

Let's Talk Research!

iGEM Grand Tokyo

About us - iGEM Grand Tokyo

We are a group of high schoolers joining an international research competition, iGEM!

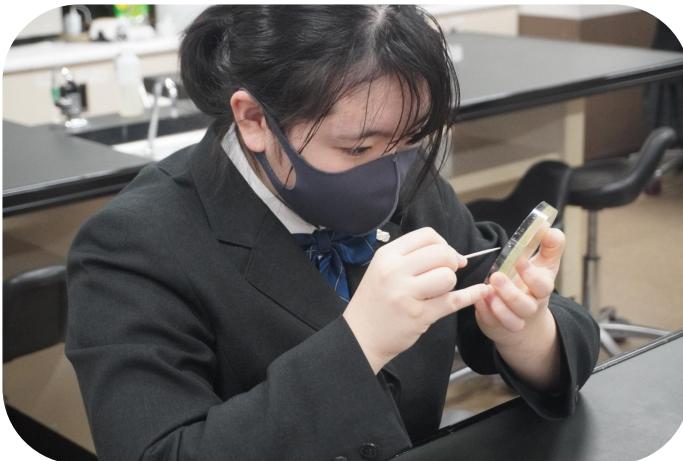
Out of 17 members, four of us, including the leader, are from Hiroo!



Shiori Kajikawa

Research on the correlation between Planarians' pain & regeneration

Chiba University GSC



All-paid science camp at Denmark last summer

Love travelling places for 学会発表 Kyoto, Kobe, Nagoya...

Planarians are CUTE



Arisa

Research at UTokyo GSC

Effect of the *triosephosphate isomerase* gene on the cadmium resistance of *Marchantia polymorpha*

超少人数研究室(めっちゃいい)

Wet lab at iGEM



It all started with a volunteering opportunity....



Be able to help those in need
through research and
developing a product!



Doria Lee

Stanford e-Entrepreneurship Japan

i-GIP 2023

HKU Academy for Talented
SJYC

Etc.

Our objective

Encourage more people to be involved in synthetic biology!

But...what is research in the first place?

The background features abstract, flowing green shapes of varying sizes and shades, resembling liquid or organic forms. Scattered throughout these shapes are numerous small, solid green dots of different sizes.

What is research?

A Venn diagram consisting of two overlapping circles. The left circle is light red and contains the word "Studying" in large black font, with the explanatory text "Learning what is already there to be learnt" in smaller grey font below it. The right circle is light blue and contains the word "Research" in large black font, with the explanatory text "Discovering something nobody else knows yet" in smaller grey font below it. The overlapping area in the center contains the letters "VS" in large black font, indicating a comparison between the two concepts.

Studying

Learning what is already
there to be learnt

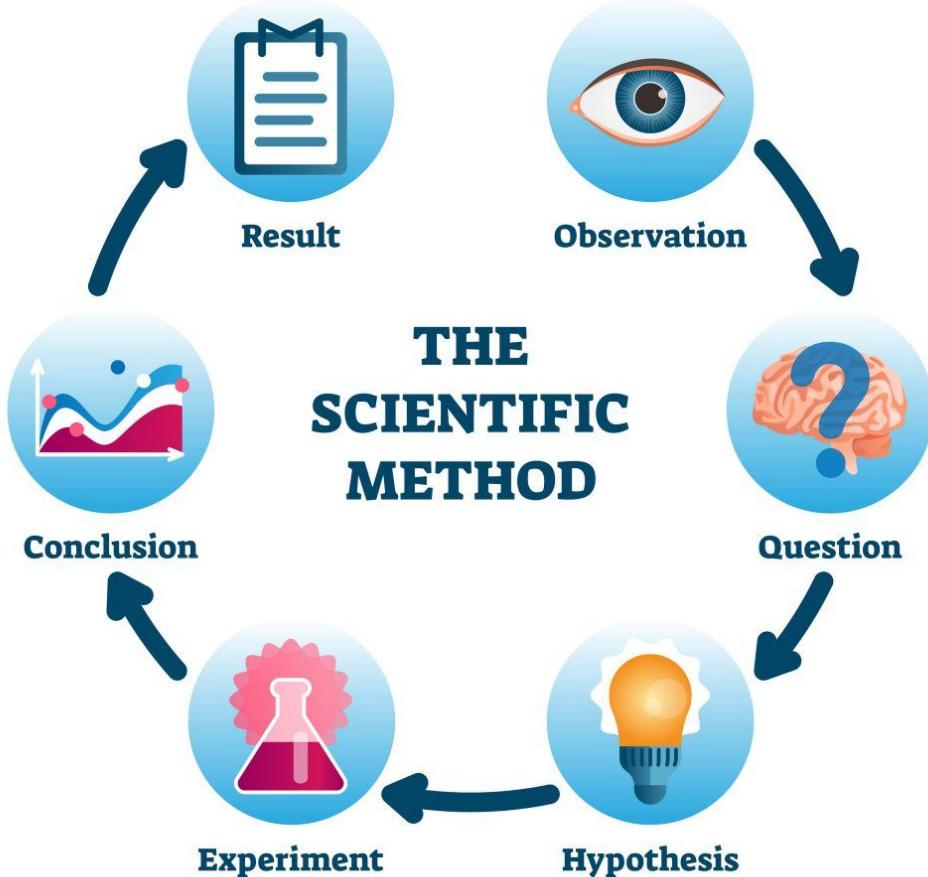
Prior research

VS

Research

Discovering something
nobody else knows yet

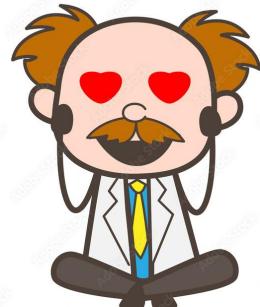
Scientific method



Research is not just an extracurricular..

The joy of discovering and looking into something that no one else has done!

The joy of having your name on an academic journal!!!!!!!!!!!!!!



in our opinion

Research Programs

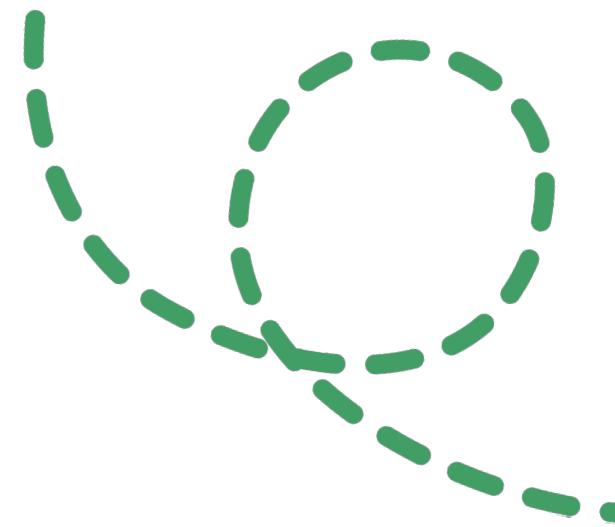
Global Science Campus

Government led program that funds labs of universities around Japan to enable research opportunities for high schoolers

Fees: Free

Age: Only high schoolers

Deadline: Depends on the university



Global Science Campus

Ryuukyuu - May 12th

Nagoya - May 21st

Shimane - May 31st

Tokyo - June 2nd

Shizuoka - June 17th

Kobe - June 23rd

Keio - July 31st

You cannot participate
in multiple GSCs!

Interdisciplinary High School Research Program (IHRP)

Conduct research about a certain social issue /
environmental problem

6-month program

Fees: Free

Age: Only high schoolers

Deadline: July 13



デザイン 小野由月

IHRP 2024
全国高校生 “異分野融合型” 研究プログラム

**全国から
高校生研究者募集**

文系も大歓迎 国際会議・学会にて発表

研究費提供 全国各地の研究者によるサポート

「巡り、繋がる、地域のいろ。」

私たちが暮らしている地球は、さまざまな仕組みが複雑に絡み合っています。自然に存在しているもの、人間が構築してきた想像のもので成り立っているものが、互いに影響しあうことで社会を支えています。

IHRPは、現在存在している問題を改善し、今後も地球環境や社会を持続していくためには、これらの「巡り、繋がる、」を見めおいていく必要があると考えています。

2024年、IHRPは、巡り、繋がる、地域に開催する研究会を主催します。また、その他の研究アイデアを聞かせてください。(「いろ」)の研究は自由です。研究対象自身の色でもいいですし、その研究の背景に連なる色でもいいせん。今まで行動的という言葉を表す青色、今まで文化的な言葉を表す緑色、何色にも染まらない黒色。

まあ、研究のキャンパスはまだまっ白です。

あなたの研究は、何色ですか?

エントリー締切 IHRP2024で検索

2024年7月13日

①7月14日までに応募課題の提出が必要

詳細はこち

Conducting on your own, reaching out

Reaching out to professors!!



Competitions

Two types of research competitions:

Report Submission / Poster Presentation

Usually, all competitions require an abstract submission for the first round of judging

Report vs Poster

② 記載項目

A:研究目的

研究をなぜ行うのか。動機や背景、疑問や課題をあげて、取り組む目的を明らかにします。どこまでが既知のことか明確にし、先行研究があれば関連性も示し、着眼点を明らかにしましょう。また、必要に応じて仮説を示し、目標や期待する結果を述べてください。

B:研究方法

実験や調査に使用する器具・材料、方法について、詳しく示してください。研究の手順、データを得るために実験計画、得られたデータや結果から仮説や課題に対する答えを見つけるための分析手法など記載してください。写真や図表を使った説明も効果的です。

実施時期について、それぞれの手順ごとに明示してください。

C:得られた結果

本研究で得られたデータおよび分析結果を示してください。統計数字やグラフなども含みます。

D:考察

得られた結果は理論値や予測した結果と比べてどうだったか、実験ごとのばらつきや想定されるエラー、予定外に結果に影響を与えたものなどの要素を含めて考察してください。今後の改善策やさらに行うべき実験などについても考えてみましょう。

E:結論

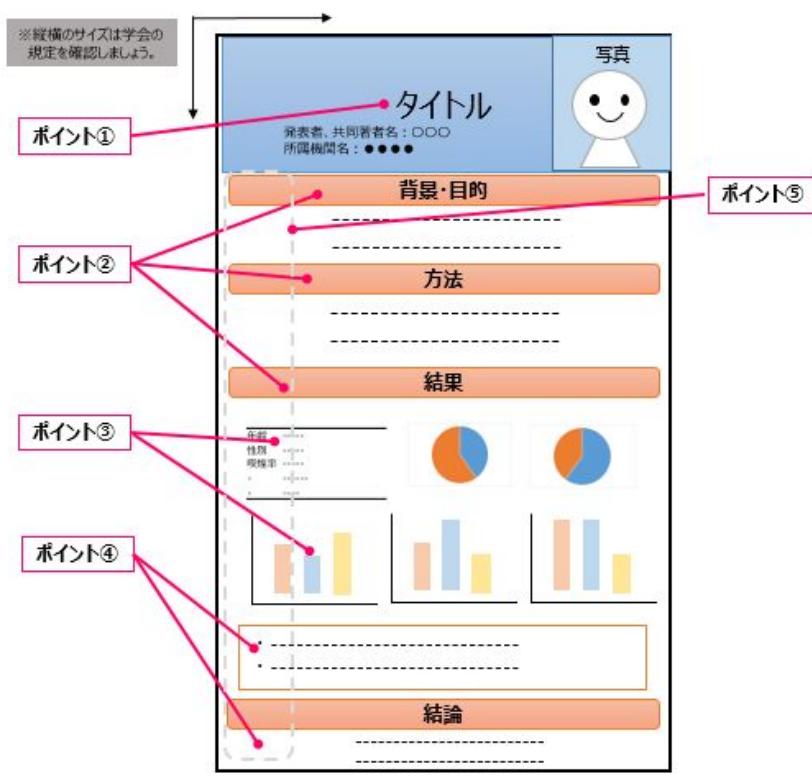
研究の成果として分かったことを述べてください。具体的に、考察の結果を踏まえて記載してください。また、今後の展望として、実社会への応用でどう役に立つか、どのように学問に貢献できるかなどについても触れてください。今後の研究課題もあれば記載してください。

F:謝辞

個人や企業あるいは教育機関や研究機関などの協力を得た場合は感謝とともに、どの部分にどう協力を受けたのかを明記してください。

G:参考文献

書籍、雑誌、新聞、ウェブサイト、論文などの参考文献がある場合は、筆者名、タイトル、媒体名、掲載日、掲載号、発行年、出版社名、掲載ページ等を明記してください。



Science Castle

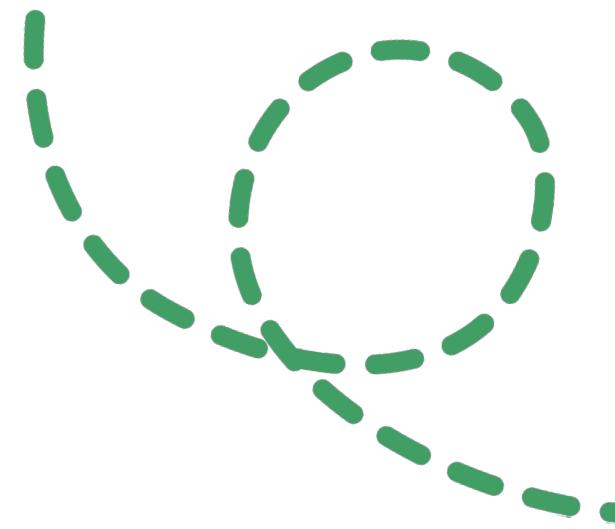
Forum to present your research!

A lot of awards (and competition..)

Fees: Free

Age: 10yrs ~ 22yrs

Deadline: July 13



JSEC / 日本学生科学賞

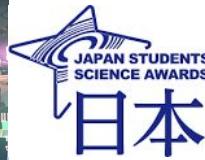
The biggest competitions to submit your research.. Winners get to go to ISEF

A lot of awards (and competition..)

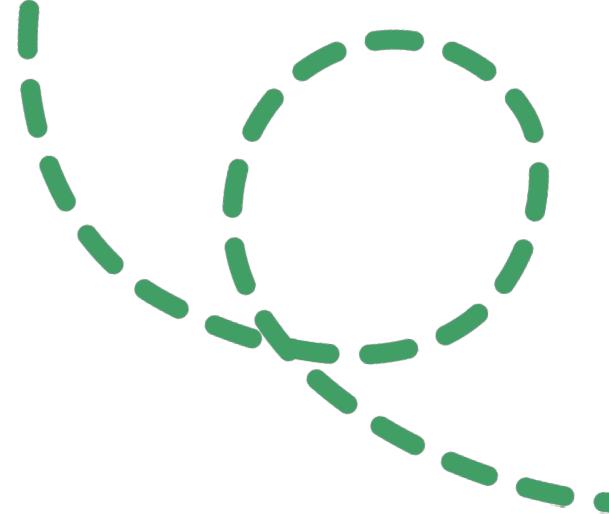
Fees: Free

Age: Middle & high schoolers

Deadline: September 30 (JSEC)



日本学生科学賞



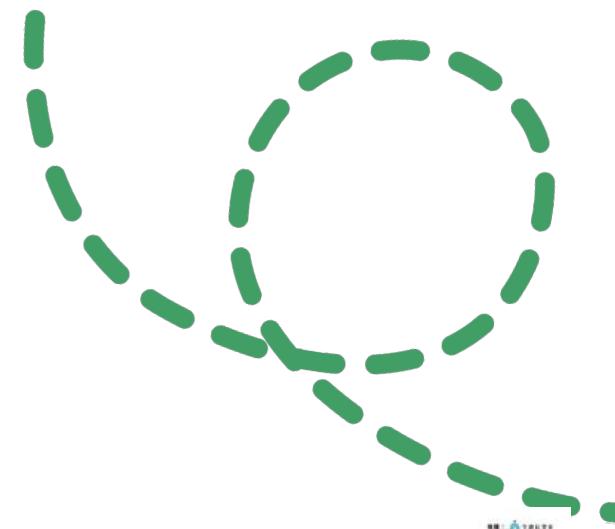
STEAM Japan Award

Solving a social issue with your research,,,

Fees: Free

Age: Middle & high schoolers

Deadline: around January (for 2025)



つくば Science Edge

Similar to JSEC/日本学生科学賞, but puts more emphasis on the “idea”



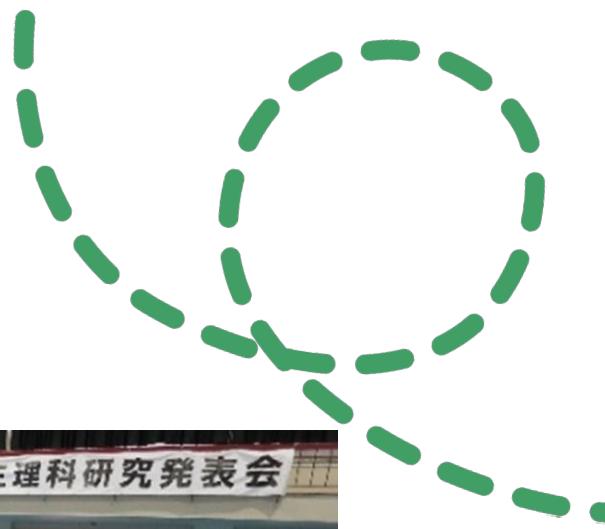
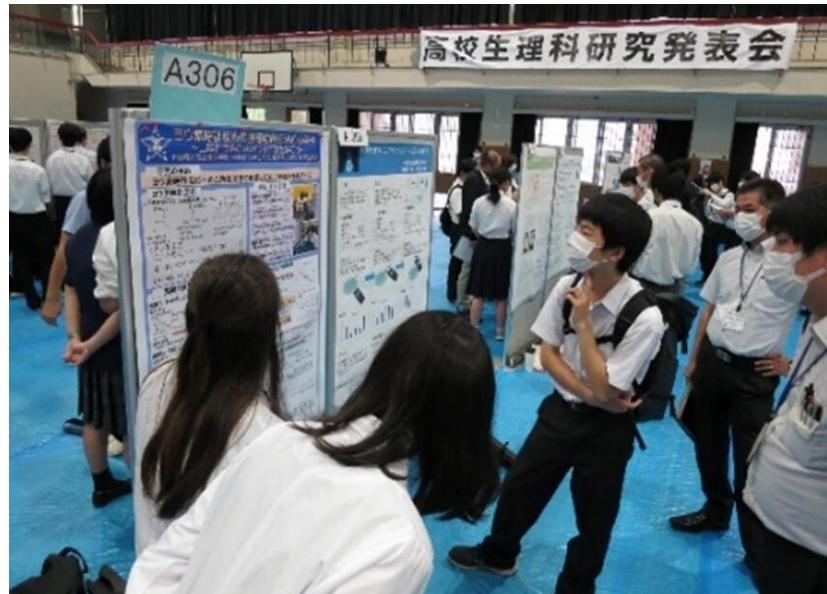
高校生理科研究発表会

Hosted by Chiba University, poster presentation

Fees: Free

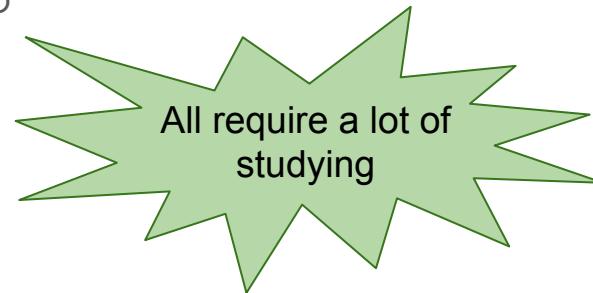
Age: High schoolers

Deadline: September 2nd

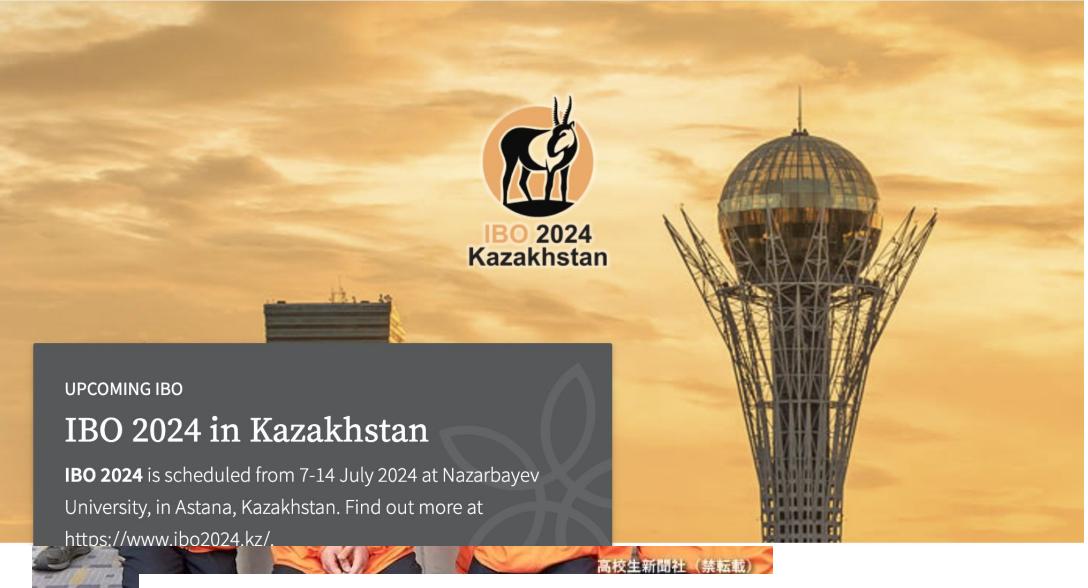


Science Olympiads

- Mathematical Olympiad
- Physics Olympiad
- Chemistry Olympiad
- Biology Olympiad
- Earth Science Olympiad
- Informatics Olympiad
- Science Olympiad
- Linguistics Olympiad
- Astronomy Olympiad
- Geography Olympiad
- Philosophy Olympiad
- Economics Olympiad
- Brain Science Olympiad
- Artificial Intelligence Olympiad
- Psychology Olympiad
- Math A-lympiad



All require a lot of
studying



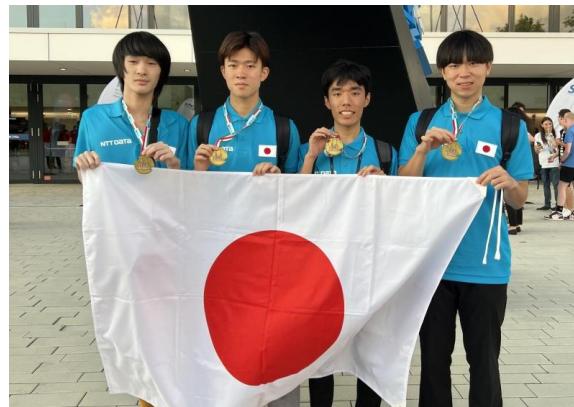
UPCOMING IBO

IBO 2024 in Kazakhstan

IBO 2024 is scheduled from 7-14 July 2024 at Nazarbayev University, in Astana, Kazakhstan. Find out more at <https://www.ibo2024.kz/>.

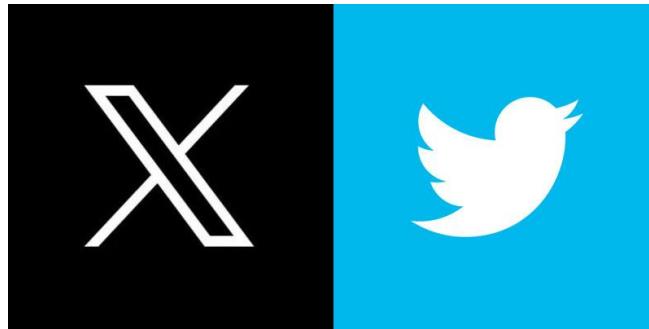


55TH INTERNATIONAL
CHEMISTRY OLYMPIAD
SWITZERLAND 2023

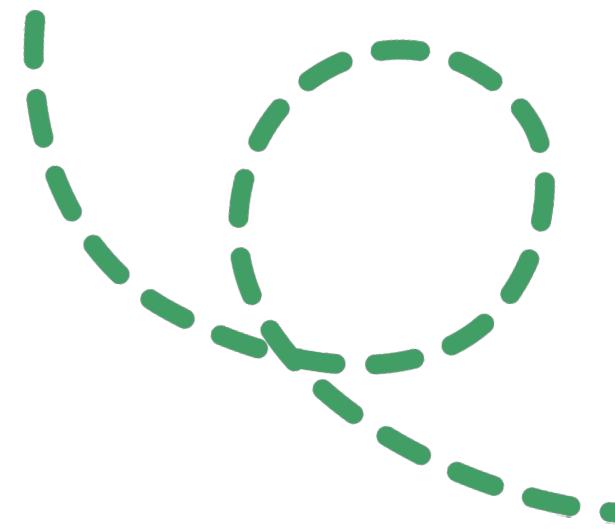


How do we get all this info??

From personal experience....



Sufficient amounts are
good :D



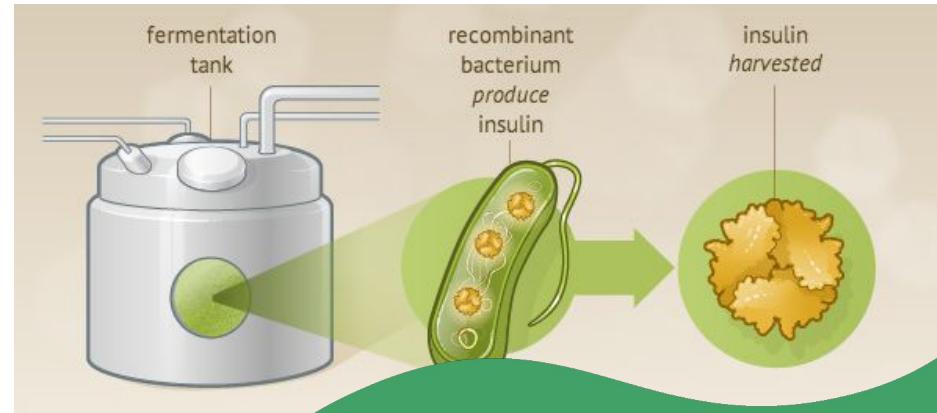
iGEM Introduction Video



iGEM???

iGEM is a research competition based on synthetic biology. It's a new study of field that utilizes microorganisms & gene editing to solve challenges in our world.

(Ex. medical insulin are produced from E. Coli, bacteria that can detect pollution)



Japanese teams

There are 3 age groups in iGEM:

High-School, undergraduate, and overgraduate, with 6000+ participants.

Some college teams participate every year, including Tokyo, Waseda, Kyoto, etc.

A Japanese HS team won first place last year!!

The collage includes the following elements:

- Saffrocure** logo with "Japan-United" below it.
- A plate of cookies next to a bunch of saffron flowers.
- Chemical structures of saffron pigments:
 - Picrocrocin: O=C[C@H]1[C@@H](O)[C@H](O)[C@H](O)[C@H]1O
 - Crocin: O=C[C@H]1[C@@H](O)[C@H](O)[C@H](O)[C@H]1O
 - Crocetin: O=C[C@H]1[C@@H](O)[C@H](O)[C@H](O)[C@H]1O
- Five members of the Saffrocure team in maroon hoodies, smiling and holding up their hands in victory, with one holding a green trophy.
- The text "iGEM提供" (provided by iGEM) at the bottom.

What we do

Currently, we're conducting a **research** to develop a new drug delivery system with the traditional Japanese food

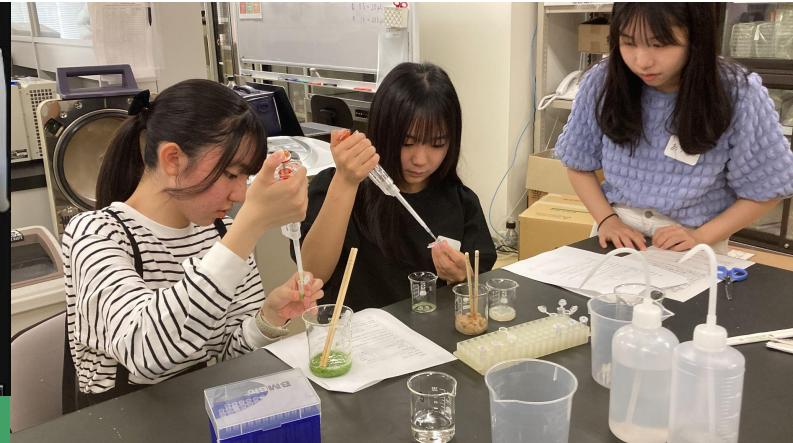
...yes, Natto!!

With the help of Prof. Suetsugu from Rikkyo Univ., we plan to conduct experiments this summer!



But iGEM isn't just lab work...

iGEM expects teams to participate in “human-practice(HP)” and “Education” activities. Teams must aim to gain diverse views from multiple experts and also put effort to widen the biology community!



Also...sponsorship!

iGEM fees are HIGH. Team registration + Jamboree registrations can cost up to 9000 USD = 140万円(円安)

[高校生チーム]合成生物学の大会iGEMで世界一を目指せ！

iGEM Grand Tokyo チャレンジ 東京都

¥ 現在の支援総額
802,500JPY
89%
目標金額は900,000JPY

支援者数
60人

募集終了まで残り
終了

Thus, sponsorship is crucial! Through iGEM, I also gained experiences in visiting companies, negotiating, and crowdfunding! Fair to say, iGEM definitely equips you with entrepreneurship and other lifelong experiences.

Getting involved in iGEM

- Creating your own team :)
 - Joining an iGEM team in university
- Really really cool stuff



塩 @shio_kawakawa · Jan 27

iGEM 2024に向けて、東京で高校生チームを結成したいです。去年のJapan-Unitedを越えていきたい。

この時期になって、興味持ってくれる人いるかな、、？気になった方はDMへお願いします！

#iGEM #募集 #合成生物学



Discussion / Q&A

Writing a Research Proposal

If this was helpful at all, pls follow!
Thanks for coming!

iGEM Grand Tokyo
X  f ...



<https://discord.gg/kMMYrHBq>

Tsukuba GFEST

Learn science in depth at Tsukuba University

Super Science Course & Science Top Leaders Course

Fees: Free

Age: Only high schoolers

Deadline: June 20th



Let's Talk Research!

iGEM Grand Tokyo

About us - iGEM Grand Tokyo

We are a group of high schoolers joining an international research competition, iGEM!

Out of 17 members, four of us, including the leader, are from Hiroo!



Self-Introduction



Shiori Kajikawa



Arisa Tani



Misaki Ozawa



Doria Lee

Today's Topic:

Writing a Research Proposal!!!

Why/When is a Research Proposal Necessary?

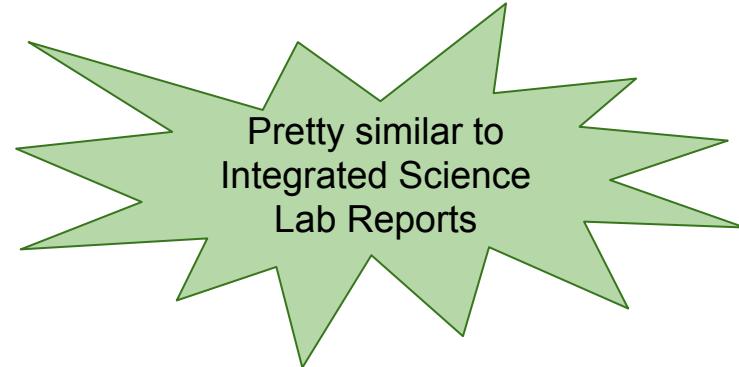
Shows you have a clear outline of what you want to do and what you need

→ Really helpful when reaching out to professors you want to work with, or are trying to apply to a research program

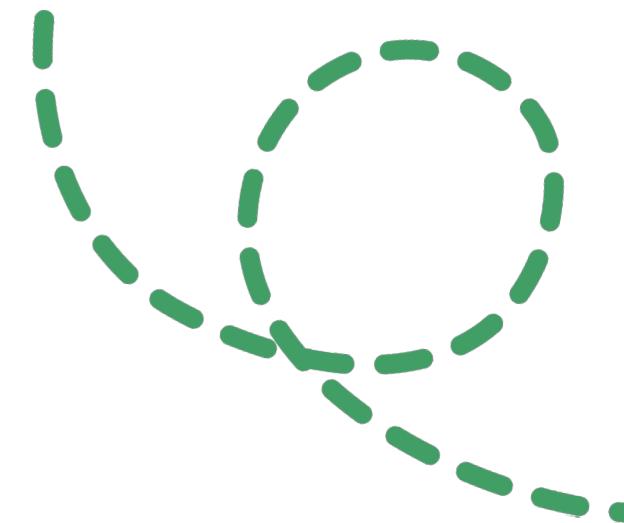
Components of a Research Proposal

Basic Structure:

1. Title
2. Introduction / Objective
3. Background
4. Research Methodology
5. Predicted Outcomes from Research Results
6. Citations



Pretty similar to
Integrated Science
Lab Reports



The Importance of a Title

1. Match your research
2. Keep it short
3. Make it specific and understandable

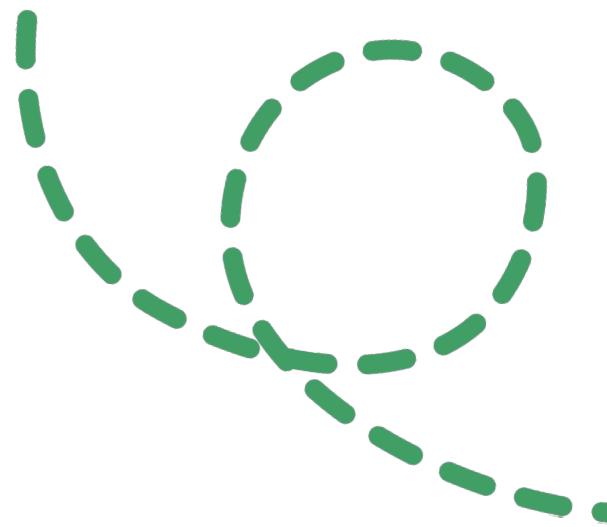
Your hook!!

“～　～” いれがち

Broad → Specific

Examples (JSEC):

- 心地良い「音楽」を「数学」で奏でる
- 守れ！美濃柴犬の未来 ～繁殖と普及を目指して～
- 個人



Introduction/Objective

- What is the bigger picture?
- What problem are you trying to solve?
- How do *you* want to solve that problem?

Keep it simple & Concise!

「〇〇を△△にするために■■をxxする。」

Example:

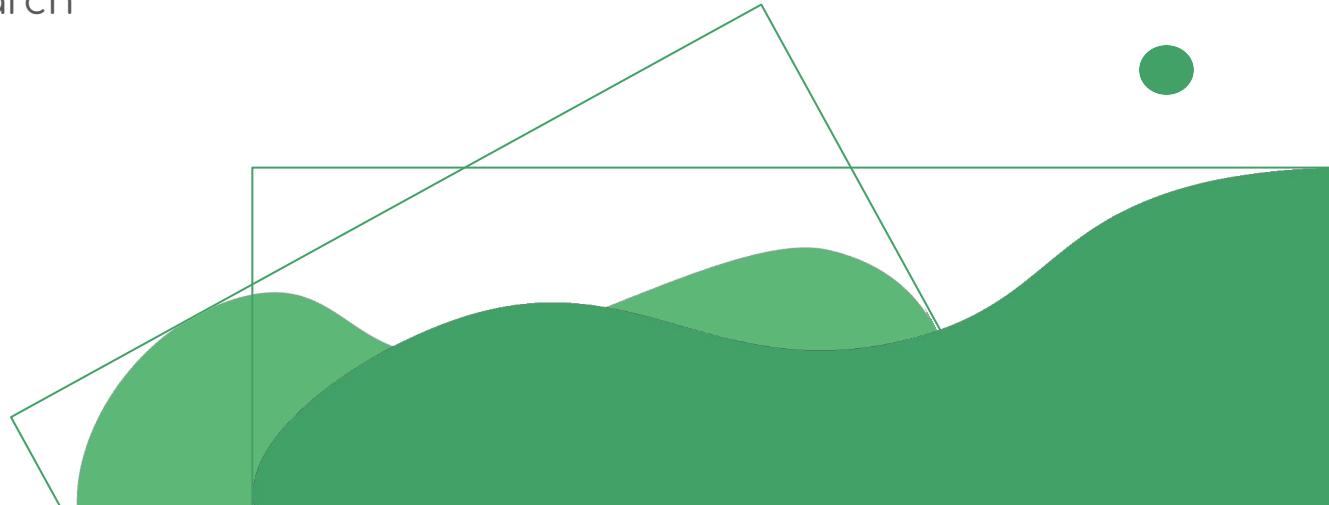
災害発生時の避難場所として、公園が使用されるケースがある。しかし、災害によって電気や水道といったライフラインが止まった場合には、公園内に常設された水洗トイレの使用は不可能となる。

本研究では、〇〇公園周辺の住民が公園で週間の避難生活をすることを想定して、マンホール型トイレを〇基設置した場合のシミュレーションを行う。

Background

Go deeper into the bigger picture of your research topic:

- Social Background ~ Data
- Academic Background
 - Previous Research



Research Methodology

What type of experiment is it?

- Wet lab vs dry lab
- Surveys, data metrics....

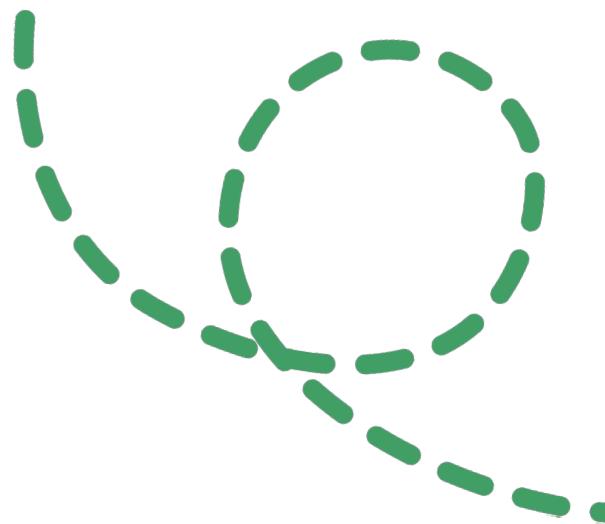
What materials do you need?

→ research equipment, humans, softwares.....etc

For this, use prior research as a guide

Procedure / Project Timeline

→ When are you doing what?



Finding out Materials / Protocol

Really, really have to search

I need to see if apoptosis is occurring in cells



A TUNEL kit can detect apoptosis

2.2. Protocols

Preparation of sample material

Cell suspensions

Prelabeling

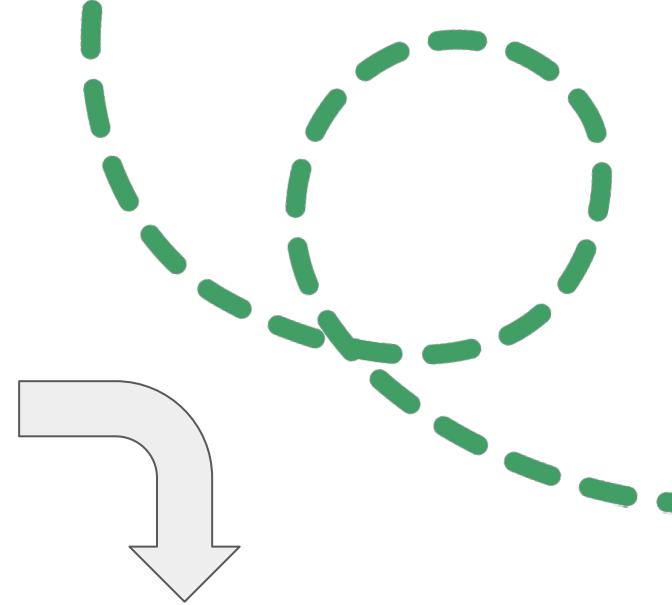
For dual-parameter flow cytometry with fluorescein-conjugated antibodies, incubate the cells prior to fixation with the cell surface marker.

The following steps describe the fixation and permeabilization of cells.

⚠️ Fix and permeabilize two additional cell samples for the negative and positive labeling controls.

- ① Wash test sample 3 times in PBS and adjust to 2×10^7 cells/ml.
- ② Transfer 100 μl /well cell suspension into a V-bottomed, 96-well microplate.
- ③ Add 100 μl /well of a freshly prepared Fixation solution to cell suspension (final concentration 2% paraformaldehyde).
- ④ Resuspend completely and incubate 60 minutes at +15 to +25°C.
⚠️ To avoid extensive clumping of cells, incubate microplate on a shaker during fixation.
- ⑤ Centrifuge microplate at $300 \times g$ for 10 minutes and remove fixative by flicking off or suction.
- ⑥ Wash cells once with 200 μl /well PBS.
- ⑦ Centrifuge microplate at $300 g$ for 10 minutes and remove PBS by flicking off or suction.
- ⑧ Resuspend cells in 100 μl /well Permeabilization solution for 2 minutes on ice at +2 to +8°C.
- ⑨ Proceed as described in section, **Labeling protocol**.

Protocol by Roche, a company that sells TUNEL kits
→ can find by looking it up



Along with the kit, I need different solutions, make a positive control....

2.2. Protocols

Preparation of sample material

Cell suspensions

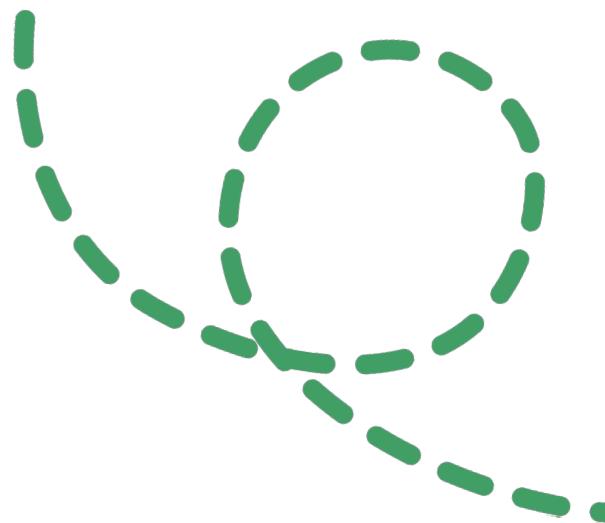
Prelabeling

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- 8 Resuspend cells in 100 μl /well Permeabilization solution for 2 minutes on ice at +2 to +8°C.
- 9 Proceed as described in section, **Labeling protocol**.



[Article](#) [PDF Available](#)

Gap Junction Dysfunction Reduces Acetaminophen Hepatotoxicity with Impact on Apoptotic Signaling and Connexin 43 Protein Induction in Rat

February 2010 · Toxicologic Pathology

38(2):280-8

February 2010 · 38(2):280-8

DOI:10.1177/0192623309357951

Source · PubMed

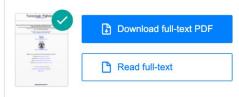
Authors:

 Ayu Nakai-Ito
Nagoya City University

 Makoto Asamoto
Nagoya City University

 Taku Nakai
Nagoya City University

 Kumiko Ogawa

[Download full-text PDF](#)[Read full-text](#)

Analyses for Apoptosis

Apoptotic cells were detected by terminal deoxy nucleotidyl transferase-mediated dUTP nick end labeling(TUNEL) assay as well as cleaved caspase-3 immunohistochemistry. TUNEL assay was performed using an In Situ Apoptosis Detection Kit from Takara (Otsu, Japan). For detection of cleaved caspase-3, deparaffinized slide sections of liver tissues were fixed with 10% formalin and then incubated with 1:100 diluted cleaved caspase-3 (Cell Signaling Technology, Boston, MA, USA) antibody. Antibody binding was visualized by a conventional immunostaining method using an auto-immunostaining apparatus (VENTANA HX SYSTEM, VENTANA Japan, Tokyo, Japan).

Predicted Outcomes from Results

1. Importance of your research ~ what meaning does it hold?
2. If your results revealed something, what does that mean?

Continue testing the hypothesis

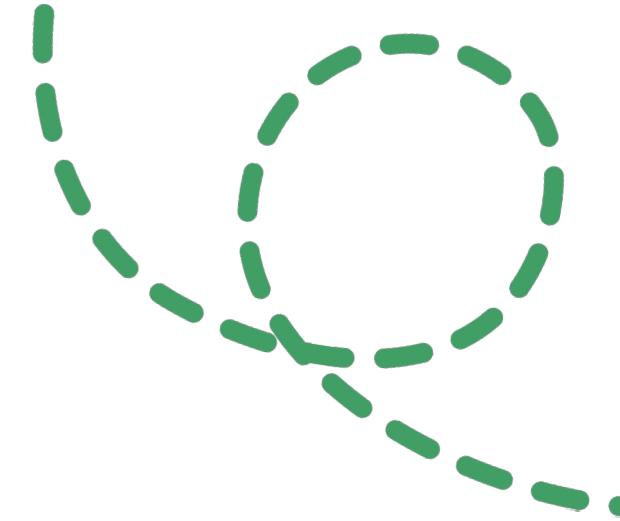
Is your analysis really correct?

- Correlation vs Causation
- Possibility of experimental errors
 - Ex. Knock out → Repair genes

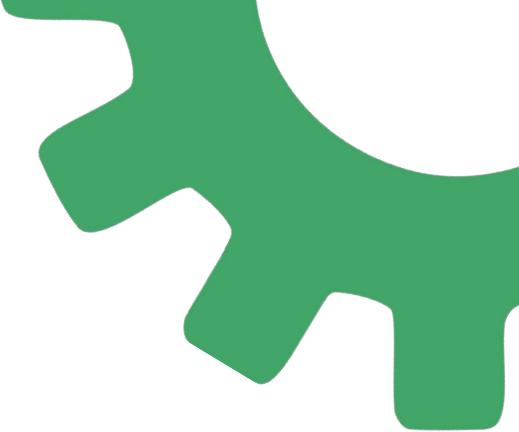
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Bioethics in Research



“Bioethics is the study of ethical,
social, and legal issues that arise in
biomedicine and biomedical research”

Q 人間や脊椎動物を対象とする研究や、潜在的な危険性のある生物や装置を使う研究を応募したいのですが。

A これらの研究を行おうとする場合は、ルールがありますので、研究を始める前に事務局にご連絡ください。JSECのSRC（倫理・安全性・環境配慮の国際ルールに従って研究作品を検討する委員会／Scientific Review Committee)が判断します。危険性のある研究は、大学や研究所で行う必要がある場合も多く、専門知識のある指導者のもとで行うことが前提になります。人間を対象とする研究は、アンケート調査なども含めて、対象者への十分な説明と同意が必要で、個人情報を守る義務も生じます。また、脊椎動物を死なせてしまったり傷つけたりする実験・研究は極力避けて、他の方法がないかを考えてください。研究倫理については、応募前に一般財団法人公正研究推進協会（APRIN）が無料公開している中等教育向け教材を読み、研究倫理について理解されていることを前提といたします。

必要に応じて、以下を参考にしてください。

- ・リスク評価を必要とする研究に関する書類 (form3)
- ・人を対象とした研究に関する書類 (form4)
- ・同意書 <記載例> (form4-ex)
- ・脊椎動物を用いた研究に関する書類 (form5a-1)
- ・脊椎動物を用いた研究に関する書類 (form5a-2)
- ・潜在的危険性のある生物を使用した研究に関するリスク評価書類 (form6)

In vitro

Translates directly to "**in glass**" meaning the study takes place in a test tube, rather than in a model organism.



In silico

An *in silico* experiment is one done in a **virtual setting**, such as a computer or virtual simulation.



In vivo

Translates directly to "**in life**", meaning the study takes place in a living cell or model organism.



Ethical Guidelines For Using Animals In Research



The 3 R's of Animal Research

Reduce



Reduce the number of animals used

Refine



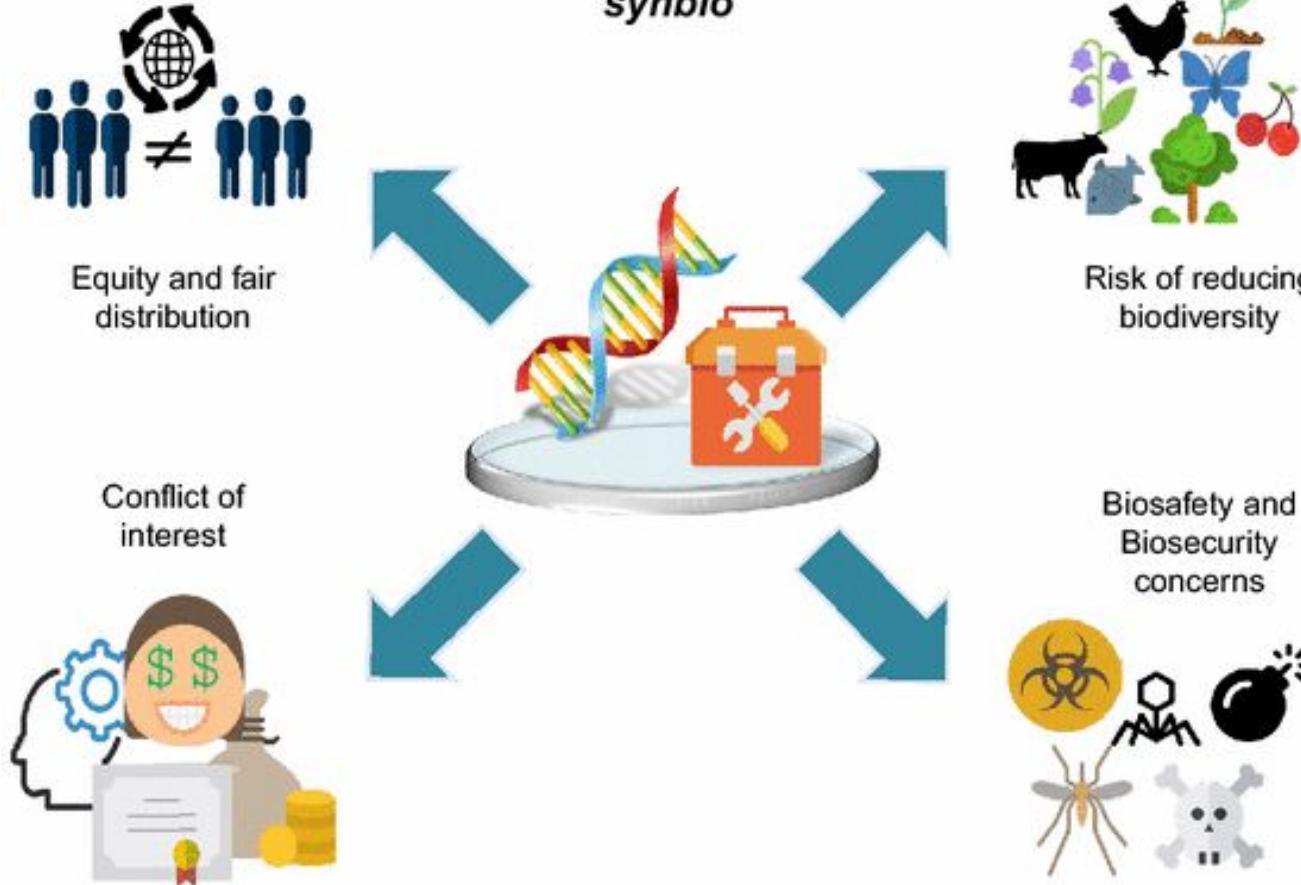
Refine tests to cause animals less stress

Replace



Replace animal studies with other methods

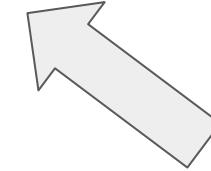
Most frequently cited concerns on translational synbio



<https://discord.gg/FQzrSGwz>

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