News Letter

NO.7

2015. 8. 15 Today's Topic

Project Update and Human Practices

Welcome to our newsletter.

· Amoy · Paris_Bettencourt · Pasteur_Paris ·

Dear All,
Here comes the seventh issue,
the last issue for 2015 iGEM Newsletter.

This issue consists five parts:
Project Update; About Competition System; Human Practices;
Human Practices-Highlight(Time Limit) and Interview.

Thanks to the following twenty-two teams:

Aix-Marseille, Amoy, Birkbeck, CGU_Taiwan, ETH-Zürich,
Freiburg, MIT, NCTU_Formosa, NUDT_CHINA,
Paris_Bettencourt, Paris-Saclay, Pasteur_Paris, Purdue, SDU-Denmark,
SJTU-BioX-Shanghai, Slovenia_HS, Stockholm,
TCU_Taiwan, TrinityCollegeDublin, Uniandes_Colombia,
WLC-Milwaukee and Zamorano.

Thanks to all of you for your contributions!

If there are any questions, please reach us at igemxmu@gmail.com

All the best! Cheer for the summer!

iGEM Amoy

2015-8-15

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Part 1

Project

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PROJECT DESCRIPTION

L-tert-leucine is an important and attractive chiral building block. Owning to its bulky and hydrophobic tert-butyl side chain, this unnatural amino acid is widely used as chiral auxiliaries and catalysts in asymmetric synthesis in developing chiral pharmaceutically active chemicals. Many methods, such as strecker synthesis, amidocarbonylation and acetamidomolonic ester synthesis, have been used in L-tert-leucine synthesis, but products are usually racemic. In order to solve the problem, scientists developed enzymatic reductive amination to product L-tert-leucine by using leucine dehydrogenase and formate dehydrogenase. This technology greatly improve the yield and excellent enantiomeric excess of L-tert-leucine.

Initially, they used isolated enzymes, which can be disadvantageous for the reason that enzymes are always destabilized in the isolation and purification process. What's more, the cofactor-NADH is rather an expensive raw material, which will enhance the cost of L-tert-leucine production. So scientists introduced whole-cell biocatalysts to L-tert-leucine production. Whole-cell biocatalysts could stabilize enzymes and reduce the addition level of cofactor NADH.

However, owing to different strength of leucine dehydrogenase and formate dehydrogenase, the NADH consumption rate does not equal to its regeneration. Therefore, it is necessary to add excess NADH. Many different methods have been used, but none of them made difference. Because the criminal is different strength of enzymes, we want to regulate the efficiency of ribosome binding site (RBS) to control the strength of leucine dehydrogenase. With the help of mathematical modeling, we will get the most suitable efficiency of RBS of leucine dehydrogenase. As a result, the addition of excess NADH could be decreased.

Amoy - Team

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IGEM FREIBURG UPDATE

Some time has passed since our last contribution to the newsletter - and a lot of things have happened in our project. To shortly recap: We are working on a chip-based detection method for antibodies in patients blood serum called DiaCHIP. To achieve this a cell-free expression system is used to express antigens from a DNA-array directly on a reactive glass surface in a microfluidic chamber (microarray xeroxing). Patients serum subsequently flushed into the chamber leads to antigen antibody binding that can be detected due to changes in layer thickness that can be measured by an interference based method called iRIf (imaging reflectometric interference). This device may replace classical ELISA-based diagnostics because of the increased storage properties of DNA-chips compared to protein arrays and the reduced risk of misfolded epitopes due to direct expression before use.

Most of the time we are currently spread into two labs on the biology campus working on our project. The cloning work is nearly done and also the purification of the antigens expressed in E.coli has now been optimized and performed successfully several times. This way we have a backup and can work on the device while cell-free expression is not

ready yet. We have developed and tested a specific nickel-NTA surface that shows promising results with GFP as testing protein but we couldn't show specific binding with our antigens yet. The two main areas we are currently working on are optimization of the binding detection in the iRIf device and the cell-free expression of the antigens.

Freiburg - Logo

For the first part it seems as if the monoclonal antibodies we are currently using are not suited for use in our device and we are currently looking for blood sera from animals with an immune reaction to the antigens we use. We hope that the polyclonal antibodies therein have a greater reactivity towards the antigens on the surface an thus lead to a higher signal in our device.

For the cell-free expression part we are working with expression systems from different companies and with a self-produced one in order to find the optimal parameters to express our antigens. We already succeeded in expressing a YFP-construct but are still struggling with expressing the antigens. This optimization-process is quite time-consuming but we are confident that finally some of our antigens will work.

Besides all the hours we spent in the lab we participated in the Freiburg contribution to an European theatre project called "re-engineering life". The project aimed at discussing and portraying the risks and benefits of synthetic biology. It was performed by a group of humanities students collaborating with directors and researchers from the institute of ethics and history of medicine of the university of Freiburg. They asked us to present the iGEM competition as such and to answer some questions on our personal viewpoint concerning the modification of organisms. In the end we passed an interesting evening talking with them about nature, genetics and the term of life itself. Moreover we were invited to take part in the final project presentation in the beginning of July where

we participated in a speed-dating-like discussion with interested visitors and also met some members of the iGEM teams Tübingen and Darmstadt.

Besides the theater project also a class of students of the Liberal Arts and Sciences course of study of the university showed interest in iGEM and after a short presentation of our project they were very interested in the idea of iGEM and in the possibility of commercialization of our device. We also had much fun in presenting our idea to a non-scientific audience and getting such positive response.

Additional to promoting our project by giving talks we also build up three running teams and participated at a local business run. We were having a lot of fun running together and talking to other runners about our device and about a possible sponsoring their company could provide. The business run challenged us in two different ways: Finishing the run in time and convincing people of our idea. Both of them were exciting experiences we really enjoyed.

Since taking a little break has always been an important part of research, some of us just returned from their trip to the German iGEM Meetup in Marburg. There we had the possiblity to share our experiences with other teams and to get new inputs for our project.

So our whole project has proceeded quite well until now and we are prepared for a work-intensive and exciting summer in the lab. For updated information on what we are doing or if you have questions concerning our DiaCHIP please contact us via email or facebook!

Freiburg - Team

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OUR PROJECT:

FEASIBLE CONVERSION OF CELLULOSIC WASTE TO USEFUL PRODUCTS USING AN ENGINEERED CO-CULTURE OF BACTERIA

Introduction to Microbial Consortia Engineering for Consolidated Bioprocessing:

Microbial consortia engineering has the potential to more effectively generate useful products, ranging from biofuels to specialty chemicals, than current technology based on mono-cultures of bacteria. Communities of microbes can better handle the complex process of the conversion of substrates to products by distributing the metabolic load among multiple species. In addition, communities of microbes exhibit increased production rates, metabolic efficiency, and robustness to changes in environmental conditions relative to monocultures due to synergistic interactions between species.

Currently, there are many challenges in creating synthetic microbial consortia. For

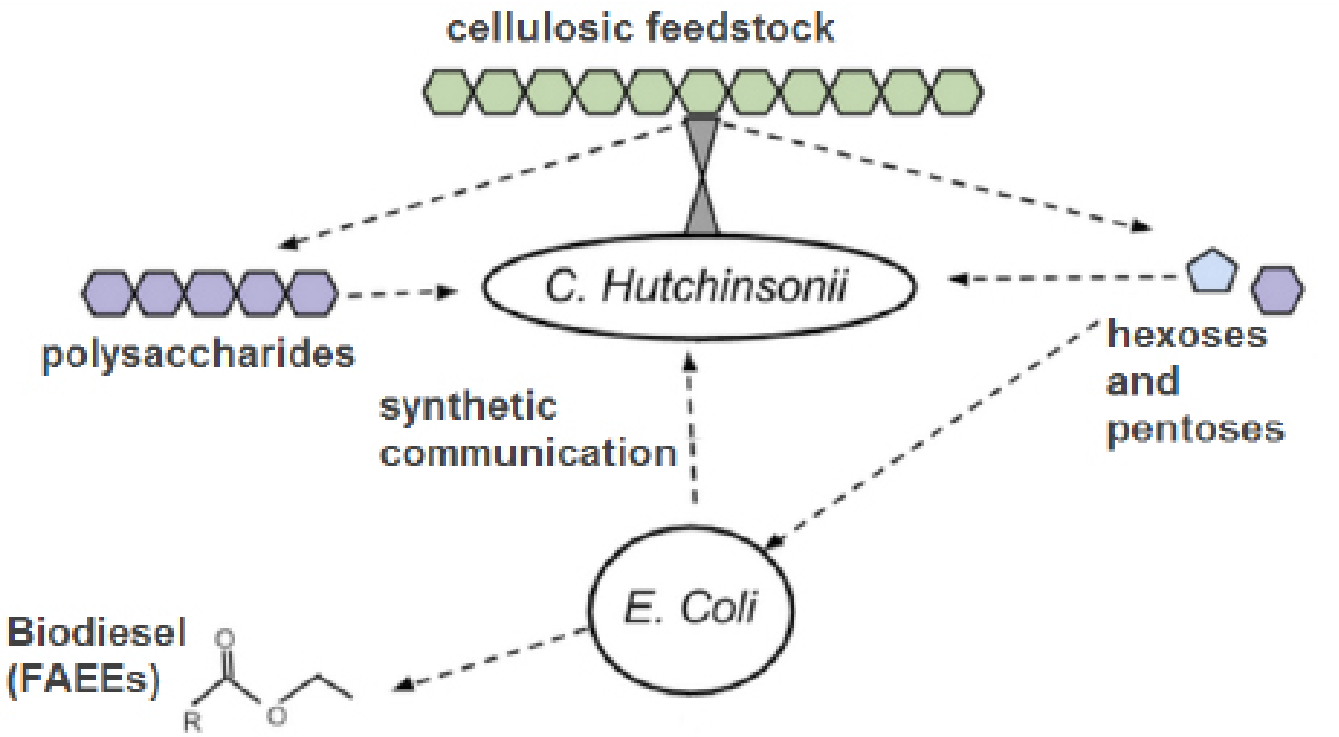
MIT - Logo

instance, natural microbial communities have evolved to be capable of maintaining homeostasis, but synthetic communities have not. When creating synthetic microbial consortia, one must ensure that the members do not outcompete each other, do not exhaust the resources in their environments, and do not have unstable genetic compositions. Thus, engineering microbial consortia requires the establishment of population control systems. The use of synthetic microbial consortia for consolidated bio-processing also faces the same challenges as the use of mono-cultures, including economic feasibility relative to current methods of production.

Our Approach - Designing a Co-Culture for Conversion of Cellulosic Waste to Biodiesel:

We aim to create a stable and robust synthetic microbial consortia that converts agricultural waste, lignocellulose, into a useful product - biodiesel. Our system consists of a co-culture of Cytophaga hutchinsonii, an aerobic bacterium that rapidly digests crystalline cellulose, and Escherichia coli, which can grow on the sugars produced from cellulose degradation and is genetically modified to produce the fatty acid esters that comprise biodiesel. In addition to this existing metabolic link, we introduce a synthetic communication pathway to ensure a synergistic relationship between them. Our main focus is thus to ensure stable and efficient ratios of the populations of the bacteria through synthetic biology. In order to predict the interactions between the bacteria and design the communication network, we model the dynamics of our co-culture using whole-genome scale metabolic models with an approach called dynamic flux balance analysis.

Our co-culture has many characteristics that make it better than current methods of generation of biodiesel and other desired chemicals and products. It is a stable co-culture as opposed to a mono-culture, so it is capable of performing the complex task of converting of the cellulosic waste into high-value products in one reactor. It does not require additional pre-processing steps of cellulosic substrate, reducing production costs. The ability of our co-culture to use cellulosic waste to produce biodiesel also makes it a cleaner method for energy production, especially when compared to fossil fuel production and biofuel production methods that require the use of food crops. In addition, our co-culture can be grown aerobically and is resilient to environmental changes, which reduces operating costs because optimal operating conditions do not have to be maintained.



MIT - Project

General Applicability of Our Approach:

Here, we demonstrate a robust, environmentally friendly, and economically effective system for production of biodiesel, but our system can be applied to the production of many different products. One could replace the biodiesel genes we have chosen for E. coli with genes of their choice to generate a desired product. In addition, our method of

creating synthetic communication pathways to stabilize our synthetic microbial consortia is an extremely important contribution to the field of synthetic biology. One could use this approach to stabilize different co-cultures with bacteria of varying phenotypes and metabolisms, or this approach can be utilized modularly so that population ratios can be modified via inducible signals.

ABOUT MIT iGEM:

The MIT iGEM team has a rich program history and one of the few teams that has participated in every iGEM competition to date. First under the faculty supervision of Drew Endy and Tom Knight (2004 – 2008) and then Narendra Maheshri (2009), MIT's iGEM teams since 2010 have been coached by Professor Ron Weiss since his arrival from Princeton after successfully managing their iGEM team for many years. Along with Prof. Weiss, the MIT team is under the leadership of Dr. Brian Teague, a postdoctoral scholar and instrumentation expert. In addition, nearly a dozen other professors and scientists at MIT lend their support and advice to the team. Last year's team worked to engineer a genetic circuit that can sense and treat Alzheimer's disease.

MIT - Team

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Team - NUDT_CHINA

NUDT_CHINA - Logo

ENGINEERING OF AN MULTI-ENZYMATIC REACTION ACCELERATOR

For years, prokaryotic cells have been widely applied in synthetic biology and bio-engineering as the host organism. However, lacking of the compartmentation of the heterologous metabolic pathways, which results in a relevantly low concentration of substrate and enzyme, may cause a low production or efficacy of the product, especially when producing through a complex multi-enzymatic cascade. In the current study, we developed a new method to accelerate a multi-enzymatic reaction by integration of a scaffold system into the bacteria chassis. In this system, different scaffold proteins, which could specifically target the corresponding DNA binding motifs, were generated by the assembly of part-coding sequences.

Subsequently, by fusing the enzymes with the scaffold proteins, the local enzyme concentration can be enriched, thus the multi-enzymatic reaction can be accelerated. To the best of our knowledge, this technique might provide a powerful way in synthesizing multi-enzymatic reaction programs in prokaryotic chassis for a wide range of application.

NUDT_CHINA - University

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Paris-Saclay - Logo

PARIS-SACLAY PROJECT

To define our project, our team conducted research on previous iGEM projects on the one hand to familiarize with the spirit of the iGEM competition and on the other hand to measure the achievements made by previous teams. Very soon we realized that biosafety was a crucial aspect in the competition but often forsaken by teams due to lack of time or resources to conduct the requisite experiments.

Regarding to multiple issues and risks that may cause the accidental (or not) spread of a newly Genetically Engineered Organisms (GEO) in the environment, the reflection led us to design a Universal System of Biosafety that could control the evolution of the GEO if/when it interacts with uncontrolled environment. Thus, we would be able to ensure that the organism would not survive outside of the lab setting in which it was originally created.

The idea is to synthesize a bacterial system that could be controlled in vivo through changes we voluntarily introduced into its genome.

To materialize the concept, we have devised a modified E.coli bacterium to regulate its viability in different conditions. To achieve this, the idea is to act on different parameters :

- Thermal: to allow our system to survive only in a restricted temperature range
- Chemical: collaborating with chemists, we will be able to design a filter allowing only the nutrients and not the bacteria to pass through.

Once operational, the effectiveness of our system will be tested in a natural environment developed through our collaboration with ecologists.

Considering the risks that could be caused by the release of the GEO on Biomass, public health, but also from an ethical point of view, and taking into account the shortcomings noticed on this aspect, many possible applications can come out with our project in order to avoid various forms of environmental risks related to organisms generated by synthetic biology.

The ultimate goal is to set up a universal Biobrick capable of providing the needed control for the newly generated system and that could be used by future iGEM teams to obtain a genetically engineered safe machine.

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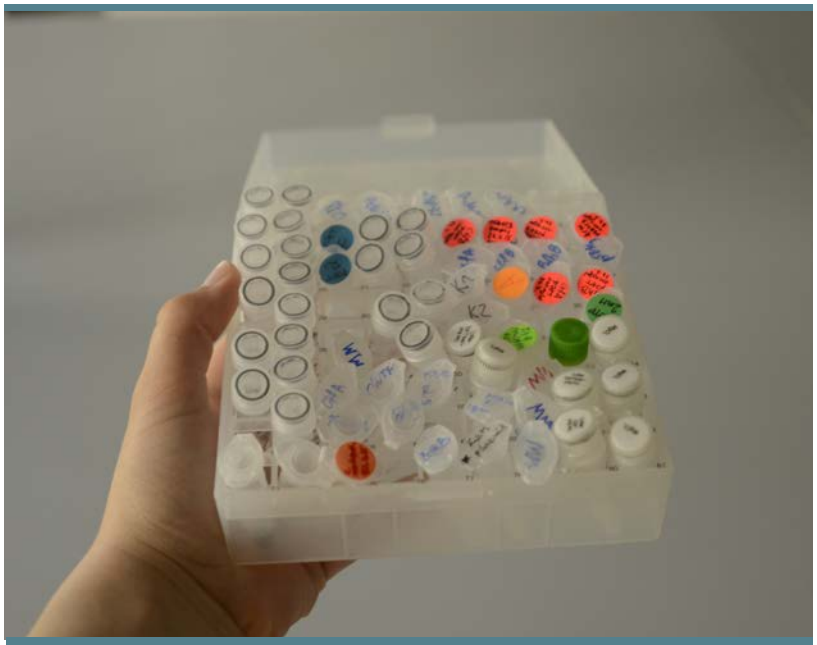
IGEM SLOVENIA_HS: PROJECT UPDATE

We gave an overview on our project in the 3rd issue of the 2015 newsletter: production of biobutanol from organic waste with E. coli. We aim to engineer E. coli for biobutanol production for the reason butanol could be used as a direct replacement of gasoline in internal with no modifications needed, meaning it could directly be used to fuel our cars, in pharmacy, for building artificial materials and much more.

Our aim is to modfy E. coli for sustainable biobutanol production via butyrate to butanol conversion. Originating from Clostridium acetobutylicum, there are 3 enzymes needed for this reaction: butanol dehydrogenase (BdhAB), CoA-transferase (CtfAB) and butyraldehyde dehydrogenase (AdhE).



Slovenia_HS - Lab

We began with our lab work in April when we first attempted to purify the DNA needed. We tried to purify the DNA from mixed culture as well as from clean Clostridum acetobutylicum culture. However, none of the procedures were successful as did not get a positive result from our colony PCRs. Finally, we have decided to order synthetized genes from IDT.

We received them in June and have been ever since then working on building our construct. Firstly, we integrated our DNA in pJET plasmids and transformed the cells. The colony PCRs later showed which colonies were successfully transformed and were appropriate for DNA purification. All 3 parts are to be put together in iGEM's standard plasmid pSB1c.

Simultaneously we built 2 negative control constructs and investigated the conditions in which the growth of E. coli in our bioreactors is to be the most suitable. We carried out toxicity tests for all substances which are to be present in bioreactors and modified the growing conditions in order to make them the most suitable.

Slovenia_HS - Setting the restrictions

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Team - Slovenia_HS

Besides our experimantal work, we reached out of the lab and did some Human Practices activities. We carried out presentations about synthetic biology and our project and aimed to raise awareness about environmental problems associated with oil consumption. In order to broaden our understanding of the field of our project and simultaneously engage with local community we visited a local cleaning plant of gaswork where found our more about how organic waste is processed by bacteriae. Furthermore, we took a part in two scientific events in our capital city Ljubljana where we spread our knowledge of synthetic biology with broader audience.

Slovenia_HS - Teamwork

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Team - Slovenia_HS

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Slovenia_HS - Preparations of the controls for measurements in anaerobic conditions

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Team - Slovenia_HS

As collaboration with others is an important part of iGEM values we are pleased to have skyped with Aalto-Helsinki and team Aachen. We are looking forward for our collaboration with both of the teams. If anyone else would also like to collaborate with our team we will be pleasured to hear from you. You can reach out to us on our Facebook page: https://www.facebook.com/hSiGEM?ref=aymt_homepage_panel.

We are excited to announce that we have launched our crowdfunding campaign on Indiegogo in which we also included a short movie about us and our project. You are all kindly welcome to check it out at: https://www.indiegogo.com/projects/biobutanol-production/x/11453862#/story.

We wish the best of luck in August to all the teams!

Mariša Cvitanič on behalf of the iGEM team Slovenia_HS

Slovenia_HS - Our team in all its glory

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Team - TCU_Taiwan

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2015 TCU_TAIWAN!!

Hello, everyone we are TCU_Taiwan from Tzu Chi University. This year, our team members are composed of twelve students from different departments and mentored by professors Ji-Hshiung Chen, Yung-Hao Ching and Guang-Huey Lin. With their guidance we learn a lot and believe we can achieve our goal at the Giant Jamboree!

Background:

"Ouch! It's hurt!" At this instant, we might have got hurt already. As the wound appears on the skin, it became vulnerable to bacterial infection. Bacterial infections could slow down the wound recovery. In some cases, if the infection is not properly treated, it could lead to severe injury and might needs amputation. Currently antibiotic is the way to treat bacterial infection. However due to over use of antibiotics drug-resistant bacteria frequently appear, such as MRSA. It makes the wounds more difficult to treat. These are the problems we encounter in our daily life. Therefor, we want to test alternative antimicrobial agents for bacterial infection.

About our project:

This year, we want to solve this problem by making a medical dressing which can both inhibit MRSA infections and also help would healing.

To achieve our goal we use antimicrobial peptides into our medical dressing. Antimicrobial peptides (AMPs), are stable peptide that have extensive ability in bactericidal effects. Unlike antibiotics, AMPs can puncture the cell membrane to kill the bacteria. Most importantly, the attack won't stop by drug resistance. Besides, the peptides also have ability to help skin recovered. Combining these two functions, we believe we can solve the serious problem of skin injury.

After reading some research articles we choose two kinds of AMPs: Signiferin and Epinecidin-1 as our reagents. Signiferin is a peptide came

TCU_Taiwan - Team

from the skin mucus of Crinia signifera (tree frog). It has great effect in killing MRSA. And had been proved by iGEM team: TU-Delft in 2013. So we pick it as the main reagent in our medical dressing. Epinecidin-1 is a peptide came from the skin mucus of Epinephelus coioides. It has ability to help wound healing and has been proven in mice experiment and published in Biomaterials. So we use Epinecidin-1 as the second reagent.

To produce AMPs and control AMPs expression, we apply the Lac operon system by ligating the DNA of signal peptide into E. coli to help AMPs secretion. After purification we will test the effect of our AMPs. We will test macro-dilution and in vitro cell test about wound healing. After in vitro test we will do in vivo test in mice to see its effectiveness on the wound. Ultimately, create a wound dressing based on the above procedure.

An excellent dressing made of AMPs will make a fast recovery.

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Team - Zamorano

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PROJECT UPDATE:

These past couple of months have been a rollercoaster for the entire team. We have been going through more downs than ups, but we have managed to stick together as a team and endure through hard times. As of now, our team has a clearer path. We have been working on our wiki which is going to be ready very soon! We are running against time to get our biobrick sequenced and everything else ready for the Jamboree. We are also holding a SynBio course hosted by an expert for students at our university so they can get a better hold of what SynBio is and the basics on the topic. It has been a slow and exhausting process, but it is all going to be worth it when we arrive at the Jamboree later this year!

Part 2

About Competition System

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Team - Zamorano

ABOUT COMPETITION SYSTEM:

Creating an entire new organism from scratch is no joke! iGEM is a great platform for people to get not only information on synthetic biology, but also getting their hands dirty and making an organism. What this competition teaches us is that we do not have to be synthetic biologist in order to make something new and understand what this new science is all about. The competition is a great platform for people from different fields of study, cultures, and countries to interact and form bonds with people from all over the world. In a sense, the competition might be too strict, stopping some people from being able to compete. The amount of money necessary to compete might be limiting to some teams. On the other hand, everything the completion offers is worth the investment. Something positive, as well, is all the connections iGEM has with companies related to the field, which are really helpful both for the competition and outside of it. In general iGEM offers great opportunities for people who are interested in synthetic biology.

Part 3

Human Practices

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PROJECT IMPACT

VETS ANSWER OUR QUESTIONS

The Birkbeck Owligos project is to modify bacteriophages to create a simple point of care diagnostic test for bacterial infections. The modified bacteriophages will produce a visible change in the presence of the target bacteria. The test is designed to be used in rural areas of countries where medical and veterinary staff do not always have access to complex equipment or laboratory testing facilities. In order to help users detect the visual signal produced by the bacteriophage, our team will also make simple microscopes that can be attached to smartphones, using a publically available design from Pacific Northwest National Laboratories *http://availabletechnologies.pnnl.gov/technology.asp?id=393*. The cost of making these microscopes will be sufficiently low that they could be included in the test kits. The glass beads for making the microscopes were kindly donated by Thistle Scientific and Biospec Products.

As part of the team's Policy and Practice activities, we prepared a survey for vets about how our project could assist them in their clinical practice. The survey was carried out by

Birkbeck - Human Practices

Dr Aurelie Brown, Senior Vet at the Brooke Hospital for Animals, a charity dedicated to improving the welfare of working equines in some of the world's poorest communities. Fifteen vets from India, Pakistan, Kenya, Senegal, Nepal and Ethiopia completed the survey and four gave filmed interviews which may be seen on our team's wiki.

The results of the survey supported our belief that our project would have a significant impact on the clinical practice of vets in challenging environments. They reported that they regularly diagnose bacterial infections including Strangles (caused by Staphylococcus Equid), E Coli, Salmonella, Streptococcus, Tetanus, Clostridium and Anthrax. The vets currently rely on clinical observations and history to diagnose these infections as they do not have access to simple testing kits and receiving results from samples sent to laboratories takes from two to ten days and the tests are prohibitively expensive for most cases as the animals are owned and used by farmers with relatively low incomes.

Currently only three of the vets use microscopes on a daily basis, four used them weekly and eight did not regularly use a microscope in their practice. Twelve of the vets said a microscope they could use in the field would be useful for activities such as examining faecal and blood samples to detect parasites. Twelve of the vets reported that they or a team member owned a smartphone so the proposed microscope would be accessible to around 80% of the vets in the field. The smartphone microscope would also have the advantage that the vet or veterinary assistant could take pictures of samples for later identification.

The team intends to carry out a similar study among doctors working in comparable environments and we will post pictures taken with our microscopes on our wiki.

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Team - CGU_Taiwan

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CGU_TAIWAN - HP

Our human practice consists of four parts, education, field research, economy, and communication. First, what we have done to educate the public is to promote synthetic biology, iGEM, and our project. People tend to get afraid of what they don't understand(our experience: many of them think it's better to stay away from microbes as far as possible), so that's why we want to share with people what these topics really are. By using plain language, we hope that everyone can embrace these ideas and eventually benefit from them. Second, we interviewed doctors, patients, volunteers and anyone we can get to that is related to oral cancer. By listening to them, we have realized how oral cancer affects peoples' lives and that what we can do to help them. We also made a questionnaire to find out how well people knew about the causes and the symptoms of oral cancer; just like what we had expected, most people didn't know enough about the disease. For instance, "chewing betel nuts" is their only answer to the cause of oral

cancer, but actually drinking and exposure to HPV virus may also be the cause. After the questionnaire, we did the education once again to let people know more about oral cancer and to raise their awareness. Third, we focused on the economy regarding our project. With the statistics we got in the interviews, we tried to evaluate the average cost of the patients' treatments and that how our project can relieve their burdens. The last part is to communicate with the other iGEM teams around the world. Through our discussion, we have been able to draw inspiration and to improve our projects in every aspect. We believe that science should not be confined to the lab and therefore we have devoted ourselves to sharing the knowledge with the general public. It is our ultimate goal that what we do can lead to the mutual prosperity of science and humanity.

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HUMAN PRACTICES

Children's education

For human practices one of our focuses was in children's education. We believe wakening interest in children is highly important, as they are the ones who will make decisions regarding biology in the nearest future. We also wanted to transmit our passion for biology to the children. To achieve those goals we visited tree primary school classes with children ranging from 9 to 12 years of age. After explaining the children what a cell and especially DNA is, and what it does, we extracted DNA from strawberries. The children were very enthusiastic about it and three of them even stated their desire to become biologists.

Talking to Experts

Another goal of ours was talking about our MicroBeacon project to experts from various fields ranging from ethics, patent/law, and medical doctors to newspapers and the

general public. Our aim was and still is to improve the design of our device by determining the societal impact of our circulating tumor cell (CTC) detection device. Our device is able to detect CTCs of various cancer types from blood samples, which we foresee as being an integral part of cancer diagnosis in the future worth investing in. The talks with the experts helped us a lot in further shaping our ideas.

Dialog with the public

For the dialog with the public we contacted various newspapers and explained them about our project and about synthetic biology in general. We chose to contact the public via the newspaper, because it is an efficient way to reach as many people with as many different backgrounds as possible. By explaining our ideas to the reporters we learnt a lot, because we really had to focus on a general, more marketing-like view about our project, instead of only concentrating on the scientific, technical aspects. One article has already been published, another is in the pipeline and coming soon.

ETH-Zürich - Lisa and Anja explaining the strawberry experiment to primary school children

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HUMAN PRACTICES

The big event that NCTU_FORMOSA had been prepare for so long start on 8/19 last 4 days. We had 27 teams present, about 210 attendees from China, Hong Kong Taiwan. We even have teams from India and Kazakhstan join us during the meetup through the internet.

During the 4-day conference, each team had prepare presentation for their amazing projects and ideas. We have knew each team's idea and their progress of project After presentation, our professors also as judges will give pieces of advices and Q&A time was a chance to interact with every team.

Besides presentation time, poster time in every meal time is also good chance that we are not only be fed with deliberately prepared food but also knowledge.

At the end of the conference, each team holds special gift , embrace bunch of friends, and feel happy and proud of being iGEMers.

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Team - NCTU_Formosa

After conference, we also planned a day trip in Taipei, visiting National Palace Museum and Taipei 101. Both are the must-go attraction that nobody would miss miss them when coming to Taiwan.

Link to video: https://drive.google.com/folderview?id=0BzAdTLer7ERffm4wcVlCYlM5a2dROGlJUHRVRmpKTXhZNDIyNWpzaXZ1MFkzR1B4NkRVYVk&usp=sharing

NCTU_Formosa

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Team - Paris_Bettencourt

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FERMENT IT YOURSELF

iGEM Paris Bettencourt decided to work on fermented food for the year 2015. Some places in the world such as south Asia are devastated by malnutrition; because of different socioeconomic factors, people are dependent of a single or two base cereal such as rice. This is why we choose India, where Idli and Dosa, two fermented dishes with a base of rice and dal (a type of lentil) are made and are eaten by millions of people every day. The aim of our project is to genetically engineer the bacteria and yeast responsible for fermentation in the batter of these dish so they can produce and deliver more vitamins. We decided to take traditional fermented food from India and built our work on that to adapt to the culture and traditions of Indian people. We built a survey for a specific region in India where the biggest city is Chennai; this survey contains contents intended for people that don't have access to enough variety of food to avoid deficiencies and might one day benefit from our project.

In order to get in touch with Indian population, we shared our survey with an exiGEMer (Alice LEBOEDEC from the 2014 INSALyon team) who went in the end of July in South India. She is helping people to fill it so our team can benefit from this survey and shape

our project along with people's preferences. The whole survey allows us to assess exactly what people are eating, how are they cooking, and what utensils are they using, etc. Collecting information on the field is essential, to understand people's acceptance toward our project, and to find ways of introducing this project into their daily life without disrupting their tradition and culture.

Our project has also been advertised in France, where we conducted a cooking workshop around fermentation, microorganisms and the basics of biology and synthetic biology. During our workshop, we distributed questionnaires to the participants with questions on basic biology. Then, three members of our team made small presentation and we gave questionnaires again to assess what people learned from the talks. This workshop was a chance for us to understand people's conceptions and misconceptions about basic biology. Between the presentations,

Paris_Bettencourt - HP

we explained and made them taste our mascot dishes, Idli and Dosa. It was a really nice experience for our team to share our project and to discuss about it. Another workshop focused on fermentation will be organized at the Cité des Sciences in Paris, a really famous crossroad for the people interested in science. We hope that it will allow us to get more opinions and conceptions about fermentation and microorganisms, along with a way to educate people about these subject.

To continue, we plan to shoot videos that will serve as a support for people to acquire knowledge and to get rid of the misconceptions. These accessible videos will be about fermentation, what are microorganisms and what is there role, synthetic biology and nutrition.

In the end, because the technology we want to build must belong to everyone, we want to involve the Indian communities as much

Paris_Bettencourt - HP

as possible in our project, and this is why we are trying to design in collaboration with the populations a safe clay pot to be used to grow

yeasts and bacteria so they can make their own microbial cultures and use it in any required quantities. The collaboration with the population doesn't stop here, because we want to involve them in the design of the end product (either a powder, a liquid or a little cube of microorganisms). We are also collaborating with Open Science School in the design of a cheap DIY spectrophotometer that everyone can built with little resource.

So our Human Practices part is a lot of work, but brings to our project so much fun and inputs that it is totally worthwhile!

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Team - Purdue

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POLICY & PRACTICES SUMMARY

IGEM SUMMER 2015

What we've been up to:

Our team has been very busy in the lab. 9-5 work days, doughnuts to bring for everyone if you're late, and endless coffee from the café next door.

However, Purdue's Human Practices—formally known as Policy & Practices, has been up to some pretty awesome stuff. Towards the beginning of the summer we hosted a workshop for 4-H'ers, teaching them the basics of synthetic biology. We also organized some lab techniques for them to try, including sterilization, bacteria colonization, and spectrophotometry with banana-smelling-like bacteria through the "Eau That Smell" lab on BioBuilder.org.

Our team actually has two undergraduate MASI (Molecular Agriculture Summer Institute) students this year who are getting their summer at Purdue funded (shout out

Purdue - Team

to Kate & Jill!). Through this program, our lab served as a shadowing base for high school students to learn what research is like. Our team taught these high schoolers the importance of lab safety and showed them our plasmid purification and transformations techniques. We thought it was pretty fun having students of our own to teach!

Last week we toured the Cardinal Ethanol plant in Union City, IN. We had a lot of fun learning about the production of ethanol and the 340,000 tons of dried distillers grains with solubles (DDGS) produced at the end.

The Purdue Biomakers have had a busy summer so far but we have much more planned for the beginning of the school year! Boiler up!

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Team - SDU-Denmark

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SDU-DENMARK HP BOOK

An essential part of our human practices are in the making.

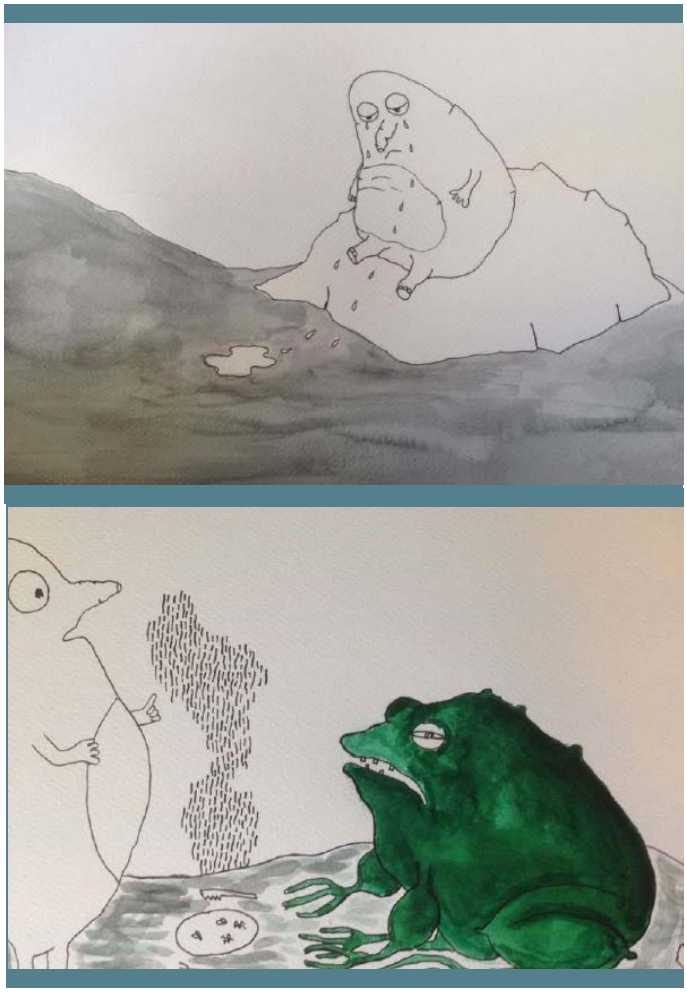
But before I tell you what it is I will share a few thoughts.

All the statistics show that it is the level of knowledge regarding GMOs that constitutes peoples attitude towards GMOs. Actually, this mechanism is quite natural and concern many other instances. The less we know about a certain thing the more we fear it, and if the road is paved with fear then irrational attitudes will be the offspring of irrational arguments.

My mission is not to convert anyone's opinion concerning GMO, but to make people talk about it. The large majority of people don't have a clue about what GMOs actually are or what their potential is. AND THAT'S WRONG!

A GMO itself isn't wright or wrong, the existence of an organism cannot be wrong, it is how we decide to use it that can be ethically discussed.

I believe that enlightenment of people is the way to make sure that whatever opinion one might have, it is built on a solid foundation.



But how do I even get started. People can be very hardheaded. Why are they hardheaded?
The have been shaped, twisted and turned by the circumstances of life and are in no way what so ever in a place where such complicated issues as GMOs can prioritized. They don't have the time...

Then I asked myself. If I am to share my thoughts on GMOs with someone who has the time and isn't bias who should it be?
Children of course.
Children are blessed with an unpolluted mind and a wonderful ability to ask the most obvious questions in ways that require not so obvious answers.
But for these questions to come into existence and be verbalized by children, they must be introduced in a form that is understandable and in some lengths entertaining.
If I can introduce children to GMOs and at the same time tell them a story with existential implications it just might do the job.
Ripples of enlightenment have been set in motion.
An introductionary children´s book about GMOs with an undertone of existentialism.
For Kids. Why make it easy.
The illustrations aren't entirely done, but here's a sneak peak.
Best Regards Tim Munk Valgreen, Team SDU, Denmark.

"The Curios Little Story about a Curios Little Being"

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Team - SDU-Denmark

SDU-Denmark - Motivational poster

SDU IGEM 2015 VISITED UNF BIOTECH CAMP IN ÅRHUS

SDU-Denmark - LOGO

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Team - SDU-Denmark

To spread the knowledge of synthetic biology and iGEM, SDU Denmarks´ iGEM team visited the UNF's ("youth science association") biotech camp in Århus. Alice Dupont Kragelund, Thea Bill Andersen and Kathrine Balslev Skovmøller were the lucky ladies, who got the pleasure of telling 60 enthusiastic high school students about iGEM and synthetic biology. The students showed great interest for iGEM and synthetic biology, and came with a lot of good inputs and aspect to the ethical debate concerning the use of synthetic biology in the end of the presentation.

The thought of having such young clever students interested in biotechnology makes the future for iGEM and synthetic biology seems very bright!

UNF iGEM

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HP PROJECT OF 2015 SJTU-BIOX-IGEM TEAM

This year, our project is bio-desalination.

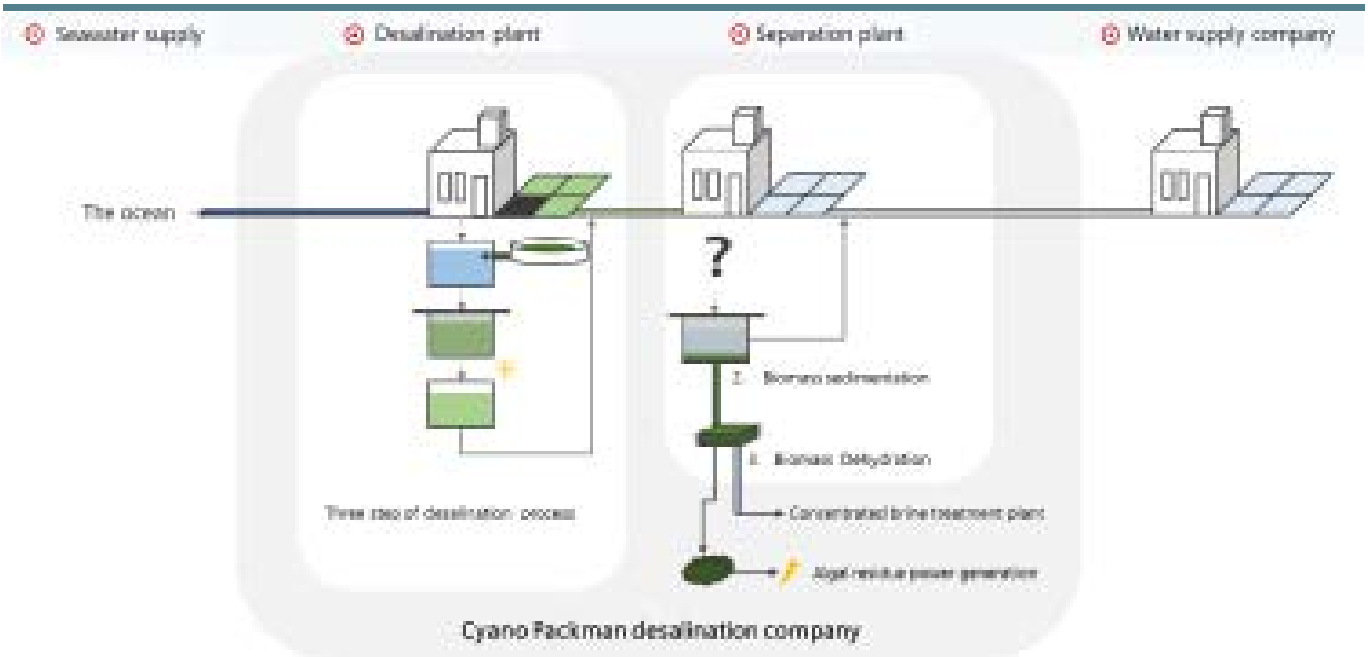
Our main HP project aims to bring our lab work one step closer to reality. With this in mind, it is not hard for us to raise questions about the input and output of this project. Where the seawater comes from? What standards should we apply at last? Also, when we introduce this project to experts in different areas. One of their main question is how to ensure the safety and quality.

Combing those questions all together brings us an idea to create a process flow. The elements in this flow should not only cover the issues can't be fixed in lab, but also fit the idea of sustainable development. Right now, this process flow has been organized in the context below.

This process flow helps us to quickly organize and screen massive information relating to desalination industry. Each red point represent one step and each step has its purpose. For example, separation plant is based on safety concern and the recycle of wastes.

This project is in information collecting process at present. We have already consulted with professors in law and environment aspects. Now, we are packing baggage for the trip to desalination center in Hangzhou, the main desalination research center in China. We are hoping this trip might bring us more insight about the present form of desalination. Also, with this ambitious plan, there's much more information collecting work besides visiting.

With the failure of HP last year in mind, we will work harder this year. If anyone want to contact us relating to the context above, you are welcome to send email to kariny888@sjtu.edu.cn. I will be glad to answer any question of our HP project as well as discussing your HP project.



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Team - Stockholm

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IMPACT FACTORS – A NECESSARY ELEMENT OF SCIENCE?

by Felix C. Richter, iGEM Stockholm

The Nobel prize laureate Randy Schekman has stunned the scientific community in December 2013 by declaring boycott on the top science journals. In a column written for the British newspaper "The Guardian", he calls upon scientists to "break the tyranny of the luxury journals." In his eyes, the role of impact factors has distorted the basal motivation of scientists on how to conduct research nowadays.

In this column, I would like to give my personal perspective on the role of impact factors in the current scientific landscape and its necessity for good research.

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Team - Stockholm

I want to become a scientist and since the start of my studies at university the "magical" word of impact factors has been all around me: Either by professors saying that papers in low impact factor journals cannot be trusted or by study advisors reminding me of how many high-class paper I have to publish during my PhD studies to survive in the academic landscape.

I wonder, why are we giving them such a big importance? Is it true that high impact factor journals are the more reliable sources? And does this impact factor orientated way of thinking improve scientific progress?

Impact factors are average scores which are attributed to different scientific journals depending on the amount of citations they have gotten for papers published in the past two years. In the scientific world, it is widely acknowledged as a certificate on how well you have performed your research. It has become a measuring stick for the reputation of scientists.

A-scientist-carrying-the--008Impact factor

From a junior scientist's perspective, I am wondering if the focus on publishing in high-class journals such as Nature, Cell and Science is promoting scientific working method, reproducibility and reliability of the results. Papers in these journals are often taken as the golden standard. We trust them more easily as it seems that publishing in these journals is more difficult and a higher threshold needs to be reached. And this is true (!), however only partially.

Latest investigations also show that the urge of publishing in these highly influential journals has led to an increased number of papers retreated, due to inconsistencies and fraud. And here, we arrive at the second issue we encounter whilst talking about impact factors. The pressure to publish in high-class journals makes us lose the focus on discovering something new and interesting which may not have a big impact but deserves to be published nevertheless. We get blindsided by this publication pressure. We more often ask questions like: Is that good enough for Cell? Or what more do I need to show to get it published in Nature?

Gunnar Ask and Karolinska Institutet

The pressure set by the current academic world is sometimes enormous for young scientists; they feel the need to alter data in order to outcompete fellow scientists. This is no excuse for fraud (!), but ultimately one of the reasons why we are seeing an increasing amount of papers which have been shown to be fraudulent.

The academic world is now based on impact factor thinking. Grant committees, university boards and the scientific community uses it to give grants, professorships and to acknowledge other peoples' work. I wonder if this is really necessary.

In my eyes, it contains the risk to promote wrong behaviour such as mistrust in collaborations, in fluffing up scientific results and in withholding negative data, as they are not regarded as important enough to be published. Notably, the last point seems to be the biggest issue in publishing behaviour of the current scientific generation, in some cases with close to lethal results.

In 2006, six volunteers tested a new drug (TGN1412), an antibody against CD28. Within a short time after the subjects have taken the drug, they developed a severe sickness leading up to multi organ failure. This could have been prevented if previous experiments with this compound had been published.

Naturally, this was an extreme case; however it shows that no data (how unimportant it might look like) should be held back because of any reason. I hope that sometime we will stop judging people according to their publication record and instead judge them for their contribution and passion for science. I hope that we will be able to share information freely and openly for everyone's access, to promote scientific progress. I don't mean this column as a critique against impact factors or journals, but as a critique for the mentality in "Impact factor thinking" that seems to have been established in the scientific world.

This is my personal (and not my groups') perspective, but I think the iGEM competitors are the future scientists and I hope to motivate them to do science in the way that they think is right and not what the current system dictates us to do.

Sincerely,

Felix

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Team - WLC-Milwaukee

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WLC-MILWAUKEE HP:

The human practices portion of our project is divided into two portions this year: education and knowledge/opinion assessment. We have now completed developing surveys to assess the knowledge and feelings of students at our institution as well as the knowledge and feelings of high school science teachers in the Wisconsin Evangelical Lutheran Synod (WELS) pool of teachers. We are interested in the education and views of synthetic biology of our WELS teachers. We hope to assess this next year and design a program over next year to address any needs that we find to better communicate synthetic biology to high school students through their teachers. The second component of our human practices project, education, is composed of our Bioengineering Summer Camp, which is now 3 years running. We had a wonderful week with our students from July 28th-31st as is summarized below.

Monday:

Today started off with a talk discussing Science and Religion. We are a small, private, Christian institution, and as such feel that we have a unique opportunity to talk about synthetic biology and bioengineering with those who may at first think that it is not Science and Religion, but Science versus Religion. Mr. Nickels, who has a background in

Christian education and public education was able to share a unique perspective of how we, as scientists, can still be both strong in faith and in science. This was the perfect way to set the tone for the rest of our summer camp as we deal with basic biology but also some controversial topics.

We then delved into science, first with the Central Dogma of Biology. This was no ordinary lecture. He brought candy! Students were able to learn about the structure of DNA and how it becomes RNA with licorice and marshmallows. Next, we used our Oreo "tRNA's" to transform RNA into amino acids, coding for proteins. It was a great and tasty time had by all!

After lunch was lab time. We gloved up to learn how to pipette and put those new skills to use by making a liquid culture and mini prep. Students were able to culture their own bacteria and learned the important conditions necessary for doing so. We then took bacteria and isolated their DNA by performing a "mini prep".

Lastly, we discussed what iGEM is all about, teamwork and excitement for science. We introduced their project for the week: review a past iGEM project and make a presentation to present to the rest of the camp students so they can understand it too! We mapped out all of the components of a tip top iGEM project: a website, consideration of policy and practices, and of course, the science!

Groups decided their interests right away and selected a past team's work to review for the week.

Tuesday:

Today was a busy day! We began with some review of proteins and chemical bonding. Then it was off to the Milwaukee School of Engineering Biomolecular Modeling lab. Gina first shared the principles of water with magnetic models so the students could feel the difference between hydrogen, ionic, and covalent bonding. We then progressed to building a peptide bond and understanding what composes the "NCC" backbone. Before we knew it, we built a long polypeptide chain! Once we understood the primary structure, we worked on forming the correct side chain interactions: hydrophobic in, hydrophilic out! Then it was story time. We got to see the large 3-D printers that they use to model and hold a GFP model. It helped us to understand RFP, which we used in the lab yesterday with our glowing red bacteria! The small scale science that we are performing in the lab this week really came to life.

Back at Wisconsin Lutheran College, Dr. Werner walked us through the basics of genetic engineering before we delved into the lab once again. It was the student's turn to make bacteria glow red, and we used the plasmids they had isolated on Monday in the mini prep to do so. We

will see how this fared tomorrow! Lastly, students were hard at work on their group projects to make a presentation to share past iGEM projects with each other.

Wednesday:

We made it to the middle of the week. Now that we had our feet on the ground, we began the day discussing viruses and medical microbes. Students learned the difference between viruses, bacteria, and how these organisms can wreak havoc on our bodies. We reviewed articles found on the internet and discussed their strengths and weaknesses. Being knowledgeable about reading scientific literature is important! In lab, we saw that our transformations from yesterday to make bacteria red were successful! Then Dr. Henkel lead us on an investigation as we learned how we detect these organisms with differential media. Students sampled various places: the bathroom floor, their armpits, and anything else that they wished to swab to determine what type of bacteria was growing. Tomorrow, we will see what types of organisms are lurking in

WLC-Milwaukee - Team

places that we touch every day. Students continued working on their group projects and began to craft their presentations.

Thursday:

The week is flying by! Now that we knew about viruses, bacteria, and their medical implications, we were ready to learn about biosafety and biowarfare. Dr. Henkel shared his experiences and expertise in dangerous organisms. We then discussed how we can fight these organisms with antibiotics. However, camp instructors did not miss a beat to discuss antibiotic resistance and the implications of this. After lunch, we learned how to make thousands of copies of DNA using the polymerase chain reaction, or PCR. Then we learned how to specifically cut DNA with a restriction digest reaction. Plus, the results from yesterday were in! We saw beautiful bacteria on our plates and were able to identify what we grew! Looks like railings make a great home for bacteria! Then it was the last day to work on presentations. Students were able to practice on the projectors to prepare for tomorrow. Tomorrow is show time!

Friday:

Today was the busiest of our days yet! The morning was spent polishing presentations and playing a game of jeopardy reviewing the week's topics. We enjoyed lots of laughs and learning some things that we may have forgotten! In lab, Matt showed us how to run a "gel electrophoresis" in which we were able to separate DNA and confirm that our previous week's experiments were successful. Next, we took some strains of bacteria and stained microscope slides in order to visualize the tiny buggers. It was exciting to see our tiny friends that we had been working with all week! After this, Sierra spoke to the students about how we are able to genetically engineer organisms like yeast, rats, and even our own cells. Students got to view HeLa cells, the immortal cell line that originated from the cervical cancer cells of Henrietta Lacks. It was incredible to see human cells! Summer campers had some free time to explore different human tissue samples with the light microscope as well as learn how we make slides to see the incredible structures of these tissues. After this it was finally time for presentations! Instructors were impressed as students spoke about past iGEM projects and explained their results. They shared their own creative ideas about how to spread the awesome knowledge of bioengineering. We finished up the camp with a grill out and said our last goodbyes. It was truly an awesome week, filled with learning, fun, and biology.

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Team - Zamorano

HUMAN PRACTICES

Last year, the IGEM Zamorano team, competed on the track of Policy and Practices as the first time ever competing and also the first time this track was stablished. This year, however, we are looking to compete in a different track of the competition. Even so, this does not mean we are going to leave our roots behind. Human practices, to us, is a really important aspect of the competition, because it is about evaluating the impact of synthetic biology in all aspects of our societies, from the ethical point of view till the biosecurity aspect. Human practices engage all teams to provide answers to questions normal people have, people who are usually scared of SynBio because they do not know what it is all about. All teams should look to evaluate their organisms and substantiate there is not going to be any problem whatsoever if it is released. Another important aspect to consider is education. Last year, our team worked in the aspect of education among others. They made small talks to kids from primary school to teach them the basics of SynBio as well as making surveys to college students to find out what is their perspective on SynBio. To sum it all up, human practices covers a very broad spectrum of aspects of our societies and it is important that all teams evaluate the impact of their projects in their countries and to persuade people into finding out more about SynBio from reliable sources.

Part 4

HP-Highlight

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Team - Aix-Marseille

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AIX-MARSEILLE UNIVERSITÉ

Hi iGEM Team Member !

I'm Simon from Aix-Marseille Université (France). We want to propose you a collaboration to collect a lot of information about chewing-gum and GMOs around the world. So we need your help !

We have prepared a small survey with some guidelines to know what people thing about it in your country :
https://docs.google.com/forms/d/1bW-NqVAyqsqgvimOX4yYkqoCa8yoofYTzHT6ES9QadU/viewform?usp=send_form

Please respect the guidelines ☺ As you can read, you will earn a collaboration badge if you help us which you can add on your wiki !

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Team - Aix-Marseille

SURVEY GUIDELINES!

Please respect these guidelines to obtain significant results…

1) Go in the street (not just next to your lab)
2) Protect you against the sun if you are lucky or against the rain!
3) Interview one by one, the largest number of persons with our fabulous survey (the interviewee has to be randomly picked, even if he or she represents your ideal partner)
4) Don't help him with the questions, you have to be impartial!
5) Of course, you can translate the survey to be understood by everyone in your country
6) All questions are mandatory
7) If it's more comfortable for you, you don't need to complete directly the survey on your computer in the street. You can print it, note the answers and fill the online form when you return to your lab!
8) Please complete it before 20th August
9) Have fun!

The Survey Contest !
The more you will help us, the better it will be for you… ^^

POLYTECH MARSEILLE
Aix*Marseille Université

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Team - Aix-Marseille

1) Collaboration Badges
You can win one of our beautiful collaboration badges. In fact, if you interview between 5 and 15 persons, you will earn our Bronze Collaboration Badge, between 15 and 30 our Silver Collaboration Badge and more of 30 our Gold Collaboration Badge.
Of course, you can include this badge on your wiki ;)

2) The best Team
The team who interview the most persons will receive 500 chewing-gums to share between team members in Boston. Be motivated!

3) The little extra
You will be extremely grateful if you can send us (by email reply) a street photo where we can see glued chewing-gum!

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Team - TrinityCollegeDublin

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IGEM ACADEMY:

There is no doubt that YouTube has become incredibly important to members of teams taking part in the iGEM competition. It is safe to say that iGEM has a very strong and growing presence on YouTube with many videos being created and uploaded by teams each year.

When our team was first put together, we found YouTube to be an important source of informative visual demonstrations of lab techniques that are relevant to synthetic biology.

In particular, we really enjoyed watching YouTube videos created by past iGEM teams, whether they were tutorials, introductions to their teams or the creative and entertaining music videos. However, we found that these videos are scattered throughout YouTube due to the fact that each team has its own channel and there may be many more brilliant videos created by iGEM teams that we haven't come across yet. What we really found lacking was a channel that would bring together all these videos and make them easily accessible. And so, the idea of iGEM Academy was born.

iGEM Academy aims to bring together and unify the iGEM community on YouTube. We encourage fellow teams to either put together videos or contribute already existing videos that fall into the following seven separate categories:

- Project Introductions: a platform for teams to share their project ideas, work done so far and goals for the future.
- iGEM Tutorials: videos that provide visitors with up to date tutorials on synthetic biology and lab techniques that are relevant to synthetic biology. Our set of lab tutorials 'A Beginner's Guide' has already been uploaded, make sure to check it out!
- Lab Art: a showcase of the colourful and creative world of synthetic biology
- Musical iGEM: a celebration of song and dance in the lab.
- Outside the Lab: videos outlining synthetic biology work being done outside of the competition
- iGEM HQ: videos about the iGEM competition and the Giant Jamboree.
- Let's Talk: video interviews with members of the public talking about synthetic biology

Taking part is easy and straightforward. Some iGEM teams with pre-existing Youtube channels have given permission for their videos to be linked to from the iGEM Academy channel.

Other teams have become managers of the channel allowing them to upload videos directly to the iGEM Academy channel.

Currently, the aim for the future is to grow iGEM Academy so that it will become a source of information for future iGEM teams as well as other visitors looking to find out more about the iGEM competition and synthetic biology. It is important to point out that this is a joint effort. We hope that as many teams as possible take part in helping to make iGEM Academy a base which connects viewers with the YouTube channels and videos of all iGEM teams.

Contact igemacademy@gmail.com for more information.

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"LOW BUDGET" IGEM

Cheap and non time consuming challenge
Created by: iGEM Uniandes Colombia

Welcome to the second edition of the Low Budget iGEM challenge!

Last year we had several teams that participated, creating all different approaches to tackle the challenge. (to see the winner and participants, click the following link: http://2014.igem.org/Team:Colombia/LowBudgetLab).

We will continue with the same idea this year: Making a lab protocol in a cheaper way.

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Team - Uniandes_Colombia

What is the idea?

Taking into account the thrilling yet expensive experience of synthetic biology, the Uniandes Colombia team launched last year a challenge where other teams were invited to develop a new and cheaper protocol used in synthetic biology. The idea is to have alternatives for several processes in an easy-to-access way. Thus, other users, that unfortunately cannot access these protocols due to monetary issues, are now able to do so.

Your mission, should you choose to accept it, is to find a new and NON-TRADITIONAL way of conducting one or more of the following processes by modifying them totally or partially, whether it is by substituting materials or equipment or both:

- DNA Extraction
- Transformation
- PCR
- Other procedures are welcomed! Be creative!

Money is always a problem when we want to work at the lab. We wish it would come down from the sky whenever we need it.

How to participate?

This challenge only requires your imagination and a few other things:

1. Choose one or more processes.
2. Create a novel way of conducting the process
3. Record your new protocol in a short video o .ppt file.
4. Estimate the price of your protocol and compare it to that of the standard protocol (Your currency and dollars)
5. Send everything to: gm.montano10@uniandes.edu.co before AUGUST 31st.

DNA extraction

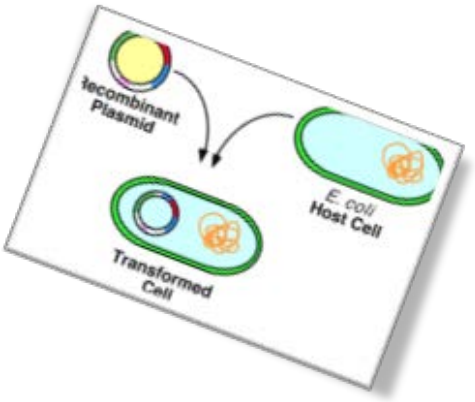
DNA extraction is probably one of the most common processes done in every iGEM lab, and whether it is whole genome or plasmids it is probably done with the help of a kit

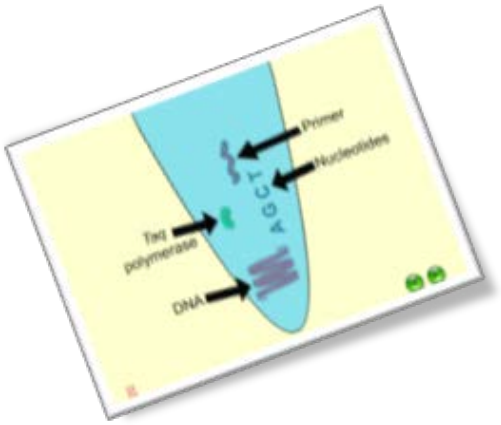
If you choose this process you will have to extract DNA of your favorite bacteria or yeast. As a result a picture of an electrophoresis of that DNA must be sent.

Transformation

Transformation is practically coupled to DNA extraction, also it is necessary to maintain and replicate the parts from the kit.

For this process you will have to transform the Psb1c3 plasmid of the registry. As a result, a pictures of the selective media and the colonies must be shown





PCR

Not only in the iGEM competitions but in near every lab being able to perform a PCR is mandatory. Watch out for patents!

For this process you will have to amplify any fragment of DNA you want. As a result the gel's picture of the amplified DNA material must be shown.

And the winner is….

The following are some of the categories by which will be judged:

- Applicability to general use: Can another team use the same protocol?
- Completeness: Does the video explain everything, from where to get all the materials to how to see the results?
- Novelty: Is it something completely new that nobody has done before?
- Yield compared to the traditional way: Is the product useful to other subsequent processes?
- Technical complexity and feasibility: The easier the better
- Impact on society (if applies): Can it help low budget labs to improve their work?

Any further questions about the challenge or the Uniandes Colombia team can be submitted to **ms.alfonso2099@uniandes.edu.co** or **en.caceres661@uniandes.edu.co**

Part 5

Interview

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Team - Pasteur_Paris

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IGEM PASTEUR TEAM

INTERVIEW OF DAVID BIKARD, CSO & COFOUNDER OF ELIGO BIOSCIENCE:

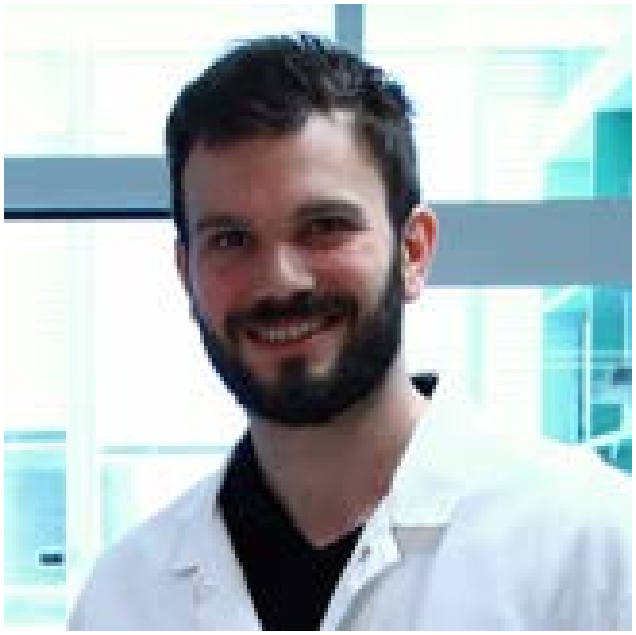
Eligo Bioscience was founded in May 2014 as a spin-off from the Massachusetts Institute of Technology (MIT) and the Rockefeller University based on the discoveries from the Marraffini and the Lu labs.

After winning several startup competitions, the company has recently raised a €2M seed-funding round and has settled its headquarters within the **Pasteur Institute** in the heart of Paris.

The French startup spun out of MIT and Rockefeller last year, where cofounders developed **highly precise antimicrobials.** Eligo's technology is based on **CRISPR/Cas9,** the trendy and invaluable molecular tool for making sequence-specific cuts in DNA. Cas9 is a nuclease that binds a small guide RNA (sgRNA). The nuclease will cleave DNA if, and only if, it encounters DNA with a sequence complementary to its guide RNA. Rewriting the guide RNA readily repurposes Cas9 to target new DNA sequences.

Their mission is to build a rich pipeline of « eligobiotics » to solve unmet needs in a wide range of industries: health, cosmetics, food, agriculture…

(http://eligo-bioscience.com/)



- What is your scientific background?

I have a degree in Agricultural Engineering from AgroPrisTech. For my final year, I did the Interdisciplinary Approaches in Life Sciences (AIV) Master, at the Center for Research and Interdisciplinarity (CRI). I began working on synthetic biology when I created the Synthetic Biology Club (SynBC), with a few classmates. We then created the first iGEM Paris Bettencourt Team, in 2007.

- What can synthetic biology provide to society?

Synthetic biology was created by a gathering of biologists, electronic engineers and physicists who applied engineering concepts to biology, in order to rationalize and

predict the behavior of biological systems. Today, synthetic biology has a broader definition and means for the most part genetic engineering. However, there are still limits to our knowledge of biological systems and only a few articles have been published about functioning synthetic systems. Synthetic biology is more and more present in our life, through biofuels and drugs for example and many startups are being created nowadays.

- What is the reaction of general public towards synthetic biology?

In France, many people are afraid of GMO, even though they are used everywhere and everyone is being exposed to them. It is a more sensitive question once GMOs affect our environments and our health. However, genetic engineering is a promising field of synthetic biology, especially on the development of diseases' treatments.

Like every new technology, synthetic biology is questioning the already established ethics while changing our collective awareness as it becomes more present in our lives.

Part 6

Feedback

Feedback

1.Is this issue useful for your team?
A. Yes. It may help.
B. No. I cannot see any important reference value to my own team, because each situation differs.
C. Maybe a little.

2. How many passages are suitable for each issue?
A. Not more than 5.

B. 6-8
C. 9-12
D.13-15
E.15-20

3. How often should we publish Newsletter?
A. Weekly.
B. Biweekly. (The same as last year)
C. Triweekly.
D. Monthly.

4. Is is necessary to add new content besides project & update?
A. Yes. (Run to 5)
B. No (Run to 6)

5. What contents can be added in Newsletter (multiple-choice) ?
A. Discussion on bioethics.
B. Experts' interviews.
C. Summary information for Biobricks.
D. Wiki technology.
E. Art & Design.
F. Others _____(Please let us know your idea)

6. Are there any problems you have encountered? Would you like to write them down on Newsletter so that other readers can help you?

7. Any suggestions after reading this issue? Help us to make the Newsletter better!

Thank you for your support.

Please complete the feedback form and send it to us: igemxmu@gmail.com