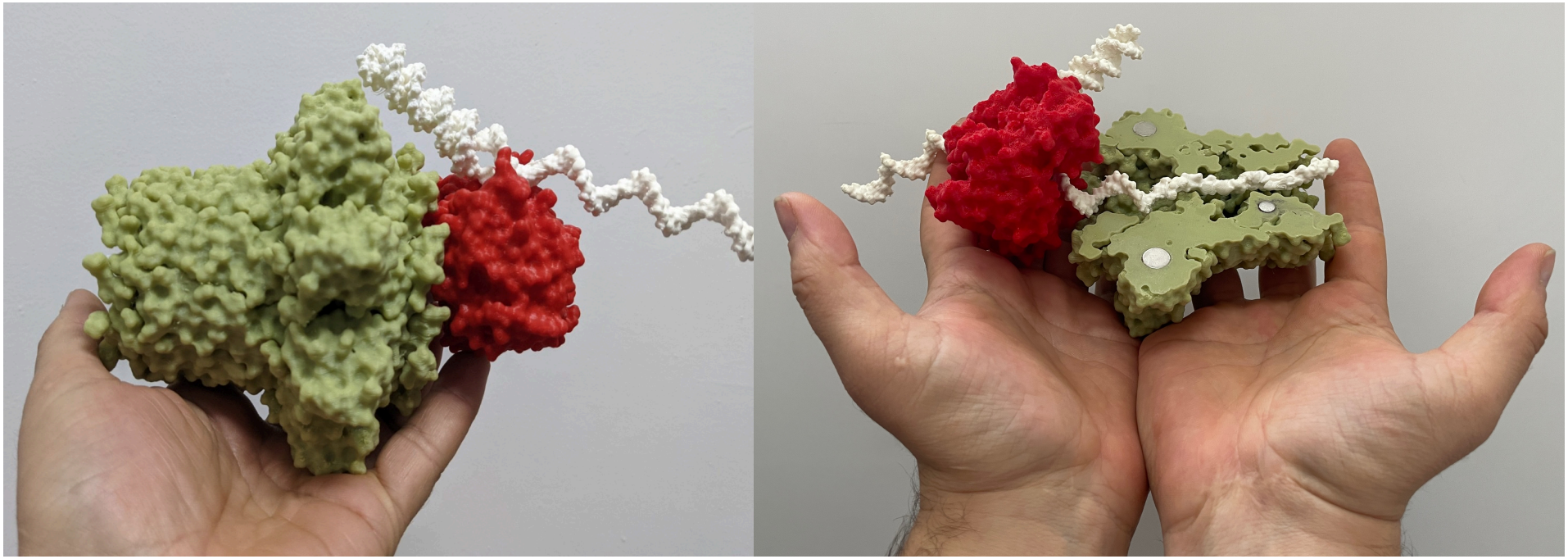
Explore the molecular Universe using 3D printed models

molecularmodels.ro

Improving life-sciences education by using molecular models

www.modelemoleculare.ro / www.molecularmodels.ro

Nanopore sequencing complex



Custom macromolecular models, adapted to each lesson / teacher are a must !!!

Who needs molecular models?

Explore the molecular Universe using 3D printed models

Pupils and Students

who want an better learning experience and a deeper understanding of key concepts in life sciences

Teachers

in secondary schools, colleges or universities with a bio-medical profile that want to carry out exciting lessons and attract young people to the field of life sciences.

Researchers

showcasing their work and wanting to bring the molecular universe to the public.

Romania, 2019: 1163504 pupils and students; 80219 teachers and faculty; 27471 researchers.

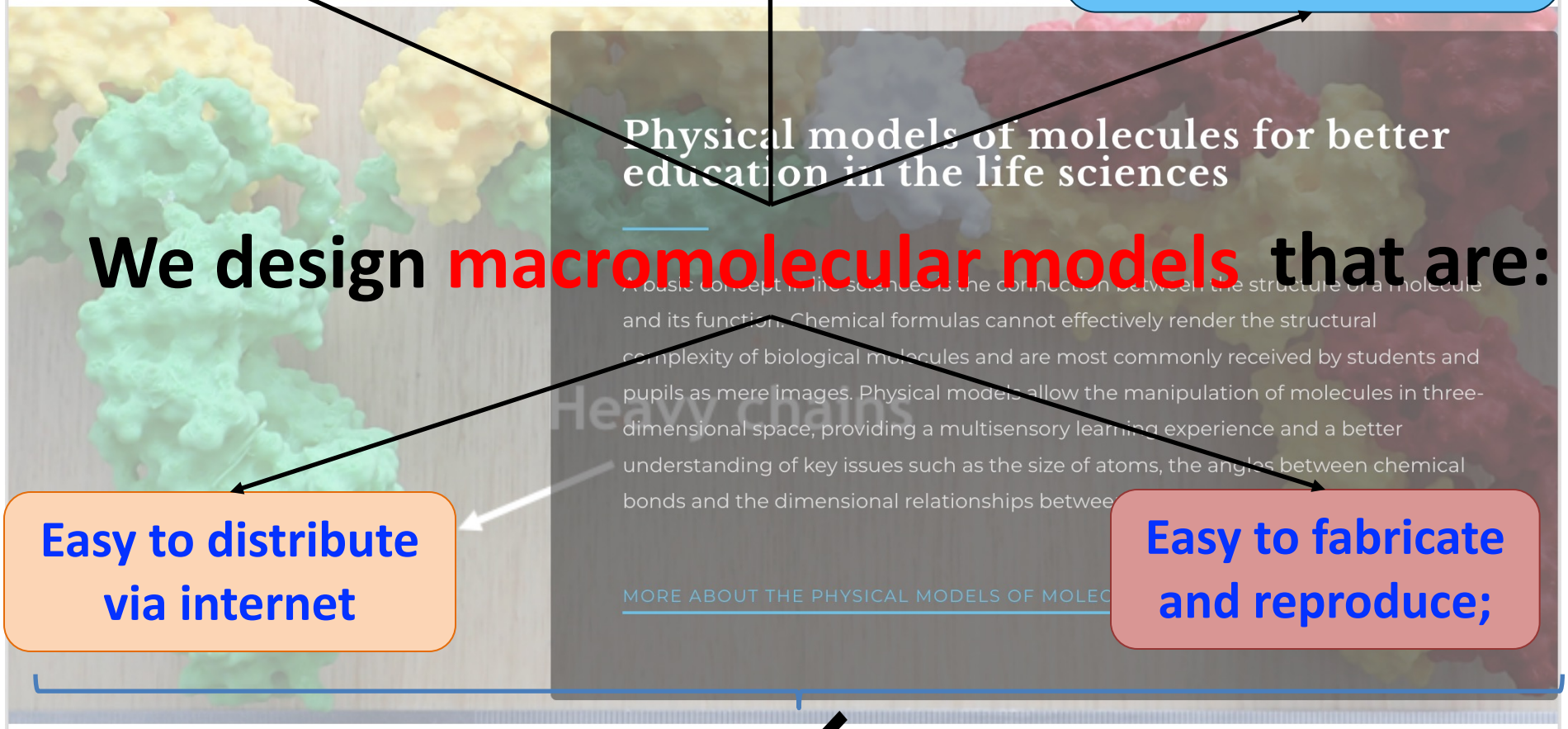
We created - molecularmodels.ro

Explore the molecular Universe using 3D printed models

Based on real scientific data;

Depicted in a "textbook"-like manner;

Easy to adapt to the changing outcomes of a given lesson;



We design macromolecular models that are:

Easy to distribute via internet

Easy to fabricate and reproduce;

Widely accesible 3D printing technology

Other companies selling 3D models?

Explore the molecular Universe using 3D printed models

Company	Price/ model	Printing technology affordability	Printing / teaching instructions	Model files availability
3D Molecular Designs (USA)	$500 to $1,500	Low to medium; **high end printers;**	No / Some	Not available
Biologic Models (USA)	$100 to $2,500	Low; **high end professional printers;**	No	Not available
molecuramodels.ro	$30 to $100	High; cheap consumer grade printers;	Yes	Yes

our models are way cheaper

AND

come with full instructions on how to use them in classroom

AND

can be printed by anyone

Models validated by our peers

Explore the molecular Universe using 3D printed models

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DOI: 10.1002/bmb.21493

ARTICLE

Biochemistry and Molecular Biology Education

WILEY

A beginner's guideline for low-cost 3D printing of macromolecules usable for teaching and demonstration

Marius Mihasan

Section created to host our models:

10 Years PROTEOPEDIA — LIFE IN 3D —

Files for 3D printer

Alpha-amylase with flexible amylopectin by Marius Mihasan

Models on

U.S. Department of Health and Human Services — National Institutes of Health

NIH 3D Print Exchange

have been downloaded

4300 times

We are building a community

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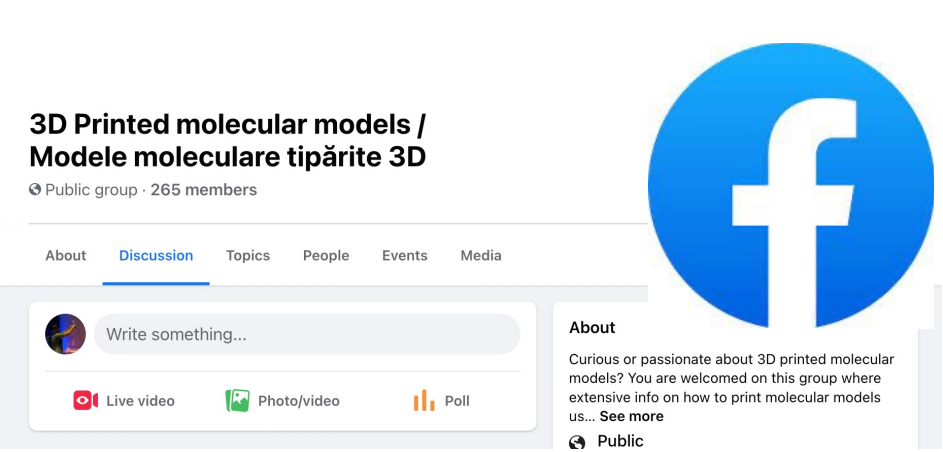

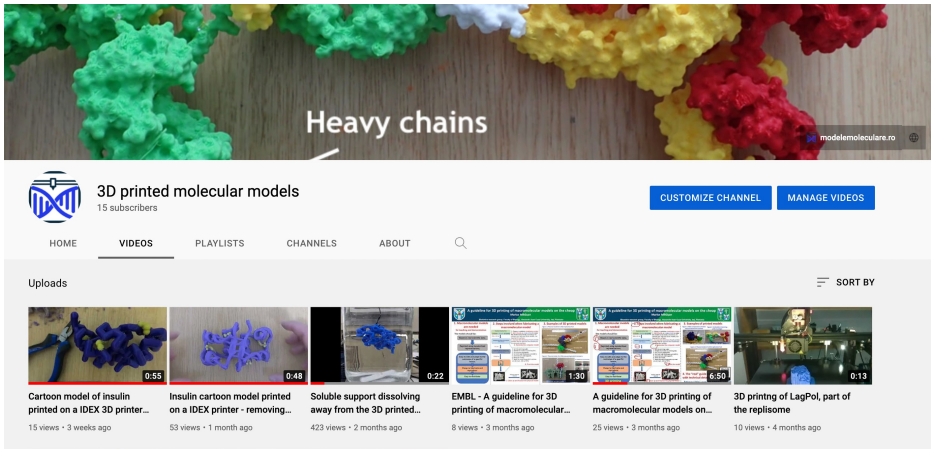

Plans to grow

Explore the molecular Universe using 3D printed models

molecularmodels.ro

Direction	A. Web-based service	B. Web-repository of molecular models	C. On-demand fabrication of molecular models
	Users can log-in, ask (or even do a minimalistic design) for a custom model	Download files, instructions and teaching context	Web-site based order
	Pay per design	Pay per package	Pay per model
Implementation	Can be automated to some degree	Fully automated	Print by us for low batches, externalisation for large batches

The team and what we can do

Explore the molecular Universe using 3D printed models

We are a team of four:

The people behind the project are:

Marius Mihășan

Prof. Dr., 3D design and printing

Teacher at the Faculty of Biology, UAIC; passionate about structural biology and 3D printing.

Eugen Ungureanu

Lect. PhD, design and photography

Teacher at the Faculty of Biology, UAIC; passionate about biochemistry, nature and photography.

Boiangiu Răzvan-Ștefan

Dr. in Biology

Postdoctoral researcher at the Faculty of Biology, UAIC; takes the first steps in molecular design.

Amada El-Sabeh

Student doctorand

PhD student at the Faculty of Biology, UAIC; takes the first steps in molecular design.

And we can:

- provide **on-demand, customizable 3D molecular models** complete with with teaching context and 3D printing instructions; all models are easy and cheap to fabricate by students and teachers alike;

- **fabricate models** using our own 3D printers;

Supported by:

iTransfer Centre for Technology Transfer, UAIC Iași

Contact:

Marius Mihășan, Grupul de cercetare BioActive, Facultatea de Biologie, Universitatea Alexandru Ioan Cuza din Iași

Adresă:
Carol I, Nr.11, 700506, Iaşi, România

Email:
contact@modelemoleculare.ro

Website:
www.modelemoleculare.ro

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Noutăți

Help us make a difference in life-science education

Explore the molecular Universe using 3D printed models

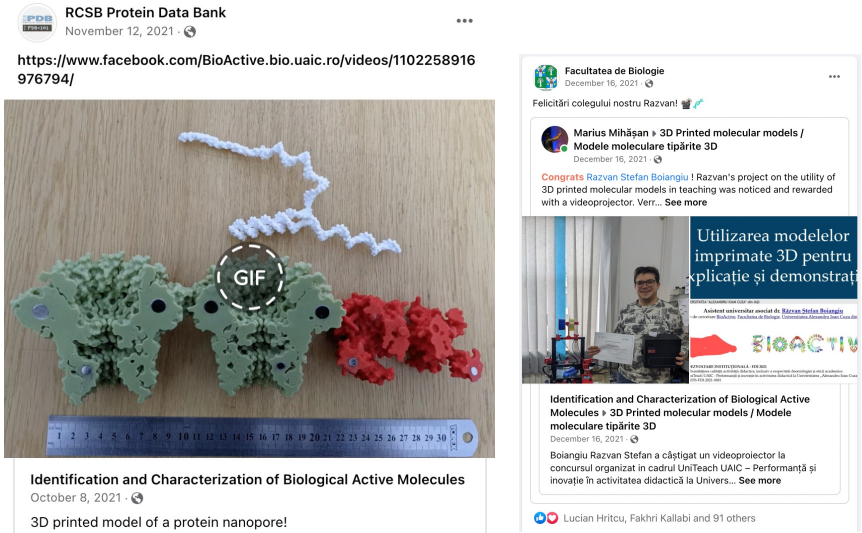
Further validation by our peers

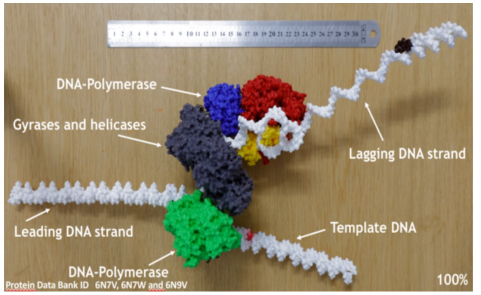
Explore the molecular Universe using 3D printed models

Best poster award in Education

and in the Newsletter from the **Federation of European Biochemical Societies**

Posts shared by Protein Data Bank, PDB





3D printing as a cheap way of creating macromolecular models usable for teaching

The structure-to-function relationship is the hallmark of biochemistry, molecular biology, and life sciences in general. Physical models give students the possibility to touch and interact with mac...

By Marius Mihasan , Professor, Alexandru Ioan Cuza University of Iasi

Prize received by Răzvan

Interest showed by:

Babeș-Bolyai University, Cluj-Napoca – order for models received

Tesla High school, Bucharest

Vasile Alecsandri University, Bacau

Who could be our partners?

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Any company that:

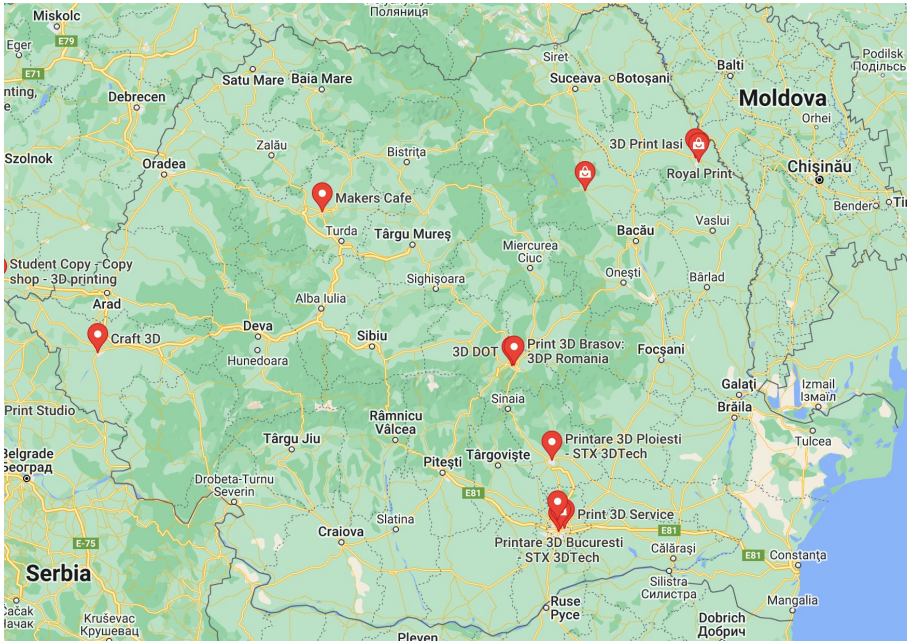
1. develops **Educational materials** – we have contacted editors of Lehningers Principles Biochemistry, book produced by

macmillan learning

2. develops **3D printing technologies**

PRUSA RESEARCH by JOSEF PRUSA

2. offers **3D printing services**



What we need to progress further?

Idealized scenario – grow and keep molecularmodels.ro free for everyone

20 000 € - initial investment for:

- **Increase the size of our models repository;**
  - 5 more printers;
  - Plastic and consumables;
- **Raise awareness on the technology**
  - Giveaways - printed demos;
  - Mass-media coverage;
  - Travel around Romania at high schools and universities to raise awareness;
  - Workshops and practical sessions on molecular modelling and 3D printing;

5 000 €/year for:

- Plastic and consumables;
- Web-hosting and web-design;
- Ocasional travel;

CC BY

molecularmodels.ro will not generate any revenue, all models released under CC BY license

What we need to progress further?

Realistic scenario – turn molecularmodels.ro into a spin-off/start-up

100 000 € for:

- **Increase the size of our models repository;**
  - 10 more printers;
  - Plastic and consumables;
- **Raise awareness on the technology**
  - Giveaways - printed demos;
  - Mass-media coverage;
  - Travel around Romania at high schools and universities to raise awareness;
  - Workshops and practical sessions on molecular modelling and 3D printing, including giveaways (printed demos);
- Software licences;
- Increase our team to 8-10 people - **1-2 for web development and automation, 2-3 for molecular design and production;**
- Costs related to spin-off creation and operation;

molecularmodels.ro will generate revenue within 1 year from investment

Key milestones towards market

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Funding received

Presentations/events organised in all major 19 cities

End of 1st trimester

5000 downloads (1000 payed dowloads)

End of the 2nd trimester

working platform for design automation

12 months since funded received

500 orders received

Examples of printed models currently used for teaching

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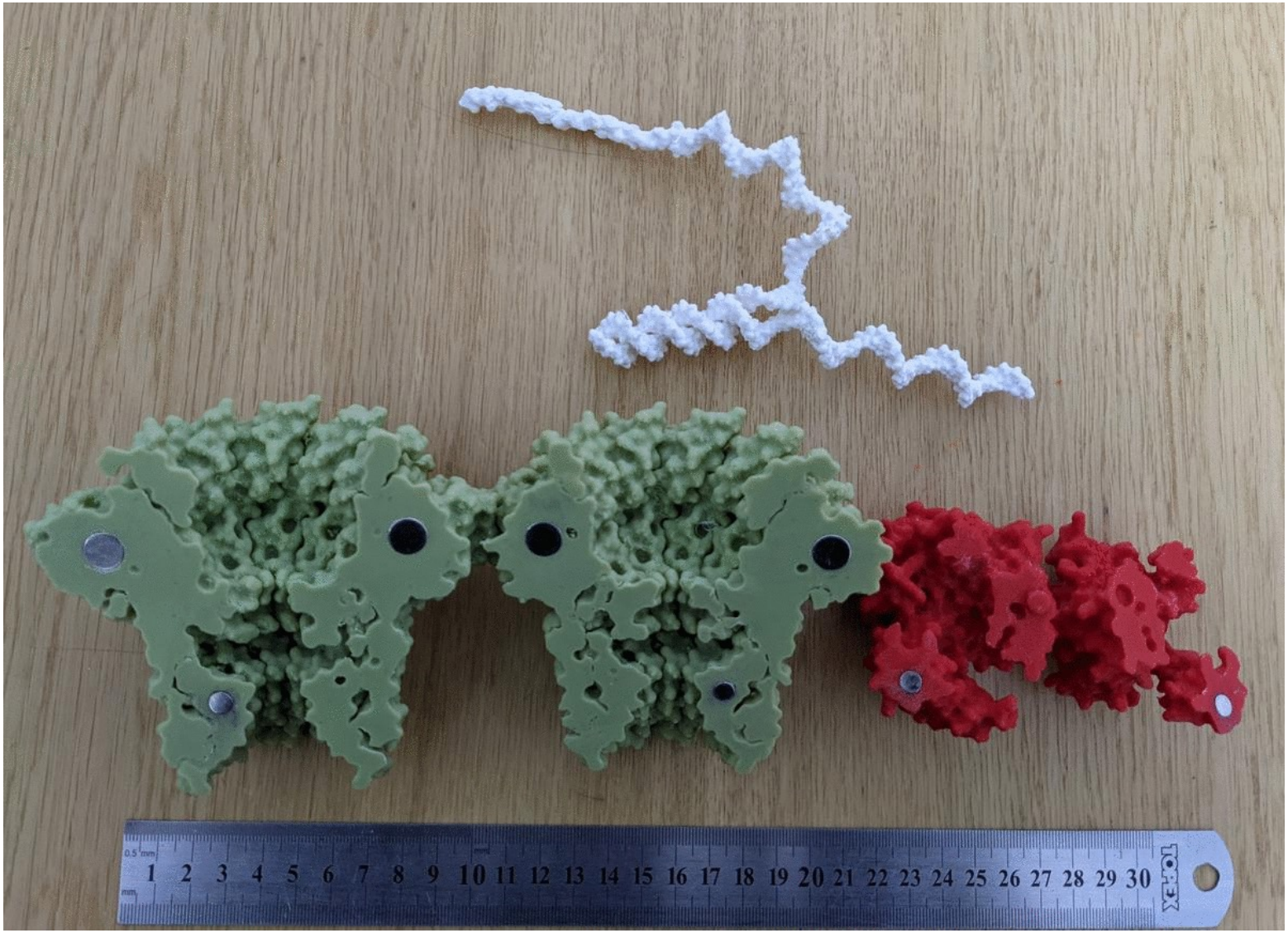
A protein nanopore sequencing DNA



Examples of printed models currently used for teaching

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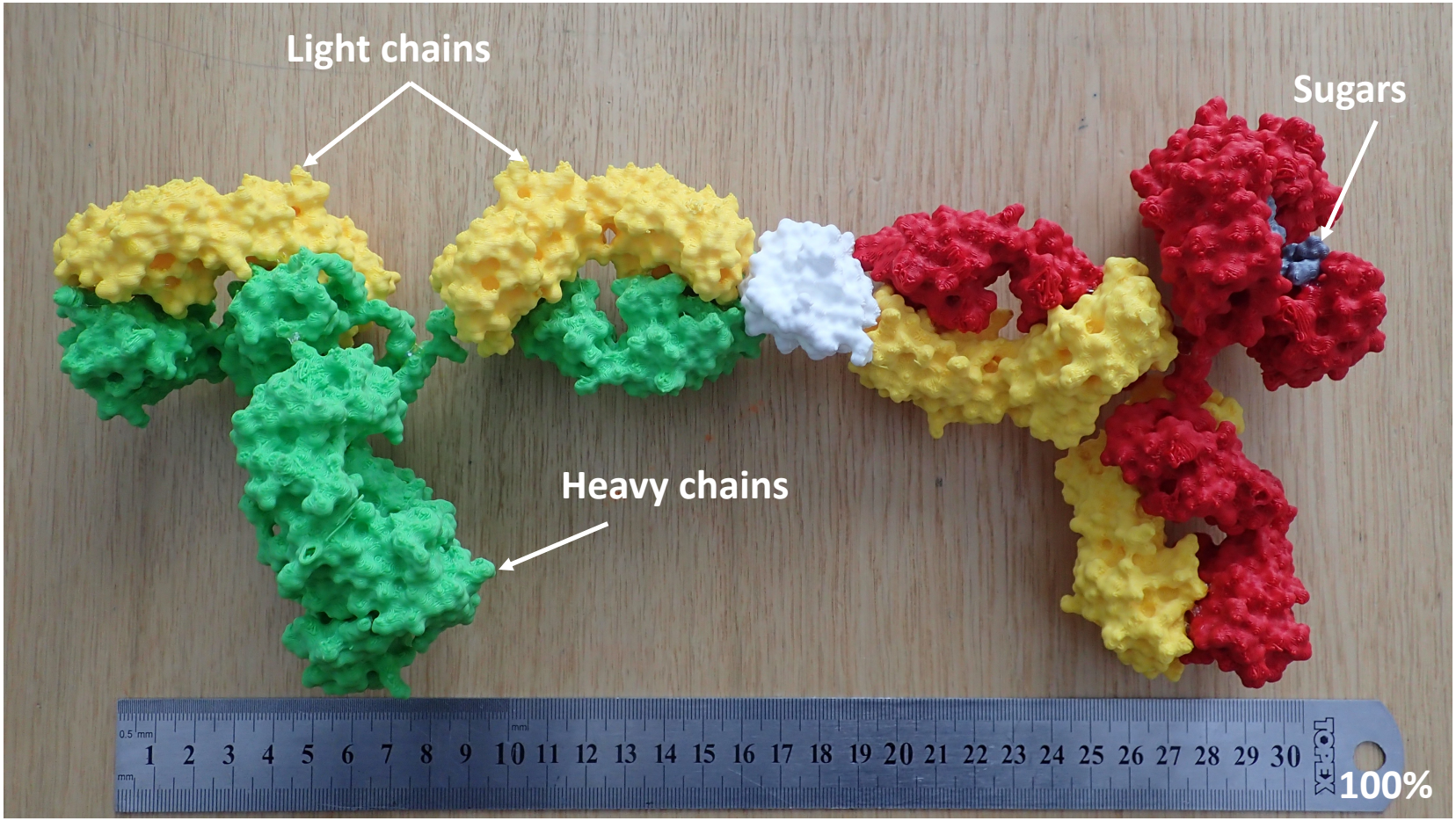
Antibodies interacting with an antigen (lysozyme)



https://3dprint.nih.gov/discover/3dpx-015554

Examples of printed models currently used for teaching

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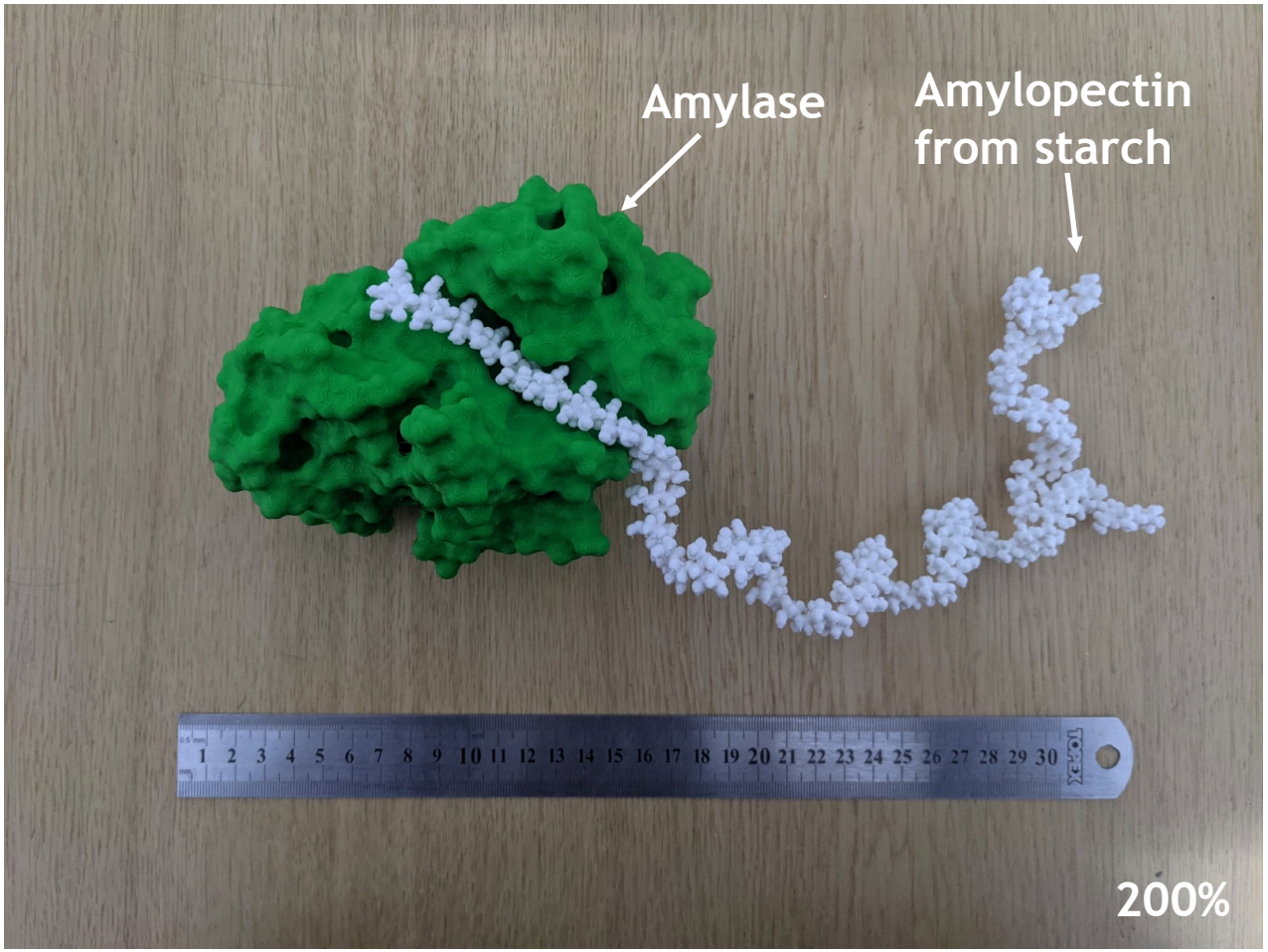
Amylase from saliva cleaving starch



Examples of printed models currently used for teaching

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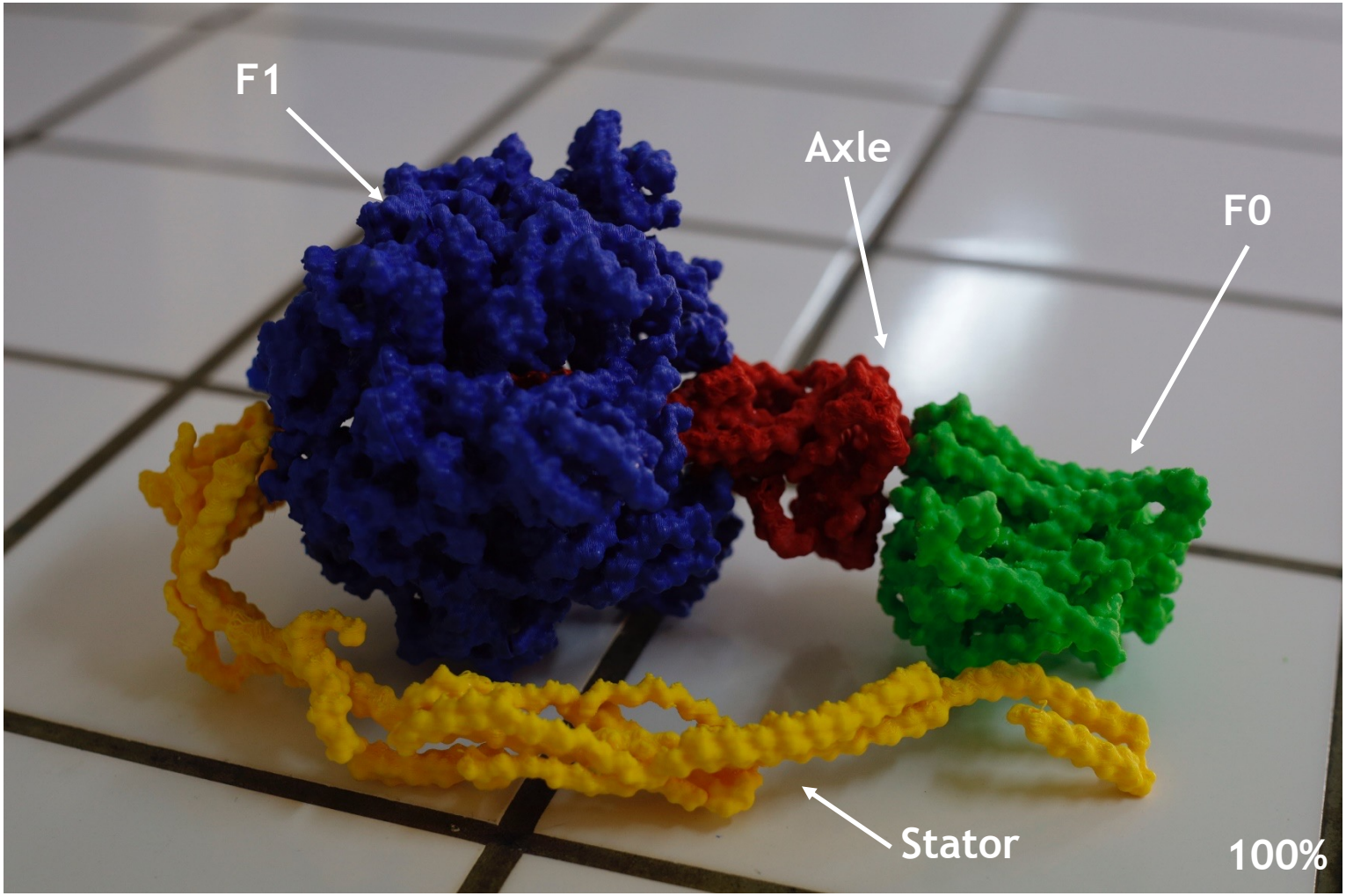
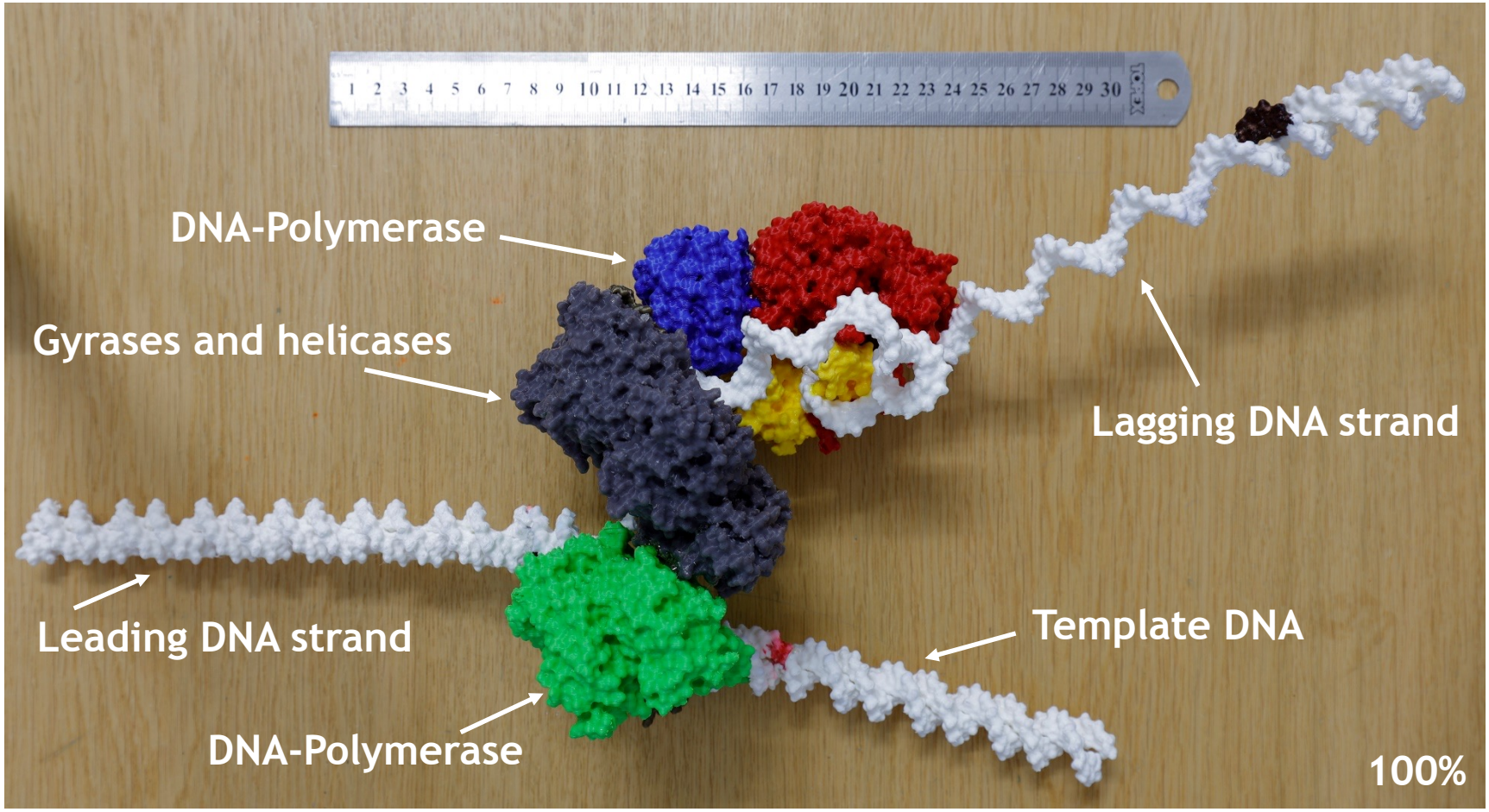
Mitochondrial ATP-ase – the protein responsible for generating energy for the cell



Complete replisome – the molecular machinery responsible for DNA replication



Hello everyone. Based on the north west demo day we would suggest that all the teams have appendix slides hidden at the end of their presentations. These slides can be used to answer questions from the panel.
Suggested questions:
- what do you need to progress your project? Be clear “we need €x to do ……”
- what are the key milestones towards market?
- how will you spend / utilise any investment?
- who could be industrial partners?
- detailed competition slide with clear advantages
- what supporting data do you have for your technology - list papers, information, data etc.

Think of other questions you may be asked…..

Thanks
Ian

Slide 1 - one –liner – cine si cui ne adresăm

Slide 2 - problema/oportunitate

Slide 3 – piata –potentiali client, tendinte, cat din piata

Slide 4 – care este solutia, cum rezolvă problema

Slide 5 – solutii alternative, pozitia fata de competitie; table cu solutii alternative de la co

Slide 6 – modelul de business , cum vindem, cum putem livra

Slide 7 – tractiune (pre si post revenue) – ce impact am avut pana acum, parteneri identi

De adaugat articolele stiintifice, de integrat prezenta pe Proteopedia si PDB

Slide 8 – planuri / obiective

Slide 9 – echipa – de ce este echipa potrivită, ce experienta exista si care recomanda

Slide 10 – ask
Slide 11 – date contact, idea de a atrage audienta de partea mea