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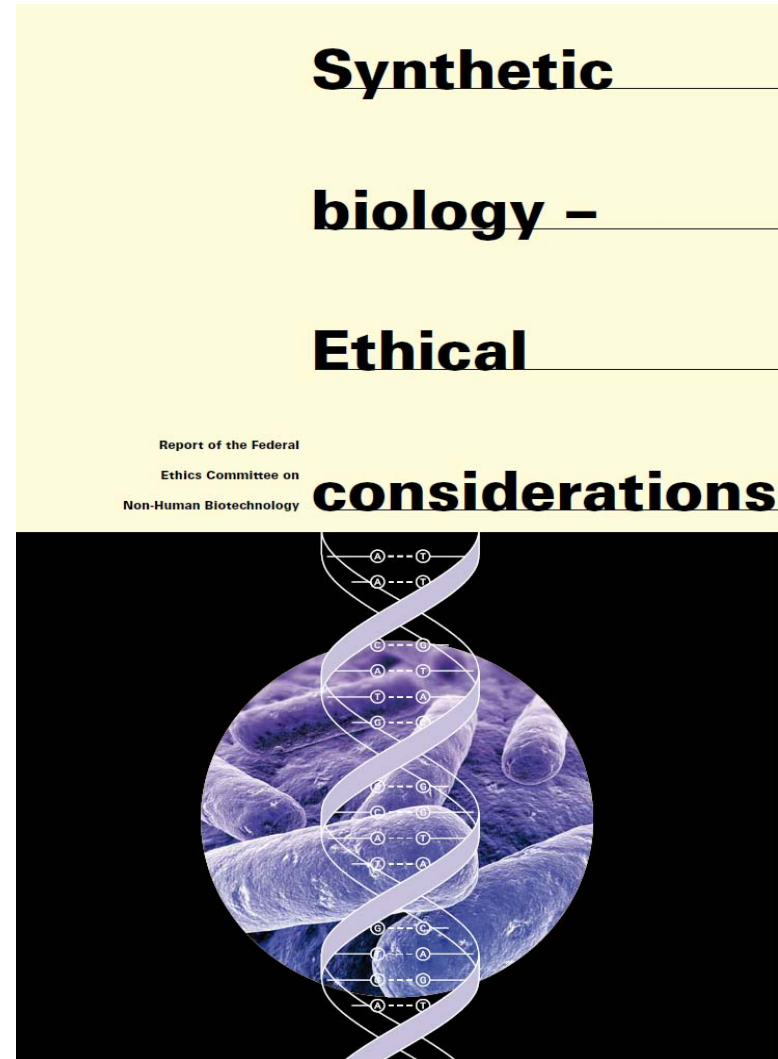
Swiss Confederation

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Federal Ethics Committee on Non-Human Biotechnology ECNH



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- \* Aspirations of synthetic biology and ontological conceptions of life**
- \* Moral status of synthetic life**
- \* Ethical evaluation**



# **The aspirations of synthetic biology (Lego model)**

**To create new living beings**

- via a controlled process**
- with controllable functions**



# Ontological conceptions of life

<b>Monism</b>	Reduction of the world's processes and phenomena to a single principle
<b>Vitalism</b>	The foundation of all living beings is a life force ( <i>vis vitalis</i> )
<b>Dualism</b>	The joint or competing existence of two principles which are not reducible to one another
<b>Scepticism</b>	It is essentially (or at present) impossible to give a true account of the nature of life



# Ontological conceptions of life

<b>Monism</b>	Reduction of the world's processes and phenomena to a single principle	Life relates to purely physical and chemical properties
<b>Vitalism</b>	The foundation of all living beings is a life force ( <i>vis vitalis</i> )	Life comprises at least one property that is essentially unknown
<b>Dualism</b>	The joint or competing existence of two principles which are not reducible to one another	Life encompasses at least one non-material component
<b>Scepticism</b>	It is essentially (or at present) impossible to give a true account of the nature of life	No affirmation can be made on this subject



# First conclusions

- None of the ontological positions exclude the possibility that the products of the Lego model may be living beings
- Even someone who rejects in principle the possibility of the Lego model being successful, has thereby not provided a justification for prohibiting any efforts in this direction
- But the differences of the ontological positions are reflected in different ways of speaking about the controllability of the process and products of synthetic biology and affect the discussion concerning the ethics of responsibility



# The moral status of synthetic (artificial) life

Present focus of synthetic biology: microorganisms

The Swiss constitution requires to take « the dignity of living beings » into account

Whether microorganisms have an inherent value depends on one's approach to environmental ethics



# The moral status of synthetic (artificial) life

**Biocentric position** (majority of the ECNH members) :  
microorganisms have an inherent value and deserve moral consideration

**Pathocentric position** (one minority) and **anthroporelational position** (other minority):  
microorganisms do not belong to living beings that have to be morally considered

**Hierarchical position**: ethics do not prohibit projects involving microorganisms (weight either negligible or inexistent)



# Is it morally relevant whether a being is a natural product or one produced by humans?

“To have moral status [...] is to be an entity towards which moral agents have, or can have, moral obligations. If an entity has moral status, then we may not treat it in just any way we please”  
Mary Ann Warren

- If a living being has a moral status, then the way how it came into life has no influence on its status



# A scientific argument

« ...Some of the things that chemists produce using fire are also given by nature, using fire » Robert Boyle



Volcanic glass (obsidian)

$\text{SiO}_2$ , plus  $\text{MgO}$ ,  $\text{Fe}_3\text{O}_4$



Artificial glass produced by a glazier

$\text{SiO}_2$  plus melting substances

➤ It is glass no matter how it was produced



# Philosophical argument 1

The moral status of a being depends on what it is,  
i.e. on its intrinsic properties

„To be produced by humans“ is not an intrinsic but a  
relational property.

➤ „To be produced by humans“ has nothing to do  
with the moral status of a being



## Philosophical argument 2

The moral status of a being depends on its morally relevant properties, e.g.

pathocentric position: sensibility

biocentric position: manifestations of life

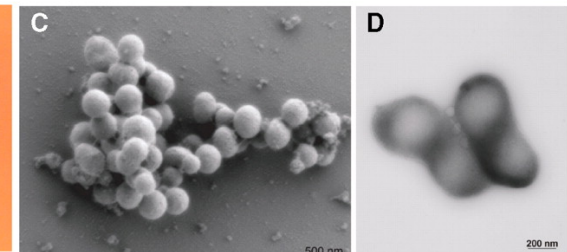
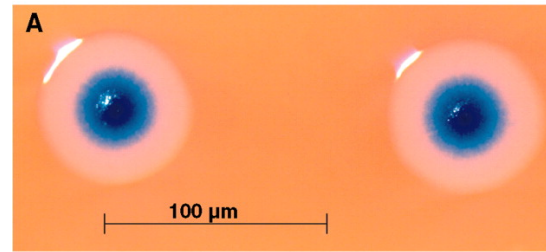
(metabolism, reproduction, movement, etc)

➤ „To be produced by humans“ has nothing to do with the moral status of a being

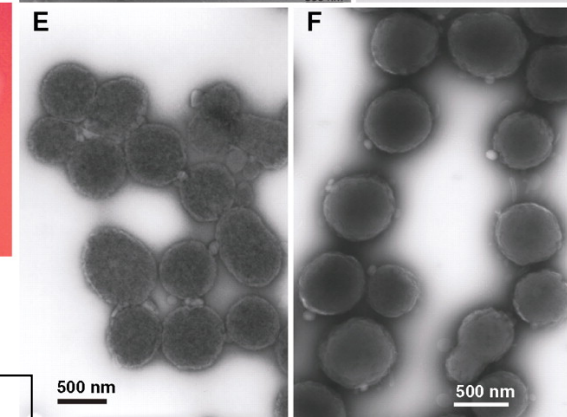
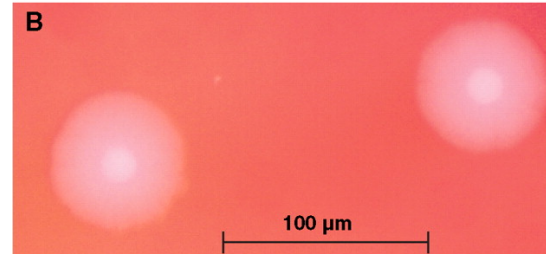


# Second conclusions

Synthetic *M. mycoides*



Natural *M. mycoides*



They are the same bacteria  
We must treat them in the same way  
Their risk is also the same



Fig. 5 Images of *M. mycoides* JCVI-syn1.0 and WT *M. mycoides*



# Ethical evaluation

## Two levels

- fundamental critique on synthetic biology
- considerations concerning the ethics of responsibility and relating to the ethics of risk



# Fundamental critique

The way of thinking which underlies synthetic biology is an expression of an attitude which regards living beings as producible, controllable and at our disposal.



# Fundamental critique

This fundamental attitude changes the way we perceive other living beings and our values and our relationships vis-à-vis such beings and life in general.

## Slippery slope

Ultimately, it could change humans' conception of themselves and threaten the protection of human dignity.



# Counterarguments

A mechanistic / reductionist way of thinking does not rule out to take inherent values or interests of living beings into consideration.

This line of criticism would need to show that these dangers are real.



## Position of the ECNH members

The majority of the ECNH-members rejects the fundamental critique on synthetic biology.

All members accept that slippery slope arguments are useful for highlighting possible consequences at an early stage, so that these can subsequently be monitored.

However, they take the view that the concerns raised by critics in this regard do not at present justify a veto on synthetic biology projects.



# Considerations relating to the ethics of risk

The mere hope that all will be well should not be the guiding principle for the handling of potentially dangerous substances and organisms, any more than fears should be allowed to prevent any action.



## **Precautionary principle is to be applied**

Until the empirical data required for an appropriate risk evaluation of release trials is available, synthetic organisms are only to be handled in contained systems, in accordance with the step-by-step principle, and taking into account the particular precautions required for specific organisms



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