**[Opening of the discussion: “How to address the relationship between synthetic biology and biological diversity”](http://bch.cbd.int/synbio/open-ended/discussion.shtml?forumid=17401&threadid=6760" \l "6760)** *[#6760]*

I express my appreciation to Ryo Kohsaka for welcoming me to this discussion and to Ms. María Andrea Orjuela Restrepo for moderating this forum.

My name is Fred Bass. I serve as an associate to the Board of the Canadian Friends (Quaker) Service Committee, with my focus directed to synthetic biology. My approach is from an epidemiological/ecological/ethical perspective. My background is that of a physician/epidemiologist who devoted more than four decades to tobacco control, helping to translate research into practice. My ethics are based on the Quaker values of simplicity, peace, integrity, community, equality and care for creation.

The (three) objectives of the Convention on Biological Diversity (CBD) are:

the conservation of biological diversity (diversity within species, between species and of ecosystems); the sustainable use of its components; and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources… [[1]](#footnote-1) [[2]](#footnote-2)

In addressing the relationship between synthetic biology and biological diversity, we should consider two distinct threads: 1) making good the unprecedented, challenging potential of synthetic biology; and 2) addressing the increasingly desperate situation of the world’s ecosystems and its biota, particularly its people. Work tends to focus either on 1) or 2). I think the task of our discussion group is to focus on both.

If mass extinction were not occurring now, there would be no CBD. But species are rapidly disappearing and we need to respond promptly and appropriately. As others in this discussion have commented, the global, ecological and social issues are problems for all technologies, not just synthetic biology. Yet this is no reason to ignore such issues. Synthetic biology has particular relevance since it deals with the core of living systems, the genome. For our group to work on both threads noted in the previous paragraph, we will require wisdom, compassion, technical understanding and technical proficiency. Of relevance, Albert Einstein is quoted,

Concern for man and his fate must always form the chief interest of all technical endeavours. Never forget this in the midst of your diagrams and equations.

Human’s implementation of technologies over the past several centuries, aided by our economic system and our consumptive behaviour, has caused serious ecological disruption—the current mass extinction (see UNEP’s Millennium Ecosystem Assessment) and its huge loss of biodiversity. As we develop synthetic biology, hopefully, we will do something different.

One aspect of synthetic biology and biological diversity concerns the risk-assessment of new genomes. In the case of natural genomes (those of biological diversity), risk is minimal, because the genome has been modified over a long period of time by evolution and by its processes of natural selection. In the case of synthetic genomes, their life history is instantaneous and thus natural selection inoperative. It seems to me that even a century’s experience with synthetic modification of genes might not be enough to assure that our human-crafted management of risk matches that of nature. For this reason, *I would recommend* that at least one evolutionary biologist who is well versed in genetics be recruited to the AHTEG.

In evaluating any intervention/treatment manufactured by humans, there is always the possibility of a catastrophic consequence of very low probability, so low as to be unprecedented. How best to deal with such contingencies regarding synthetic biology is a major challenge to decision-making under uncertainty. Dana *et al’s* statement seems reasonable: “no one yet understands the risks that synthetic organisms pose to the environment, what kinds of information are needed to support rigorous assessments, or who should collect such data”.[[3]](#footnote-3) To accept risks that are only estimated theoretically, rather than measured in actual frequency, is more an act of faith than of evidence-based practice.

The CBD should guide prudent development of this technology, by carefully attending to ecological and social values and by seeking to avoid unacceptable damage to species, people and ecosystems. Such contribution would be of the highest human value.

1. Text of the Convention on Biological Diversity Article 1. Objectives [↑](#footnote-ref-1)
2. For specification of biological diversity see ibid Article 2 Use of Terms [↑](#footnote-ref-2)
3. from CBD Technical Series No. 82 Part I Potential Impacts of Synthetic Diversity on Biological Diversity, p 33 [↑](#footnote-ref-3)