Short reports and announcements

Biosecurity in the Gene Synthesis Industry

As representative for Synthetic Biology industry within project Synenergene, Thermo Fisher Scientific GENEART GmbH gave a presentation at the Policy Forum on Risk Governance of Emerging Technologies organized on March 1-3 2017 in Venice, Italy by the Society for Risk Analysis.

The presentation with the title "Commercial Synthetic Biology: Biosecurity in the Gene Synthesis Industry" covered the folowing subject:
DNA synthesis allows the direct construction of genetic material starting from digital information and raw chemicals. Improvements in synthesis technology are accelerating innovation across many areas of research, from breakthroughs in human health and medicine to the development of renewable energy, from agricultural productivity to the production of fine chemicals. Like any powerful technology, DNA synthesis has the potential to be purposefully misapplied and could give rise to both known and unforeseeable threats to our biological safety and security. In September of 2009, five of the world's leading gene synthesis companies came together to form the International Gene Synthesis Consortium (IGSC). By development and consequent application of a harmonized protocol for screening of the sequences of synthetic gene orders and the customers who place them, the IGSC companies aim to support government efforts to prevent the misuse of gene synthesis technologies.

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Synenergene at Ciência Viva

As part of the Synenergene project, Ciência Viva organised two secondary teachers' professional development training courses. These activities aim at exploring molecular biology materials and technics easily reproducible in classrooms, and help understanding the synthetic biology thematic.

Development of both training modules is based on the Synthetic Biology Kit that Ciência Viva is creating in partnership with the Portuguese Biologists Association. A special training course in also being prepared to

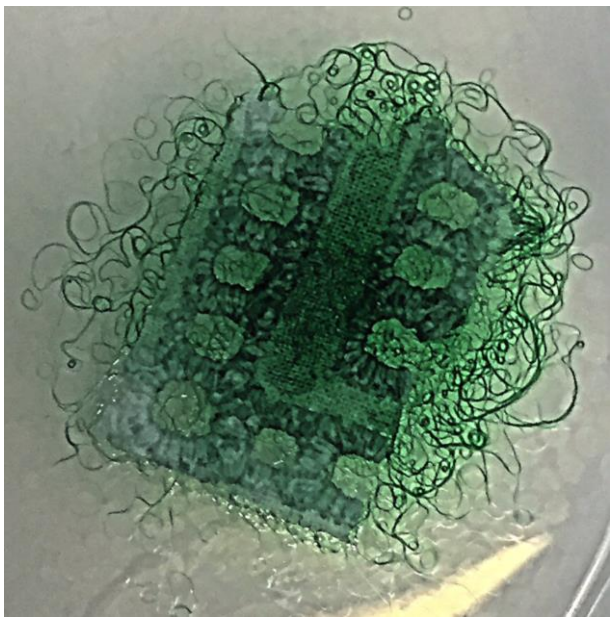
science centres professionals, aiming at improving the dissemination of the kit at national level.

The first training course, "Bioinformatics: biology, mathematics and informatics in one?", took place on 25 March, giving 23 teachers the opportunity to better understand what bioinformatics is and how it works, as well as to explore open access programs and databases. A hands-on activity on molecular biology laboratory techniques was also included. By using GeneJet Plasmid Miniprep Kit it was possible to extract and purify Plasmid DNA from E-coli, which would then be used in genetic engineering techniques.
The second training course took place on 29 April with the same time schedule and target audience. This session, focused on "The Genetic Engineering - how to program new life forms?", covered a wide range of molecular biology techniques closely related with synthetic biology studies. Recombinant DNA, genetic manipulation and DNA edition were approached through numerous hands-on activities, allowing teachers to create and select specific antibiotic resistant bacteria.

A partnership is also being developed with the Portuguese Environment Agency (APA) to increment the activities already considered in the Synthetic Biology Kit, allowing schools and science centres to manipulate OGMs.

By Ciência Viva team, www.cienciaviva.pt/

Possible Tomorrows



Possible Tomorrows was an exhibition organised by Bio.Faction and shown at the Vienna Design week 2016. It introduced a selection of experimental and technical design applications hatched from the fields of biotechnology and synthetic biology.
Selected designers/artists contributed on the one hand speculative applications and ideas for the future, and on the other hand already tried and tested implementations for the design and material culture of tomorrow: Cement that is composed of microorganisms. Plants that not only bear fruit, but also grow textiles from their roots. What possibilities will the future bring? Will synthetic biology be the foundation of tomorrow's industrial design? These and other questions were addressed in Possible Tomorrows.

A short impression can be watched at https://vimeo.com/213243362

The iGEMer's Guide to the Future available soon

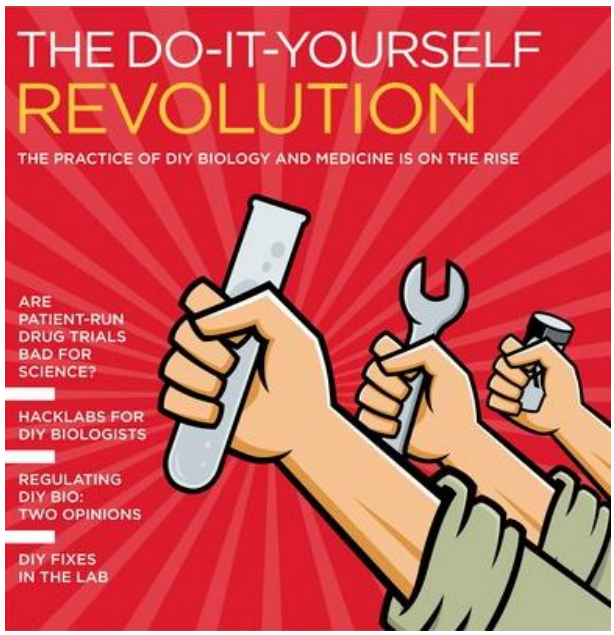
The iGEMer's Guide to the Future is an interactive web-based tool that supports iGEM teams in their integrated human practices work, or doing responsible research and innovation.

iGEM (international genetically engineered machine) is a competition in synthetic biology. Every year almost 300 teams participate in the competition with inventions ranging from rapid diagnostics to bioremediation or energy production. The iGEMer's Guide to the Future is the result of a four-year collaboration with iGEM teams and supports them in making their innovation sensitive to their contexts. The Guide creates a space and a process to think about synthetic biology in its context. It contains a variety of tools and activities that aim to gather knowledge and integrate it into in their innovation process and design. This allows to improve a biotech innovation to make it societally relevant. This guide is not only relevant to iGEM teams but also to all innovators in the field of life sciences.The iGEMer's Guide to the Future will be available to everyone from May 17th 2017 on synenergene.eu and rathenau.nl.

The do-it-yourself movement as a source of innovation in biotechnology – and much more

By Victor de Lorenzo and Markus Schmidt

"The best way to have a good idea is to have a lot of ideas". This celebrated quote from Linus Pauling summarizes one of the key drivers of innovation.



Breakthroughs and major advances in biotechnology (and science in general) can often be traced to specific individuals who had one sparkling thought that did work – out of an ocean of failures and ideas too heretical to share with the establishment of the time. In fact, many feel that both the academic and the industrial Gotha have become veritable obstacles for innovation. In the first case, professional scientific careers depend to a very large extent on publications in high-impact journals. This frequently makes academic scientists to focus on a limited number of topics likely to result in high impact factor papers. In the best-case scenario, risky, out-of-the-box research is the privilege of well-established individuals who do not jeopardize their careers and reputation when they pursue somewhat crazy ideas. But

when young scientists face a thematic choice, the panic to failure and ridicule at an early stage of one's academic career often place invisible barriers to creativity and curb the pursuit of new ways to tackle scientific and technological questions. Even if young scientists are brave enough to challenge inherited wisdom and come forward with smart, creative and bold ideas, more often than not they are unable to attract funding and support from senior colleagues (Nicholson, 2012).

In industry, the issues are somewhat different, but equally worrisome. In this case, the rampant paranoia about intellectual property (IP) not only inhibits candid discussions among specialists on a given topic (one of the best cradles for new ideas) but it also kicks very inventive minds (who use to abhor any restriction in their thinking) away from the industrial realm. One deplorable consequence of the current IP frame is that patents that operate on specific materials and technologies become actual deterrents of their further development by those not inclined to pay the licences. This makes much of the IP held by industry to be well protected, but ultimately useless. And a wealth of possible discoveries and innovation opportunities may never be born.
Another constraint in industry is the fact that innovations do need to fall under the companies' strategic aims and must have the real potential to bring a return of investment in a reasonable timeframe. Finally, a third vector of such an innovation-unfriendly landscape that afflicts both academia and industry is the cost of modern biological research. Large investments in equipment, facilities and information management seem to be a must for producing high-level bioscience and biotechnological breakthroughs. This leaves behind large communities, even whole countries, which may have the talent but lack the money to assemble the facilities and resources necessary to translate ideas into value. This is accompanied by an inevitable brain drain from developing countries to wealthier ones, with the collateral effect that the focus is shifted from Third World to First World problems.

The full essay is published in the open access journal Microbial Biotechnology. The full text is available at http://onlinelibrary.wiley.com/doi/10.1111/1751-7915.12715/full