Ecoinformatics : Where are we, Where do we want to go and , How to reach there

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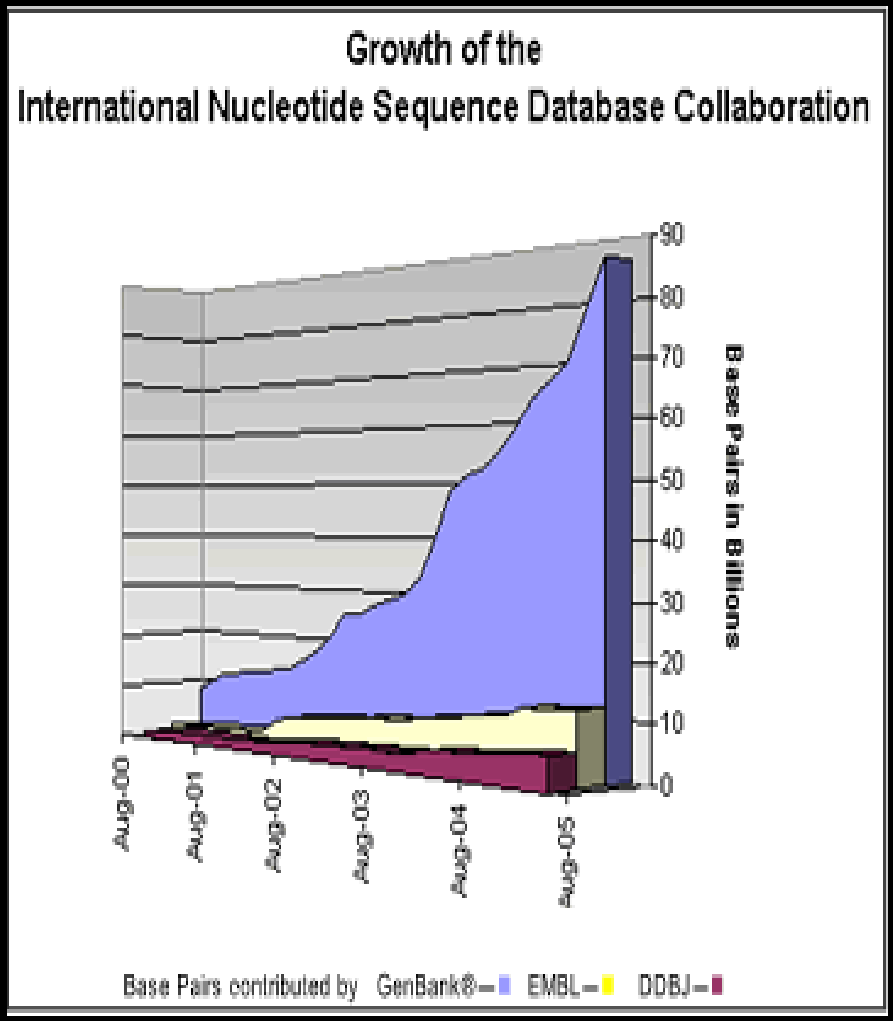
All researchers are facing a seemingly insurmountable problem "Data Explosion"

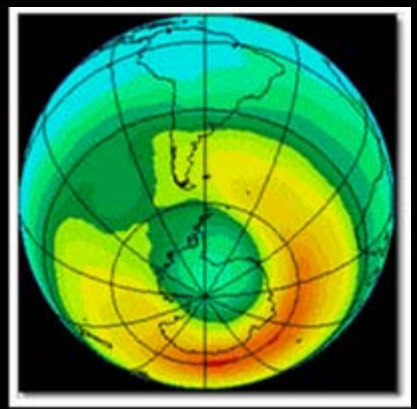


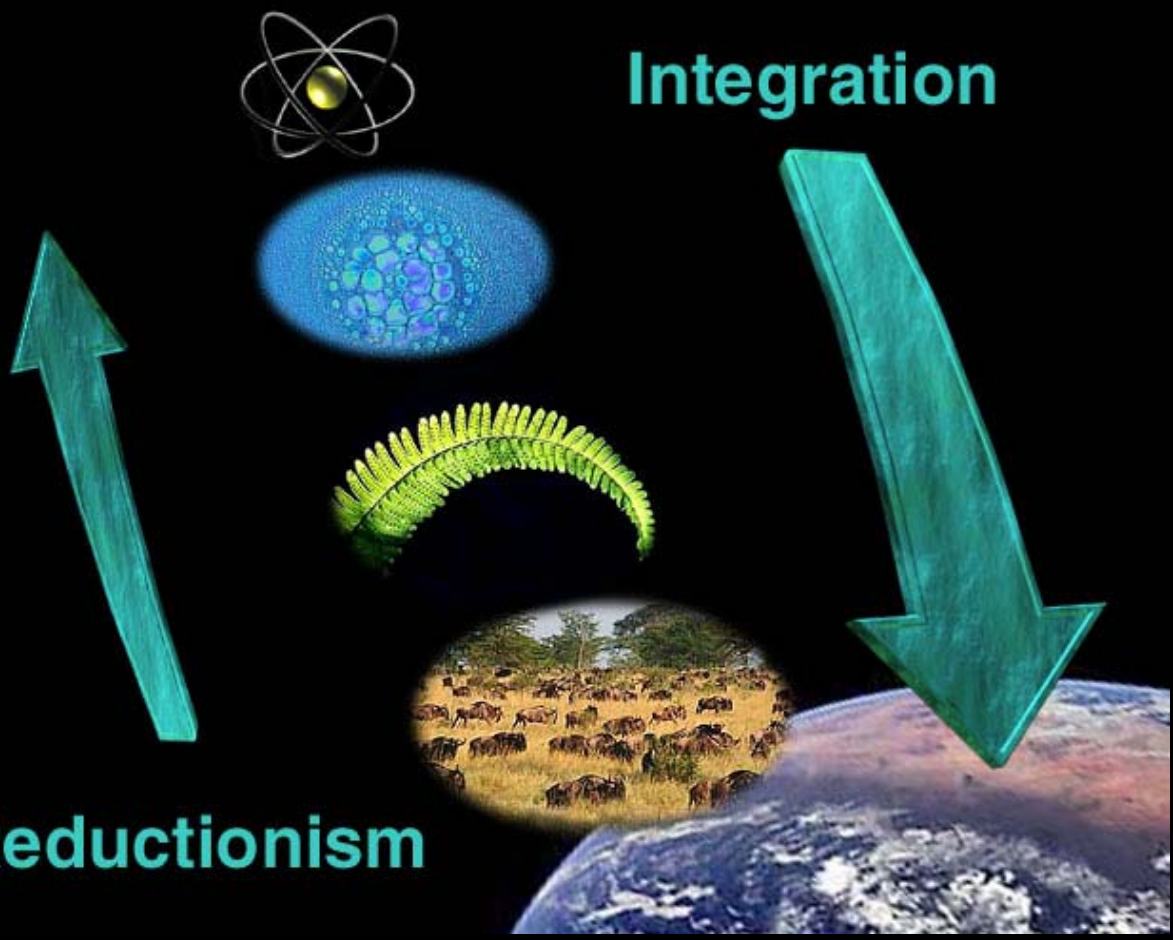
Source:NCBI

Taxonomy Amphibian, Bird, Fish, Fungus, Invertebrate, Mammal, Microbe, Plant, Reptile, Virus Measurements Biomass, Carbon, Chlorophyll, GIS, Nitrate, Nutrients, Precipitation, Temperature, Radiation, Weather Level of Organization Molecule, Cell, Organism, Population, Community, Landscape, Ecosystem, Global Evolution Adaptation, Evolution, Extinction, Genetics, Mutation, Selection, Speciation, Survival Ecology Biodiversity, Competition, Decomposition, Disturbance, Endangered Species, Herbivory, Invasive Species, Nutrient Cycling, Parasitism, Population Dynamics, Predation, Productivity, Succession, Symbiosis, Trophic Dynamics Habitat Alpine, Freshwater, Benthic, Desert, Estuary, Forest, Grassland, Marine, Montane, Terrestrial, Tundra, Urban, Wetland

Source:KNB

The key question for all data-rich ,data-heterogeneous sciences is how to mine the knowledge from the data





(Michener, 2000)

Theoretical ecology→ Ecoinformatics a new interface science in the making

- Science is increasingly about information: its collection, organization and transformation. And if we view computer science as "the systematic study of algorithmic processes that describe and transform information", then computing underpins science in a far more fundamental way. One can argue, as has George Djorgovski, that "applied computer science is now playing the role which mathematics did from the seventeenth through the twentieth centuries: providing an orderly, formal framework and exploratory apparatus for other sciences.

2020 Computing: A two-way street to science's future Ian Foster
Nature 440, 419 (23 March 2006)

- If you want to understand life, don't think about vibrant, throbbing gels and oozes, think about information technology.

Dawkins, R. *The Blind Watchmaker* (Norton, 1986)

Objective

- Ecoinformatics tour
- Lessons from more mature interface sciences,' Bioinformatics’
- Pragmatic step by step method for a mature Ecoinformatics

Ecoinformatics tour: Past Present and future

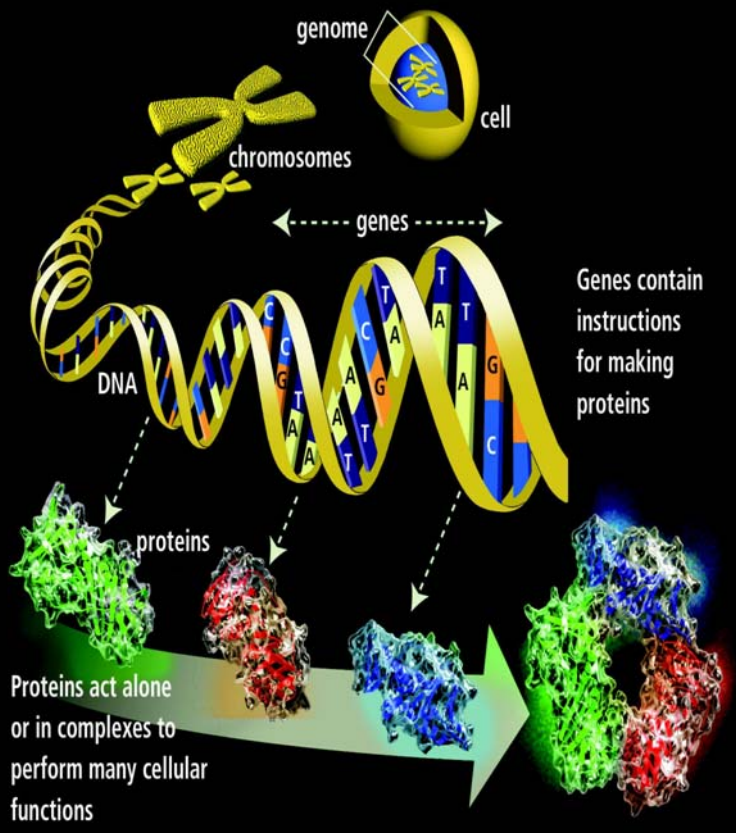
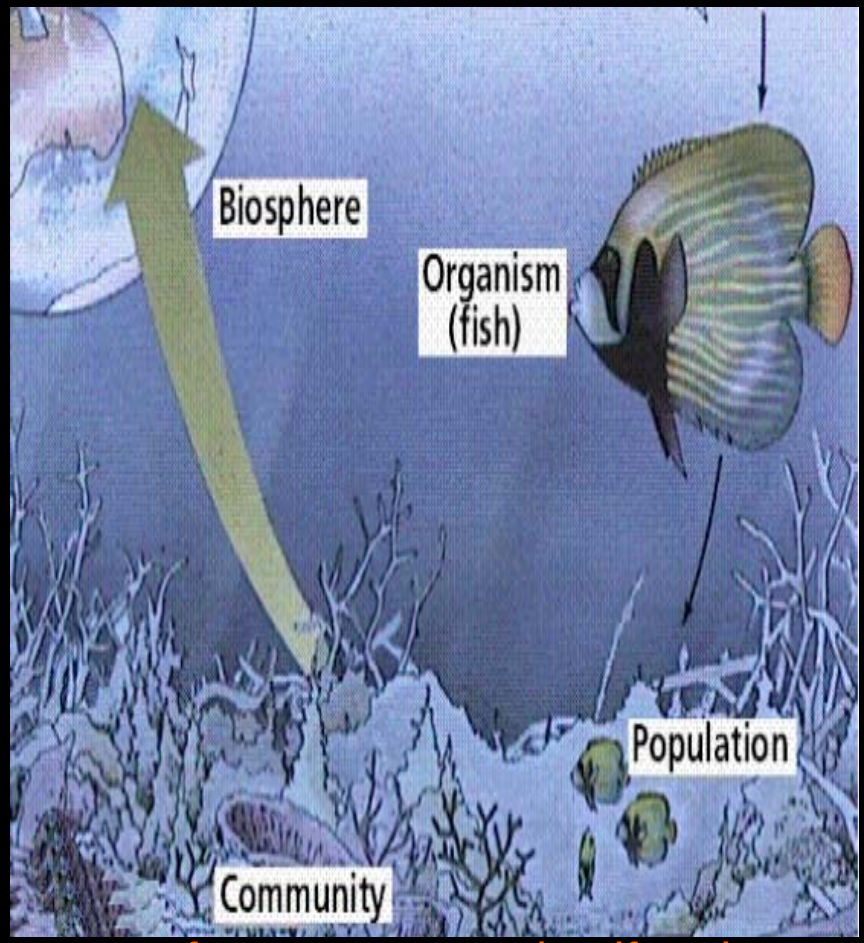


Image credit: U.S. Department of Energy Human Genome Program



Images from Purves et al., Life: The Science of Biology, 4th Edition, by Sinauer Associates

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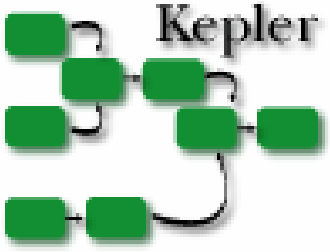	CSDGM	Morpho 	SRB	Vegbank
Mat lab		Metamaker	Ecogrid	CLIMDB
Mathematica				HerpNet

What can we learn from more mature interface science: Bioinformatics

- Stress on ontology
- Stress on quantification
- Stress on Systems level model
- Stress on data integration
- Stress on increasing the resolution of integration

Pragmatic step by step guide towards more mature Ecoinformatics

- Store data using metadata specifications in freely available ,well annotated databases.
- Standards such as MIAME for ecological experiments.
- An Individual Ontology project analogous to Gene Ontology project
- Development of Systems ecology markup language analogous to Systems biology markup language

Ecoinformatics, What does it mean to all ecological researchers,icons or upstarts

Upstarts can become icons by standing on shoulders of icons adopting ecoinformatics and icons can ensure there legend lives on following ecoinformatics.

Ecoinformatics Usability Survey

Password: ecoinf

Acknowledgement

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