

19.06.2020, Enpact + AsiaBerlin by Berlin Senate

**A Rapid Test Kit For The Global South :
Open Science Responses To
COVID-19**



Aravinth Panch

DreamSpace Academy | Just One Giant Lab (JOGL)
araCreate | Sri Lanka Institute of Nanotechnology (SLINTEC)



About Me

An interdisciplinary expert with 17+ years of global experience in science, engineering, arts and sustainability, with the core expertise in research, development and production of electro-mechanical embedded systems and digital products.

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7	120+
2	10M+
8	30K+
4	1.5M+
23	50+

Talk The Talk



“

The DIY Biology Movement





DIY Bio | History

DIY biology can be described as a movement that is independent from the government, academic and corporate institutions. It attracts people with a common interest in biology who want to study and practice it without the costs and restraints imposed by universities and other institutions.

1988 - BioHacking Concept

2003 - iGEM : Synthetic Biology Competition

2005 - San Francisco : First Maker Community

2008 - DIYbio : First Online Group

2010 - Genspace : First Community Bio Lab

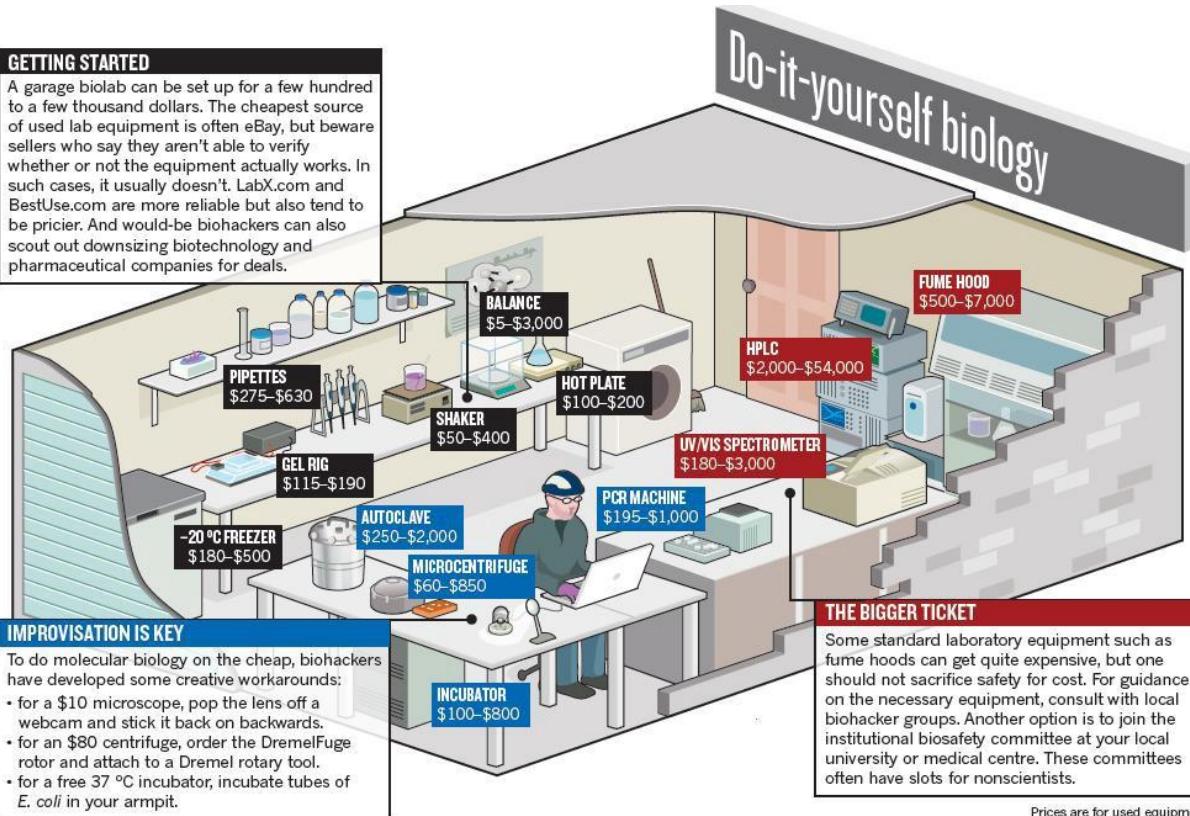
2020 - 56+ Community Labs Globally



DIY Bio Lab | Wet Lab

GETTING STARTED

A garage biolab can be set up for a few hundred to a few thousand dollars. The cheapest source of used lab equipment is often eBay, but beware sellers who say they aren't able to verify whether or not the equipment actually works. In such cases, it usually doesn't. LabX.com and BestUse.com are more reliable but also tend to be pricier. And would-be biohackers can also scout out downsizing biotechnology and pharmaceutical companies for deals.



Prices are for used equipment



DIY Bio | Social Success Stories

Ellen Jorgensen: Biohacking – you can do it, too

Press esc to exit full screen

7:36 / 10:08

Scroll for details

Sascha Karberg TED



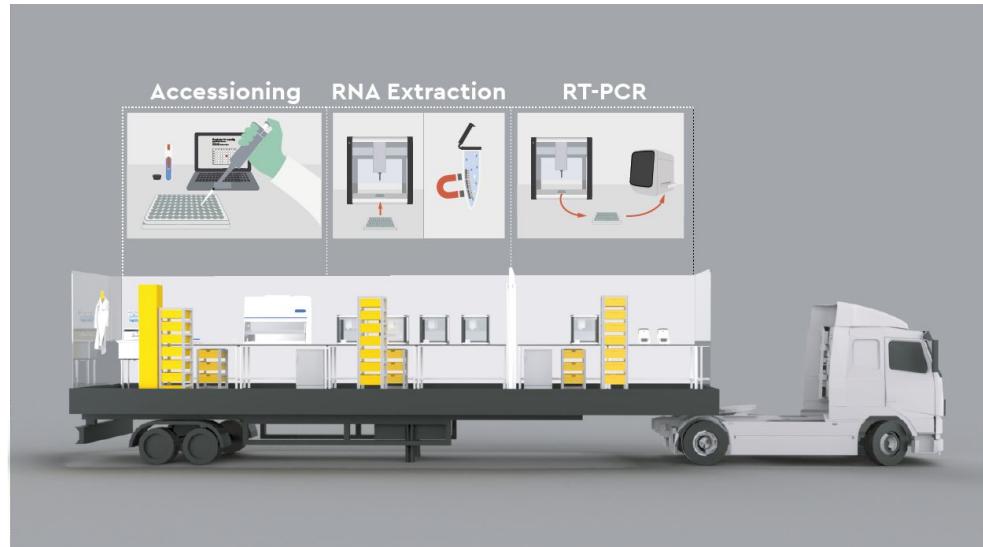
DIY Bio | Social Success Stories

**OPEN
INSULIN**



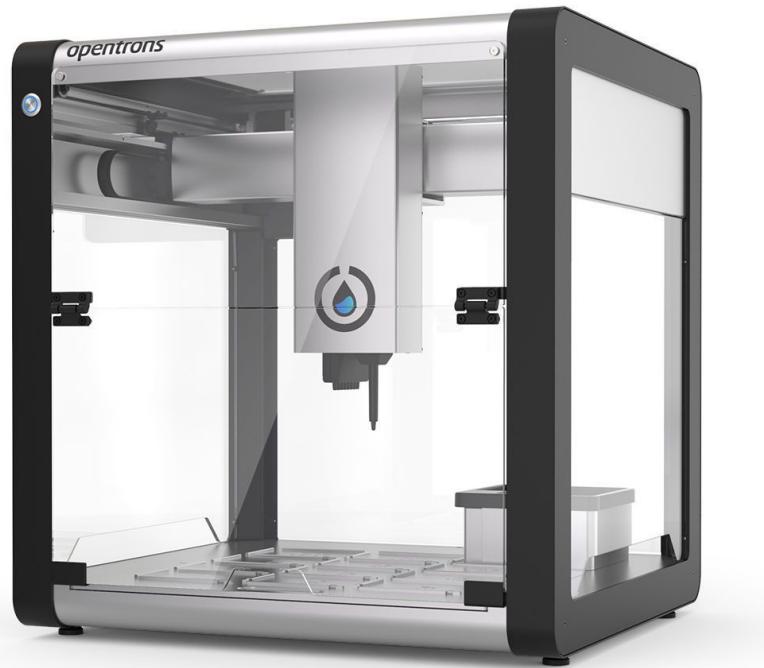


DIY Bio | Economic Success Stories



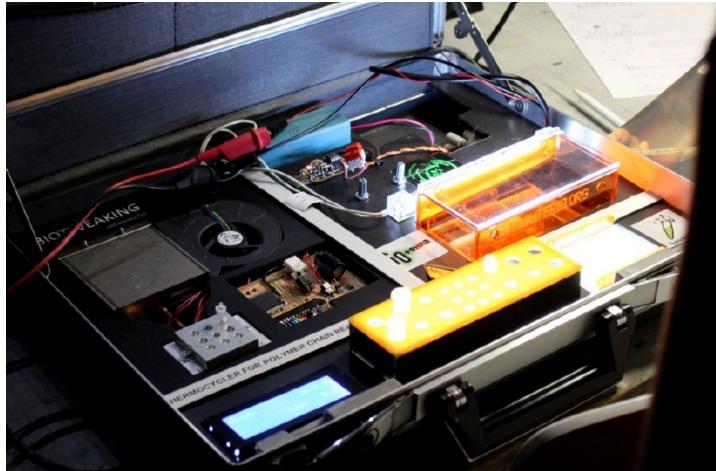


DIY Bio | Economic Success Stories





DIY Bio | Economic Success Stories



Biology





Kingdoms | Microbiology



Animalia



plantae



fungi



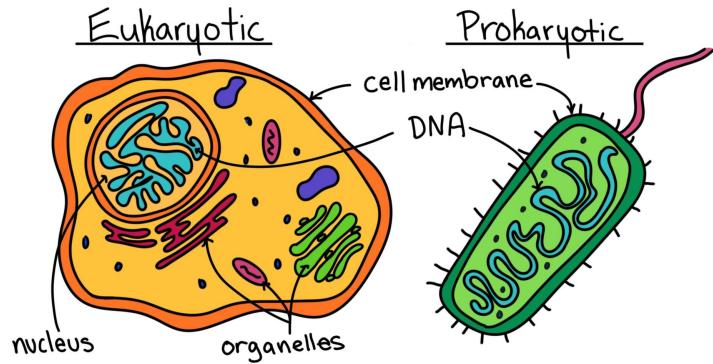
protista



archaea

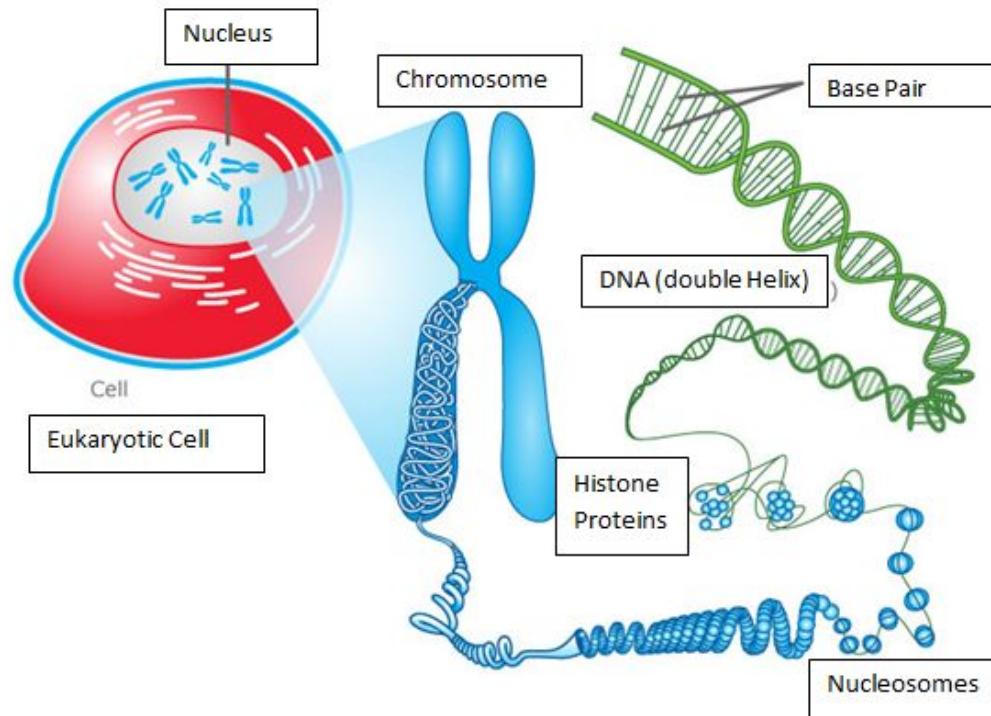


bacteria



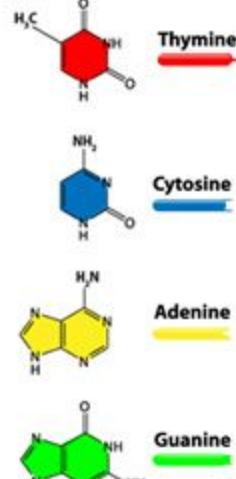


Molecular biology

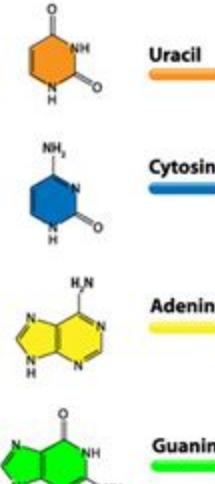
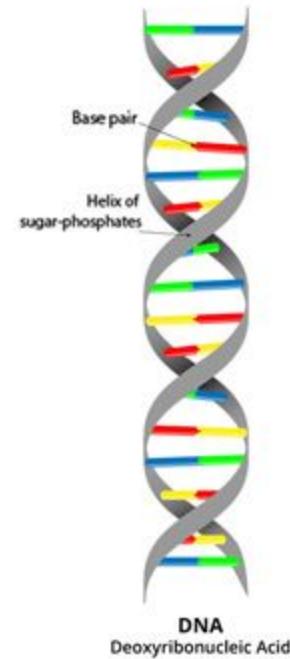




Molecular biology | DNA | RNA



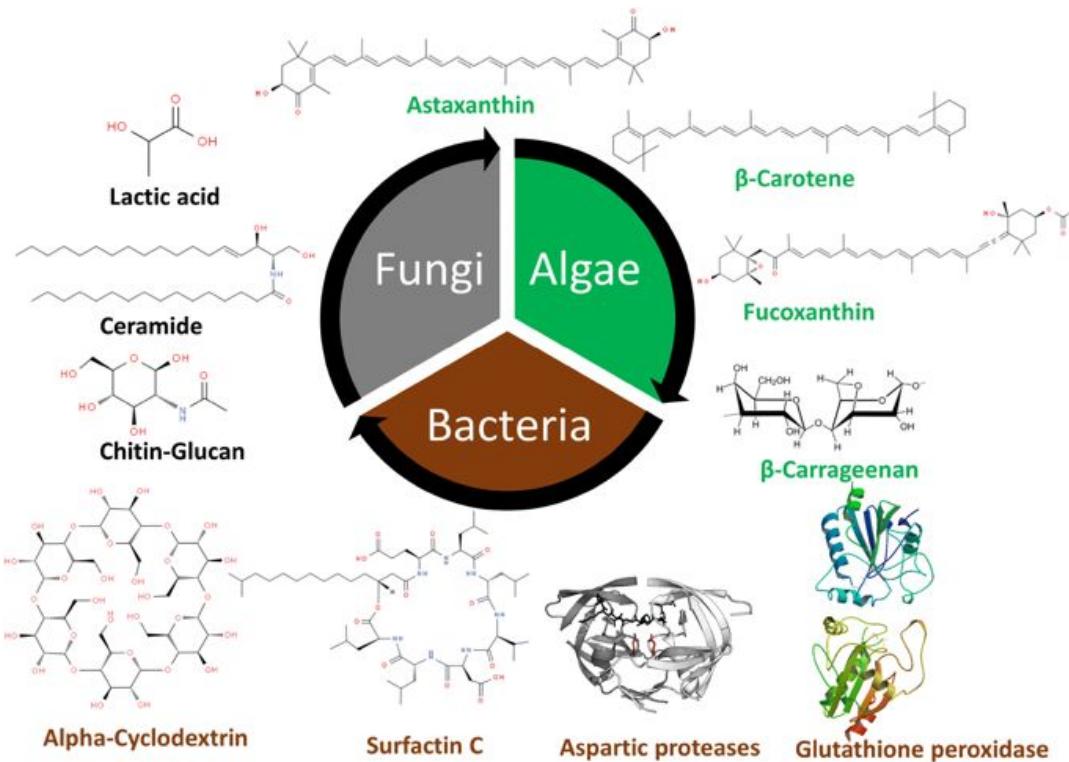
Nucleobases
of DNA



Nucleobases
of RNA



Biochemistry | Enzymes





DNA | Extraction & Purification

HOW TO EXTRACT YOUR OWN DNA

MATERIALS



METHODS



Spit into the shot glass until it's a quarter full of your saliva



Add a few drops of dish soap



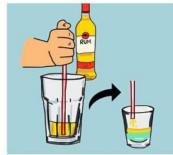
Add a tiny splash of pineapple juice



Add a pinch of salt



Mix the ingredients



Add the alcohol gradually with a drinking straw

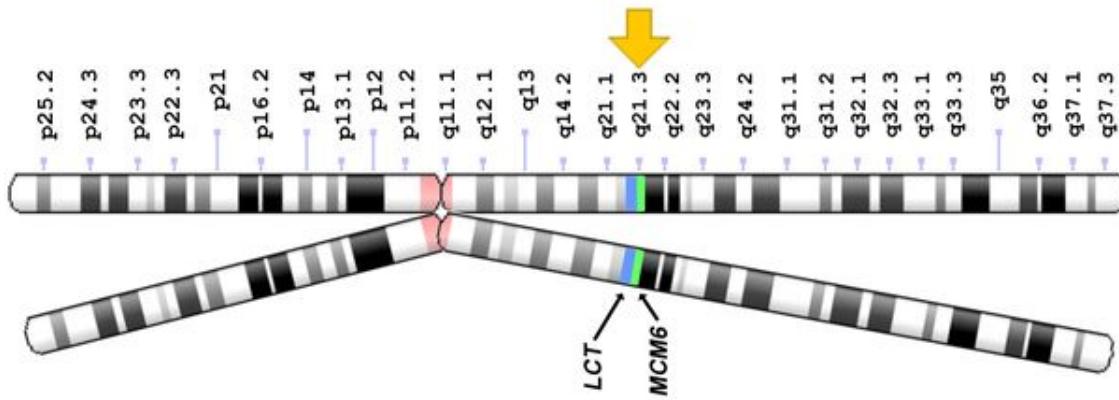


Use a toothpick to spool up the cloudy, snot-like material (your DNA)





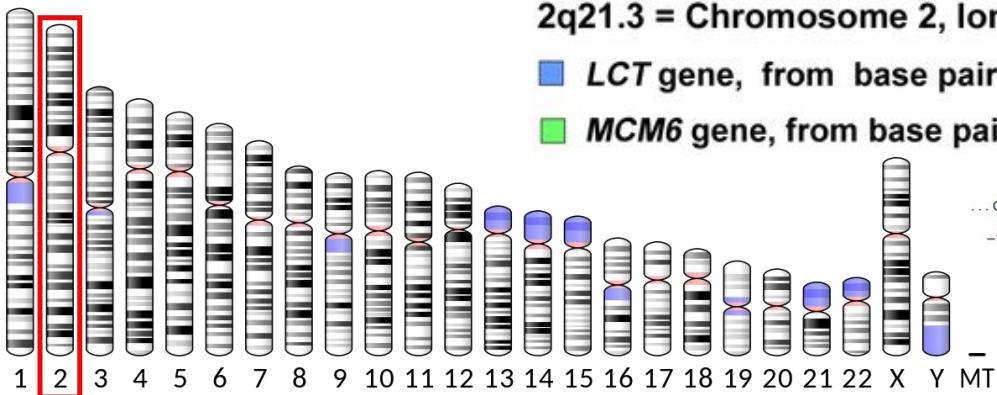
Genetics | MCM6 Gene | Lactose



2q21.3 = Chromosome 2, long arm, position 21.3

■ *LCT* gene, from base pair 135,787,840 to 135,837,195

■ *MCM6* gene, from base pair 135,839,626 to 135,876,477

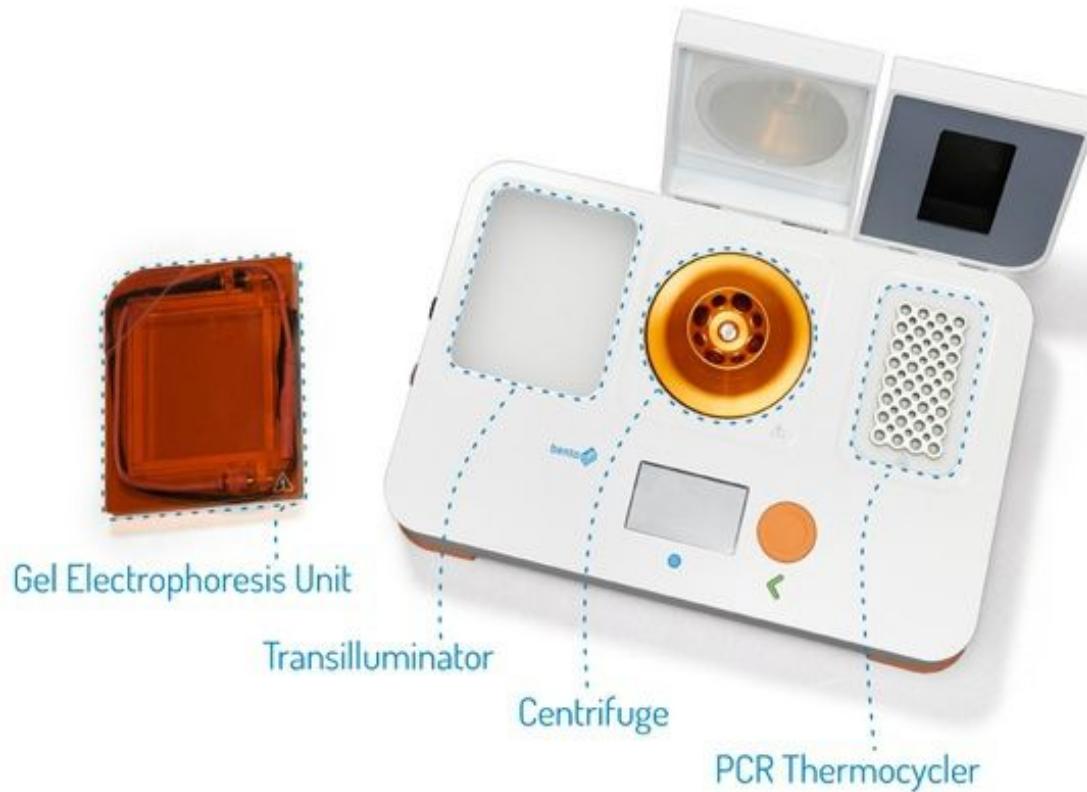


... C [G/C] TAAGTTACCA AAGATAA [T/G] GTAG [C/T] CC [C/G] TG ...
-14010 bp -13915 bp -13910 bp -13907 bp

... GGC [G/A] CGGTGG ...
-22018 bp

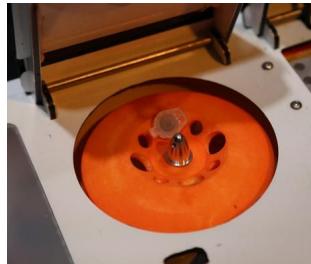
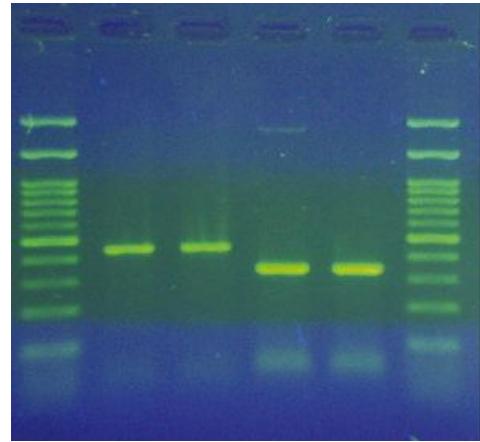
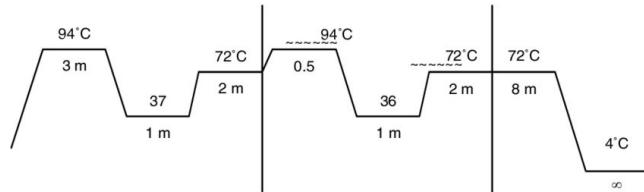


Genetics | MCM6 Gene | Lactose



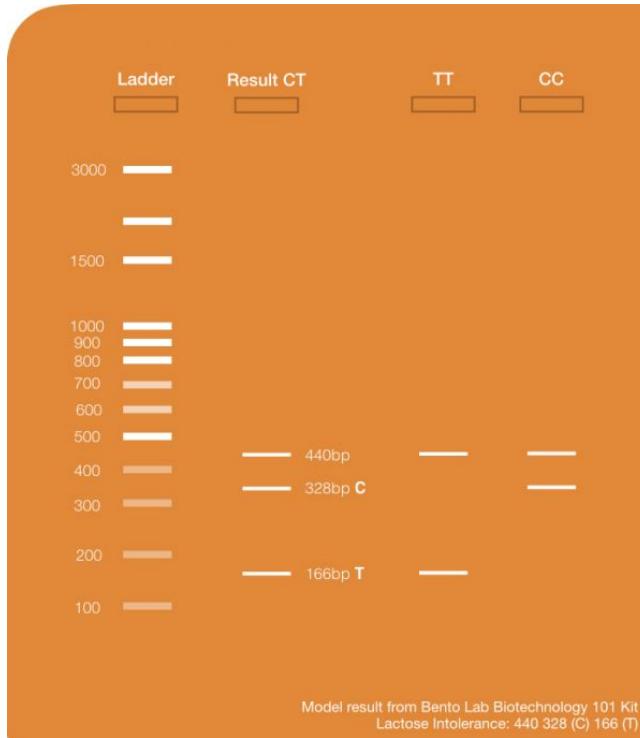


Genetics | MCM6 Gene | Lactose



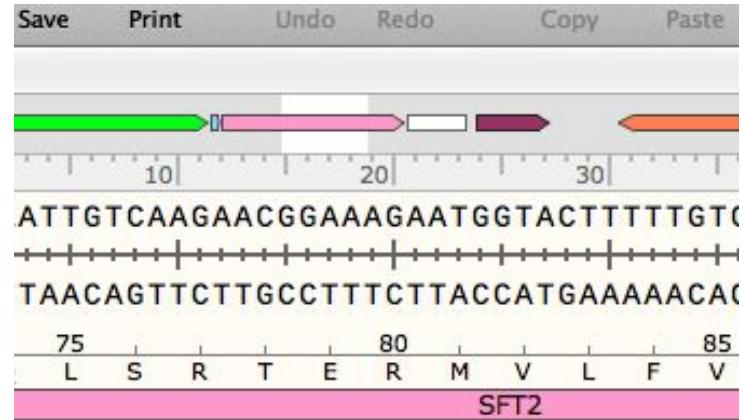


Genetics | MCM6 Gene | Lactose





Genetics | DNA Sequencing & Mapping



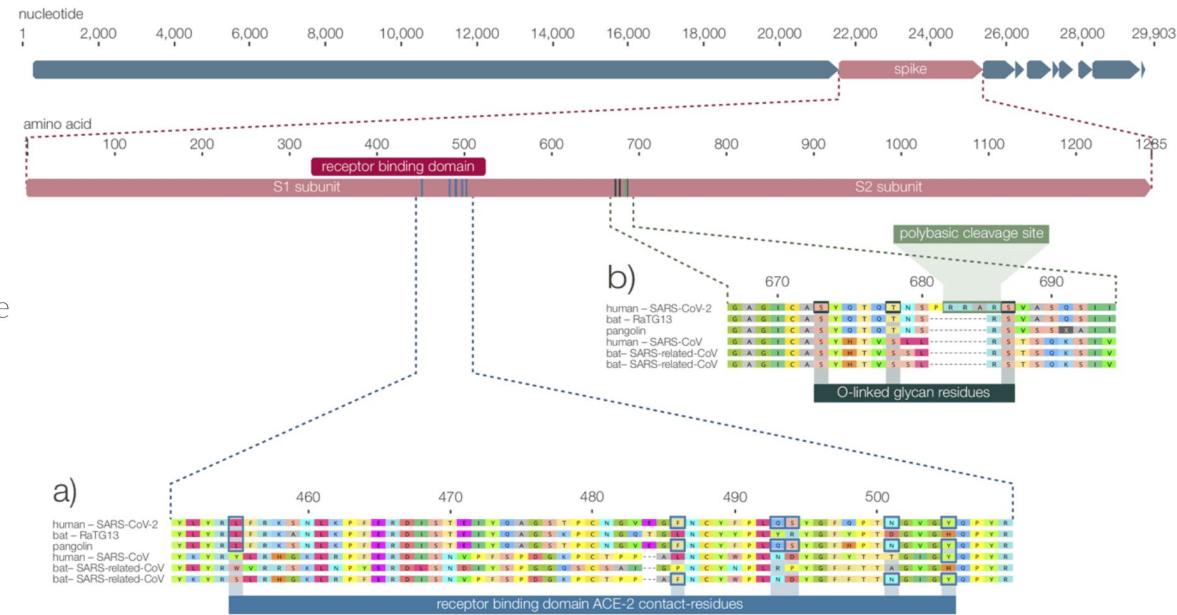
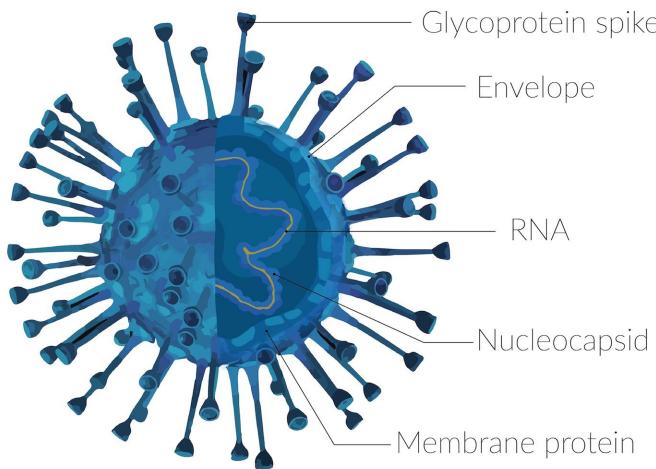
SARS-CoV-2

Diagnostics





SARS-CoV-2





WHO RT-PCR Protocol



OpenCovid19 :

Corona Detective

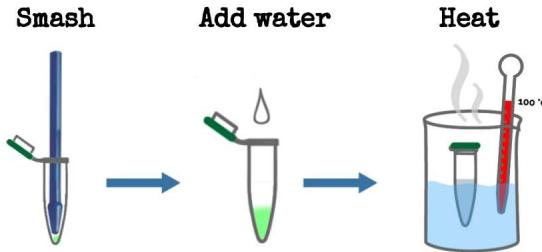


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Corona Detective | LAMP Protocol

2. Extremely Simple DNA extraction:



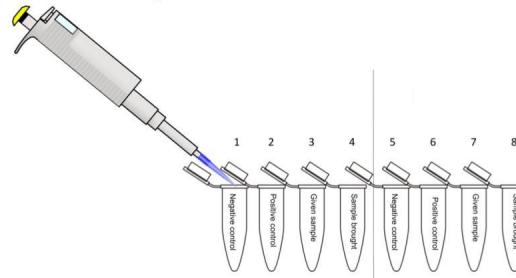
4. Keep at ~63°C for around an hour

There are many simple ways to do this!



3. Transfer the DNA to the test tubes

Along with positive and negative controls



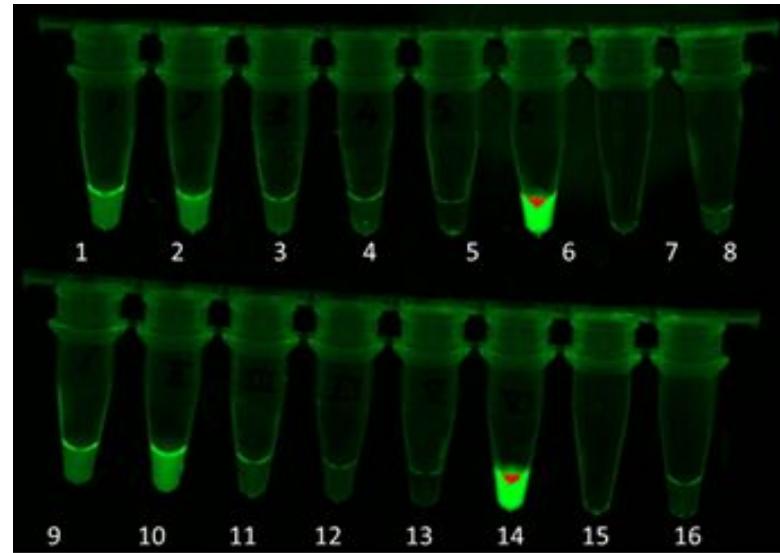
5. Read the fluorescent results

With our incredibly affordable and easy to build open hardware detector



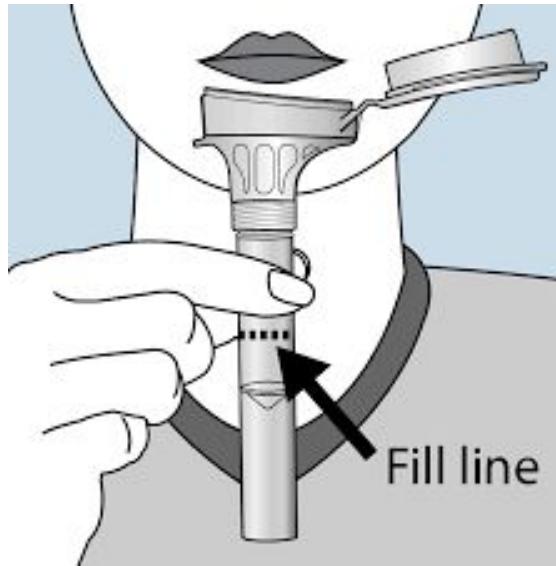
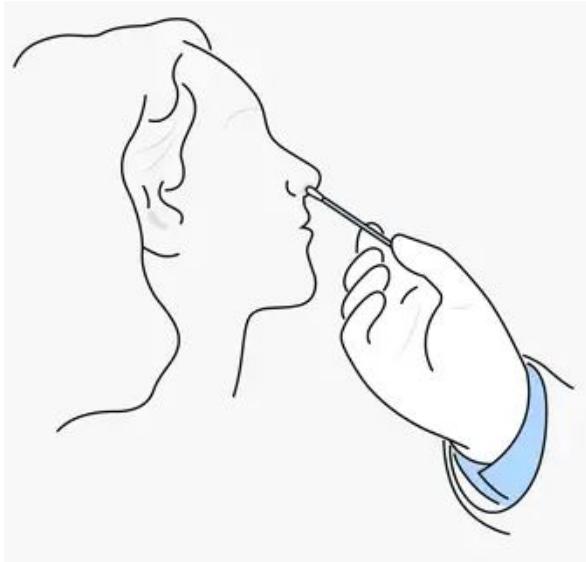


Colorimetry | Fluorometry





Swab | Saliva





OpenCovid19 | Organisations



Just One Giant Lab
learning & solving together



Hackuarium



OPEN BIOECONOMY
LAB



GMO Detective



Genspace



Open FIESTA Lab

AANIKA

epiLAMP
TestEmAll



SLINTEC
SRI LANKA INSTITUTE OF NANOTECHNOLOGY (PVT) LTD.



UNIVERSITY OF
CAMBRIDGE



TECHNISCHE
UNIVERSITÄT
DARMSTADT

gig
GLOBAL
INNOVATION
GATHERING

BioBricks
FOUNDATION

Reclone.org

& Many more

FREE
GENES

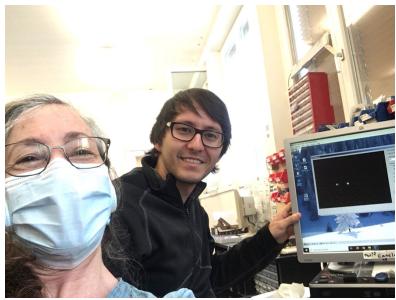
iGEM



Corona Detective | Team



Guy & Team
France



Rachel & Team
Swiss



Sarah, Isabella &
Team USA



Fernan & Team
Chile



Ellen & Team
USA



Madhavi, Kalindu, Sanjaya,
Aravinth & Team - Sri Lanka



Thomas, Stephane, Nadine
& Team - Cameroon



Scott & Team
Canada



Fran & Team
Spain

& Many more

**Guy & Team
France**



**Rachel & Team
Swiss**



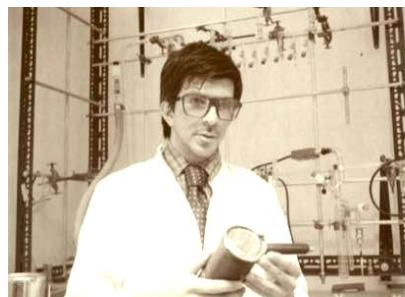
**Ellen & Team
USA**



**Madhavi, Kalindu, Sanjaya,
Aravinth & Team - Sri Lanka**



**Sarah, Isabella &
Team USA**



**Fernan & Team
Chile**



**Thomas, Stephane, Nadine
& Team - Cameroon**



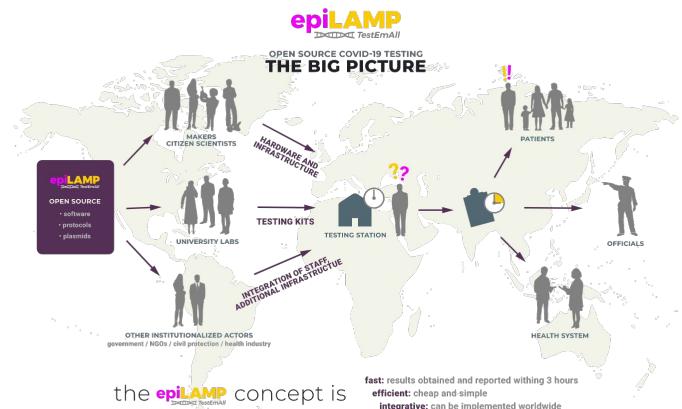
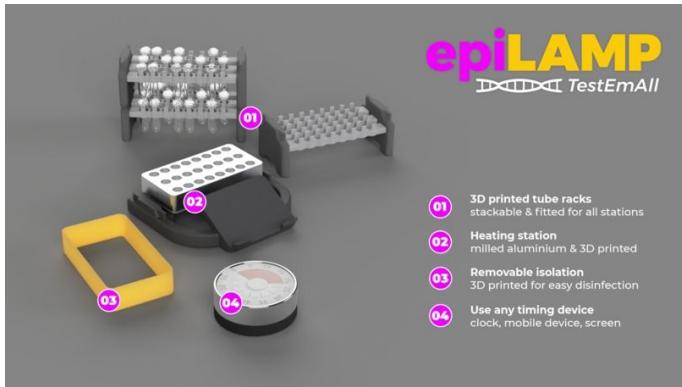
**Scott &
Team
Canada**



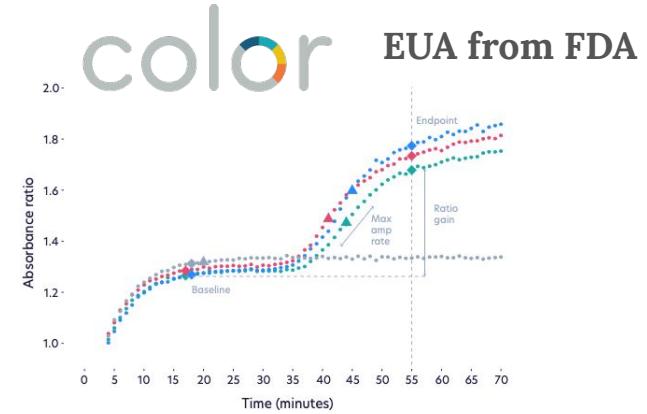
**Fran &
Team
Spain**



epiLAMP | Color Assay



Source : epilamp.org, color.com



Target
▲ ORF1a ▲ E-gene ▲ N-gene ▲ RNaseP

Table 5. Clinical sample positive and negative agreement results

		Previous assay result		
		Positive	Negative	Total
Color assay result	Positive	41	0	41
	Negative	0	502	502
	Total	41	502	543
Positive agreement		100% (41/41)		
Negative agreement		100% (502/502)		

The Global South Perspective





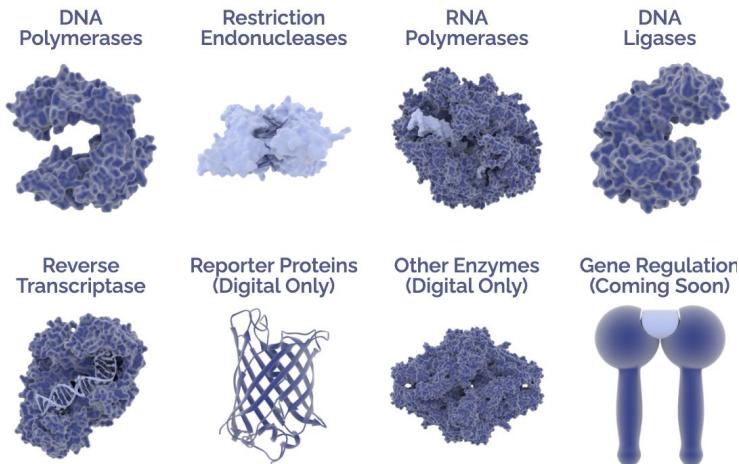
Open Protocol | Open Material



Jennifer Molloy

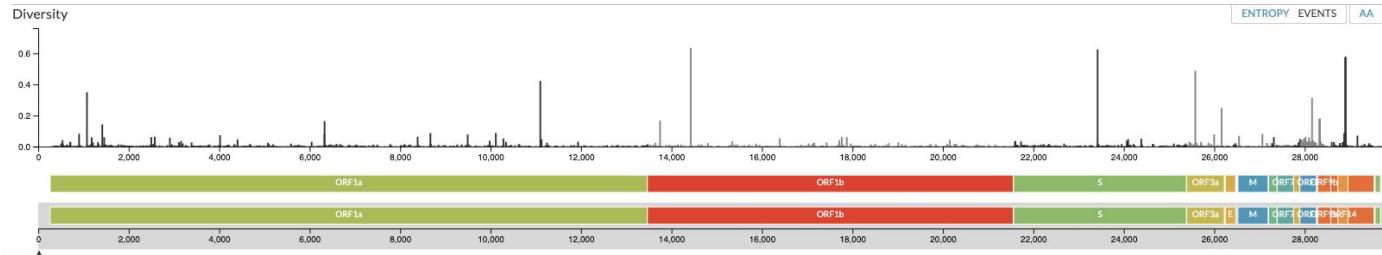
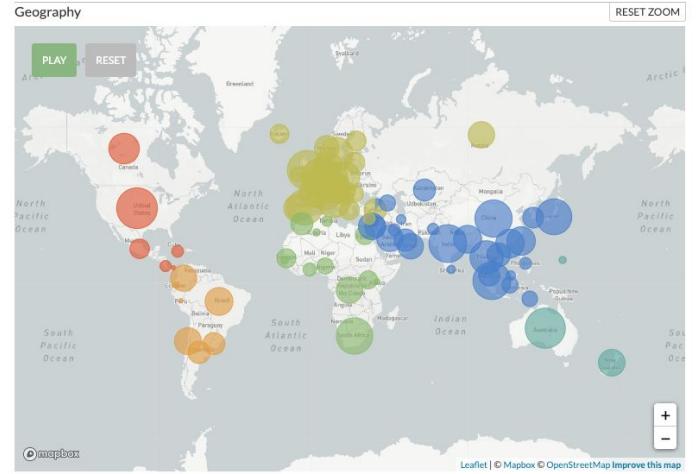
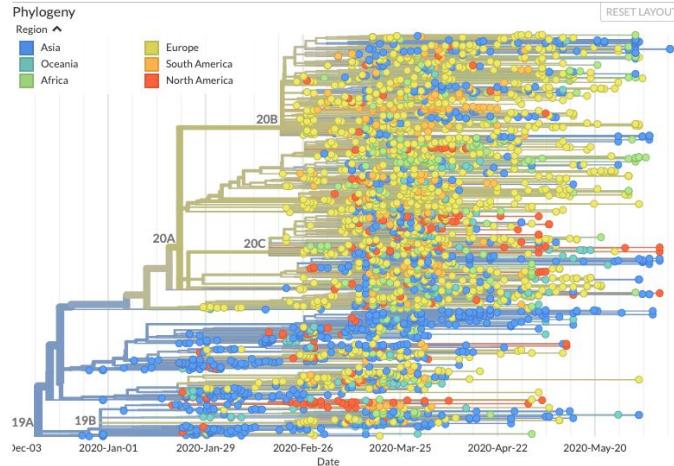


UNIVERSITY OF
CAMBRIDGE



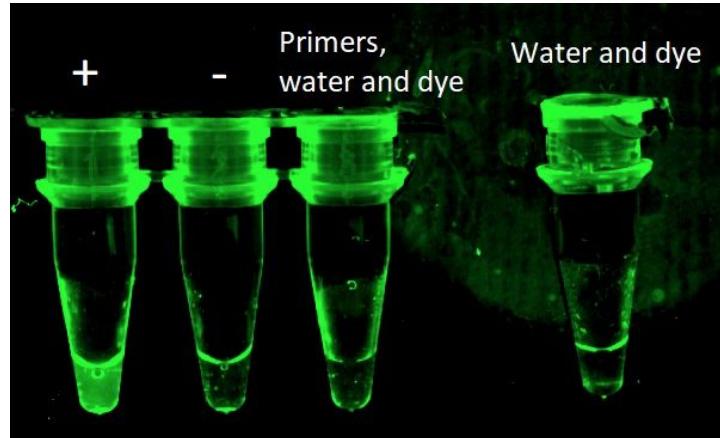
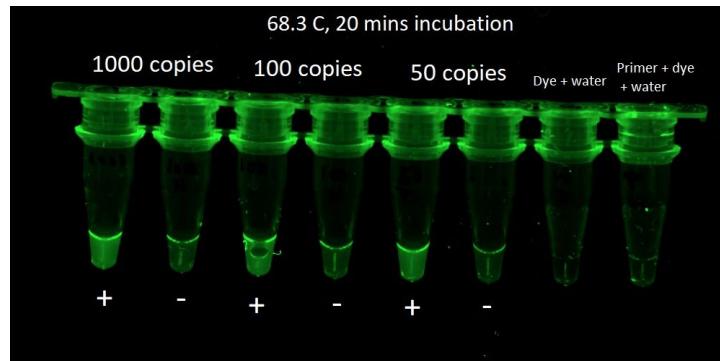


Mutation | Local Production





Sri Lanka Institute of Nanotechnology



*You Can Be A Part Of This
To Be Better Prepared For
The Next !!!*





Thank You