



Biohacking as possible playground for genome editing

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Search Queries for „Biohacking“



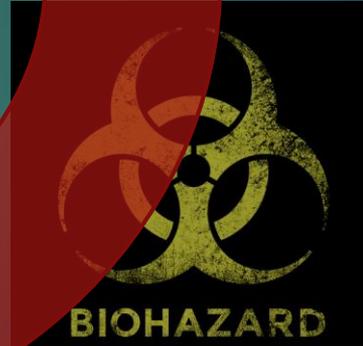
nutrition trend



enhancement



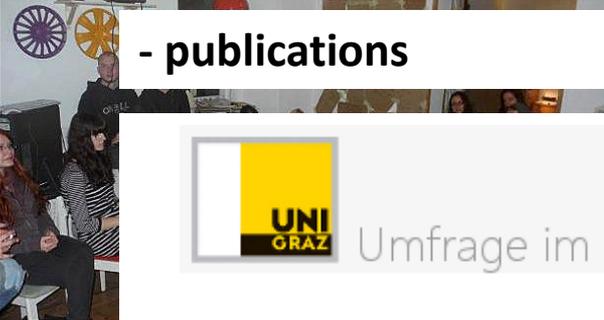
citizen science



bioterrorism

Our Definition of Biohacking

„self motivated participation in life sciences/genetic engineering/research outside of academia/industry“



- publications

- online research



- personal experience



Umfrage im Rahmen des Studiums

The international Biohacking Community and its opinion on genome editing

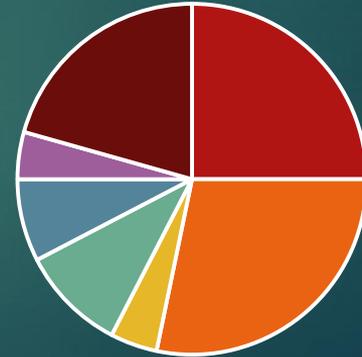
Survey with 27 single/multiple choice and open questions

European Biohacker Community

- ▶ Network / Connections: DIYbio Sphere, Bio Summit 2018/19
- ▶ ~ 40 different Biohacker Groups in Europe
- ▶ Code of Ethics
- ▶ Characteristics of european biohackers
- ▶ Characteristics of hackerspaces
 - ▶ *Average: facilities with more than 20 members*
 - ▶ *Active biohackers: 1 – 10 people*
 - ▶ *Funding or Private money*



Where do you perform biohacking?



■ Community Lab ■ Hackerspace ■ FabLab ■ Academic Lab
■ Company Lab ■ Private Lab ■ At home n= 52

Biohacking activities

Gaudi labs



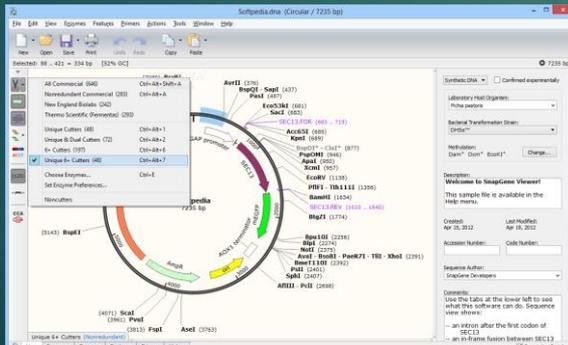
building up



crafting



wet lab



bioinformatics

softpedia.com

Mini Workshop – Mikrobi Basics

Geschrieben am 2018-11-09 von salmonella

Eisef und Sanchez haben einen Mini-Workshop für Labor- und Mikrobi-Basics abgehalten. Darunter mischen, Agar-Platten gießen, Bakterien-Koinkulturen ausstreichen, pipettieren, mikroskopieren usw.

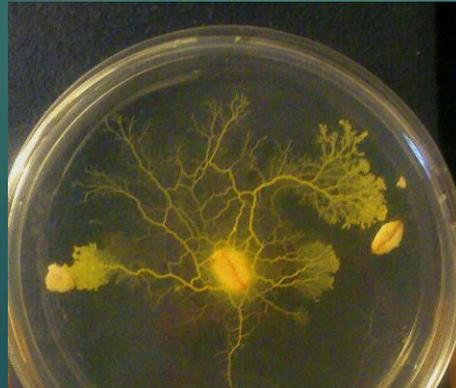


Über Nacht wurden die Kulturen dann bei 37°C inkubiert

workshops

Realraum

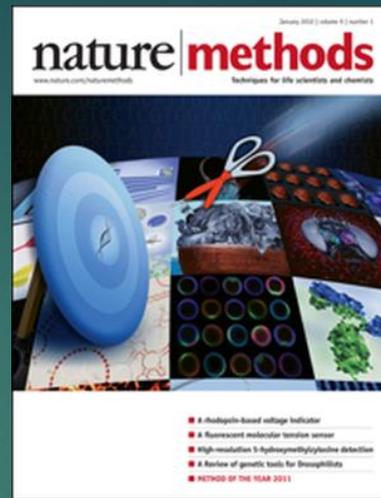
Open bioLab Graz Austria (OLGA)



Realraum



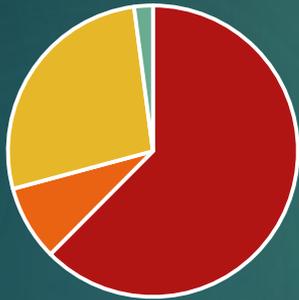
Genome editing



- ▶ Nature Method of the year 2011
- ▶ „Biggest game changer to hit biology“ (H .Ledford, Nature)
- ▶ „Any idiot can do it“ (R. Jaenisch, MIT)
- ▶ Safe handling and regulation?

Biohackers experiences with Genome editing

As a Biohacker do/did you use Genome Editing in experiments?



■ never ■ once ■ several times ■ very often

Bacteria and yeast
Plants
Eukaryotik cell lines

Cool, hot topic

It is the future

More possibilities

Don't want to work with it (~20%)

What are your intentions for using Genome Editing as a Biohacker?



■ learning the technique
■ create an organism with new features
■ produce a certain substance
■ following a higher goal (curing diseases)
■ just for fun
■ other

Do you expect Genome Editing methods such as CRISPR/Cas **to extend biohacking activities** ?

Generates enthusiasm and interest

Saves time, resources

New, creative ideas will come up

Similar to genetic engineering – a lot was possible before

Needs more time, knowledge

Do you expect Genome Editing methods if used in biohacking, to **result in increased risks** compared to classical genetic modification technology?

Not if done correctly, by educated people

It requires enough learning and dedication to filter out jerks

Discussion can increase awareness

Specific targets for gene drives

More people = bigger risk

Caution and responsibility are needed

Biohackers opinions on genome editing

Would you welcome the idea of more people having access to Genome editing?



■ yes ■ no ■ no opinion ■ other

It has to be regulated

Only if done correctly and supervised

Good education is needed

Caution, responsibility, accountability is necessary

Conclusion

- ▶ Big interest in new technologies
- ▶ Awareness of responsibility
- ▶ No big genome editing biohacking projects until now

- ▶ Genome editing adds possibilities, but does not radically change biohacking

Does genome editing (method development, safety, discussion) profit from a broader spectrum of users as in biohacking?

Thank you