiguous projects in the biosciences and other technology sectors.

In his state of the state address, Governor George Pataki proposed a new \$200 million **Biotechnology and Biomedicine Research Initiative** to support equipment acquisition and faculty recruitment. This was later endorsed by the state Senate majority leader. In his budget message, the Governor also proposed further expansion of the Empire Zones into 1-square-mile **Tech Zones** surrounding each of the five Centers of Excellence. For more on both concepts, see below under "Pending Proposals."

## Building Bioscience R&D Capacity

### Recent state investments in facilities

The 150,000-square-foot **Center of Excellence in Bioinformatics and Life Sciences** at the State University of New York (SUNY) at Buffalo is the bioscience flagship of Governor Pataki's Centers of Excellence initiative. Five centers across multiple fields received \$250 million in state capital funding for start-up capital costs and operating expenses, matched between 2:1 and 3:1 by New York State companies in the same sector. The Bioinformatics Center is part of the **Buffalo Niagara Medical Campus**, a downtown development district surrounding Buffalo General Hospital that also includes a new 73,000-square-foot, \$24 million **Structural Biology Research Center** for the Hauptman-Woodward

Institute and a new 170,000-square foot, \$72 million **Center for Genetics and Pharmacology** at Roswell Park Memorial Cancer Institute. Funding has come from a variety of state sources.

Gen\*NY\*sis, a separate capital program organized by the state Senate, has contributed to bioscience facilities and programs across the state, including projects co-funded with SUNY such as a 194,000-square-foot, \$78 million life sciences building at the East Campus of the University at Albany that houses the university's **Center for Functional Genomics** and related programs. Additional Gen\*NY\*sis awards of varying size were made to Alfred University, Binghamton University, Cold Spring Harbor Laboratory, Cornell University, Clarkson University, City University of New York (CUNY) College of Staten Island, Hofstra University, Niagara University, Rensselaer Polytechnic Institute (RPI), Rochester Institute of Technology, SUNY Upstate Medical Center, University of Rochester, Trudeau University, and Yeshiva University-Albert Einstein College of Medicine.

Since the last BIO report, some of the projects funded by NYSTAR in its own capital-facilities funding program opened or entered construction. This program operated at two levels: large-scale **Strategically Targeted Academic Research (STAR) Centers**, funded at \$15 million to serve as a significant funding source for major building programs; and **Academic Research Centers (ARCs)**, funded at up to \$4 million each, representing construction and fit-out of new laboratory suites for targeted projects.

One STAR Center that opened since the last BIO report is the **New York Structural Biology Center**, a high-field nuclear magnetic resonance spectroscopy center at CUNY City College that is funded and operated by a consortium of 10 large universities and institutions, most in the New York City area. STAR grants are also funding centers that are part of major facilities now being developed at Cornell's Life Science Building (**genomic technologies and information sciences**), University at Buffalo/Buffalo Niagara Medical Campus (**disease modeling and therapy**), Stony Brook University (**biomolecular diagnostics and therapeutics**), and Columbia University (**integrated imaging**). Smaller ARC grants were made to facilities in **pharmacogenomics** (Albany Medical College), **plant proteomics-metabolomics** (Cornell); and **neuronal plasticity** (Mt. Sinai School of Medicine).

RPI continued construction on its 218,000-square-foot, \$80 million **Center for Biotechnology and Interdisciplinary Studies**, funded by an anonymous gift and support from the Gen\*NY\*sis program.

## Research programs

NYSTAR maintains a pool to match federal awards from the NSF, NIH, or other agencies. For example, it made a \$1.2 million grant to allow Cornell University to leverage the **NSF Nanobiotechnology Center**.

### **Faculty development programs**

NYSTAR offers two programs:

- **Faculty Development Program**, which assists in recruitment of entrepreneurial research faculty in targeted fields including the biosciences. In 2005 the program made awards totaling \$4.4 million, supporting recruitments at Columbia and the University at Buffalo (both in nanobiomedicine) and Cornell University (in biofuels).
- **James D. Watson Investigator Initiative**, which provides recognition and professional development to young investigators. In 2005 the program made awards totaling \$3.2 million (\$200,000 each) including to faculty in the biosciences.

## Encouraging Academic/Industrial Interaction

NYSTAR funds a series of 15 Centers for Advanced Technology (CATs) charged to conduct applied research in close partnership with New York State companies. Each center is funded at \$1 million per year, and several will make grants available to faculty outside the home university provided they bring a matching partner. Several CATs with bioscience focus were renewed for 10 years after a recent program review:

- **Center for Biotechnology**, a biomedically oriented program at Stony Brook University
- **Center for Life Science Enterprise** at Cornell, which integrates this originally agbiotech-oriented program into a larger Institute for Biotechnology and Life Sciences
- **Center for Advanced Biomedical and Bioengineering Technologies**, a medical-device-oriented center at the University at Buffalo
- **Center for Photonic Applications**, which is exploring multiple medical applications of photonic sensing in laboratories at CUNY
- **Center for Advanced Information Management** at Columbia University, which has medical informatics as one of three focus areas.

## Moving Technology into the Marketplace

### Commercializing university technology

NYSTAR offers regular rounds of a **Technology Transfer Incentive Program**, which makes grants up to \$750,000 over 2 years to support commercialization of a university-owned technology by a New York State company, which must match the award 1:1. The program has also been used to build university infrastructure for technology transfer, including the start-up of university-affiliated business incubators.

University at Buffalo has unusually organized its CAT to report to the Office of **Science, Technology Transfer and Economic Outreach (STOR)**, which also manages intellectual property and operates a business incubator.

New York University (NYU) Office of Industrial Liaison and Technology Transfer maintains an **Applied Research Support Fund** that can fund precommercialization projects up to \$50,000.

### Supporting bioscience entrepreneurs and emerging companies

New York State offers a series of interrelated credits to **QETCs**, which are broadly defined in law to include the biosciences and other research-intensive sectors. Since the last BIO report, the law was amended to allow a refundable 9 percent credit to the companies themselves for research and a very broad range of other “soft” costs, including not only research but also fund-raising and commercialization, as well as tuition costs for companies in a qualified university business incubator. The range of QETC credits is refundable up to a total cap of \$250,000 a year per firm.

NYSTAR funds a series of **Regional Technology Development Centers (RTDCs)**, one in each economic region of the state. The RTDCs function as multisector commercialization centers. The

program is funded at \$1 million in total, exclusive of funding for the manufacturing extension partnership also operated by the same grantees.

Commercialization support programs are also aimed specifically at the life sciences in four regions of the state:

- **Bioconnex**, a networking group affiliated with the Center for Economic Growth RTDC in the Albany area
- **Bufflink**, an independent nonprofit based near the Buffalo Niagara Medical Campus
- **CNY Med Tech**, based in Syracuse, with strong corporate support from the nearby Welch-Allyn Corporation
- **Long Island Life Sciences Initiative**, a separately funded outreach adjunct of the CAT for Medical Biotechnology at Stony Brook University.

Several of the regional initiatives have begun meeting with each other regularly. The New York Biotechnology Association interacts with all of the groups listed above.

## Making Capital Available

### Pre-seed and seed capital

Among the QETC tax credits is a Capital Tax Credit available to early-stage investors in these firms. This credit is 10 percent for investments held 4 years and 20 percent for investments held 9 years, capped at \$150,000 and \$300,000, respectively.

Cornell's student-run **BR Ventures Fund**, whose returns support the Johnson School endowment, can make investments including in the biosciences between \$50,000 and \$200,000. It targets companies with some relationship to the Cornell community.

At the regional level, seed investments from \$250,000 to \$750,000 in multiple fields including medical technology are available from **Monroe Fund**, capitalized at \$10 million from the county and local institutions in the Rochester area and privately managed by Trillium Group. Trillium also operates a \$6 million **University Technology Seed Fund** capitalized by some of the same institutions, which can invest up to \$2 million with focus on spin-offs from local universities.

Under the announced NYSTAR reorganization, additional pre-seed funding vehicles will be created, probably at the regional level.

### Venture capital

Empire State Development, the state's financing agency, operates an in-house **Small Business Technology Investment Fund** that can make several investments per year.

In 2004 New York State created a new \$60 million pool of **CAPCO** credits, joining four previous rounds totaling more than \$270 million. The newest pool emphasizes earlier-stage investments. Participating venture funds are as follows:

- **Advantage Capital**
- **Aegis NY Venture Fund**
- **Enhanced Capital**
- **New York Small Business Venture Fund**
- **Stonehenge Capital Fund New York**
- **Whitecap New York Growth Fund**
- **Exponential/Wilshire New York.**

The state has also invested \$364 million with at least 12 New York–domiciled venture partnerships through an **In-State Private Equity Investing Program**. Investees with bioscience deals currently in their portfolios or stated interest in bioscience include the following:

- **Wheatley Partners** (\$50 million from the state)
- **High Peaks Ventures** (\$30 million from the state)
- **Easton Hunt Capital Partners** (\$30 million from the state)
- **Trillium Lakefront Partners** (\$25 million from the state).

## Providing Space for Bioscience Companies

### Incubators

Since the last BIO report, new or expanded bioscience incubators have opened at SUNY campuses in Farmingdale, Stony Brook, and Brooklyn and at Cornell University's Geneva campus. Bioscience incubators statewide include the following:

- **Audubon Business and Technology Center**, a 100,000-square-foot, multitenant wet lab that anchors Columbia University's Audubon research park (see below)
- **Building II** at Broad Hollow Bioscience Park, a 41,000-square-foot, \$16.4 million incubator with 37 laboratory suites
- **Calverton Incubator**, a 15,000-square-foot wet-lab facility aimed at environmental technology and operated by Stony Brook University in nearby Riverhead
- **Downstate Advanced Biotechnology Incubator**, a 50,000-square-foot facility built in phases (two completed, two under development) at SUNY Downstate in Brooklyn, with support from NYSTAR
- **East Campus Incubator**, 330,000 square feet of space at University at Albany's East campus, a renovated former pharmaceutical research facility

- **FlexTech**, a 20,000-square-foot commercial facility anchoring Cornell University's Agriculture and Food Technology Park
- **Long Island High Technology Incubator**, a 72,000-square-foot facility on the Stony Brook campus
- **UB Technology Incubator**, a 45,000-square-foot facility on land just opposite the University at Buffalo campus in Amherst.

Cornell also expects to include incubation space at its Life Science Building now under construction.

### Facilities financing

Under the reorganization of NYSTAR into a foundation, 10 regional partners will be recognized and provided with access to up to \$90 million to support programs including the financing of specialized facilities.

### Bioscience research parks

Major private technology parks specializing in bioscience include the 275-acre Landmark at Eastview in Westchester County and the 500-acre Rochester Technology Park.

#### *Under development*

Since the last BIO report, the New York City Economic Development Corporation (NYCEDC) announced the master lease of 4.7 acres near the NYU/Bellevue Hospital medical campus to Alexandria Real Estate Equities for development of **East River Science Park**. Alexandria targets buildout of 872,000 square feet of bioscience space over two phases, starting with a speculative multitenant building now in planning. The New York City Investment Fund, associated with the New York City Partnership, will invest \$10 million in the project. NYCEDC is also seeking to convert part of the city-owned **Brooklyn Army Terminal** into 300,000 square feet for biomanufacturing and other uses.

Other bioscience parks under development include the following:

- **Agriculture/Food Technology Park**, a 72-acre zone for agriculture, food, and agbioscience being developed by Cornell University at the Geneva campus of its New York Agricultural Experiment Station
- **Audubon Biomedical Science and Technology Park**, a four-building complex anchored by the Audubon incubator (above) at Columbia University Medical Center's campus in upper Manhattan
- **Broad Hollow Bioscience Park**, a commercial bioscience development zone within the campus of SUNY Farmingdale on the Route 110 corridor in Long Island, anchored by OSI Pharmaceuticals
- **Downstate Biotechnology Park**, a planned four-building complex at SUNY Downstate Medical Center in Brooklyn, anchored by a wet-lab incubator and single-tenant space.

## Addressing Talent Needs

### Specialized postsecondary programs

- Rochester Institute of Technology, not previously known for the life sciences, opened a state-supported **Center for Biotechnology Education and Training**.
- The Biotechnology CAT at Stony Brook University added a certificate program in biotech fundamentals.
- St. John's University's Institute for Biotechnology offers a professional master's degree program in biological and pharmaceutical biotechnology.
- CUNY Hunter College offers undergraduate science students a 4-week, credit workshop in biotech techniques and coordinates internship placements at hospitals, universities, and research institutions.

### K-12 outreach programs

Cold Spring Harbor Laboratory on Long Island sponsors the **Dolan DNA Learning Center**.

Stony Brook University offers a 10-week **Summer Research Institute** for minority students interested in the sciences including the biosciences, with support from NYSTAR.

NYSTAR supports a pilot program through which middle school teachers from Long Island participate in 3-day genetics workshops at Brookhaven National Laboratory. There is also a broader Science Research in the High Schools Program that serves 135 New York schools.

## Pending Proposals

Elements of the proposals unveiled in the state of the state and budget addresses are as follows:

- Creation of 1-square-mile **Tech Zones** around each of the Centers of Excellence, including the Center in Bioinformatics. This would convey Empire Zone–like benefits to companies locating in the zone in order to collaborate with the center.
- \$11 million for an **Empire Innovation Program** to help SUNY and CUNY campuses attract 200 new research faculty members across multiple fields including the biosciences.
- A two-part **Biotechnology and Biomedicine Research Initiative** available as a challenge grant to a broad range of research institutions:
  - \$40 million in capital funding for equipment
  - \$200 million for recruitment and start-up costs, to be financed by a foundation established with 5 percent equity ownership in the state's privatized Blue Cross/Blue Shield program.

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The New York Biotechnology Association is a not-for-profit trade association dedicated to the development and growth of New York State-based biotechnology-related industries and institutions and to strengthening the competitiveness of New York State as a premier global location for biotechnology/biomedical research, education, and industry.

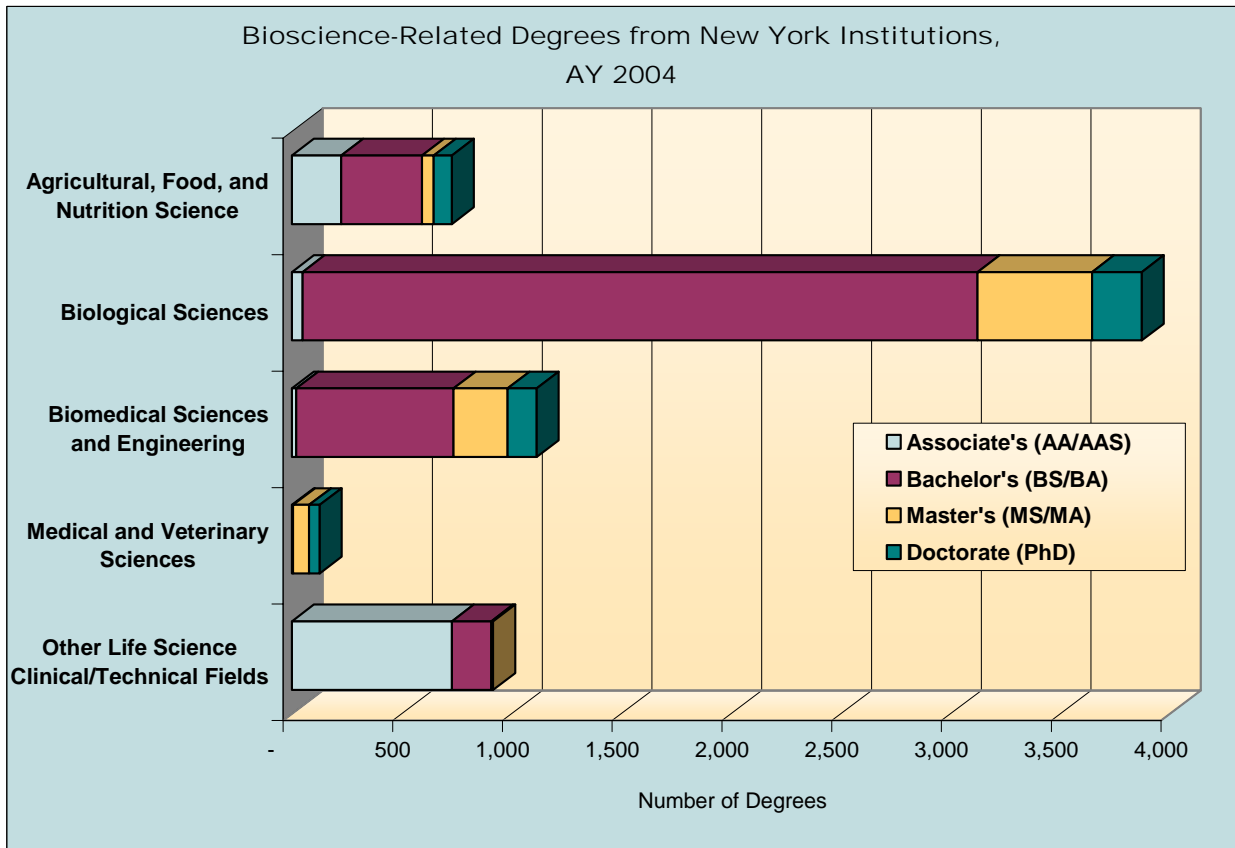
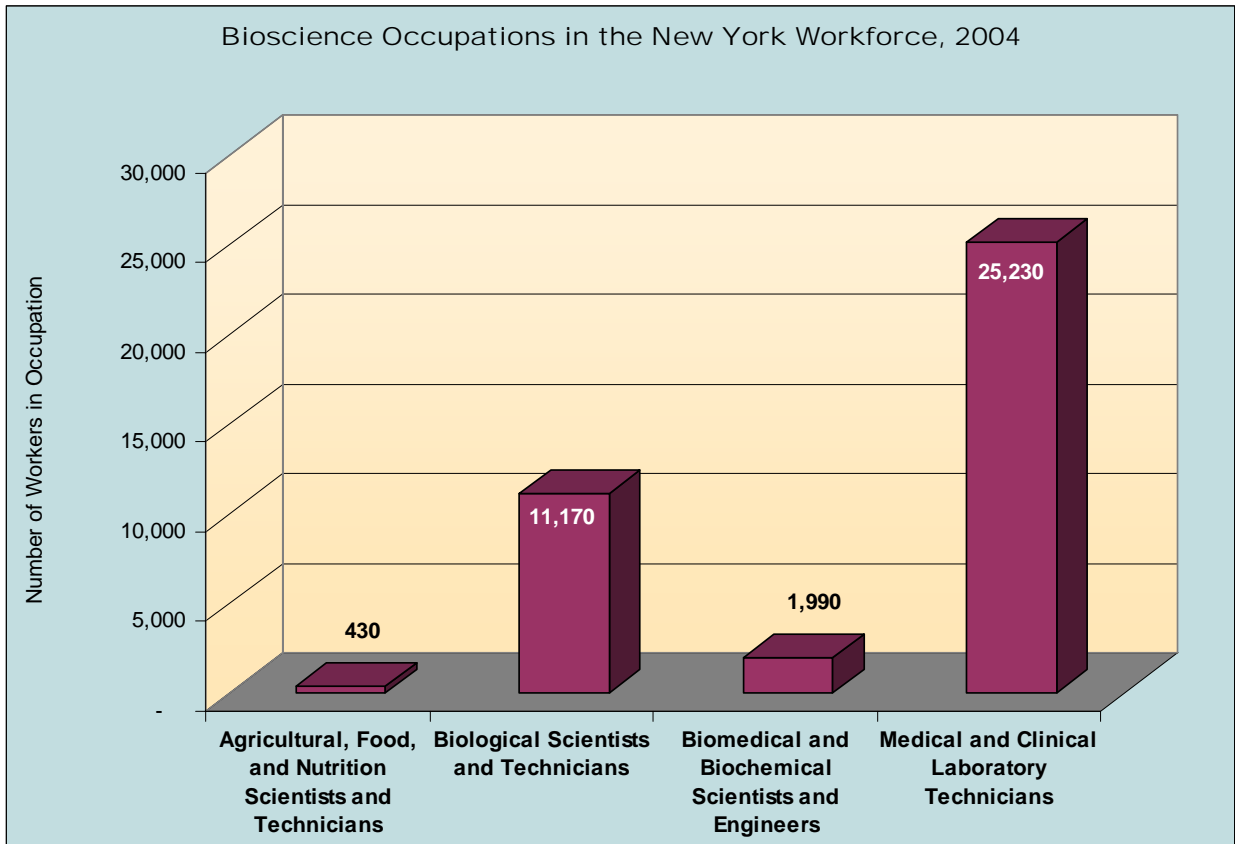
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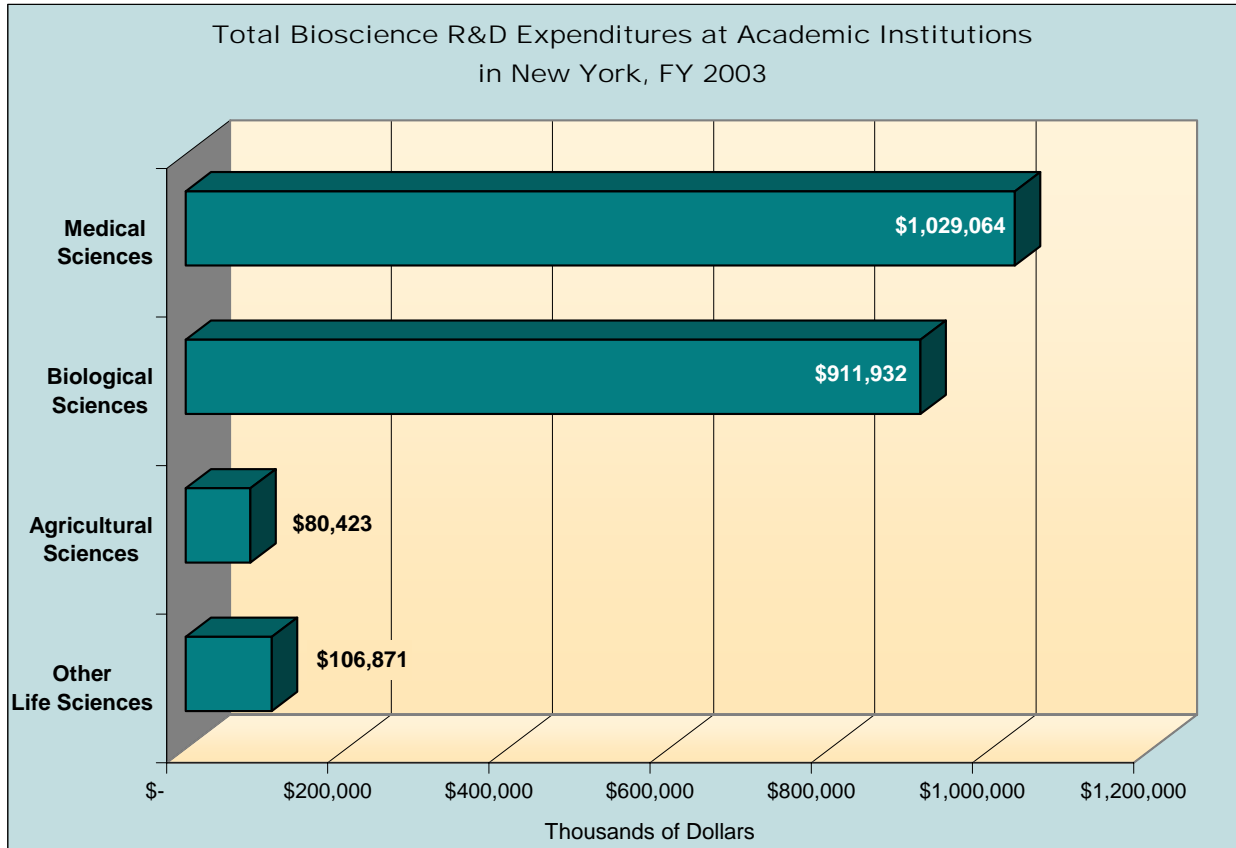
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Industry Subsector	New York	United States
<b>Agricultural Feedstock &amp; Chemicals</b>		
Establishments 2004	56	2,111
2001-2004 Establishment % Change	-6.6%	0.4%
Employment 2004	1,557	104,893
2001-2004 Employment % Change	-17.4%	-6.9%
Share of U.S. Employment	1.5%	100.0%
Location Quotient	0.24	n.a.
Average Annual Wage 2004	\$53,182	\$63,383
Direct-Effect Employment Multiplier	3.86	10.91
Total Employment Impact	6,019	1,212,094
<b>Drugs &amp; Pharmaceuticals</b>		
Establishments 2004	149	2,589
2001-2004 Establishment % Change	-3.2%	-0.6%
Employment 2004	21,630	313,207
2001-2004 Employment % Change	4.8%	2.7%
Share of U.S. Employment	6.9%	100.0%
Location Quotient	1.10	n.a.
Average Annual Wage 2004	\$69,110	\$79,303
Direct-Effect Employment Multiplier	4.29	9.51
Total Employment Impact	92,836	2,731,321
<b>Medical Devices &amp; Equipment</b>		
Establishments 2004	885	15,190
2001-2004 Establishment % Change	3.1%	0.2%
Employment 2004	20,799	411,460
2001-2004 Employment % Change	-3.4%	-3.6%
Share of U.S. Employment	5.1%	100.0%
Location Quotient	0.81	n.a.
Average Annual Wage 2004	\$50,397	\$56,449
Direct-Effect Employment Multiplier	2.40	4.56
Total Employment Impact	49,967	1,817,705
<b>Research, Testing, &amp; Medical Laboratories</b>		
Establishments 2004	1,233	20,565
2001-2004 Establishment % Change	11.4%	19.4%
Employment 2004	27,294	413,550
2001-2004 Employment % Change	-1.3%	8.2%
Share of U.S. Employment	6.6%	100.0%
Location Quotient	1.05	n.a.
Average Annual Wage 2004	\$56,326	\$65,414
Direct-Effect Employment Multiplier	1.91	3.15
Total Employment Impact	52,058	1,272,936
<b>TOTAL PRIVATE SECTOR</b>		
Establishments 2004	541,784	8,156,137
2001-2004 Establishment % Change	2.2%	4.8%
Employment 2004	6,852,824	109,249,195
2001-2004 Employment % Change	-2.5%	-0.7%
Share of U.S. Employment	6.3%	100.0%
Location Quotient	n.a.	n.a.
Average Annual Wage 2004	\$50,768	\$39,003

Source: Battelle calculations -- based on Bureau of Labor Statistics QCEW data from the Minnesota Implan Group, RIMS II Employment Multipliers from the Bureau of Economic Analysis, and the Census Bureau's Economic Census.

Note: n.a. = metric is not applicable.





	New York	United States	Rank
<b>University R&amp;D Expenditures, FY 2003</b>			
Total (\$ thousands)	\$3,089,988	\$40,104,621	2
Life Science R&D (\$ thousands)	\$2,147,286	\$24,062,088	2
Percent of Total R&D	69.5%	60.0%	
Life Sciences Per Capita	\$111.90	\$82.74	
Change in Life Sciences FY 1999–2003	58.2%	52.7%	
<b>NIH Support to Institutions, FY 2004</b>			
Total (\$ thousands)	\$1,964,889	\$22,556,459	3
Per Capita Expenditures	\$102.39	\$77.56	
Change in Expenditures FY 2000–2004	38.1%	53.2%	
<b>Higher Education Degrees in Bioscience Fields, AY 2004</b>			
	6,760	111,329	3
<b>Bioscience Occupations in the Workforce, 2004</b>			
	38,820	616,140	3