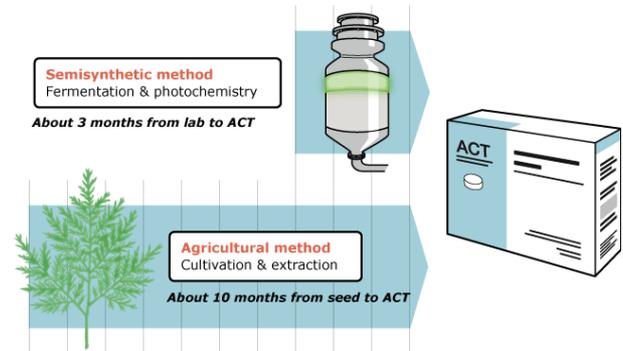


REVIEW: "Synthetic biology's malaria promises could backfire"

Claire Marris' article, "[Synthetic biology's malaria promises could backfire](#)," posits that synthetic biologists—by using semi-synthetic artemisinin as a prime example of why synthetic biology is important—are repeating history and, in doing so, repeating past mistakes. The mistake at issue first arose with the advent of genetic modification and its role in crop production, as the public realized that scientists would fail to deliver on exaggerated promises made in the late 1990s concerning this new science. Ironically, it appears that while synthetic biologists are keen on remedying the subsequent bad reputation of genetic modification, they are attempting to do so using the exact methods—overstated promises that reach beyond scientists' expertise or current capabilities—that had led to this bad reputation.



Access for the poor

In the latest case of grand promises, the focus is on NGO Path's consortium with the University of California, Berkeley, Amyris (a synthetic biology company), and Sanofi (a pharmaceutical firm). These advocates promoted in April their new achievement—the industrial production of semi-synthetic artemisinin—as a crucial breakthrough in anti-malaria efforts, particularly in terms of affordability and access for the poor. However, such one-sided advocacy ignores two facts that undermine semi-synthetic artemisinin's capability to have such a great impact against malaria:

- The price for semi-synthetic artemisinin will be close to the price for the artemisinin extracted from plants grown by farmers (despite a \$50 million investment by the Bill & Melinda Gates Foundation, cost-cutting advantages the project enjoyed—i.e., usage of technology without payment of royalties—and sale of semi-synthetic artemisinin on a 'no-profit, no-loss' basis), and
- There is already enough agriculturally grown artemisinin—with an expected surplus this year—for global use. (The pharmaceutical firm Sanofi does not currently plan to produce enough semi-synthetic artemisinin to replace the agriculturally grown and extracted artemisinin. While this may help alleviate concerns about negative impacts on artemisinin farmers, and help steady annual fluctuations in artemisinin market prices, Jay Keasling, lead scientist on the project, has made statements that imply this stance could change).

Scientists making claims outside their sphere

In making claims about the greater global impact of this new achievement on malaria, scientists are attempting to both lay claim to results that depend on knowledge outside of their sphere—including political, social, or economic expertise—as well as protect themselves from outside critique by eschewing responsibility for the part of the claims that are reliant on such expertise. More specifically, some synthetic biologists are making claims about the global health benefits of industrially produced semi-synthetic artemisinin, but do not hold themselves accountable for ensuring that their claims align with results from current and rigorous global economic, social, and political analysis, which underlie and

necessarily impact any such claims. The risk of such double-dealing is a public that is likely to distrust scientists as imprudent or uninformed at best, duplicitous and two-faced at worst.

High risk of another PR disaster

While synthetic biologists may have had good intentions in developing industrial production of semi-synthetic artemisinin, the use of this new development as representative of the possibilities of their field is highly risky. Synthetic biologists may find themselves embroiled in yet another public relations disaster if they once again disappoint the public by failing to meet their promises. Rather than moving further down the precarious path of overstated promises, a safer—albeit probably longer and more laborious path—for synthetic biologists could be to rely on smaller, yet proven, benefits they can provide to the public through working in their field. For example, at the end of her article, Claire Marris wonders why more hasn't been said about Amyris and Solazyme's contributions of compounds, developed by synthetic biology, to cosmetics.



Limited capabilities of the technology

A last of caution is about the limited capabilities that synthetic biology may possess concerning complex issues like global or community health. In a world of limited resources, funding, and public attention, strategic measures against malaria may demand that, instead of restricting our efforts to technological or scientific advancement, in SYNENERGENE we take a more holistic view in addressing such issues. In short, synthetic biologists should apply themselves to realize both the strengths and the limits of their field, and work to regain the trust of the public by communicating these realizations, instead of presenting overstated promises.

Gartner Hype Cycle

Marris' criticism reminds us of the Gartner hype cycle – a generalised model for subsequent expectations phases in technology development. Often caused by the need for research groups and startups to find funding for their R&D and the desire of mass media to present 'new and revolutionary technological solutions to society's challenges', expectations tend to reach a peak before more realistic projections take over. In the worst case the result is disillusion which can hamper further development of a technology. Is synthetic biology following a similar pattern and what does this mean in terms of Responsible Research and Innovation? Should we develop and apply expectation management strategies at an early phase of technology development and think about responsibilities of different actors?



From a perspective of management expectation Marris' suggestion to focus more on as components for cosmetics makes sense. But if you want to promote a technology or your company's or research lab's activities with applications that can count on a high level of public support it makes a lot more sense to focus on medical applications. It looks as if we have to deal with a short term interest of getting direct support versus a long term interest of avoiding inflated expectations.