

Fringe Interlocutors with Wet Biology

Do-it-yourself, hacking, art and design

Nora S. Vaage

Senter for vitenskapsteori (SVT)

Universitetet i Bergen

ASFPG, Hamburg, September 2014

- 🎬 A very brief history
- 🎬 Heterogeneity
- 🎬 Common factors and differences
- 🎬 Ethics, biosafety and biosecurity issues

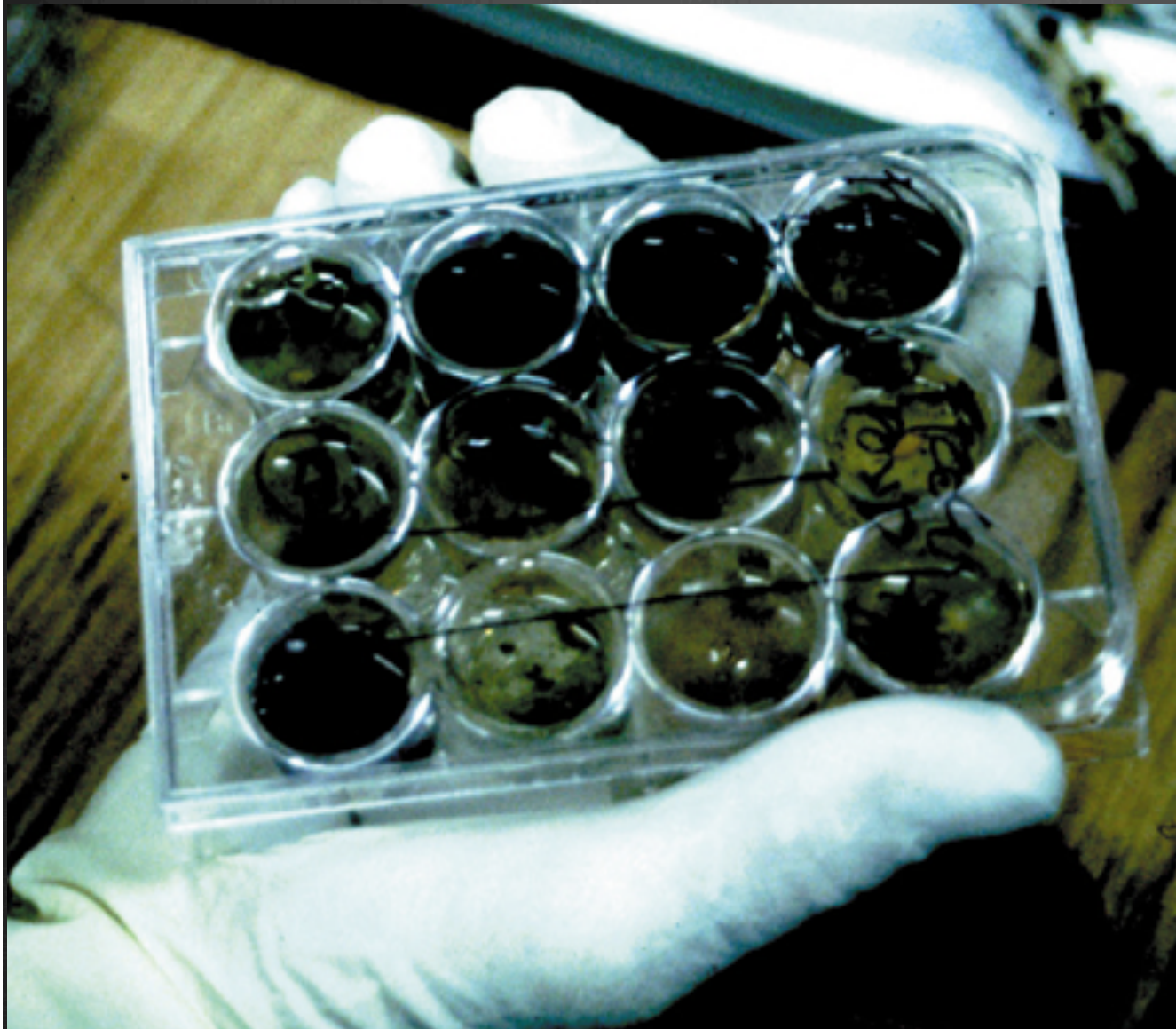
“When a new process or product emerges from the laboratory, it undergoes a profound transition – from well-behaved, insular idea or object to a dynamic component of a complex interactive social system. Once embedded in that social system, the new idea or innovation may produce effects that are completely surprising”.

Daniel Sarewitz, *Frontiers of Illusion. Science, Technology, and the Politics of Progress*, 1996, p. 9.

“... shifting the focus from Mode-2 science to Mode-2 society, the emergence of a Knowledge society means that a much wider range of social, economic and even cultural activities may now have ‘research’ components”

Helga Nowotny, Peter Scott and Michael Gibbons, *Rethinking Science*, 2001, p. 89.

Joe Davis, *Microvenus*, 1986-2000



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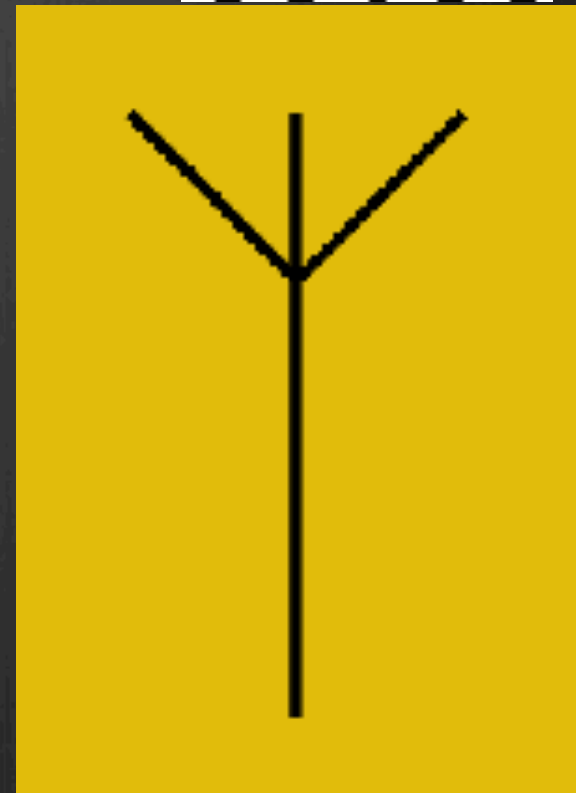


Image credits: Ars Electronica

“In 2050, following the fine tradition of hacking automobiles and computers, garage biology hacking will be well under way”

Rob Carlson, “Open-Source Biology and Its Impact on Industry”. *IEEE Spectrum*, Mai 2001: 15-17).

The iGEM competition



Synthetic Biology
based on standard parts





Synthetic Biology

based on standard parts



[local](#) [projects](#) [blog](#) [weekly news](#)

An Institution for the Do-It-Yourself Biologist

DIYbio.org was founded in 2008 with the mission of establishing a vibrant, productive and safe community of DIY biologists. Central to our mission is the belief that biotechnology and greater public understanding about it has the potential to benefit everyone.

- [Join the global discussion](#)
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- [Ask a biosafety expert your safety question](#)
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A.D. Ginsberg, J. King & University of Cambridge
2009 team, E.Chromi: the Scatalog



Image credit: Alexandra Daisy Ginsberg

DIY bio: Genspace, New York (2013)



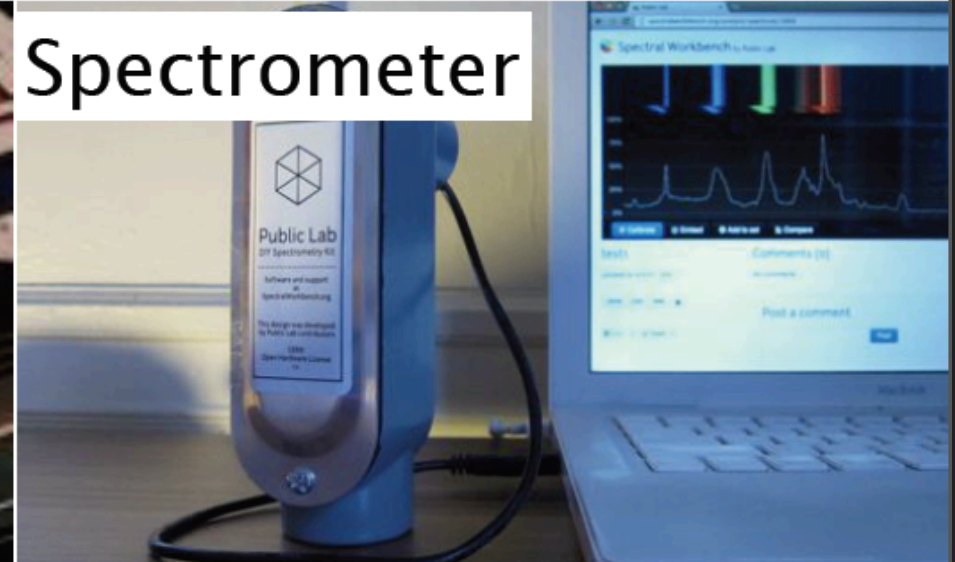


Open Hardware

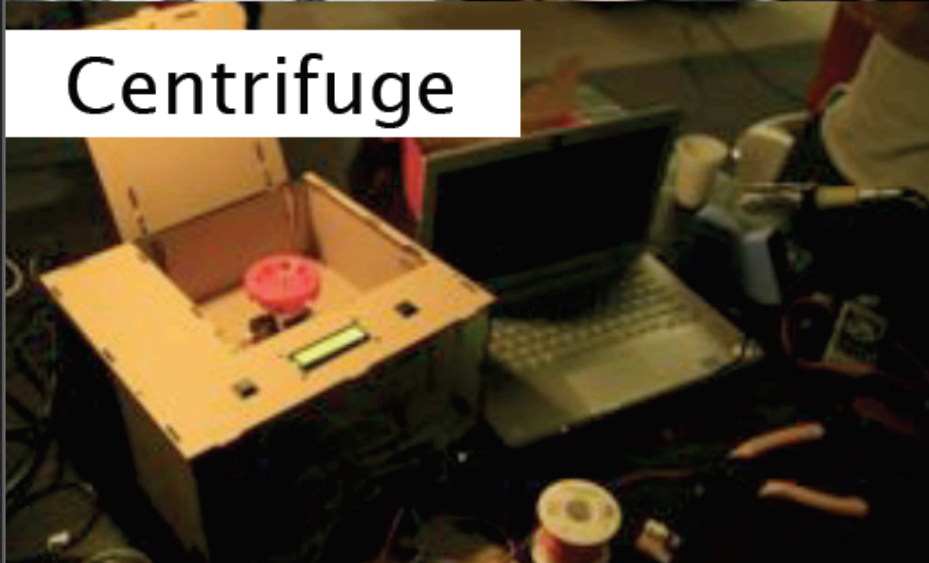
OpenPCR



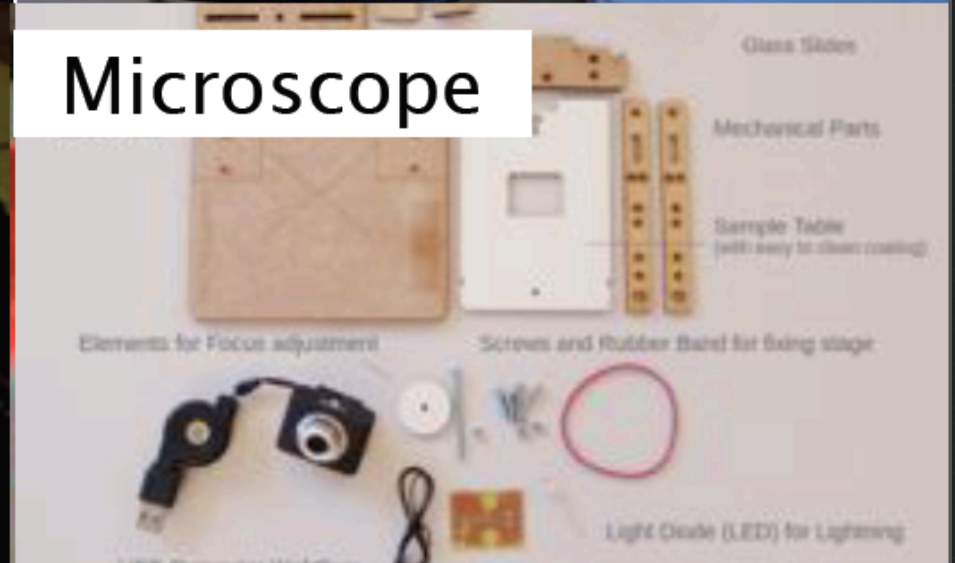
Spectrometer



Centrifuge



Microscope





1 2 3 4 5 6

Bacterial Painting

Click here to see your petri dish art from Rockefeller's Saturday Science event on Genspace's Flickr Photostream!

[More Info](#)

Genspace in the News

[#ScienceHack: Violacien Factory Design Automation with OpenTrons...](#)

[Genspace in China!...](#)

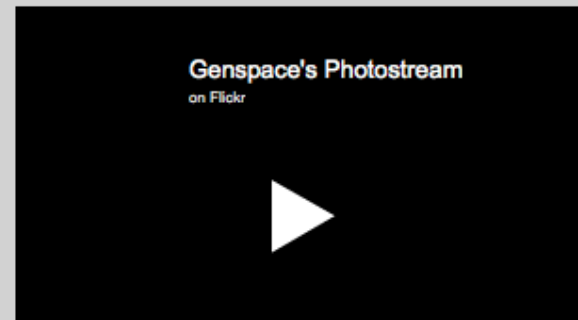
[Bacterial Photography: Creating Photosynthetic Images Using Living Microorganisms...](#)

Remember when science was fun?

At Genspace it still is.

Genspace is a nonprofit organization dedicated to promoting education in molecular biology for both children and adults. We work inside and outside of traditional settings, providing a safe, supportive environment for training and mentoring in biotechnology.

Flickr Photos



DIY bio: Genspace, New York (2013)



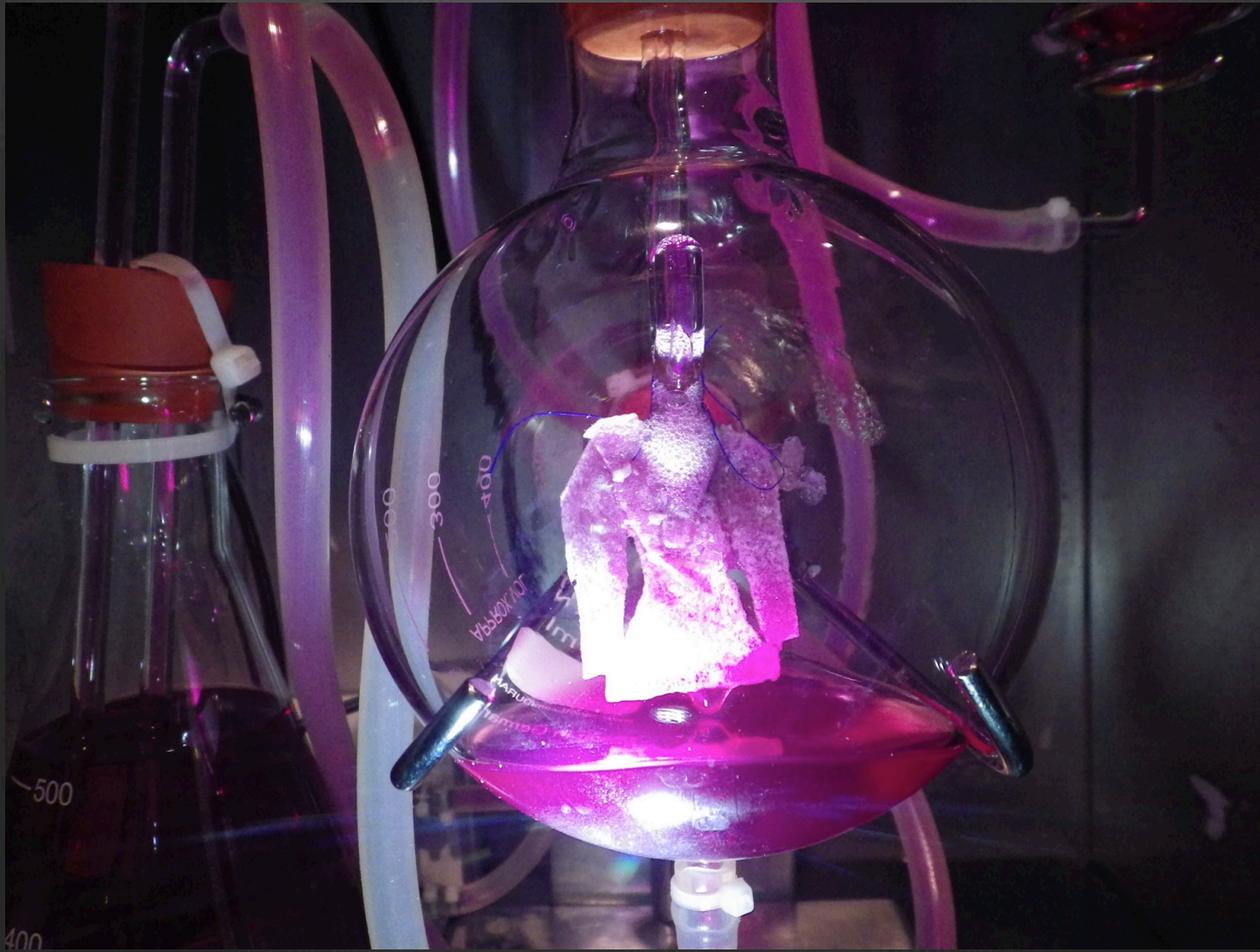
Artists at work in the tissue culture lab



”As artists, we hope to have a different ‘contract’ with society – we ought to provoke, question and reveal hypocrisies through different tactics: whether through aesthetic, absurd or subtle confrontations. Allowing loss of control or ‘engineering futility’; making our audience uneasy is an outcome of our own discomfort. All we propose to offer are contestable future scenarios different from the cannon of the contemporary trajectories”.

Oron Catts, ”Why Artists Play with Life”, in the *Waag Society Bioart Special*, 2012, p. 6.

Tissue Culture & Art Project
Victimless Leather, 2004/2013



SymbioticA

SymbioticA is an artistic laboratory dedicated to the research, learning, critique and hands-on engagement with the life sciences.



RESIDENCY PROGRAM



SymbioticA is the first research laboratory of its kind, enabling artists and researchers to engage in wet biology practices in a biological science department. It also hosts residents, workshops, exhibitions and symposiums.



open wetlab waag society



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open wetlab

**Amsterdam,
Netherlands**

Founded Feb 13, 2012

DIY Biologists 331

Group reviews 5

Upcoming Meetups 3

The Dutch Do It Yourself Biology (DIY Bio) community a growing movement of citizen scientists working with biology hosted by the Waag Society's Open Wetlab. Meeting topics are about the tools to do biology, such as hardware, software, wetware and DIY protocols. Invited speakers present their projects and/or insights. Please feel free to join and learn.

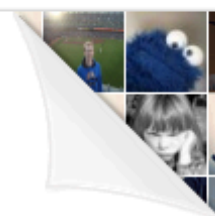
Join us

Join us and be the first to know when new Meetups are scheduled

Who do I know here?

Log in with Facebook to find out

By creating a Meetup account, you agree to the [Terms of Service](#)



Open Wetlab Community

Upcoming 12

Suggested 1

Past

Calendar

Open Wetlab = Open & Frame Reflection Lab

What's new





The Wetlab promotes a ‘maker culture’ and closely collaborates with the Fablab Amsterdam; a place where people can realise their ideas and transform them into a prototype or product with the aid of high tech equipment. We stimulate a culture that makes the life sciences and biotechnology tangible and ‘makeable’ for a broader public. In our opinion this will lead to a deeper public understanding of technology and innovation.

Lucas Evers, interviewed in the *Waag Society Bioart Special*, 2012, p. 2.

“DIY Biology and Bioart turn the public into producers, not just consumers.”

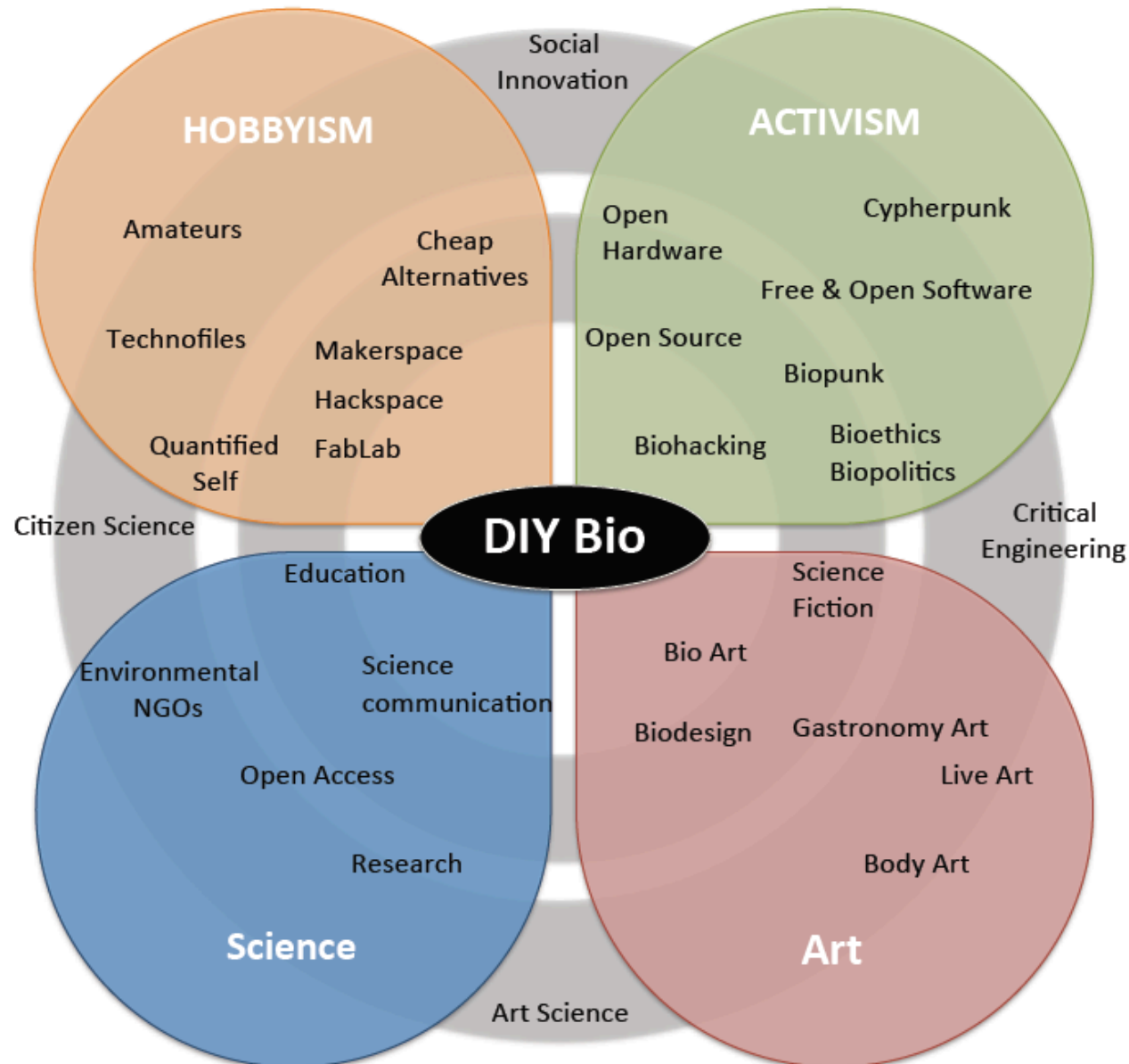
Marleen Stikker, interviewed with Huub de Groot and Colja Laane in the *Waag Society Bioart Special*, p. 12.

”Bioart is about shared responsibility and asking the right questions. In the classic perception, the public and the arts act as a correcting factor on the sciences. This is not what it’s about – ideally we want a society in which artists and citizens are at the base of scientific research. So they get the means to produce knowledge themselves. Artists and scientists challenging each other and working side by side”.

Marleen Stikker, interviewed with Huub de Groot and Colja Laane in the *Waag Society Bioart Special*, p. 12.

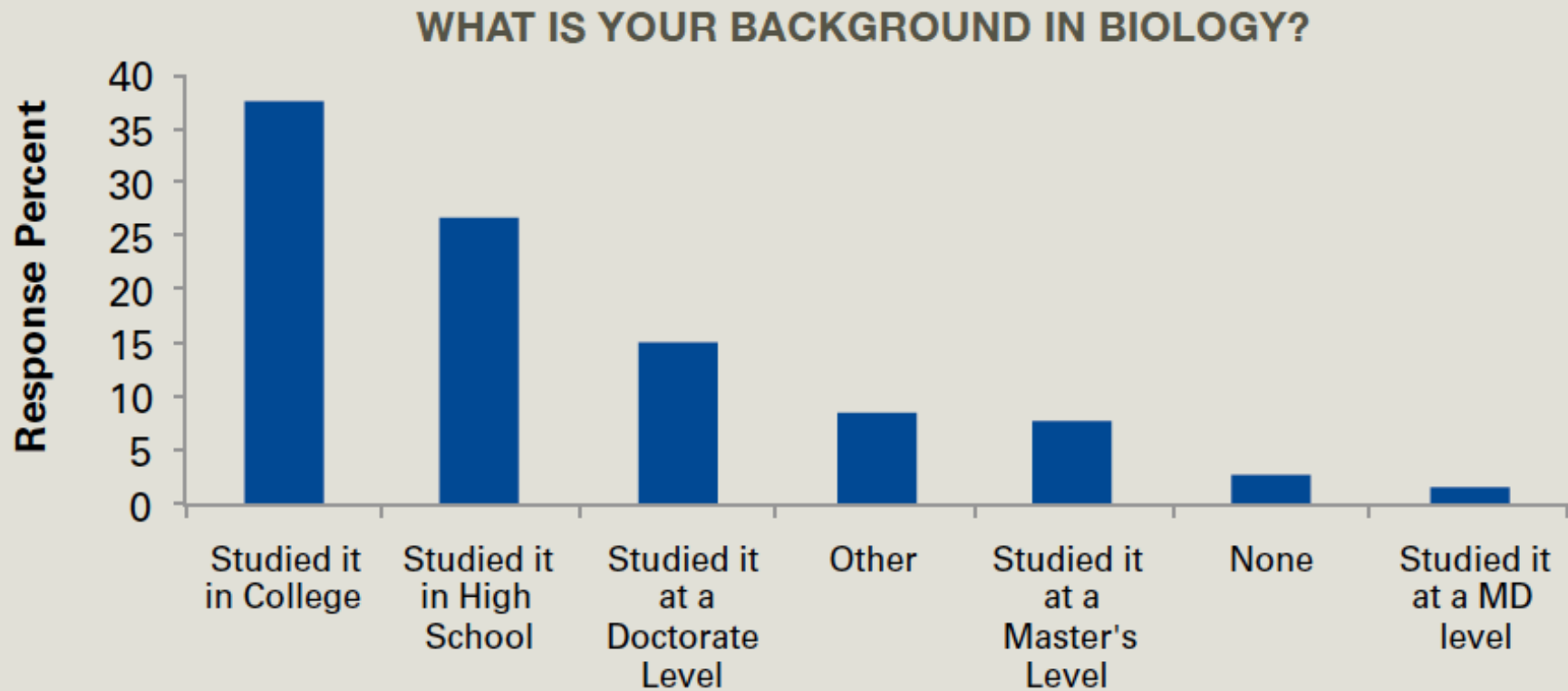


What is going on in the lab?



Adopted from De Vriend & Van Boheemen (2014)

Friday, September 26, 14



”On average, the DIY community is more educated than the general population”

D. Grushkin, T. Kuiken and P. Millet, Seven Myths & Realities about Do-It-Yourself Biology. *Synbio* 5, 2013.

DIY bio

do-it-yourself biology

- 🎬 Open source science
- 🎬 Citizen science
- 🎬 Hobbyist biotech
- 🎬 Amateur biology
- 🎬 Garage biotechnology
- 🎬 Kitchen biotechnology
- 🎬 Homebrew biotech
- 🎬 Life hacking
- 🎬 Biohacking
- 🎬 Biopunk
- 🎬 Biodesign
- 🎬 Bioart

Terms used about the same person

🎬 Researcher/

🎬 Artist/

🎬 Scientist/

🎬 Designer/

🎬 DIY biologist

It doesn't bother us though that the term "hacking" has several different meanings, on the contrary, especially in the context of our biohacking projects this leads time and again to interesting discussions.

Mark Dusseiller, of Hackteria, interviewed in D. Landwehr and V. Kuni (Eds.) *Home Made Bio Electronic Arts*, 2013: 74.

🎬 “To me this is kind of a discussion that is solely, um, it’s, it’s done and discussed by administrators”

Interviewee 45 (artist)

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A hackerspace and economic hub for biotech and STEM in San Diego

Backed by the city of Carlsbad for the purpose of supporting bio-entrepreneurs, educators and technologists focused on starting new businesses, creating more jobs and improving the healthcare industry.

[Home](#)

LA BIOHACKERS

Welcome to biohackers.la, the Los Angeles Biohackers' home in the tubes. We are a diverse and eclectic group of amateur scientists with a lab based in Downtown LA. We provide space and equipment for people to work on their own biology projects and experiments. Our meetings are on Sunday afternoons, so please come visit.

UPCOMING EVENTS

Sunday Meetup

@ The Lab

June 8, 2014 - 1:00pm

Sunday Meetup



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BioCurious – your Bay Area hackerspace for biotech.

Posted on 2011

BioCurious is a completely volunteer run non-profit organization. We serve the community by providing low-cost lab space and classes to members.

***Join now!** Joining the lab helps us continue to serve the community. Become a member to make the world a better, more sciency place!*



DIY Workshop: Grow your own ink



Art/meat/flesh II, Stavanger 2012





HACKTERIA.ORG

Open Source Biological Art, DIY Biology, Generic Lab Equipment

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HSC#2 | 16. Mai 14: Hybrid Ecology | The Finnish Society of Bioart @ Corner College, Zürich

By dusjagr
Tuesday May 27, 2014

About Hackteria



As a community platform hackteria tries to encourage the collaboration of scientists, hackers and artists to combine

Factors facilitating DIY

- ⦿ The ICT revolution
- ⦿ "Deskilling" (Tucker 2011)
- ⦿ Open source

Common factors:

- ⊙ Open source: Democratisation of knowledge
- ⊙ Eagerness to 'get wet'
- ⊙ Technologies, methods

- ⦿ Different *products* from artists, designers, hackers, citizen biologists
- ⦿ Background and environment affects one's motivations, intentions and goals

Meredith Patterson: Biopunk manifesto

DIYbio.org

”Biopunks experiment. We have questions, and we don’t see the point in waiting around for someone else to answer them”.



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”We keep in mind that our subjects of interest are living organisms worthy of respect and good treatment, and we are acutely aware that our research has the potential to affect those around us. But we reject outright the admonishments of the precautionary principle, which is nothing more than a paternalistic attempt to silence researchers by inspiring fear of the unknown”.

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Europe: **Transparency, safety, open access, education, modesty, community, peaceful purposes, respect, responsibility, accountability**

North America: **Open access, transparency, education, safety, environment, peaceful purposes, tinkering**

Draft DIYbio Code of Ethics from European Congress

Transparency

Emphasize transparency and the sharing of ideas, knowledge, data and results.

Safety

Adopt safe practices.

Open Access

Promote citizen science and decentralized access to biotechnology.

Education

Help educate the public about biotechnology, its benefits and implications.

Modesty

Know you don't know everything.

Community

Carefully listen to any concerns and questions and respond honestly.

Peaceful Purposes

Biotechnology must only be used for peaceful purposes.

Respect

Respect humans and all living systems.

Responsibility

Recognize the complexity and dynamics of living systems and our responsibility towards them.

Accountability

Remain accountable for your actions and for upholding this code.

Draft DIYbio Code of Ethics from North American Congress

OPEN ACCESS

Promote citizen science and decentralized access to biotechnology.

TRANSPARENCY

Emphasize transparency, the sharing of ideas, knowledge and data.

EDUCATION

Engage the public about biology, biotechnology and their possibilities.

SAFETY

Adopt safe practices.

ENVIRONMENT

Respect the environment.

PEACEFUL PURPOSES

Biotechnology should only be used for peaceful purposes.

TINKERING

Tinkering with biology leads to insight; insight leads to innovation.

History: The draft code was formulated by participants in the 2011 North American DIYbio Congress and agreed in July 2011. See also, the draft code developed at the 2011 European DIYbio Congress.

”Advances in software engineering, widespread internet connectivity, affordable 3-D printing, cooperative problem solving through crowdsourcing [...] and the DIYbio movement have shifted unprecedented potential to the masses, including that for bioweapon development”

Kathleen Eggleston, “Emerging Nanoscale Technologies and Plausible Security Threats”, in *Innovation and Responsibility: Engaging with New and Emerging Technologies*, 2014, p. 112.

”A small minority may have unleashed computer viruses over the years, but it’s the computer hacking community at large who created many of the solutions that safeguard us from them”.

Mac Cowell, interviewed in *Seed Magazine*, Dec 2008.

”A small minority may have unleashed computer viruses over the years, but it’s the computer hacking community at large who created many of the solutions that safeguard us from them”.

Mac Cowell, interviewed in *Seed Magazine*, Dec 2008.

”People overestimate our technological abilities and underestimate our ethics”

Jason Bobe, interviewed in *The New York Times*, March 2012.

Thank you for listening!
Looking forward to your comments...

Nora.Vaage@svt.uib.no

DIY biology

From Wikipedia, the free encyclopedia



This article has multiple issues. Please help [improve it](#) or discuss these [\[hide\]](#) issues on the [talk page](#).

- This article **needs additional citations for verification**. *(April 2009)*
- This article **possibly contains original research**. *(April 2009)*

Do it yourself biology (**DIY biology**, **DIY bio**) is a growing movement in which individuals, communities, and small organizations, study biology and life science using the same methods as traditional research institutions. DIY biology is primarily undertaken by individuals with extensive research training from academia or corporations, who then mentor and oversee other DIY biologists with no formal training. This may be done as a [hobby](#), sometimes called [biohacking](#), as a not-for-profit endeavor for community learning and open-science innovation, or for profit, to start a [business](#).

BioArt

From Wikipedia, the free encyclopedia

BioArt is an [art practice](#) where humans work with live tissues, bacteria, living organisms, and life processes. Using scientific processes such as [biotechnology](#) (including technologies such as [genetic engineering](#), tissue culture, and [cloning](#)) the artworks are produced in laboratories, galleries, or [artists' studios](#). The scope of BioArt is considered by some artists to be strictly limited to "living forms", while other artists would include art that uses the imagery of contemporary medicine and biological research, or require that it address a controversy or blind spot posed by the very character of the life sciences. ^[1]

Although BioArtists work with living matter, there is some debate as to the stages at which matter can be considered to be alive or living. Creating living beings and practicing in the life sciences brings about [ethical](#), [social](#), and [aesthetic](#) inquiry. The phrase "BioArt" was coined by [Eduardo Kac](#) in 1997 in relation to his artwork *Time Capsule*. Although it originated at the end of the 20th century through the works of pioneers like [Joe Davis](#) and artists at [SymbioticA](#), BioArt started to be more widely practiced in the beginning of the 21st century.

Biohacking

From Wikipedia, the free encyclopedia

Biohacking is the practice of engaging [biology](#) with the [hacker ethic](#).^[1] Biohacking encompasses a wide spectrum of practices and movements ranging from Grinders who design and install DIY body-enhancements such as magnetic implants to DIY biologists who conduct at-home gene sequencing.^{[2][3][4][5]} Biohacking emerged in a growing trend of non-institutional science and technology development.^{[1][6][7]} Many biohacking activists, or biohackers, identify with the [biopunk](#) movement as well as [transhumanism](#) and [techno-progressivism](#).^{[2][8][9]}

"Biohacking" can also refer to managing one's own biology using a combination of medical, nutritional and electronic techniques. This may include the use of [nootropics](#) and/or [cybernetic](#) devices for recording [biometric](#) data.^{[5][10]}

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2 Contemporary biohacking movements