



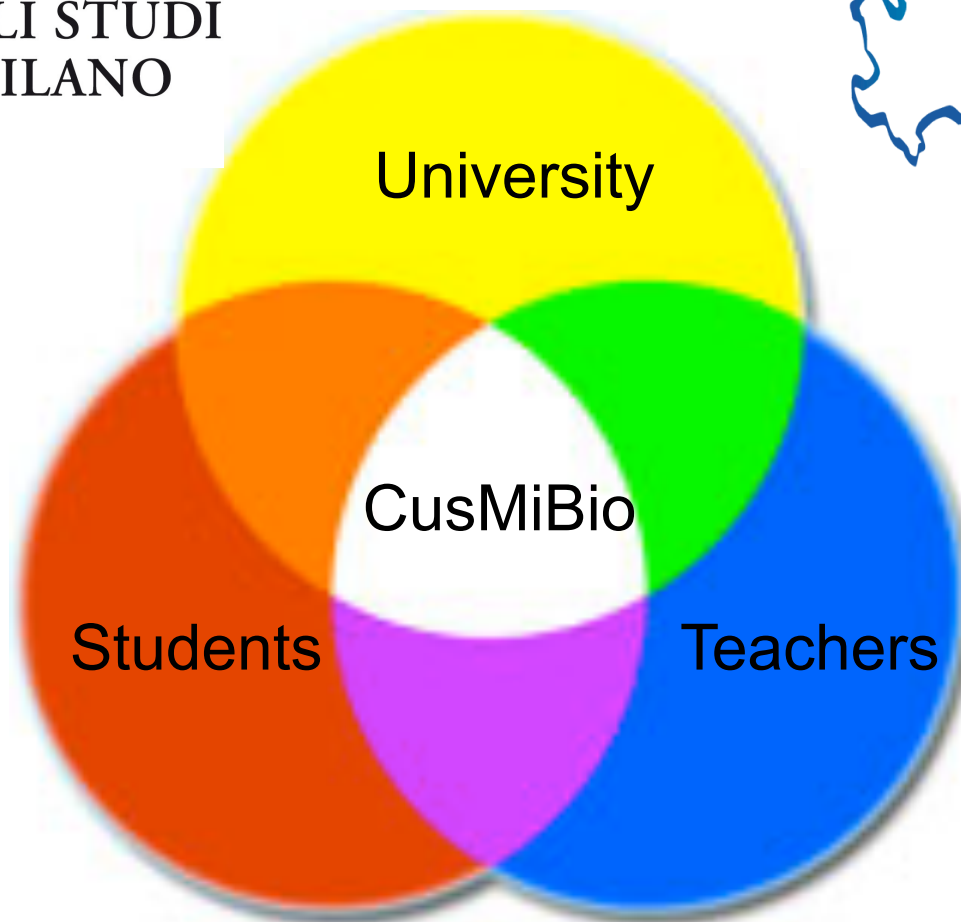
**FROM SCHOOL TO UNIVERSITY
A ROUND TRIP**

**AN INTERACTIVE LINK BETWEEN
MOTIVATED HIGH SCHOOL STUDENTS, SCIENCE TEACHERS
AND
UNIVERSITY REASERCHERS**

**CINZIA GRAZIOLI,
CUSMIBIO, MILAN ITALY**



UNIVERSITÀ
DEGLI STUDI
DI MILANO



CUSMIBIO PERMANENT STAFF



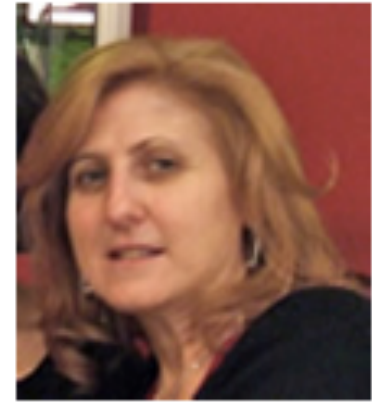
Paolo Plevani



Giovanna Viale



Livia Pirovano



Cinzia Grazioli

✓ **about two dozen researchers and professors of the University of Milano** active in different fields (Biomolecular Sciences, Medicine, Agricultural Sciences, Pharmacy and Veterinary) collaborate with CusMiBio in seminars, updating courses, and setting-up of new hands-on activities for students;

✓ **several Ph.D. students and post-docs act as tutors** during the hands-on activities in the lab. This is extremely important because the presence of motivated young people strongly facilitates productive interactions and dialogue with high school students

CUSMIBIO HAS DEDICATED LABS IN THE MILAN STATE UNIVERSITY CAMPUS



These labs are an integral part of the Lombardy school system

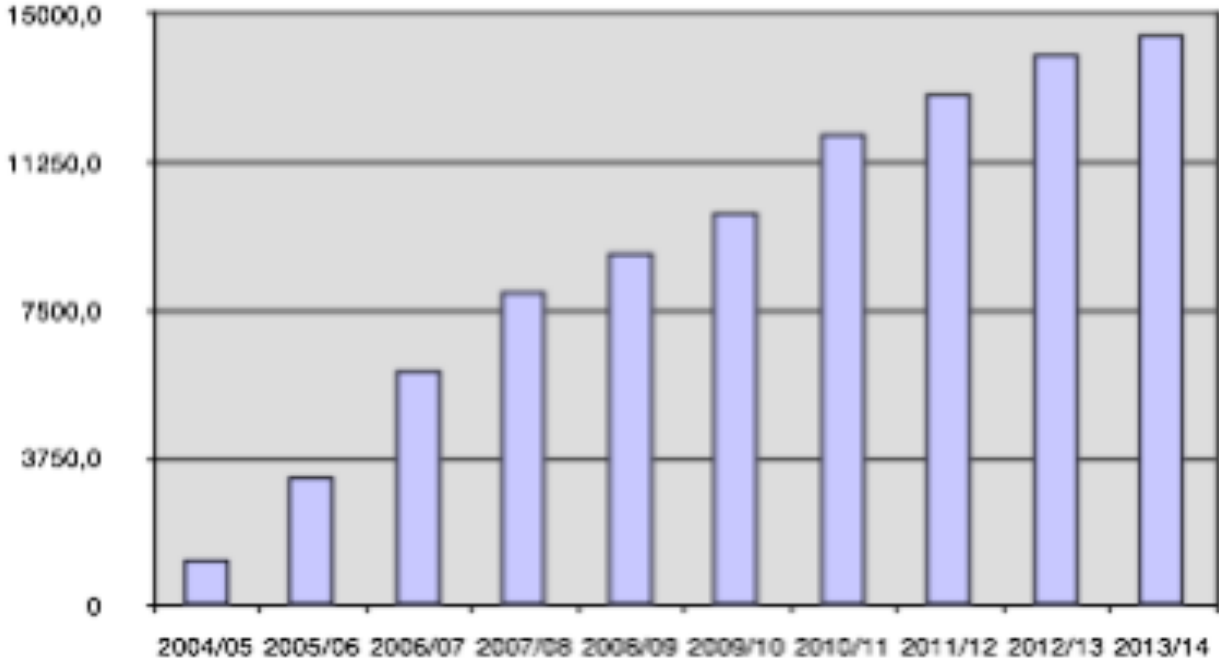
CUSMIBIO FOR HIGH SCHOOL STUDENTS

•for a more conscious choice in University studies

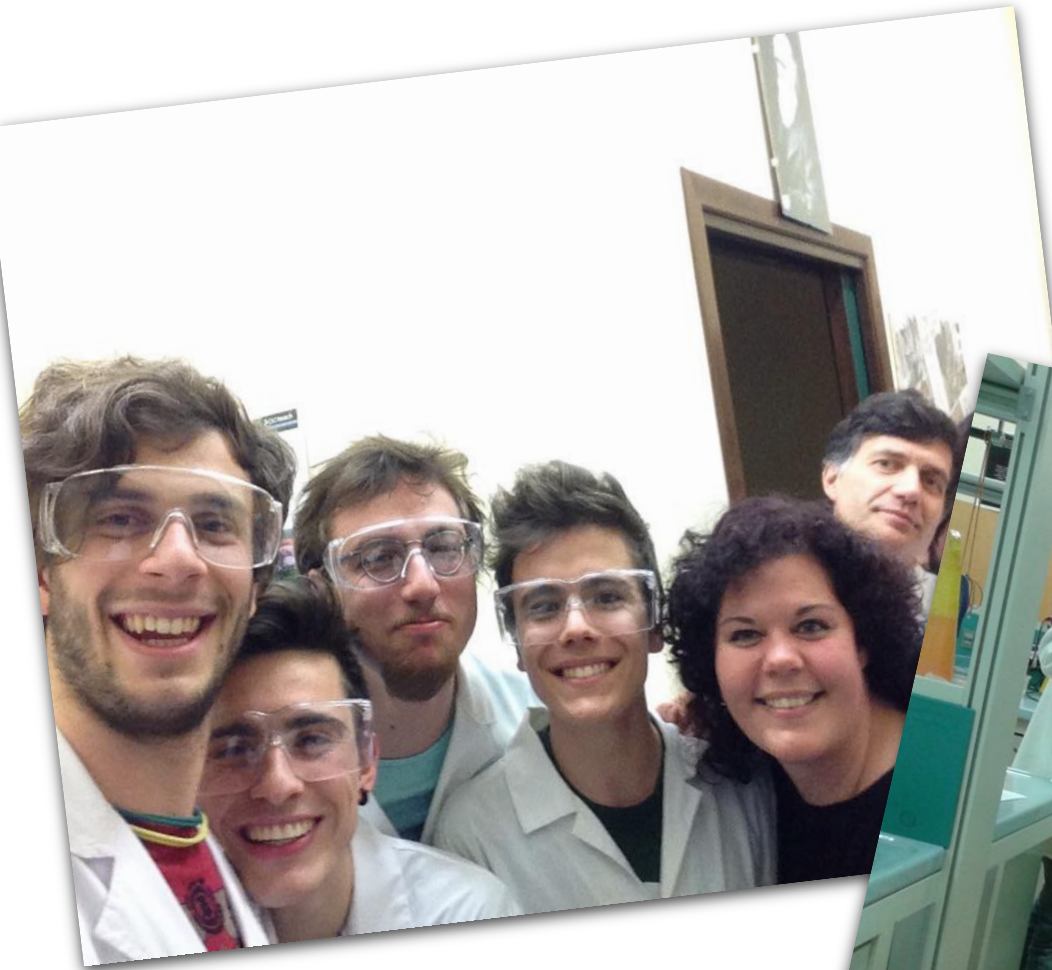
Try the BioLab



Participants to “Try the BioLab activities”

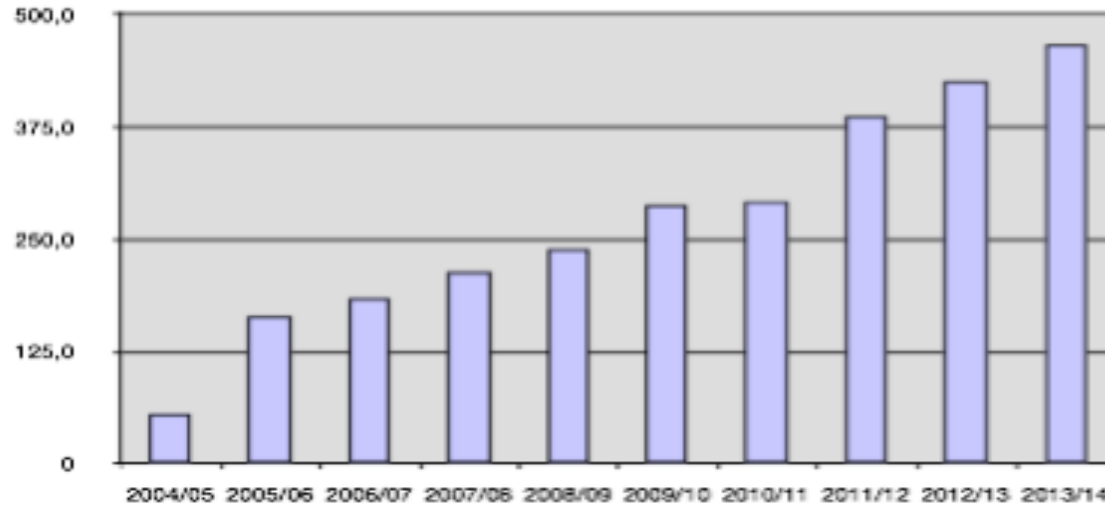


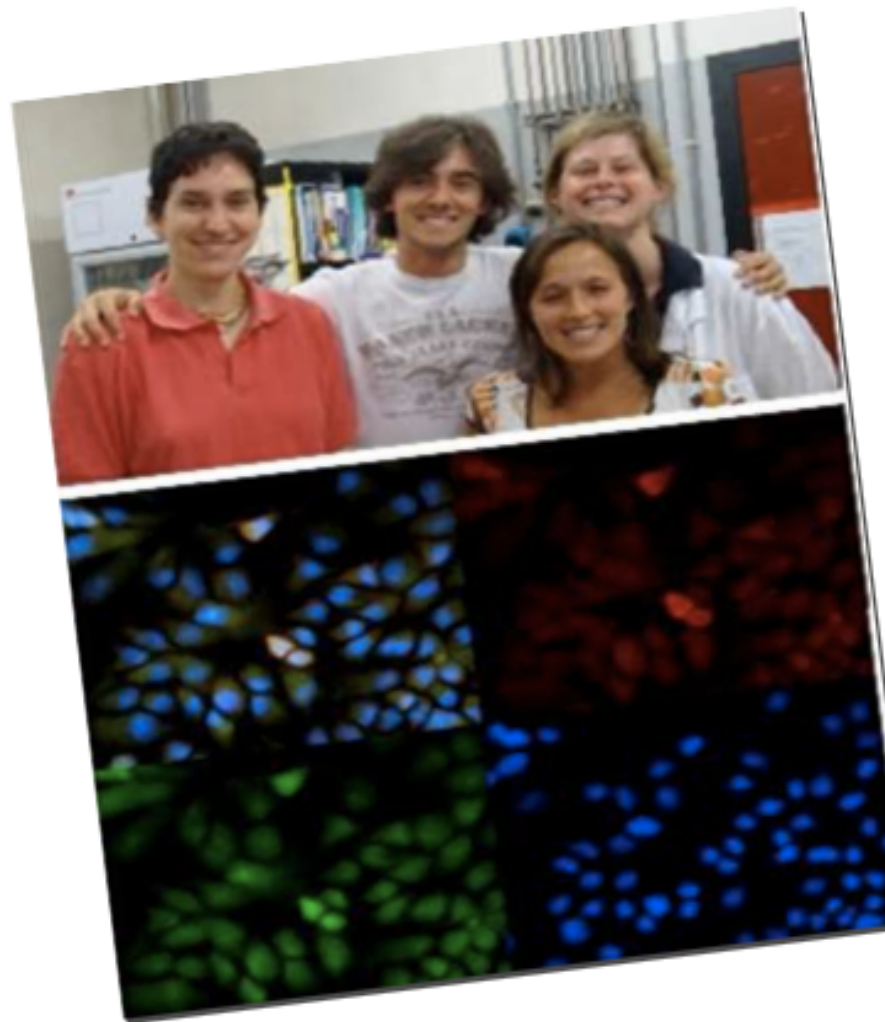
Science is FUN and interesting



A WEEK AS A RESEARCHER: ANNUAL COMPETITION

N° studenti partecipanti al concorso "Una settimana da ricercatore"





**Winners during their stage in the field
and in the lab**

**A dream postcard from
Cambridge 2005**



**A dream comes true: Venice 2013
Conference “The Future of
Science”**





FROM SCHOOL TO UNIVERSITY: A ROUND TRIP

From School to CusMiBio

Try the biolab: hands-on activities for High School students at the CusMiBio Laboratories

From CusMiBio to School

Kits (materials, handbook, protocols, teacher guide etc..) that can be “hired” from CusMiBio and taken to school

AN INTERACTIVE AND SYNERGISTIC TANDEM TO DESIGN INNOVATIVE HANDS-ON LEARNING PRACTICES IN BIOLOGY

The most motivated and skilled students are invited together with their teachers to set-up **KITS** and learning modules adapted to be transferred to their schools.

Both are actors of the project.

Together they develop the theoretical and practical activities to be proposed to their peers and this generates a virtuous circle



A positive reciprocal feedback



**‘Learning by teaching’
strategy:
*you learn a lot when you
have to teach others***



TRAINING FOR TEACHERS AND THEIR STUDENTS

How to use the kits at school

The collaboration starts during the training courses where the different stake-holders, i.e. scientists, students and their teachers come in close contact.



FROM SCHOOL to UNIVERSITY: A ROUND TRIP RESULTS: Students (1)

Using peer-to-peer teaching:

- Engages students and inspires their peers
- Helps students motivate each other to delve deeper into science
- Develop a wide range of complementary skills, such as work in groups, self confidence, communicate with an appropriate language

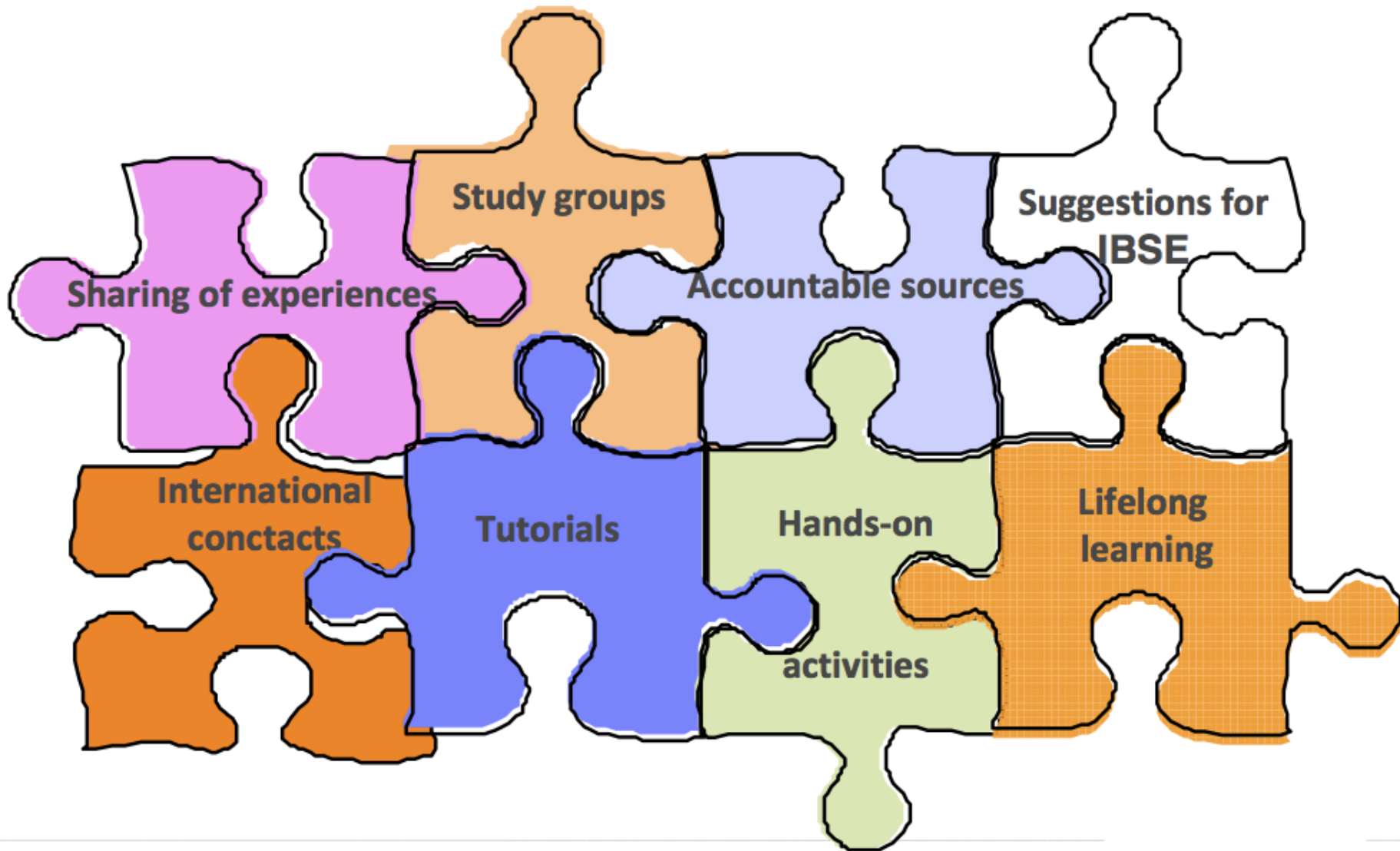
This approach facilitates productive interactions and dialogue within peers and can break the “teacher-student” barrier

FROM SCHOOL to UNIVERSITY: A ROUND TRIP RESULTS: Teachers

- acquisition of additional knowledge to manage the topics with the required competence
 - design of Lab activities suitable for being performed at school
 - creation of the most favorable conditions for cooperation within and between schools
 - exchange of materials and experiences.
-

•filling the GAP

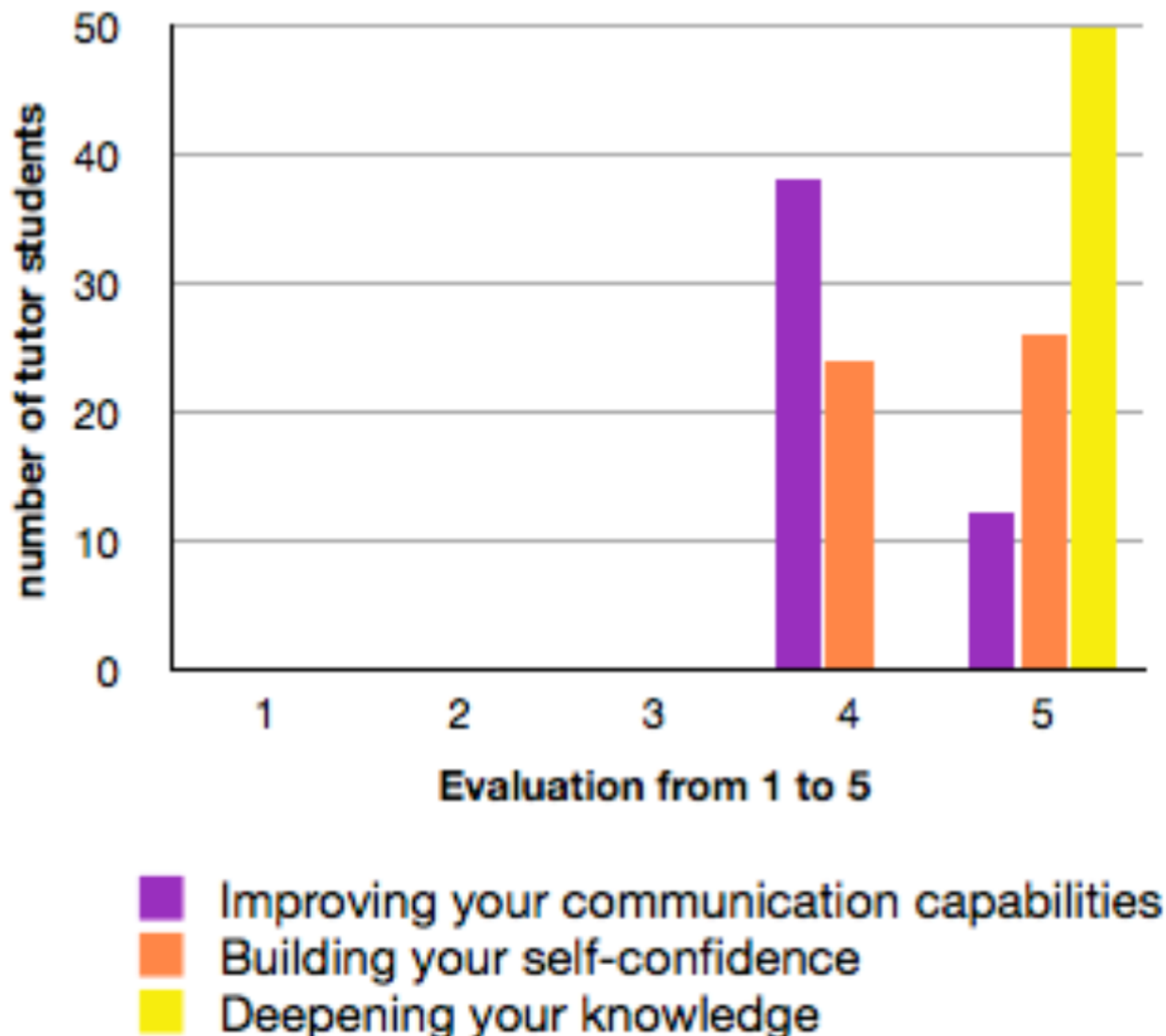
•recover motivation & social role



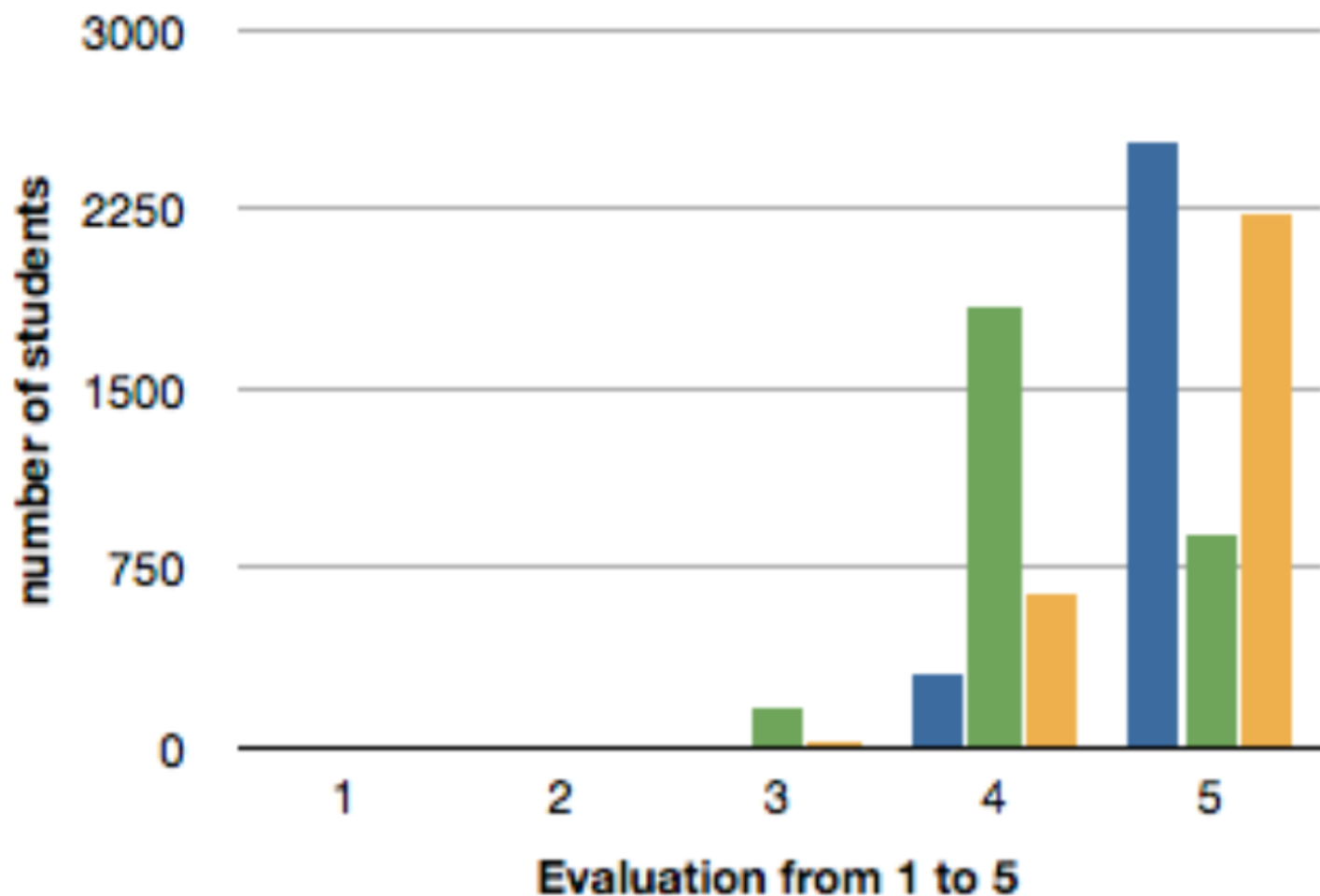




Evaluation of peer to peer teaching by 50 tutor-students



Evaluation by 2900 students receiving kit activities



- Engagement in the activity
- Teaching efficacy of your tutor peers
- Interest and appreciation

WHO IS THE CULPRIT?



A real IBSE approach

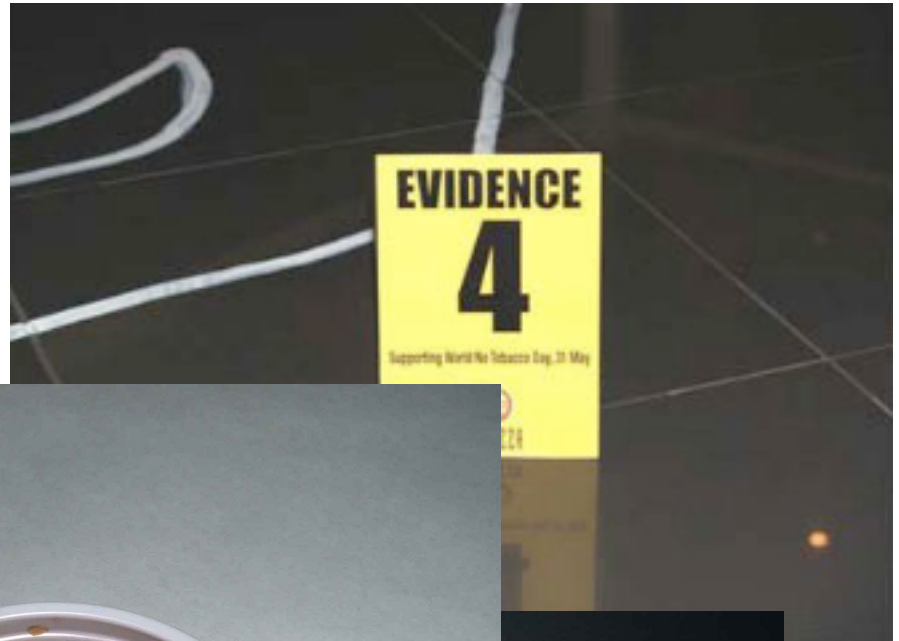
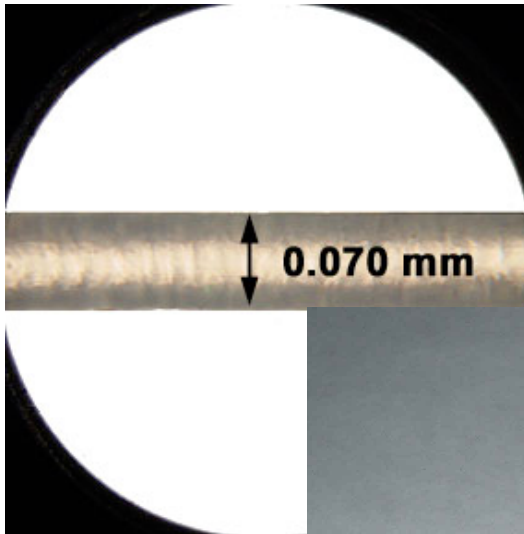


- **construct a real life crime scene investigation, collect evidence and find the incriminating evidence**
- **perform DNA analysis to obtain molecular identikits for human genotypic identification.**

DNA PROFILING

- constructing a real life crime scene investigation, collecting the evidence







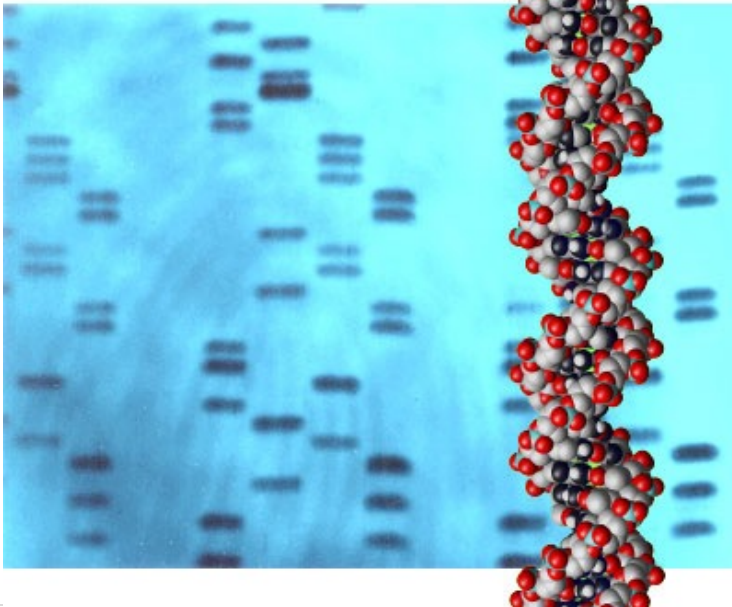
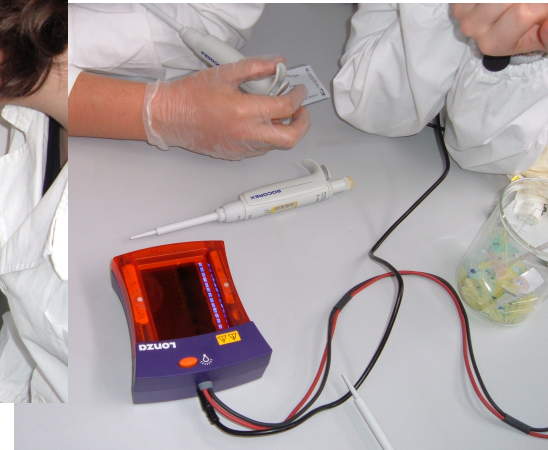
•finding the incriminating evidence, through blood testing and DNA analysis to obtain molecular identikits for human genotypic identification.

FLASH GEL SYSTEM

DNA extraction

Amplification and analysis

5 min separation & recovery



...find the culprit

Thank you!

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e-mail: cusmibio@unimi.it

Cinzia Grazioli: cinisa@tiscali.it





THE CITY BARCODE PROJECT (2014-2015) ANALYZING BIODIVERSITY IN A URBAN ENVIRONMENT



UNIVERSITÀ DEGLI STUDI
DI MILANO



a CusMiBio project in collaboration with



Cold Spring Harbor Laboratory
DNA Learning Center



THE URBAN BARCODE PROJECT IN NYC



Supported by a grant from the Alfred P. Sloan Foundation

<http://www.urbanbarcodeproject.org/>



Dr. DAVID S. HORNER
DIPARTIMENTO DI BIOSCIENZE



This initiative

- facilitates productive connections and synergies between High School and Research Universities
- provides a challenging and rewarding experience to talented students
- and an opportunity for team work of students and their teachers



TEACHERS & TALENTED STUDENTS AN INTERACTIVE AND SYNERGISTIC TANDEM

**The most motivated and skilled students,
identified through selective competitions,
and their teachers**

become actors of the same project

Together they discuss, develop and submit a research project

How will CityBP work?

1. Students will convene in teams and design projects that use DNA barcoding to answer a question.
Teams of 2–4 students must be sponsored by a qualifying science teacher or mentor. Sponsors must participate in a six hour training conducted by the CusMiBio Staff
 2. Student teams will enter CityBP by submitting a research/project proposal
 3. Proposals will be judged for originality, creativity, relevance, plausibility, and scientific merit. The top teams will be invited to compete in the *City Barcode Project*.
-

What research questions could students ask?

Research questions can be about any living thing or about non-living things (foods or other products) that have DNA.

- Are there invasive (non-native) plants in my local park?
 - What are the most popular types of flowers in my city?
 - Do the teas I buy at my supermarket really contain the ingredients on the package?
 - How many different living organisms can I find in an office building?
-

DNA testing uncovers suspect SUSHI



If you're paying for white tuna and you're eating tilapia, I think you'd want to know that.....

Team B

Gourmet Coffee - Is It Your Average Joe?

School: Columbia Preparatory School, Manhattan

Teacher/Mentor: Patrice Buckley

Students: Robert Jacobs, Nicholas Mishaan, Tyrel White, Max Kalikow



The two main species of the coffee plant that are used by humans are *Coffea canephora*, and *Coffea arabica*. Typically, the beans of these plants are used to make coffee or similar beverages. There is a large variety of gourmet coffee that is sold at high prices and advertised as being organic and of high quality and purity. For our Urban Barcode Project we propose to use DNA barcoding to determine whether the coffee sold at gourmet coffee shops is comprised of the species that it is advertised as. Furthermore, we will ask whether the beans of these coffees are pure or not by determining how many species of coffee plant are present in each sample. To accomplish this we will obtain coffee beans from several primary coffee merchants in the New York metropolitan area. We will then generate DNA barcodes from these samples and compare them to known coffee barcodes in the DNA databases.



Math, Science Research and Technology High School Tuna Investigation

Tuna Identification

School: Mathematics, Science Research and
Technology, Queens

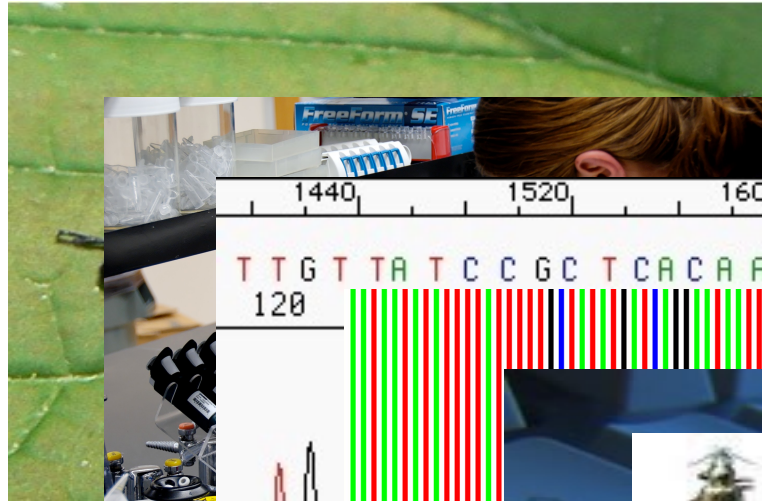
Teacher/Mentor: Christine Kola

Students: Rosenissa Pierre, Serena Wilson

For our Urban Barcode Project, we seek to
investigate the authenticity of tuna fish sold and
distributed in our local Queens supermarkets and fish markets.



DNA barcoding



Collecting samples

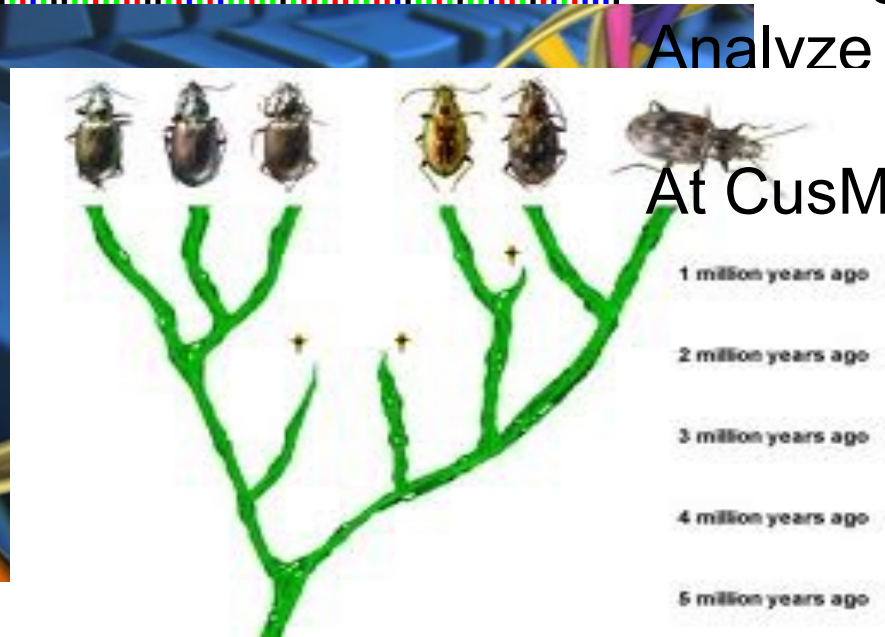
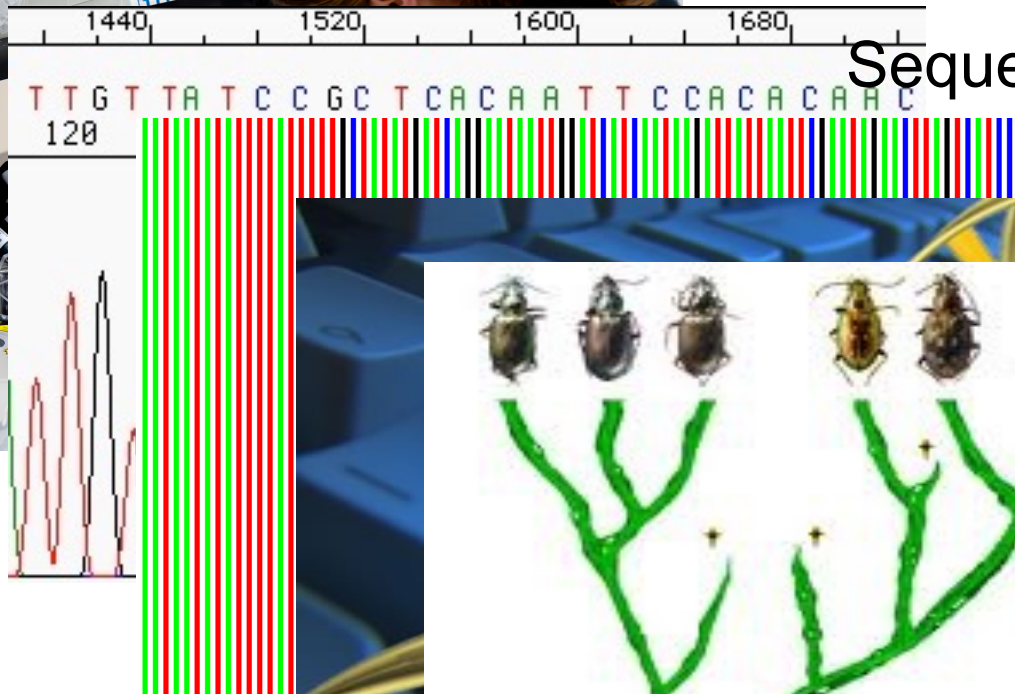
At CusMiBio labs

Sequencing

Barcoding

Analyze results

At CusMiBio lab



Participants will have access to online tools to help analyze their results

Username:

Password:

[Forgot Password?](#) [Register](#)

D N A

SUBWAY

Optimized FOR PLANTS
animals coming soon

Annotate a Genomic Sequence

Prospect Genomes Using TARGET

Determine Sequence Relationships

Find Repeats

Predict Genes

Search Databases

Build Models

Search Genomes

Alignment & Tree Viewer

Assemble Sequences

Add Sequences

Analyze Sequences

Browsers & Transfer

This site ties together key bioinformatics tools and databases to assemble genomes, investigate genomes, work with phylogenetic trees and barcodes. Roll over the "stations" on the subway map to find out more about the analysis steps. Analyze your own data or sample data provided. To share your results.

Dr. DAVID S. HORNER
DIPARTIMENTO DI BIOSCIENZE

Use the blue line of *DNA subway* to analyze novel DNA sequences generated by a DNA sequencing experiment

The access and use of a simplified platform, specifically designed and adapted by DNALC, Cold Spring Harbor experts, has been authorized to analyze results

The banner features a background of a city skyline. On the left is the Cold Spring Harbor Laboratory (CSH) logo, a circular emblem with 'CSH' inside. To its right, the text reads 'Cold Spring Harbor Laboratory' and 'DNA Learning Center'. In the center, a stylized DNA double helix is overlaid on a barcode. Below the DNA helix is a red apple icon with 'NYC' written on it. To the right of the apple, the words 'URBAN BARCODE PROJECT' are displayed in green and black. Above the DNA helix, the text 'School Year 2012-13' is visible. At the bottom of the banner is a dark red navigation bar with white text for the following links: Home, About the Project, Project Guidelines, Equipment Loan, Barcoding Experiment, Resources, Current Projects, and Prior UBP Results.

Contributing to big science

BARCODE OF LIFE DATA SYSTEMS v 2.5

Advancing species identification and discovery through the analysis of short, standardized gene regions

SEARCH

About BOLD Contact Us



Published Projects | Taxonomy Browser | Request an Account | Identify Specimen | Documentation | Data Release | Citation

The Barcode of Life Data Systems (BOLD) is an online workbench that aids collection, management, analysis, and use of DNA barcodes. It consists of 3 components (MAS, IDS, and ECS) that each address the needs of various groups in the barcoding community.

MANAGEMENT & ANALYSIS

BOLD-MAS provides a repository for barcode records coupled with analytical tools. It serves as an online workbench for the DNA barcode community.

Username
Password
[Request a new user account](#)
[Forgot your username or password?](#)

IDENTIFICATION ENGINE

BOLD-IDS provides a species identification tool that accepts DNA sequences from the barcode region and returns a taxonomic assignment to the species level when possible.



EXTERNAL CONNECTIVITY

BOLD-ECS provides web developers and bioinformaticians the ability to build tools and workflows that can be integrated with the BOLD framework. BOLD-ECS supplies REST services that allows access to public sequence and specimen data. We welcome the addition of new analytical modules.



BARCODE COUNTS

Formally Described Species With Barcodes	77,467
Total Barcode Records	984,535
Source	Breakdown
GenBank	108,139
Canadian Centre	809,020
Others	67,376

BOLDSYSTEMS

BOLD 2.5 Release

Version 2.5, unveiled on Nov 11th 2009 at the Third International Barcoding of Life conference in Mexico City, provides new core functionality including support for multiple sequence markers per specimen and more complex workflows. Features include identification services for ITS, matK, and rbcL markers, comparative analytics, web services and a variety of convenience upgrades. A few are highlighted here:

Accumulation curves	Explore diversity of species and sequences by site or higher level taxonomy.
Multi-marker analysis	All analytical tools have been upgraded to support processing and visualization of all registered markers.
Alignment browser	Quickly identify alignment errors and evaluate substitutions through the alignment browser which support visualization of amino translations of coding sequences.
Web Services	A two phase data retrieval service based on Representational State Transfer (REST) is available at services.boldsystems.org to access and retrieve published data on BOLD in text, XML and JSON formats.

BARCODING CAMPAIGNS



FINAL STEPS

Finalizing their project, conferring with mentors, and creating the final paper and poster

Papers and posters will be presented at the CityBP Symposium to be held at the end of the 2012-2013 School Year





UNIVERSITÀ DEGLI STUDI
DI MILANO

ITALIAN VERSION

ABOUT US

TEACHERS

STUDENTS

CREDITS

CONTACTS

Theoretical courses

New frontiers in Bioscience:

a serie of Symposia on topics such as
Nanomedicine, Epigenetics, Stem cells, RNA
interference

Basic and advanced Bioinformatics courses:

skills and competences to use bioinformatics tools at
school

Happy Science:

short conference cycles followed by an aperitif on
topics such as:
Neurodegenerative diseases, Model organisms, DNA
repair mechanisms

Practical courses

Major initiatives directed towards High School Teachers

High School Teachers attend education groups that meet regularly under the supervision of university professors and provide them with constant scientific and cultural updating (so far, more than 300 High School Teachers have taken part in these initiatives). The practical products of these education groups are handbooks and "tools and tips" that can be used by the teachers during their work at school and the development of laboratory activities that will be offered to the students.



New Project

The City Barcode



UNIVERSITÀ DEGLI STUDI
DI MILANO

STUDENTS

CREDITS

CONTACT

Follow us online
www.cusmibio.unimi.it

In collaboration with
Cold Spring Harbor Laboratory

The City Barcode



CUSMiBIO
MILANO BARCODE PROJECT

CUSMIBIO INTERNATIONAL SUMMER SCHOOL

Diving into molecular biology (Summer 2012 and 2013)



The students admitted (20) will receive a week intensive hands-on experiments and seminars at the CusMiBio laboratories on the University of Milan campus.

Lab activities will be supervised by scientists of Milan University, post-doc tutors and CusMiBio teaching staff. Seminars will be given by University faculty members or affiliated research organizations active in the fields of Biotechnology and Biomedicine.

At the end participants will have gained a broad up-to-date and experimental overview of nowadays biological research and they could be inspired and encouraged to take an interest in research and to consider careers in bioscience and technology.

<http://www.plantday12.eu/>



Fascination of
Plants Day

May 18th 2013

Enter →

Plant Science . Agriculture, Horticulture & Forestry .
Plant Breeding . **Plant Protection** . Sunlight into Sugars .
Food & Nutrition . Environmental Conservation .
Climate Change Mitigation . **Smart Bioproducts** .
Biodiversity . Sustainability . **Renewable Resources** .
Education & Artvation



