



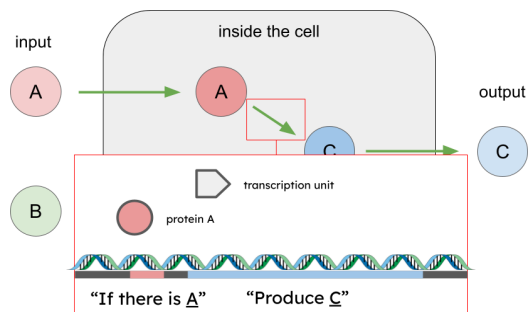
Newsletter for December 2022

Midwest Furfest Presentation!

By Lathreas | December 29, 2022

In the beginning of December, Zennith and I gave a presentation at Midwest FurFest named "TF IRL!?! Time for some SCIENCE!". It was aimed at a wider audience, but with enough technical depth to show the full picture of what a transformation would entail. There were a large number of people interested in joining the presentation, too many to fit the room in fact, but luckily it all turned out well and it wasn't too cramped. It was a very fun and informative presentation to give, with lots of audience participation and discussion, so we will recap some of the things we talked about in this newsletter article.

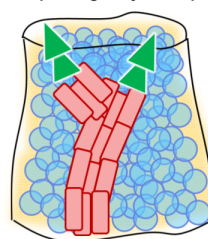
We divided the talk into three parts: part one is to convince people that transformations are in fact possible, and that we fundamentally do understand how a metamorphosis, such as in butterflies, can be engineered. We showed a few simple 'hello world' programs written as gene regulatory networks, i.e. the "programming language of life". In the end, each gene is similar in nature to a logic gate. And we know from computers that we can program almost anything when you link enough logic gates together.



A slide from Part 1, used when explaining the basics of the "programming language of life".

This theoretical knowledge is enough to create a theoretical transformation treatment, but how do you make it in practice? And how can we simplify it all such that it becomes possible in as little as, say, thirty years? To answer that, part two of the presentation was centered around existing techniques that we can use or advance upon to bridge the gaps, such as distraction osteogenesis (a surgical method to change bone shape) or bioprinting of tissues (such as to 3D print wolf ears). Together, the promise of gene editing along with printing and traditional techniques gives us a wide toolbox to create our full transformation treatment from.

Bioprinting - key concepts



Overall, you are creating an engineered, controlled environment for cells.

A slide from Part 2, used when explaining bioprinting.

The main focus of our presentation is centered around the question: how can we turn someone into an anthropomorphic creature? The main thesis of our presentation is that this is easier than you might think. In part three we showed how it all comes together. Although it sounds like a gargantuan

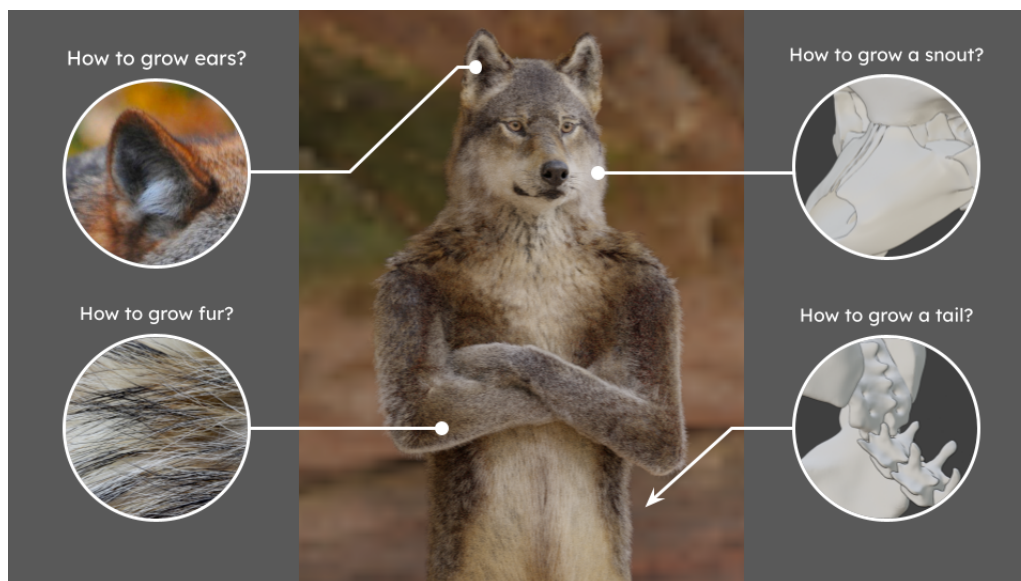
task at first, we must do what engineers do best: cut up the problem into small, bite-sized problems, and suddenly you can see that each individual problem can be overcome in a very reasonable amount of time.

Taking the example of an anthropomorphic wolf, there are only a handful of changes we need to make to a human body. The most important ones: adding a muzzle, adding wolf ears, adding fur, changing the texture of exposed skin (wolf nose and pawpads), changing to a digitigrade stance, and adding a tail. Each of these can be tackled separately. And although that is still challenging, it is no longer insurmountable once we cut it up. And we can subdivide each of these into even smaller tasks too. When it comes to "adding fur", for example, it may be hard to know where to even begin. But here too, we can do what engineers do best: cutting up the problem into smaller problems.

Fur, in the end, is just hair. We just don't have enough of it yet. And there are some other properties that need to be changed too, such as the thickness of hair, the length of hair, whether it is wavy or curly, or the color. With the list of properties written down, which contains as little as eight separate properties of diminishing importance, we can tackle each and every property separately. Importantly, if we tackle each of these properties, we will in fact have reconstructed fur in its entirety!

Changing a single property of hair to fur is a very doable research project, and overall takes just a few years to perform in a petri dish. In fact, we have already begun the development of a bioactive compound (a first step on the path of drug development) to change the width of hair, in a project led by Tiltwolf. That is one property already underway, with only seven more to go to transform hair to fur! Of course, each project will take time, but since they can be parallelized, it is not at all unreasonable to think we can finish in just two to three decades depending on funding. This includes the time it takes for preclinical testing and FDA approval, for the first version of a full anthropomorphic transformation. Of course, the exact time we finish depends on funding and the amount of researchers working at the same time, which makes that kind of planning extra important.

Perhaps the most challenging part of the development pipeline is to bring everything together in a patient-safe and aesthetically satisfying way. After all, each individually developed change must be compatible with one another to be useful. Hence we need, among other things, Computer Aided Design tools to ensure that we can model the aesthetics and treatments before we begin research. Hence why we're working on the Anatomy Re-engineering Framework alongside the more biochemical projects, so



that we can tweak the anatomy of a transformation in a computer before we commit to anything, ensuring safety and viability. If we can simplify the amount of changes that we need to make to the human body in a computer, that means that the transformations become safer, more efficient and cheaper, and above all means we need much less time to develop biotechnology for difficult anatomical changes in a patient. Overall, that speeds up our timeline, making our aim for a 20 to 30-year trajectory within reach.

All in all, this defines our game plan. First we need to understand what we need to change to the human body, and then we can create biotechnology for each of these changes individually and in parallel.

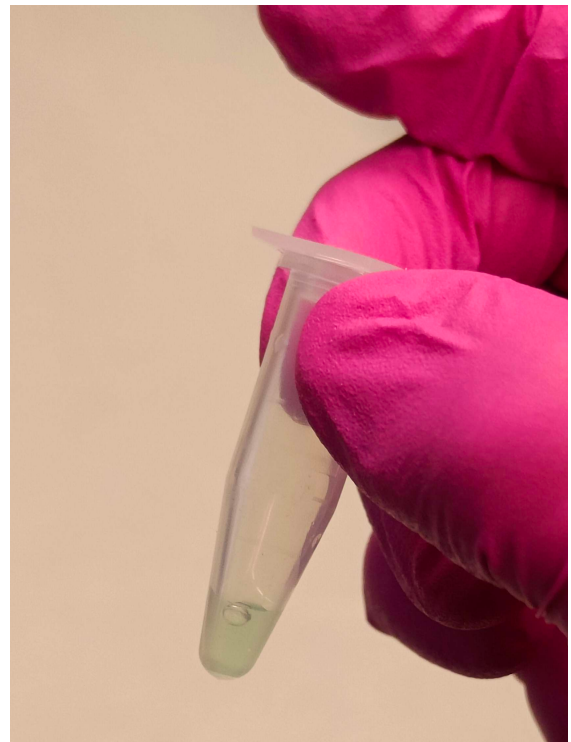
The presentation ended with a question round, which went about one hour over the allotted time, which we thought was a good sign. The audience was very interested in many different practical, technical, and ethical aspects, which we thought was very fun to answer. Overall, I would say this type of presentation was well appreciated by the audience, who (unsurprisingly) are very technically minded. And who knows, maybe we will be able to produce some in-depth videos in this style as well! I personally think it was a lot of fun to work on and would love to do it again.

First Reagent for the Wet Lab Wnt10b Project!

By Tilt | December 9, 2022

We've acquired the first reagent for our wet lab experiment! As a reminder, this is the peptide array experiment to find peptides - small protein-like molecules - that can affect the thickness of hairs, an essential control knob for making realistic fur. Our experiment scans through the sequence of Wnt10b, a

human protein known to affect hair thickness in mice through canonical Wnt signaling, and we will attempt to find peptide fragments that bind the matching receptors that are expressed in hair follicles - Frizzled-7, Frizzled-10, and Frizzled-1.

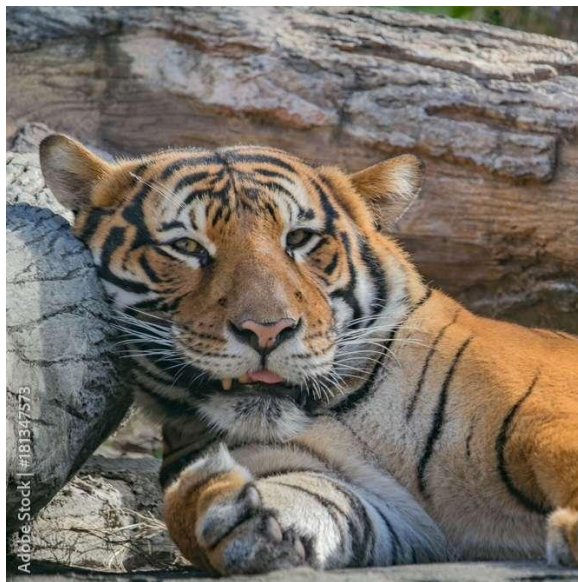


This reagent is an antibody against the 6xHis tag, which is encoded onto our recombinant proteins, and this allows us to detect them. The white stuff is just dry powder - it's lyophilized (freeze-dried)! Then you add 100 μ L deionized water to reconstitute it, and transfer into a centrifuge tube for use. The antibody is conjugated to an infrared fluorescent reporter called DyLight 800 nm, which is what gives it the slight green tinge you can see!

These are very exciting times, and we'll be sure to keep you all updated with new developments as our experiments progress. Thank you all for your support and help! We wouldn't be where we are today without you.

Welcoming Rumi to our Integument Team

By Rumi | December 19, 2022



Rumi, also known by Socks the Tiger, is a biology graduate student studying at a local zoo. He's worked in computer science and robotics at companies like Microsoft, Epic Healthcare, and more, but now prefers studying animals, making art, and learning languages, and hopes to make a career out of

one of these - hopefully with the zoo. His art focuses on the beauty of the masculine form, and he's studying Chinese, Korean, and Japanese.

Rumi currently works on the integument project by helping to fill out, clarify, and organize data. The project excites him because it's essential to his ideal form: plumes of gold fur down his neck, on his chest, and accenting his limbs, a tiger tail, and maybe a big cat nose and ears, mrow! He's excited to see how the organization progresses and possibly contribute his other skills soon too.

Board Election Update

By Zennith | December 30, 2022

Our Q4 board meeting happened earlier in December and it went well! Each year, our Q4 board meeting is when we conduct our elections for board members. This is one of the most important ways to keep our organization looking forward.

Each year, we get a little better at the process. This year, we had each candidate prepare (confidential) essays or position statements, and/or answer live questions. All board members excelled at this exercise. It's not intended to be competitive per se - but we deeply believe in meritocracy, and have seen enough rot in other organizations to understand how serious complacency can be.

The election this year was particularly important, due to both the departure of Atha, and rising talent we're very excited about.

I'm thrilled to announce that we've elected Tiltwolf to be our new Vice President starting Jan 1, 2023. Tilt has been with us for several years, and has exceptional scientific acumen, an active approach to outreach and advocacy, and is the sort of person you can count on.

I'm also very excited to announce Syralth will be our new Secretary starting Jan 1, 2023 as well. Syralth has gained a ton of additional experience with the logistics and compliance

behind scientific activities, since he started his postdoc a couple years ago. He's already been using that experience to get our Board of Directors working more smoothly.

He's taking over for Moonbeam, who was also re-elected to our board. Moonbeam is currently maxed out (e.g. leading our Discord server), so this seems to be the best arrangement for letting each of them focus.

The other re-elections were: Keiro, Svaros, and myself. Other directors' terms were not up for re-election this year.

And last, but definitely not least, I'm happy to say that we've elected Lathreas to join the board for the first time. Lathreas has been with us about as long as Tilt has. Lathreas is creative, has a knack for engineering complex systems, and is extremely hard-working and yet skilled at prioritization.

It's people like these who you want to lead a purpose-driven organization. I genuinely look up to these people.