

The last sprint before the Giant Jamboree

Introduction

iGEM team Groningen 2021 is developing a genetically engineered system to tackle the nitrogen crisis in the Netherlands. We aim to engineer Baker's yeast to produce a feed-additive that reduces ammonia emissions in cows while simultaneously enhancing their growth and milk production. Moreover, we aim to use a special filter device to capture any leftover ammonia, that can be given back to our yeast as a nutrient source to produce even more feed additive. In this monthly newsletter we keep you up to date on our process, struggles and successes!

Welcoming new sponsors

We are thrilled to announce our new sponsors: DSM, Qiagen, The Max Gruber Foundation, The Groningen Engineering Center, The Bernoulli Institute for Mathematics and The Stratingen Institute for Chemistry

Update on the advancements of the project

This is the second newsletter of iGEM Groningen 2021 and a lot has happened since we sent out our first newsletter.

First of all: we have made great strides in the lab. In the last newsletter we already mentioned that we were planning on expressing alpha-amylase in yeast. And we are thrilled to be able to say that we did so not once, but multiple times! As of now, we have over 60 yeasts that have taken up different combinations of our genetic constructs and should therefore, in theory, be able to produce alpha-amylase. However, in order to get to this stage, lots of high-throughput experiments were needed!



All the (different) DNA constructs
we made



All the petridishes with the
(different) yeasts we engineered



A petridish with yeast colonies. The
yeast will only grow if it took up our
genetic construct



All the glass tubes we used in one
week of experiments

We have actually already tested some of our engineered yeasts, and have indeed been able to demonstrate alpha-amylase activity in several of them! However, because we had not paid enough attention in advance to how many yeasts we had to test, our kit that we used to test alpha-amylase ran out in the middle of the experiment. Fortunately, it has since been reordered and we are busy collecting the final data.

We have also been hard at work outside the lab: our Human Practices team spoke to several other stakeholders involved in our nitrogen crisis, this time focusing on professionals working in collecting and processing data surrounding nitrogen emissions. Summaries of these interviews can be found in the last sections of this newsletter.

Moreover, our education team is working on comics about synthetic biology and online info-graphics to explain the science behind the comics. Last time we were already able to [introduce the characters](#) of these comics. In the next section of this newsletter, we are even able to show you the first comic!

Lastly, our dry lab team has been working on a modeling approach, called the ART-tool, to help our wet lab team find the best combination (of the possible 640) of genetic components to produce as much feed additive as efficiently as possible. As of now, the model is completed and functional. We are only waiting for the last data from the wet lab to run the model and predict the best combination for optimal alpha-amylase production.

First comic

Our education team and design team have been working hard on comics and online info-graphics to teach people about the principles of synthetic biology. Now that the first comic is finished, we would like to show it to you! The science behind the comic can be found [on our website](#), and deals with the principle of bio-luminescence.

All characters - both appearance and characteristics - are based on real micro-organisms. The comics are based on the fundamental principles of synthetic biology: introducing new DNA to a micro-organisms leads to new capabilities for the micro-organism.

Chapter I: Bioluminescent Mark

The farmer has just left the farm and the crew of microorganisms are in charge. The fun is about to begin.



Mark, Armin and Musoke are playing volleyball.



Suddenly, the ball gets lost in a hole between the bushes.



It looks dark and scary...



Mark can only give off a bit of light, but it's not enough. Is it game over?



He has an idea!



Mark can transfer his superpower of glowing in the dark to his friends.



Now they can all look for the ball together!



Ah there it is!

Ukrant article

A few weeks ago, we got interviewed by the Ukrant (the newspaper from the University of Groningen) about our project. Are you curious to what they had to say about us and our project? You can find the article on [the website of the Ukrant!](#)

Next things to look forward to

Our team is currently working hard in the lab to collect the final data on how well each of our yeasts produces alpha-amylase. Once this is in, we can run our dry lab model and start predicting which combination of genetic elements and yeast strain yields the optimal alpha-amylase production.

Moreover, as the Giant Jamboree (the end of iGEM) approaches, we are working hard on our project website and project presentation video. We are hoping to be able to being able to update you on this in the next newsletter!

Furthermore, our Human Practices team will continue interviewing stakeholders who are involved in the nitrogen crisis and taking their input to improve our project. Do you happen to know someone who could help us improve our project or give us valuable feedback? Then do not hesitate to contact us at igemteam@rug.nl since we are always looking for new stakeholders to contact!

Lastly, our education team will keep working on the comics and info-graphics and hopes to release the second one soon.

Stay tuned for any more updates!