NextFeed

A new supply chain for sustainable textiles

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Our Team

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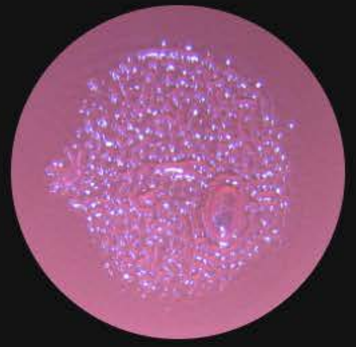
Cellulose = Sustainable Textiles

The next generation of sustainable textiles are made with vats of bacteria and a food source, their feedstock.

FEEDSTOCK AND BACTERIA MIXED

Feedstock is typically comprised of sugarcane and soybean



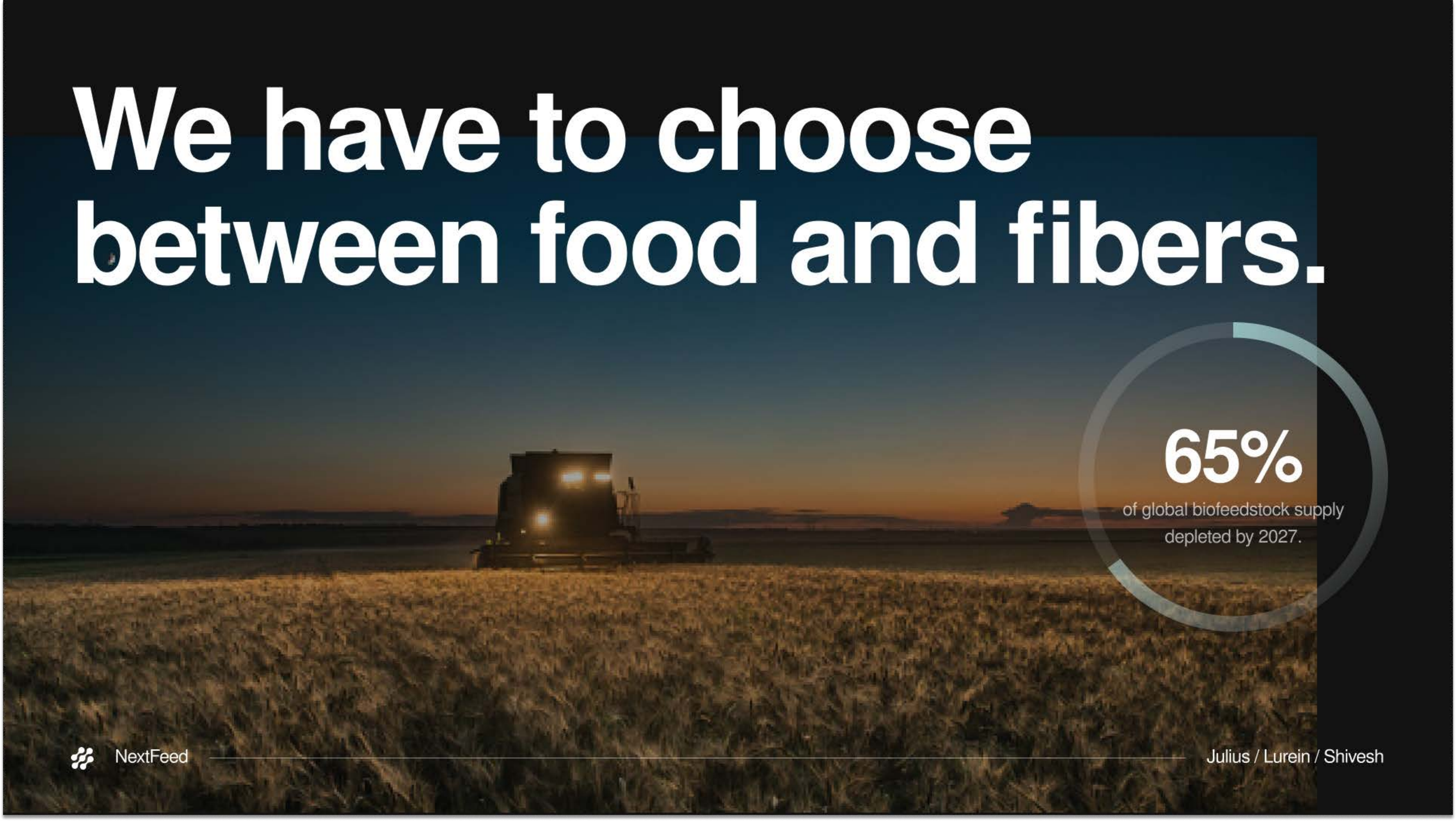
CELLULOSE COLLECTED

A biofilm of cellulose forms as an output, which is then collected.

PROCESSED INTO TEXTILES

Companies then use cellulose fibers as the base material of a textile

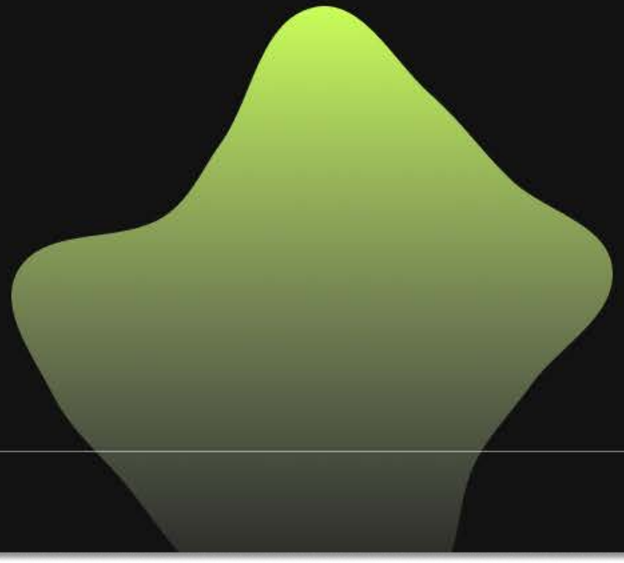
We have to choose between food and fibers.



65%

of global biofeedstock supply depleted by 2027.

We set out to separate the foodstock from the feedstock.



Nissl Kombucha

E. coli Nissle is added to Kombucha to produce cellulose internally for collection during waste treatment.

WEEKLY DIETARY SUPPLEMENT

In order to sustain a significant colony of E. coli Nissle in the gut, people drink at least one bottle of Kompoocha weekly

CELLULOSE PRODUCED INTERNALLY

Cellulose is produced by the colony, nourished by your digestion, and passes harmlessly through your digestive tract

FIBERS COLLECTED AT WASTE TREATMENT

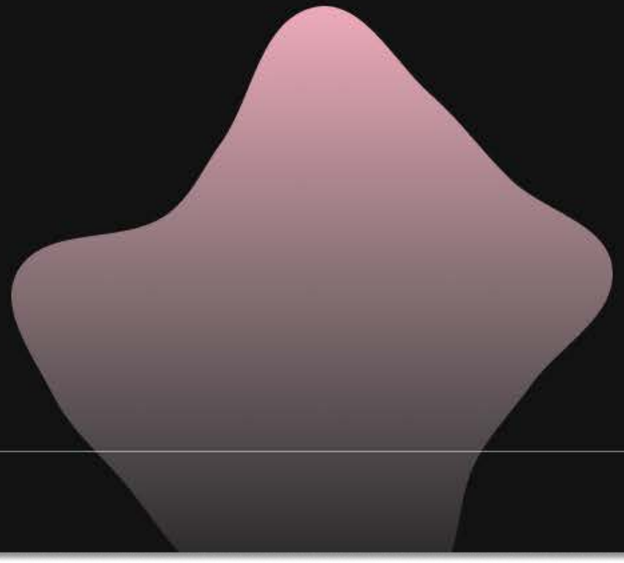
Waste treatment centers can easily separate the cellulose through mechanical filtration for refinement and use in the production of Rayon, Lyocell, and artificial cotton

NissIX

The daily ‘do your part’ supplement.

Julius / Lurein / Shivesh

But what can we do to fix the supply chain today?



Glycerol Feedstock

Glycerol is a waste product of biodiesel production

10.28 Billion Kilograms

of Biodiesel produced, growing at 10% annually

913 Million Kilograms

of Glycerol produced as a waste product

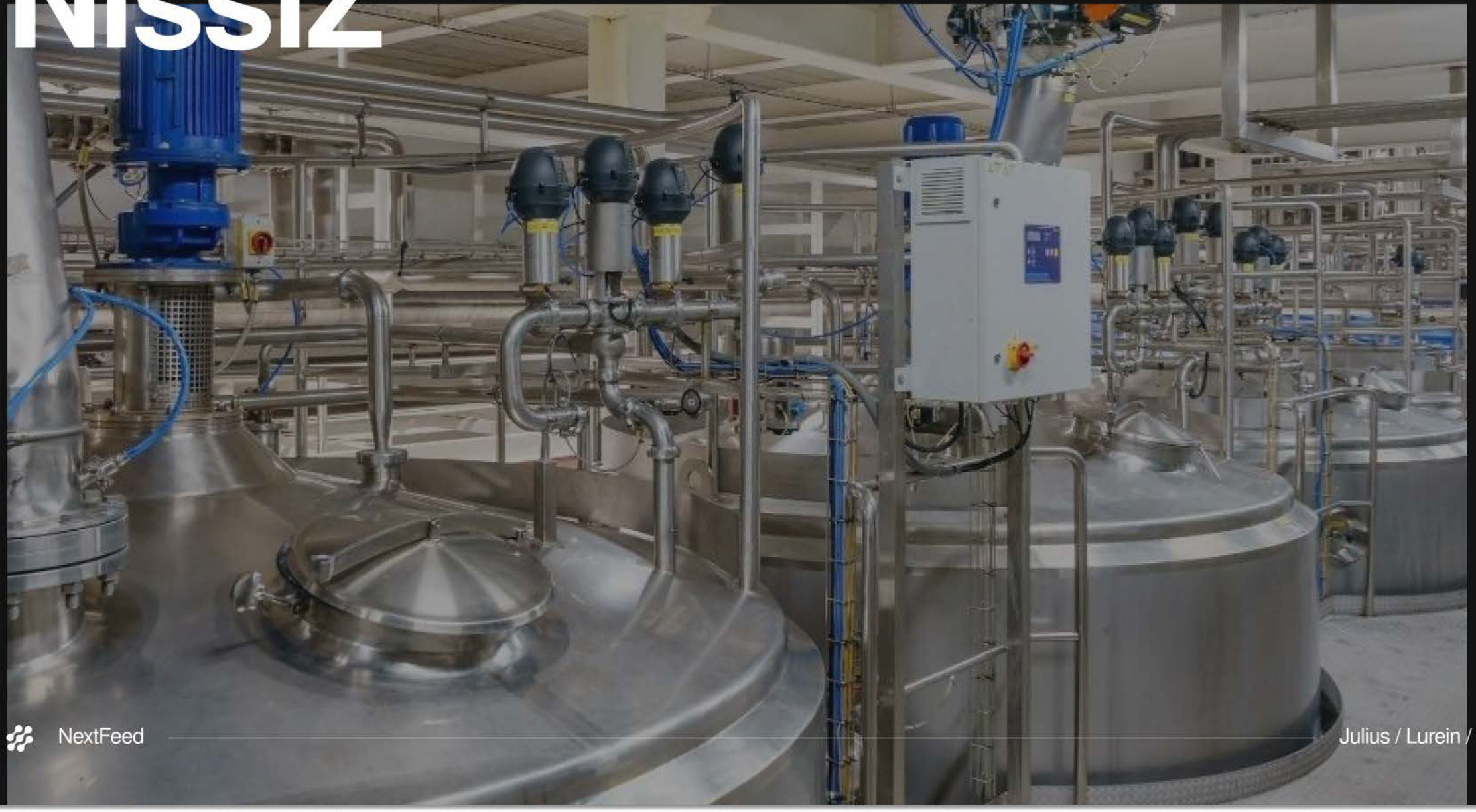
$560

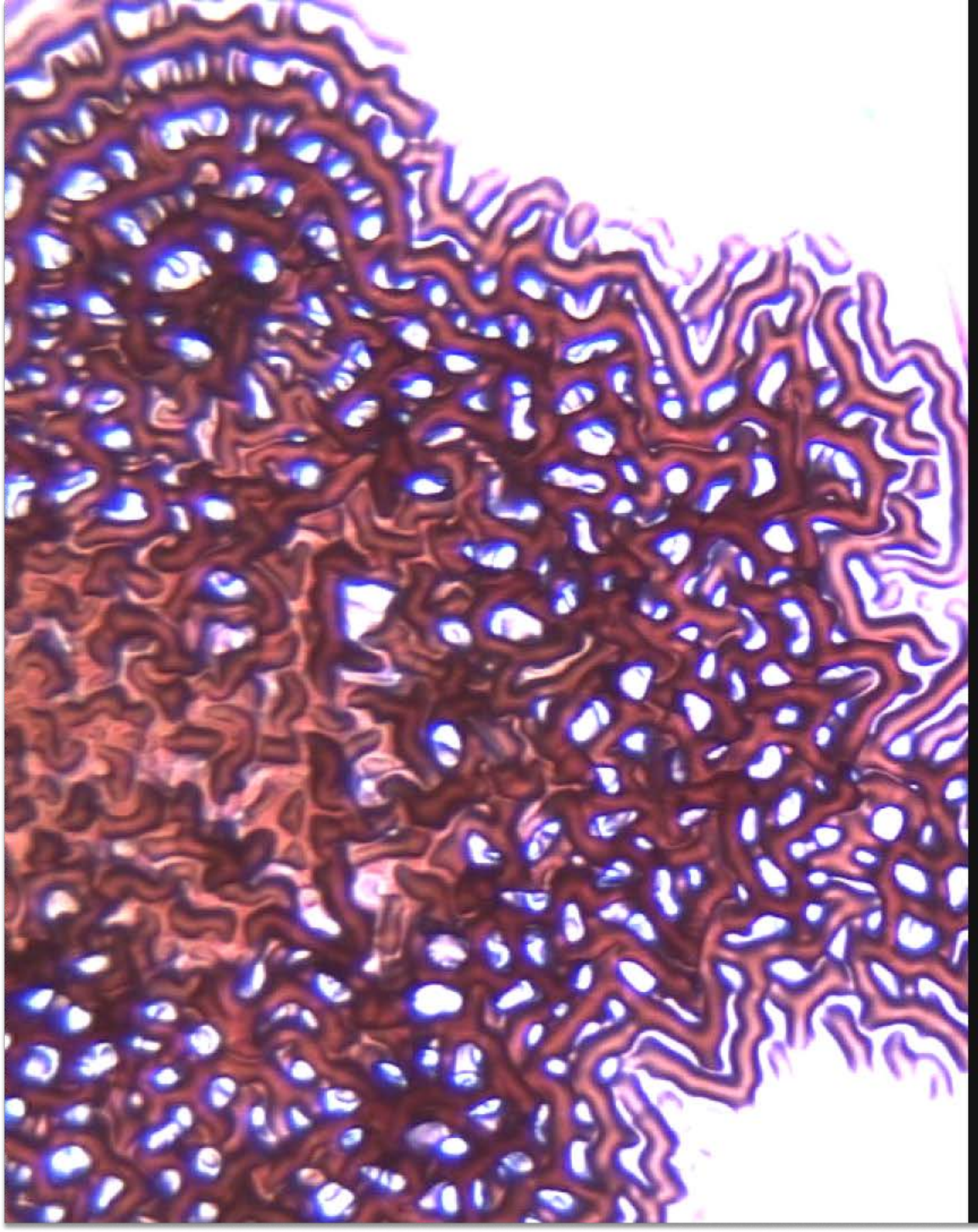
Cost of Glucose per tonne

$88

Cost of Glycerol per tonne

NisslZ





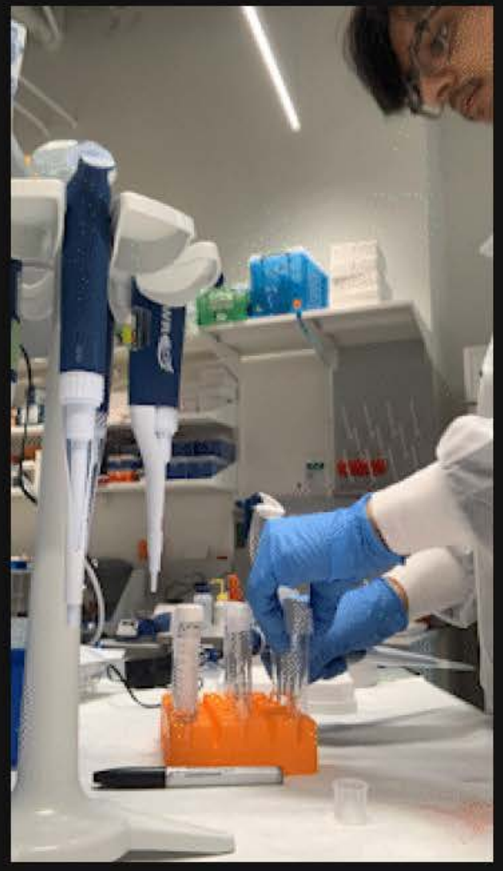
Laboratory Assisted Evolution

Using an LAE approach, we pushed E. Coli Nissle 1917 to evolve an ability to consume Glycerol for colony growth

Left: E. coli Nissle 1917, SIngle Colony, Congo Red

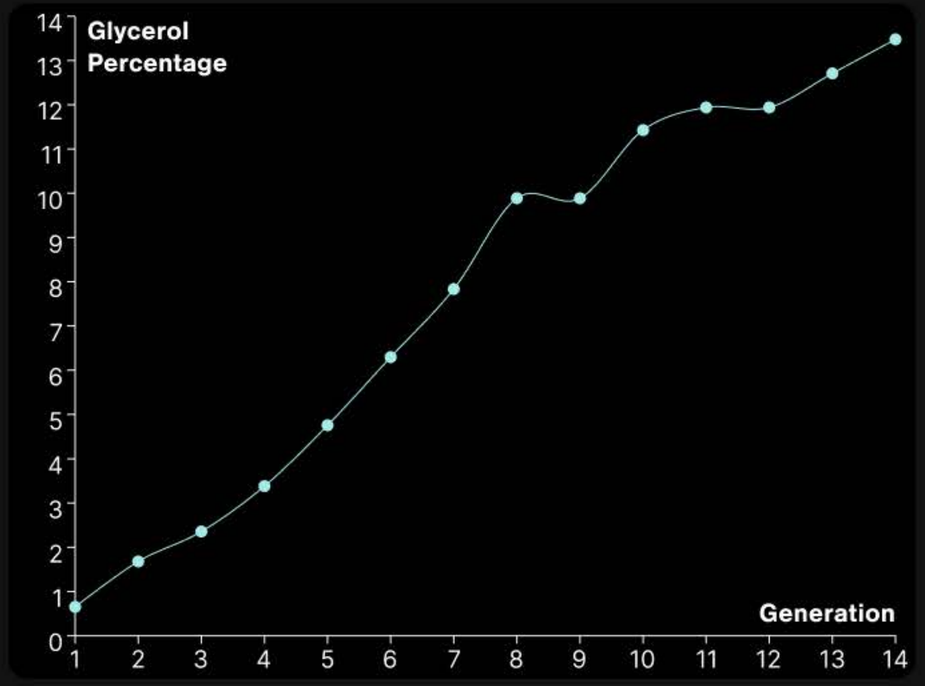
Process

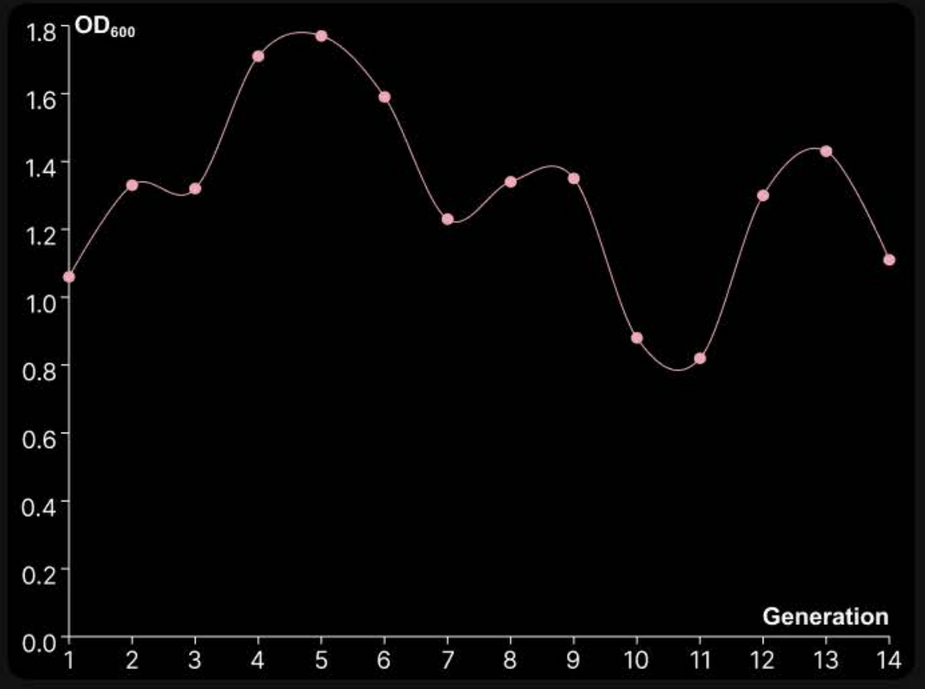
Daily Steps Checklist
Do OD600 tests on each of the latest incubated generations, using each of their relevant controls as a baseline
Pick the Generation/version that grew in the highest concentration (>1) as the baseline for your next generation (lets call that the selected variant)
First, make a glycerol stock of the selected variant:
Take 500 microliters of glycerol, put in a minitube, cap, then add 500 microliters of the selected variant shake twice and put in the freezer (-80) in the addgene plasmids box, label as ECN GX
Figure out the 3 glycerol concentrations you are going to use for making your next generation from the selected variant, calculate their volumes against 4000 (e.g. 2% concentration is 80 microliters):
Start with 4000 microliters of M9, put into a falcon tube (using the suckergun)
Then subtract the volume of glycerol from your M9 tube (e.g. if using 2%, subtract 80 microliters and dispose) Use the yellow pipette.
Add your glycerol volume to the falcon tube - leave the pipette in the glycerol solution a bit longer than usual for absorption
Mix a bit with pipette pushing
Split this falcon tube into two falcon tubes, each with 2000 microliters of solution. One of these you will incubate with, the other one you will use as a baseline for your OD600 tests, label well.
From your incubation falcon tube, take out 100 microliters of solution
Add 100 microliters of your selected nissle variant
Pipette mix
Add 2 microliters of Streptomycin (StR), which is in the 4C fridge, vial with an orange cap
Incubate
Put the Streptomycin back in the fridge
Make sure to keep your baselines out on our working desk for the next person



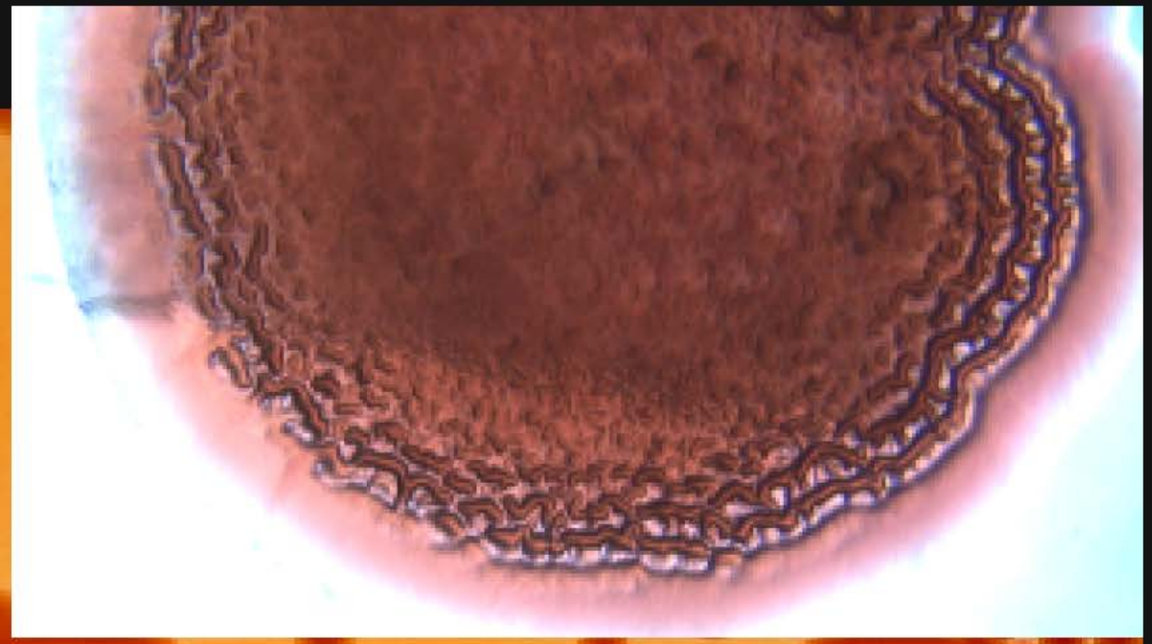
Intermediate Results

With initial cultures failing at Glycerol concentrations 10% and above, we are now growing Nissle at a 15% Glycerol concentration





Cellulose Assay

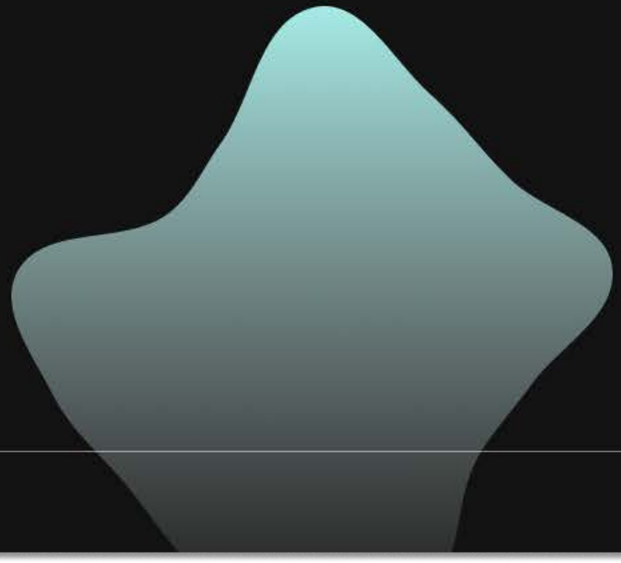


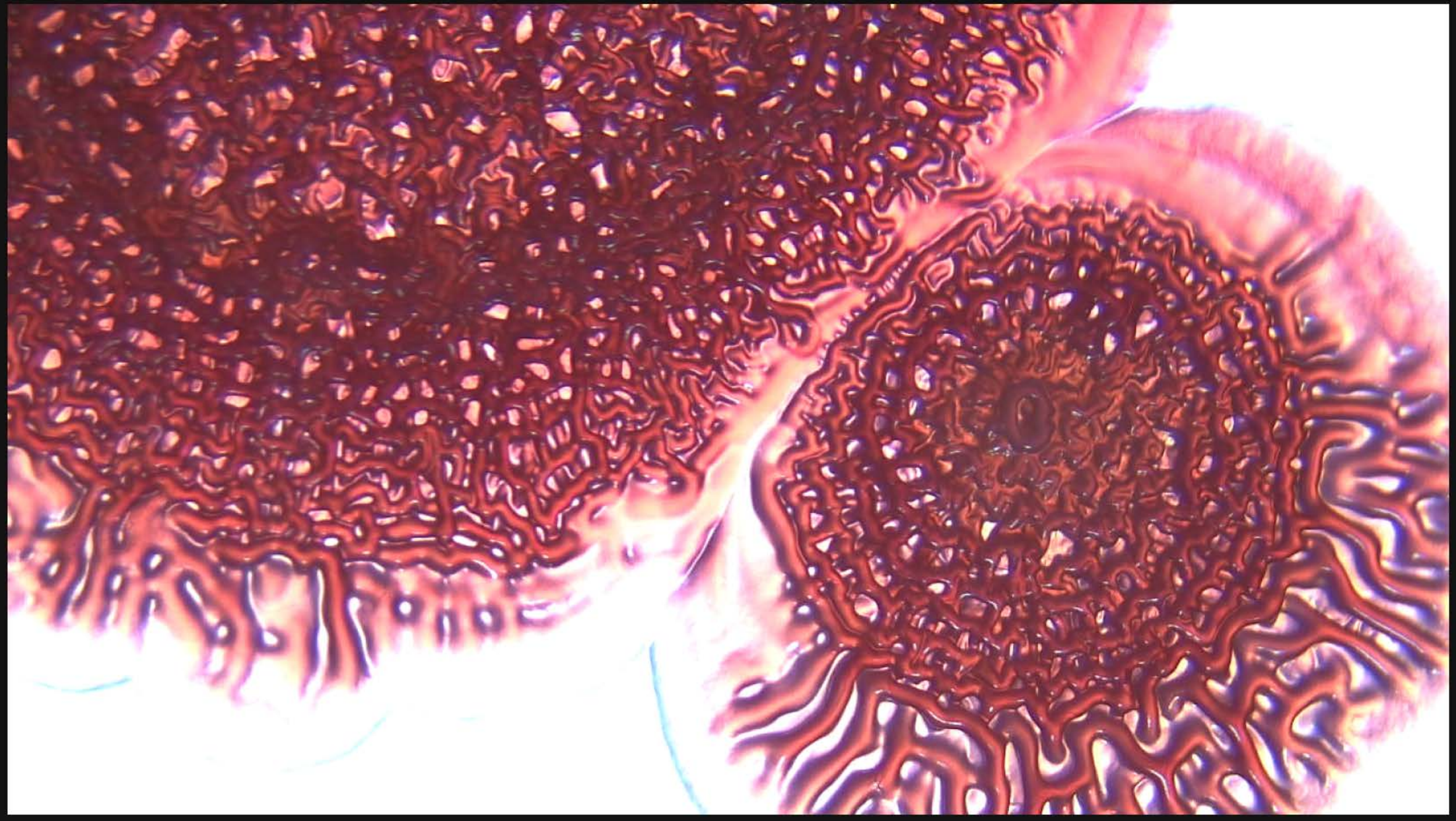
Left: Nissle 1917, Congo Red

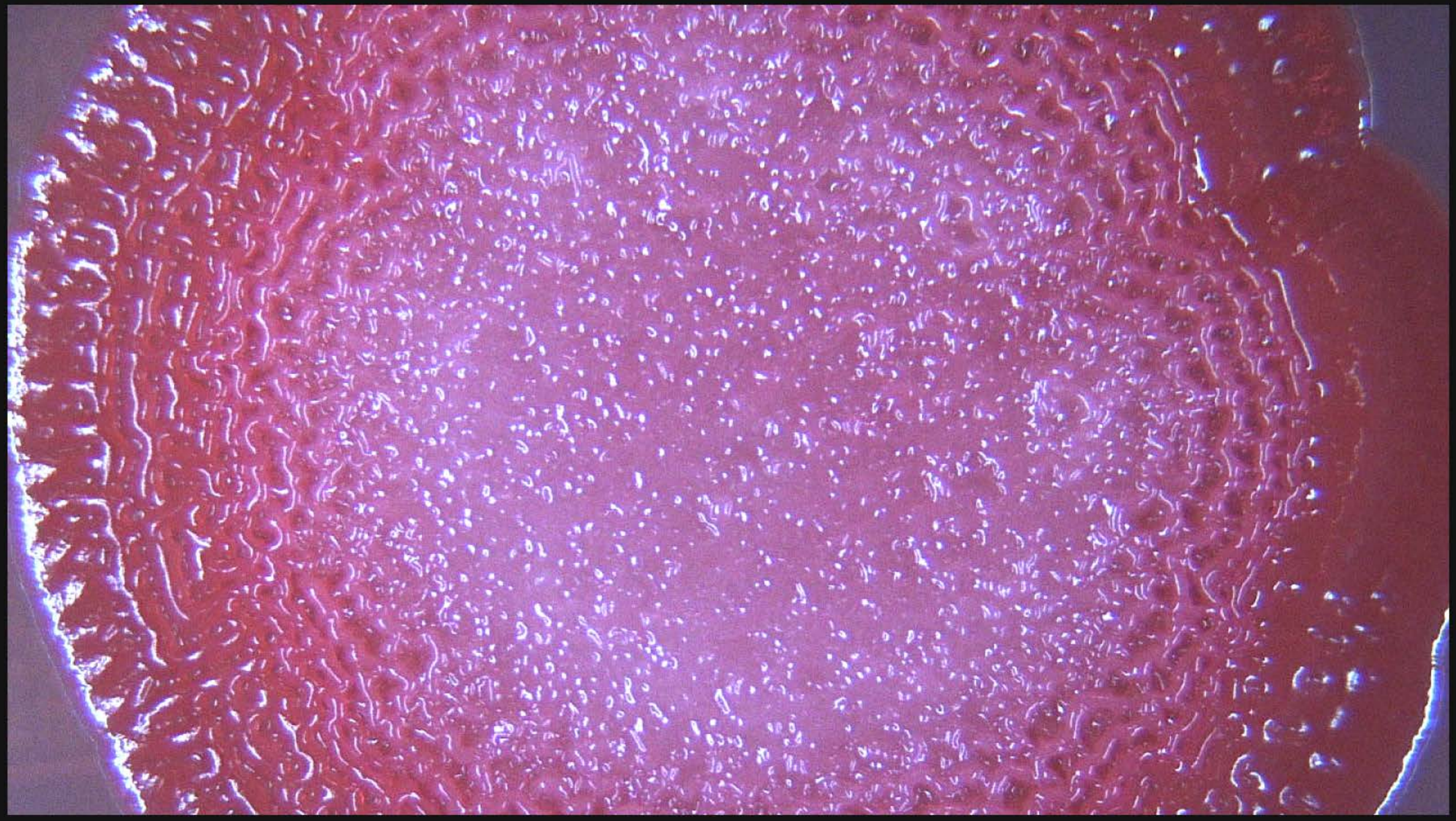
Inset: Single Colony, 100x mag

Biofabrication is the future of textiles

but there’s a problem.







Thank you.

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