High School Track

【一】Introduction

1. New change： In 2015， high school teams will participate as a track within the main competition.
2. High school team members will not only be able to compete against other high schools, but also have the great experience of the Giant Jamboree.
3. High school teams will be responsible for the same registration fees， Jamboree fees， timeline, deadlines and attendance dates as the collegiate teams.

【二】2015 Teams Information

1. Requirements：high school teams additional requirements：All high school track participants must submit the appropriate consent forms. Participants including instructors, advisors, students, and others.
2. Calendar of Events： (Referenced from http://2015.igem.org/Calendar_of_Events)

Date	Event
February 09	Team Registration opens
March 31	Team Registration: regular registration ends
April	DNA Distribution ships
May 01	Team Registration: late registration ends
May-August	Safety Check-Ins
May - August	Meetups
June 01	Giant Jamboree registration opens
June 01	Judging application form deadline
June 02	Visa Application Day
June 19	InterLab Measurement study sign up
June 26	"About Our Lab" Questionnaire
June 26	"About Our Project" Questionnaire
July 1	First round selection of judges announced
July 15	Project description
July 31	Giant Jamboree registration closes (all iGEM teams) ?
August 07	Track selection
August 07	Title and abstract
August 28	Final Safety Form
August 28	InterLab Measurement study data: InterLab Worksheet and InterLab Protocol forms due
September 11	Team rosters are due
September 11	Giant Jamboree late registration closes (all guests)
September 18	Part Submission
September 18	Judging Form
September 18	Wiki freeze
September 18	Project Keywords (optional)
September 24	Giant Jamboree

3. Fees： The team registration fee for iGEM 2015 is $4000 USD. ($500 late fee after Deadline) The Jamboree attendance fee for the iGEM 2015 Giant Jamboree is $695 per team attendee.
4. Notice： All presentations will be on-site; virtual participation will not be an option.

【三】Medal Criteria (Referenced from iGEM official website)

1. Bronze：

Must complete the following 6 goals:

①Register for iGEM and attend the Giant Jamboree.

②Complete Judging form and all required consent forms.

③Create a Team Wiki.

④Present a poster and a talk at the iGEM Jamboree.

⑤Create a page on your team wiki with clear attribution of each aspect of your project. (This page should include host labs, advisors, instructors, sponsors, professional website designers, artists, and commercial services.)

⑥Collaborate with another team or become a mentee for any iGEM team that has previously participated in the iGEM competition and is attending the 2015 Jamboree.

2. Silver:

The additional goals:

①Document at least one new standard BioBrick Part or Device central to your project and submit this part to the iGEM Registry. You may also document a new application of a BioBrick part from a previous iGEM year, adding that documentation to the part main page.

②Document the characterization of an existing part in the “Main Page” section of that Part’s/Device’s Registry entry. This part can come from the 2015 Distribution, or you can order a part from the Registry.

③iGEM projects involve important questions beyond the bench.(For example relating to (but not limited to) ethics, sustainability, social justice, safety, security, and intellectual property rights. Demonstrate how your team has identified, investigated and addressed one or more of these issues in the context of your project. Your activity could center around education, public engagement, public policy issues, public perception or other activities (See the human practices hub for more information and examples of previous teams exemplary work).)

3. Gold:

The additional goals:

①Expand on your silver medal activity by demonstrating how you have integrated the investigated issues into the design and/or execution of your project OR demonstrate an innovative human practices activity that relates to your project (this typically involves educational, public engagement, and/or public perception activities; see the human practices hub for information and examples of previous teams comprehensive and innovative activities).

②Help an iGEM team from another school or institution to meet a specific experimental or modeling goal by. (For example, characterizing their part, debugging their construct, or modeling or simulating their system.)

③Experimentally validate that at least one new BioBrick Part or Device of your own design and construction works as expected. Document the characterization of this part in the Main Page section of that Part’s/Device’s Registry entry. (This working part must be different to the part documented in silver medal criteria①.)

④Demonstrate a functional prototype of your project. Your prototype can derive from a previous project by your team or by another team. Show this system working under real-world conditions (biological materials may not be taken outside the lab).

【四】Previous Teams Examples

1. 2014—CSIA_South Korea (Grand Prize winner)

(Referenced from the wiki：http://2014hs.igem.org/Team:CSIA-SouthKorea)

①Complete their designed construct， run comprehensive tests to confirm their results.

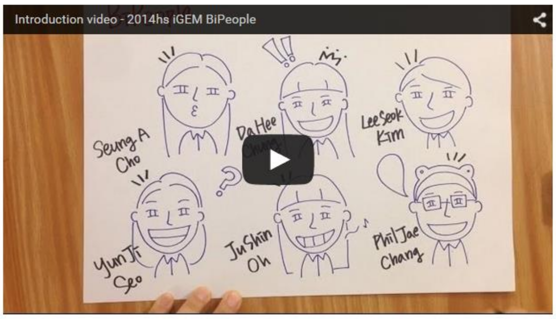
②The testing of their designed parts really set them apart from other teams.

③Provide application for their project to show how it could be applied in reality.

introducing our project

ABSTRACT

Nowadays, **"desertification"** is a global problem. Our team presents a synthetic biology method for preventing this acceleration of desertification.The solution that we are trying do is based on the urease reaction, changing the dry soil to the $CaCO_3$, which can ultimately concise the dry lands and also make a capsule to contain water. The work presented here has profound implications for future studies of synthetic biology and will help to solve the problems of desertification.



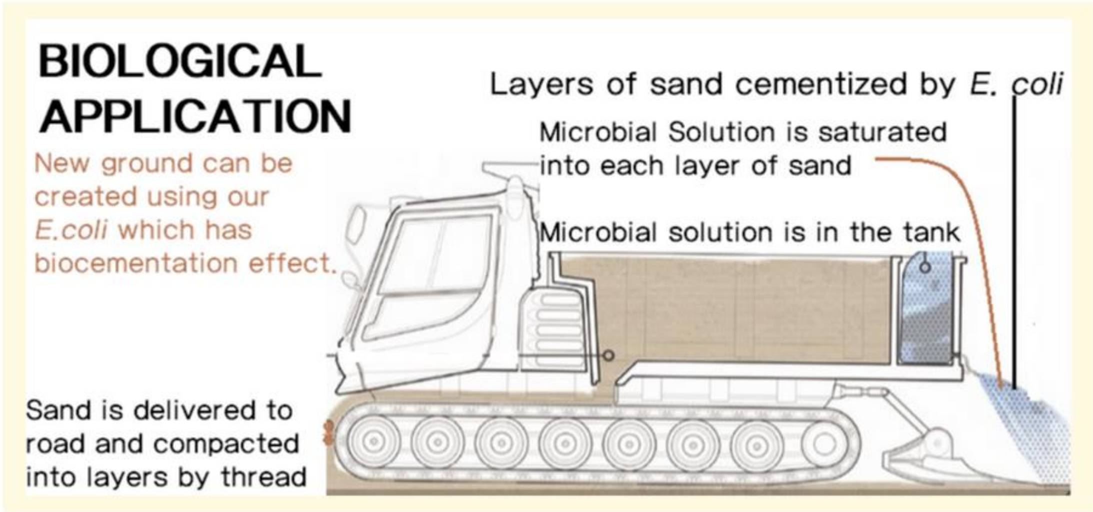
WHY DESERTIFICATION?

Deserts as a biosphere provides many organisms with shelter. However, desertification indicates significant decrease in number of trees and depletion of water, vegetation and wild life. The grass field turned in to sand can cover other areas with sand, accelerating the desertification process.

During spring time, South Korea is affected hugely by yellow dust that comes from the deserts located near China. It is important that the global society cooperate to solve the desertification problem. However, solutions that are widely known, such as planting trees, are ineffective mainly because the desert land cannot retain water. The plants planted in the deserts cannot survive for long, and the water provided by irrigation seeps through the sand very easily. The roots cannot settle on the easily moving sands, making the solution of "planting trees" implausible.

Therefore, we thought of an easier way to hold water in deserts—hardening the sand to biocement, precipitating $CaCO_3$.

According to the definition suggested by the United Nations Convention to Combat Desertification, deser tification is 'land degradation in arid, semi-arid and sub-humid areas resulting from various factors including climatic variations and human activities'. In other words, it is a dynamic process by which fertile land becomes desert affecting terrestrial areas, animal and plant populations, as well as human settlements and their amenities. It is considered as one of the major environmental problems all over the world so that various solutions are continuously proposed.



PART SUBMISSION

This part is complex of pSB1C3 vector and urease gene from *Klebsiella oxytoca* KCTC 1686.

Our main purpose is prevention of desertification by biocementation, and we used this en zyme for biocementation. A function of urease is catalyzing the hydrolysis of urea to releas e ammonia and carbon dioxide. The released carbon dioxide dissolves in water, and is precipit ated with Ca^{2+}, forming $CaCO_3$ (biocement).

In our study, we cloned this enzyme with pBAD vector by ligation independent cloning (LIC) for enzyme overexpression, and observed the catalytic activity of it in Escherichia coli by pH indicator assay. To verify microbial biocementation, we performed a biocementation test with synthetic E. coli and detected the whole-cell activity by measuring the radius of precipitated biocement.

For more information, click on the link below.

http://parts.igem.org/Part:BBa_K1297000

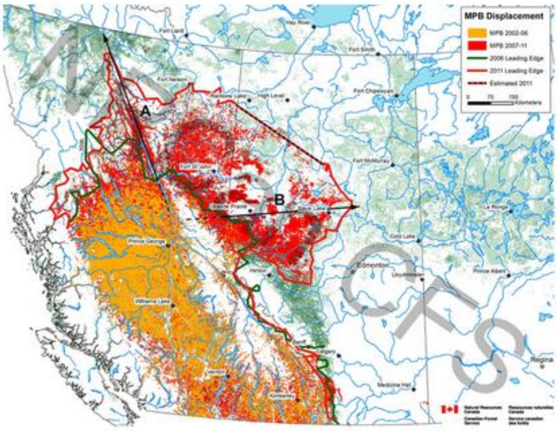
2. 2014—CoBRA(Best Presentation)

(Referenced from the wiki：http://2014hs.igem.org/Team:CoBRA)

①Clear presentation style and development of the importance of their research question.

②They placed the project on a local and global scale， outlined how all of the aspects of the project (Human Practice, Business and Wet Lab) related to their project.

③The presentation was persuasive and showed the importance and need of their project.



This graphic depicts the enormity of the infestation. Historically, the beetle was killed off by the harsh winters of the Canadian Rockies, but with a series of milder winters, the beetle population has exploded exponentially, killing off the trees that provide food and habitat for most of the other organisms that live in this ecosystem.

Table 1. ***Classification of infective microorganisms by risk group***

Risk Group 1 *(no or low individual and community risk)*
A microorganism that is unlikely to cause human or animal disease.

Risk Group 2 *(moderate individual risk, low community risk)*
A pathogen that can cause human or animal disease but is unlikely to be a serious hazard to laboratory workers, the community, livestock or the environment. Laboratory exposures may cause serious infection, but effective treatment and preventive measures are available and the risk of spread of infection is limited.

Risk Group 3 *(high individual risk, low community risk)*
A pathogen that usually causes serious human or animal disease but does not ordinarily spread from one infected individual to another. Effective treatment and preventive measures are available.

Risk Group 4 *(high individual and community risk)*
A pathogen that usually causes serious human or animal disease and that can be readily transmitted from one individual to another, directly or indirectly. Effective treatment and preventive measures are not usually available.

Table 2. **Relation of risk groups to biosafety levels, practices and equipment**

RISK GROUP	BIOSAFETY LEVEL	LABORATORY TYPE	LABORATORY PRACTICES	SAFETY EQUIPMENT
1	Basic – Biosafety Level 1	Basic teaching, research	GMT	None; open bench work
2	Basic – Biosafety Level 2	Primary health services; diagnostic services, research	GMT plus protective clothing, biohazard sign	Open bench plus BSC for potential aerosols
3	Containment – Biosafety Level 3	Special diagnostic services, research	As Level 2 plus special clothing, controlled access, directional airflow	BSC and/or other primary devices for all activities
4	Maximum containment – Biosafety Level 4	Dangerous pathogen units	As Level 3 plus airlock entry, shower exit, special waste disposal	Class III BSC, or positive pressure suits in conjunction with Class II BSCs, double-ended autoclave (through the wall), filtered air

【五】Project Requirements and Q＆A (Referenced from iGEM official website)

1. The High School track is encouraging teams to tackle projects across the full facet of potential Synthetic Biology applications.

2. How will High School teams be judged?

High school teams will be judged and evaluated against others in their track only (ie. high school teams will not be judged against collegiate teams).

3. Will there be Tracks within the High School track?

iGEM is encouraging all high school participants to follow their passion and work on projects that inspire them. Unlike previous years, the high school teams will not be competing within focus research areas. High school teams may work on any research area of their choosing with evaluations and judging across all projects and fields.

4. Why did we make this change?

iGEM is proud to support High School students in the iGEM competition. However, it became increasingly difficult, with our limited resources, to run and coordinating two separate programs, and collegiate division and High School division, with their two distinct timelines. We felt that to best support the iGEM program we needed to concentrate our efforts on one Jamboree a year.

We’re optimistic that this will make iGEM High School stronger and will also greater synergy between the high school teams and colligate teams. Forming relationships between colleges and high schools can lead to an exchange of ideas and resources as well as mentorship or guidance from professors or colligate teams. We hope to inspire future studies in synthetic biology.

5. Fees and other considerations?

The high school team registration fee will be the same as for all participants (high school and collegiate). Attendance fee till be decided as the 2015 Giant Jamboree competition schedule is finalized.

【六】Recommended books and articles

1. Molecular Biology——Yuxian Zhu
2. Genetic Engineering——Ming Sun
3. Genetic Engineering Experiment guide——Xufen zhu
4. Industrial Applications of Synthetic Biology——Zhaoshou Wang
5. Progress and Application of Synthetic Biology, International Journal of Genetics——Xinxing Zhu
6. Introduction to Synthetic Biology——Kai Song
7. Synthetic Biology——Kaiming Zhao