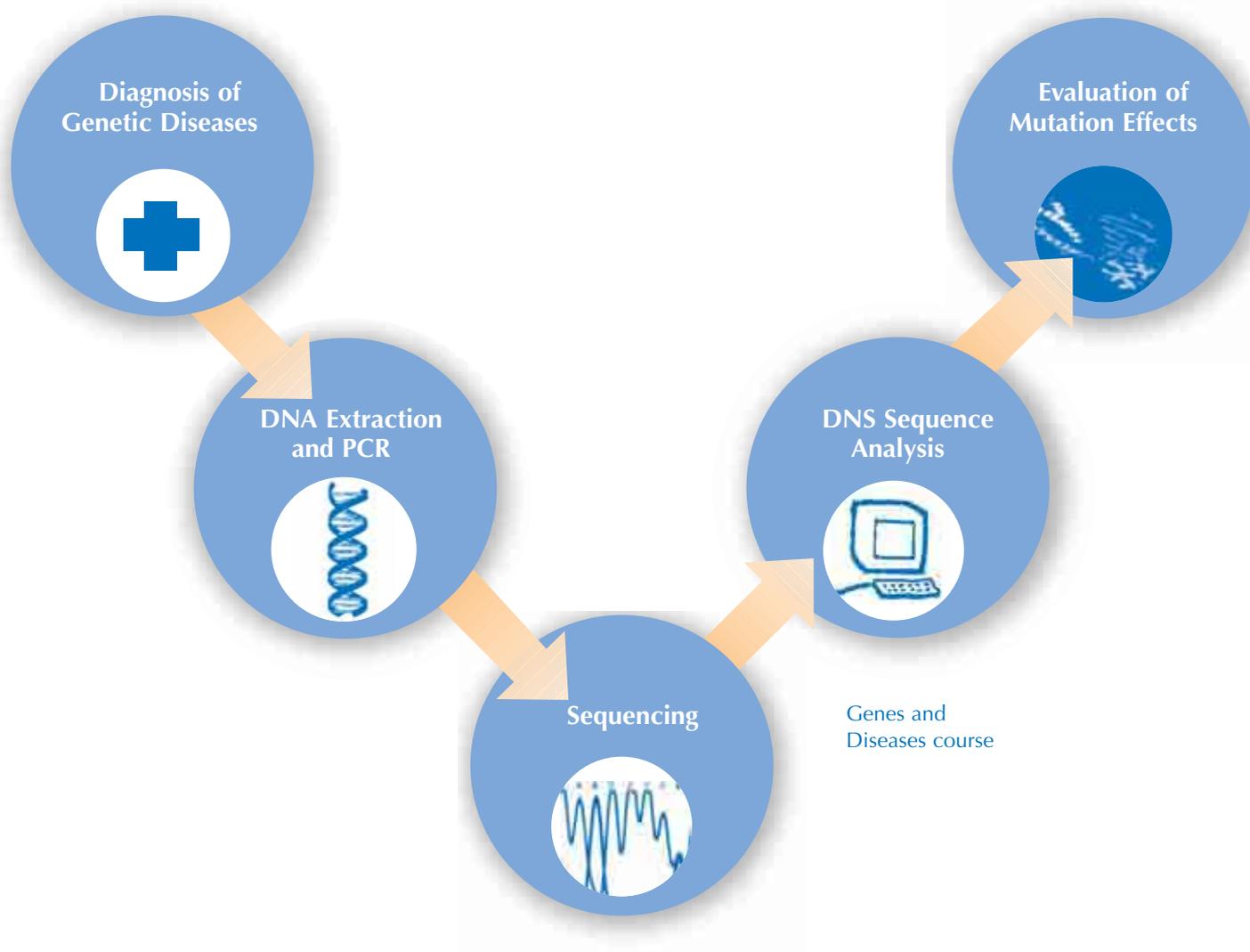


Linking university and school: addressing the challenges of science teaching in Italy

Mariolina Tenchini, Director of Cus-Mi-Bio in Milan, Italy, introduces a university initiative to motivate science teachers and provide both them and their students with hands-on experience of cutting-edge science.



Science teaching in Europe provides many rewards, but also many challenges. Some of these are familiar to teachers in all countries: keeping up with developments in science, for example, or dealing with difficult children. Other problems depend to an extent on where you are teaching: which country, which region or which type of school.

In Italy, unlike in some other European countries, science teachers are expected to cover the full range of sciences from geology to molecular biology, from stoichiometry to astrophysics. Although this offers the opportunity to teach some fascinating interdisciplinary topics (e.g. Farusi, 2006), it makes it very difficult for teachers to feel confident about their own knowledge.

Of course, colleagues in the region may have the necessary expertise and be willing to help, but the opportunities to exchange opinions, discuss problems and offer advice are not always available.

The vast majority of Italian schools have little if any money to invest in laboratory equipment. In schools that have laboratories, the equipment is often outdated and unsafe, reagents are inappropriately stored and waste disposal is problematic.

Responding to the need for teachers to receive training in the latest scientific developments, swap advice, and use modern and well-equipped laboratories, the University of Milan, in cooperation with the Education Office of Lombardy, has developed a centre for science education in secondary schools: Cus-Mi-Bio. Since 2004, Cus-Mi-Bio, the Centro Università di Milano Scuola per la Diffusione delle Bioscienze, has offered teachers an innovative and stimulating opportunity to combine instruction in theoretical developments in biology with hands-on laboratory work.

Cus-Mi-Bio organises activities for both high-school students and

high-school teachers. The two are closely linked, with teachers helping to develop the courses for the students.

Courses for teachers and high-school students

Courses for teachers at Cus-Mi-Bio are intended not only to update their scientific knowledge but also to motivate teachers by getting them personally involved in the process of improving science education in high schools. The topics covered so far include recent advances in molecular genetics, such as genetic engineering, forensic science, the Human Genome Project, regulation of gene expression, and bioinformatics. The teachers learn about modern scientific developments and work in well-equipped university laboratories, and they are provided with materials and ideas to use in their own schools. Most of the courses are in Italian but some, in collaboration with the European Learning Laboratory for the Life Sciences^{w1}, have been in English. Courses conducted over the last few years include 'Recent advances in molecular genetics', 'From organisms to genes: what zebrafish can tell us', 'Genes and diseases', e-learning activities, and 'Bioteach: tools and tips for biology teachers'.

A key feature is that some of the attendees not only benefit themselves but also work together to develop resources for all teachers, which are published on the Cus-Mi-Bio website^{w2}. Together with university scientists, about 50 high-school teachers, in collaborative groups of ten, prepare new materials or tools to be used in school. The school teachers, therefore, have a dual role: they not only learn new information, but also use their expertise and experience to ensure that the materials developed are appropriate and interesting for their students.

Once the materials have been prepared, the teachers in the collabora-



Search for European partners

Cus-Mi-Bio aims to establish a network of European universities working to improve science education for high-school students. If you are interested in setting up a similar centre in your own country and would like advice, the Cus-Mi-Bio team would be happy to help. Contact anna.cartisano@istruzione.it or cinisa@tiscali.it.

BACKGROUND

tive groups test them in their schools and provide feedback. Then the next step begins: bringing the high-school students into the University of Milan. Students attend courses in groups of 20-25, accompanied by their teacher. The course, 'Try the BioLab', consists of various laboratory activities devised by the collaborative groups. Each student has his or her own working space and gains hands-on experience of working in a laboratory. The accompanying teachers should first attend a course for teachers on the same activities, so that they can prepare their students for the course, with the help of handbooks prepared by the collaborative groups.

The courses are run by 'lead' teachers employed by the Education Office; these are high-school teachers who have worked in one of the groups to develop the materials. Additionally, research students from the university work as tutors, explaining the equipment to small groups of five or six school students. The involvement of these young scientists is very impor-



A personal slant

After nearly 30 years of teaching science, we still enjoyed it: students are often very stimulating and we both love the subjects we teach. The chance to join the Cus-Mi-Bio team was a new and exciting challenge. It was a chance to do something we believed in: to help enthuse our colleagues and provide them with the materials to teach inspiring lessons in modern science.

Very important is the friendly atmosphere at Cus-Mi-Bio, where teachers can get to know each other. We are now a real landmark for teachers who want advice, information, or a place to study or exchange experiences. The enthusiastic response shows that high-school teachers needed something like this. The two different worlds of university and school are slowly drawing closer, thanks to the support of some university professors. Working at the interface is not always easy, but it is always interesting.

Anna Cartisano and Cinzia Grazioli, high-school teachers working at Cus-Mi-Bio



Cinzia Grazioli

tant, as they act as role models for the students and are able to give careers advice.

The courses are popular with both teachers and their students; many teachers return several times with different classes. Now in its second year, Cus-Mi-Bio has increased the numbers of students attending from 1000 in the first year to 4000.

Although many of the people attending the Cus-Mi-Bio courses are from around Milan, participants are welcome from all over Italy. Attendees receive handbooks including protocols of the experiments and a CD of information. Teachers unable to attend the courses can still download materials from the Cus-Mi-Bio website.

Other activities

Cus-Mi-Bio also enables Italian high-school teachers to attend national or international meetings, where they can swap ideas with teachers from other backgrounds. In 2005, for example, one group of teachers attended a summer course in Sweden, while another presented activities developed together with Cus-Mi-Bio at a meeting in Germany.

In addition to the 'Try the BioLab' courses, which are open to all high-school students, Cus-Mi-Bio also offers a work-experience programme for a few selected students. The students, who spend a week working alongside scientists in the laboratory, all declared it to be a fantastic experience.

References

Farusi G (2006) Teaching science and humanities: an interdisciplinary approach. *Science in School* 1: 30-33. www.scienceinschool.org/2006/issue1/francesca/

Web references

w1 - The European Learning Laboratory for the Life Sciences (ELLS): www.embl.de/ELLS

w2 - Cus-Mi-Bio: www.cusmibio.unimi.it

