

N°8

EXCERPT

# ABSTRAKT

POCKET LABORATORY FOR THE FUTURE

## THE POWER OF MAKING

*The rise of the do-it-yourself culture*



*With stories about the value of mediocrity,  
super-spreaders and the land of power giants*

**W.I.R.E.**

WEB FOR INTERDISCIPLINARY RESEARCH & EXPERTISE

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Business | Society | Life Sciences  
Think Tank of Bank Sarasin & Co. Ltd  
and Collegium Helveticum of ETH and the University of Zurich

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# THE REVOLT OF THE HAND-CRAFTERS

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*Interview with Marc Dusseiller*

*By Max Celko*

*Ensnconced in garage labs, a young generation of amateurs is getting down to work: the biohackers, biology's answer to the computer nerds of the late 1970s. Marc Dusseiller co-founded the hacker network Hackteria. Nevertheless, he doesn't believe that the Bill Gates of do-it-yourself research will be discovered in this scene.*

**Marc, you are a co-initiator of Hackteria, an international network of biohackers. What exactly is biohacking?**

Let's start with the term "hacking". Because definitions of it vary widely to start with. For us, hacking means a creative way of examining technology and finding new applications for it. In somewhat overdrawn terms, a hacker is someone who enjoys making toast with a coffee-maker. The public often associates hacking with the misuse of computer hardware and software, nothing else. In reality, however, that's only a very small part of the scene. And in addition to conventional technology hacking, there is another field, i.e. biohacking, which is about the creative redesign of living, biological systems – in other words, the hacking of so-called wetware.

### Can you name examples?

There are very different areas of biohacking, which actually isn't really a new phenomenon at all. It includes orchid growers who create a new strain of orchid by cross-breeding. We, in contrast, represent a different type of biohacking for which I personally prefer to use the expression DIY biology. That term still has more of the vibe of the hand-crafter tinkering around in his garage. People who grow algae at home to produce biofuel fall into this category, for example. Likewise DIY beer brewers or the mushroom-picker scene, whose members set up elaborate home labs to grow their own mushrooms.

### What about DIY microbiology and genetics?

That's right, those fields are also part of it. For example, adding a fluorescent gene to bacteria so that they glow at night is a popular experiment. Because the colour of the glow effect can be controlled, patterns or even simple pictures can be made. A research team from Osaka grew fluorescent bacteria in the shape of Super Mario, the computer game figure. But microbiology and genetics are only one aspect of DIY biology. The subject is much broader. It also includes all the life sciences, from agriculture through nutrition to medicine.

### Why are more and more laypeople getting into biological research?

Amateur scientists have always been around. As soon as a technology is affordable for the bulk of the population, people will start to experiment around with it. It was no different with radio technology. After that came computers

and digital technologies. And the price of instruments for microbiological and genetic research is falling and falling nowadays. PCR<sup>1</sup> instruments, which can be used to analyse gene sequences, were extremely expensive not long ago, now they are available for USD 1000 or less, so the man in the street can afford them.

### **What kind of people are active in the DIY biology scene?**

There's a wide variety. A lot of people in the scene have a background in molecular biology. They pursue personal research projects in the DIY bio environment in their free time. Because at work they're often tied into rigid structures that leave them little freedom to do their own experiments. However, there are of course amateurs as well. Apart from scientists, our Hackteria network contains artists, philosophers, business people and even chefs who are interested in microbiology and genetics.

### **Can such interdisciplinary collaboration deliver new findings to official research as well?**

It is often said that the next generation of pharma companies will be garage firms, similar to Gates or Jobs. I don't believe that.

I'm inclined to think it's improbable that ideas for developing new drugs or solving the problem of world hunger will come out of this scene. Because the DIY biologists mostly pursue research topics similar to those of the commercial labs. I could wish for a greater willingness to pursue alternative themes. Because the commercial industrial labs are definitely better set up for cancer research or the development of alternative energies.

1

*Polymerase chain reaction is used in biological and medical laboratories for a number of tasks, e.g. to recognise hereditary diseases and virus infections, to generate and inspect genetic fingerprints, to clone genes and prepare paternity tests. PCR numbers among the most important methods of modern molecular biology and accounts for many scientific advances in this field.*

## So where does the social value added of doing your own research lie?

A core social benefit is that the DIY bio scene also allows laypeople access to the scientific debate. As a result, biotechnology is being democratised, to some extent at least. I think that's very important, because we have now reached a point where biotechnology is making incredibly fast progress and opening up entirely new possibilities for manipulating live material. It's now up to all of us to define together as a society what research we want and what legal restrictions we will impose on biotechnology.

As a consequence of greater knowledge, people are also less susceptible to populist ideas from politicians or empty marketing promises from the corporate world.

## Where do you see untapped potential?

I see opportunities particularly for emerging economies. For example, the DIY bio scene could contribute to the development of low-cost scientific instruments and lab equipment. That would enable people in poor countries to do research into their own topics in simple garage labs, things that are of no interest to any company because no financial gain is expected. I myself was in Kenya recently and presented projects of my own there, about low-cost diagnostic applications and agricultural labs. The aim is for even people with limited financial means, barely any scientific knowledge and a short supply of electricity to be able to perform simple medical analyses and genetic screenings of agricultural products. The latter are helpful, for example, in livestock husbandry or horticulture. This approach should also give people the courage to take the initiative and solve their problems themselves, because they are no longer dependent on big Western companies.

**You were invited by the FBI to make an assessment of the risks of DIY biology. Is it dangerous when laypeople can genetically modify bacteria or viruses, for the purposes of terrorist attacks, for example?**

This subject has been hotly debated in the public domain. But the fear is unfounded. I can't imagine anything being created in DIY labs that is dangerous to the environment or to health. It takes an enormous amount of knowledge as well as good equipment to produce a dangerous pathogen. These conditions are not given in the DIY biology scene. Additionally, dangerous microorganisms are not freely available just like that.

And apart from that, it wouldn't make a great deal of sense for terrorists to smuggle themselves into the DIY bio scene. Because there is a very intensive exchange of views and information between the members, and if someone was trying to make dangerous pathogens the word would soon get round.

**What are the basics that are needed in order for laypeople to get involved in biology?**

The first step is to build an infrastructure. By that, I mean simple biology labs under controlled conditions. In addition, you need a certain basic knowledge of electronics and hardware hacking, which can be acquired very easily. A lot of the techniques we use are extremely simple. The main problem at present is that virtually no low-cost laboratory infrastructure exists for hobby scientists as yet. Most of the products on the market are designed for use in professional labs. But that is gradually beginning to change. China, for example, is already producing very cheap instruments for the consumer sector. The entire spectrum is being covered – from pipettes through microscopes to entire production plants.

**Are patent problems not an issue for the DIY bioscene? After all, you do get microorganisms that are patented.**

Nobody bothers about patents in this scene. But of course, if you want to build a business with your creation you are confronted with these issues. It's no different from musical compositions, which are protected by copyright.

**A lot of artists are also active in the Hackteria network. Why is the exchange between art and science so important to you?**

We've seen that a gap exists in the DIY bio environment: DIY biologists are often close to the genetic engineering industry and sometimes deal with the subject very uncritically. At the same time, artists engaged in the themes of biology and life mostly spend their time in a theoretical ivory tower. What we want is to bring the two spheres together. People with a background in microbiology and genetics should swap ideas with artists and philosophers and in doing so try out new approaches in the context of DIY bio. There is still a very great deal of untapped potential in niche areas of biological research – but the prerequisite for using it is for people from the widest possible variety of fields to have access to research and be able to use it for their own purposes.



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*Marc Dusseiller is a transdisciplinary scholar, lecturer for micro- and nanotechnology, cultural facilitator and artist. He works in an integral way to combine science, art and education. He performs DIY workshops in lo-fi electronics, music and robotics, has made various short movies and is currently developing means to perform biological science (co-founder of Hackteria | Open Source Biological Art) in a DIY fashion in your kitchen or your atelier. He is also co-organises Dock18, Room for Mediacultures, and various other engagements like the diy\* festival, national and international workshops for artists, schools and children as the president of the Swiss Mechatronic Art Society, SGMK.*

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