



Meeting the Challenges

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National Science Foundation

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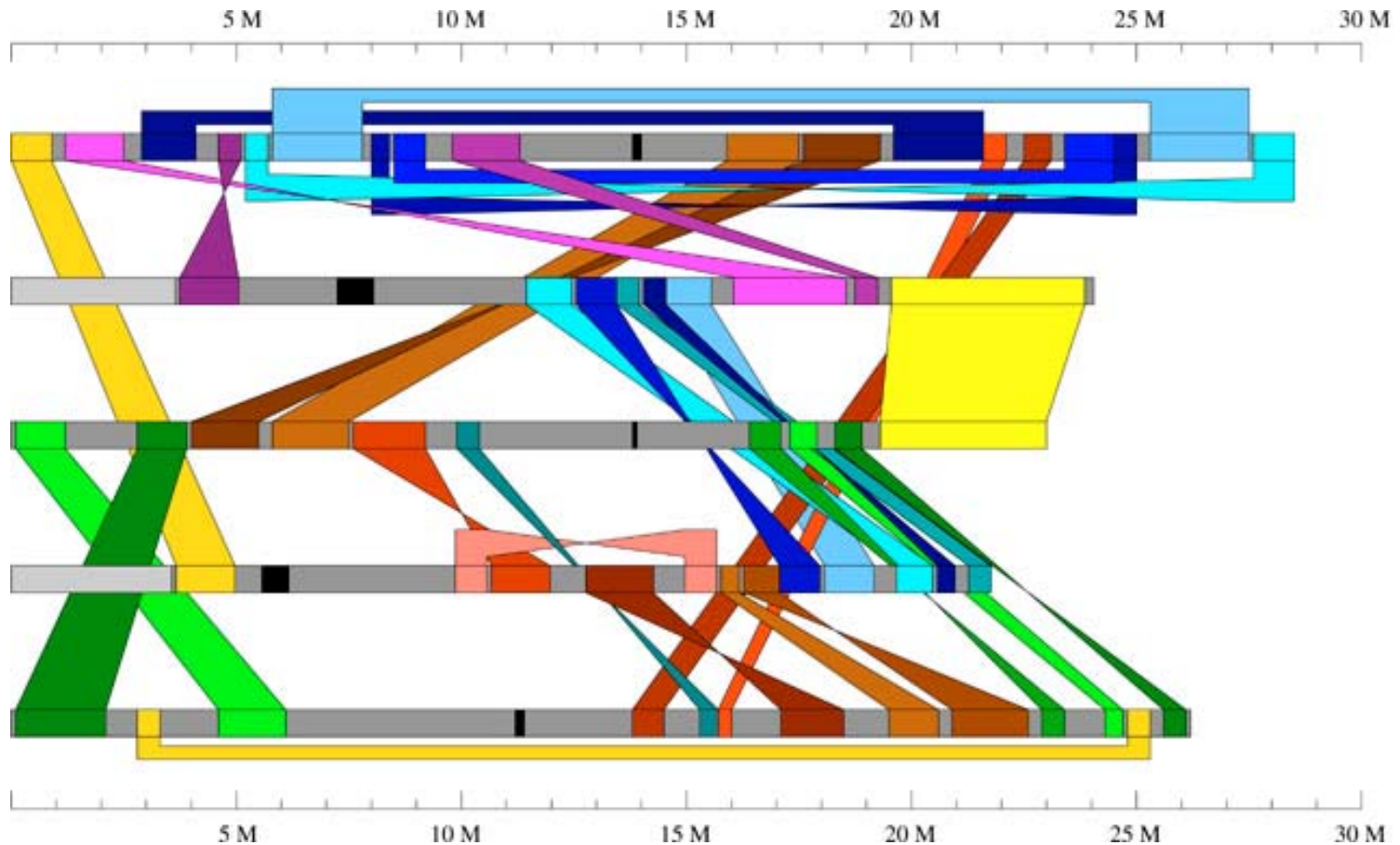


“ ...If this century is the age of physics, the 21st century will be the age of biology.”

- D. Allan Bromley



Arabidopsis Genome Sequenced, December 2000



Source: <http://mips.gsf.de>



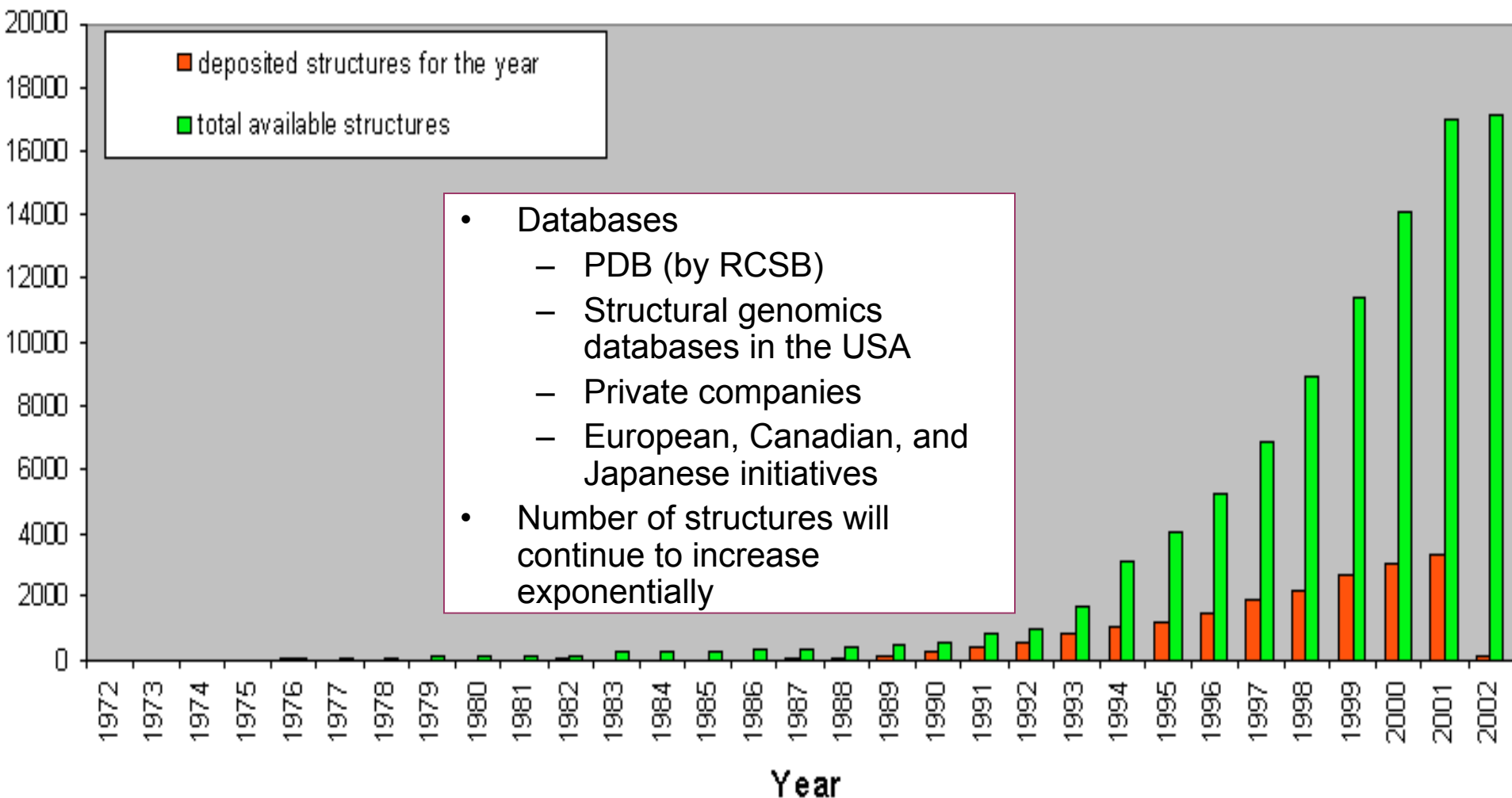
21st Century Biology

- **Multidisciplinary**
- **Multidimensional**
- **Information-driven**
- **Education-oriented**
- **Internationally engaged**





Protein structural information





*“Computers have changed
biology forever, even if most
biologists don’t yet realize it.”*

- Michael Levitt



Drivers for Linking Mathematical, Biological, and Computer Sciences

- The “omics” (genomics, metabolomics) are bringing mathematics to all sub-fields of biology
- Enhanced computer power and new IT tools allow analysis of complex systems and predictive modeling
- Opportunities to significantly advance understanding of biosystems from submolecular to global scales



Major Challenges

- **Overcome 20th century barriers**
 - **Disciplinary barriers**
- **Reshape education at all levels**
 - **Curriculum reform**





Overcome 20th Century Barriers

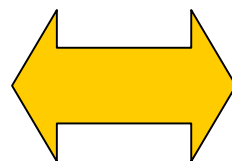
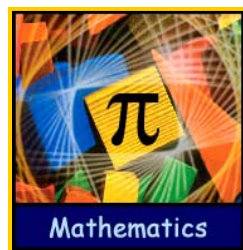
NSF Priority Areas

- Biocomplexity in the Environment
- Information Technology Research
- Nanoscale Science and Engineering
- Human Social Dynamics
- 21st Century Workforce
- Mathematical Sciences



Mathematical Sciences

- **FY2004 Request: \$ 89.09 M**
- **Goal: To transform the way mathematics, science, and education interact.**
 - Enhance research in fundamental mathematical and statistical sciences
 - Incorporate sophisticated mathematics into other disciplines
 - Advance mathematical sciences education

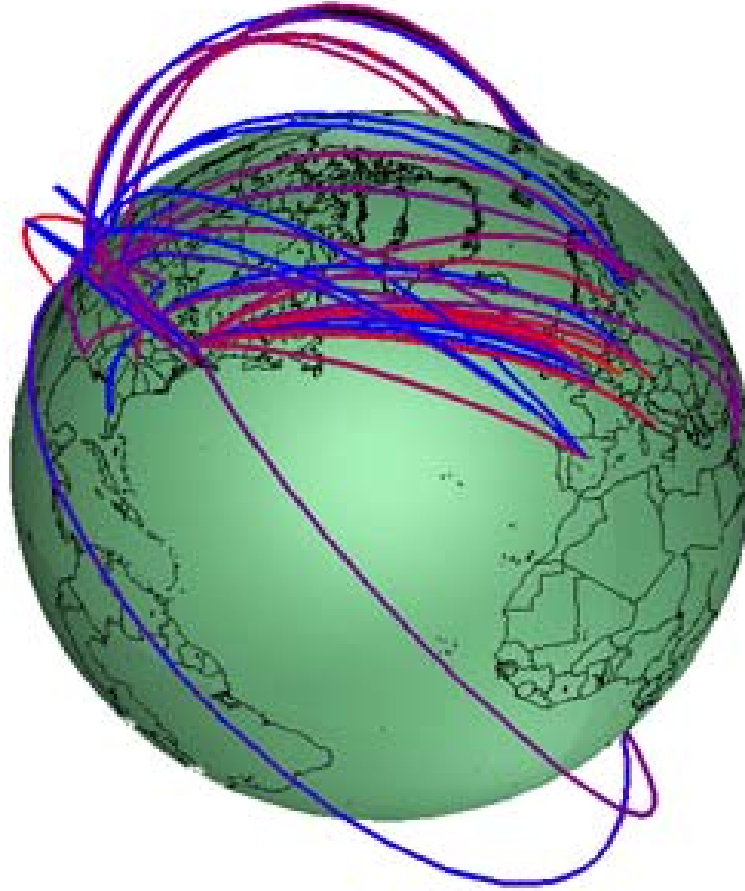




Reshape Education at All Levels

- Math and Science Partnership
- Integrated Graduate Education Research Traineeships (IGERT)

This is a time of great opportunity



and great challenges...