Comment on Article by Graham Molitor (I)

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This is one of the best futures-oriented surveys of this subject matter I have seen, and I have no problem with its generally upbeat tone, since we are talking about one of the most exciting and promising scientific/ technological revolutions of all time. Of course it brings problems: all human evolutionary advances, from the domestication of fire onward, have brought problems. But it is such a massive transformation, affecting so many areas of life - even, as the paper suggests, altering the rules of life - that we are all obliged to think hard about what it will entail to move into a world being transformed by applications of bio-information, and to give up the notion that the genie can be put back in the bottle (to use a favorite metaphor of anti-biotech activists) or even that the revolution can be made to wait until everybody says it may proceed.

Although the bio-information revolution itself is not something that can be halted, there are many ways that its various applications can be, and should be, and are being, governed. We already have laws and regulatory regimes at every level of governance, from local to international, and this will continue to be a major challenge to public policy in the future. Governments everywhere are dealing with such issues as food safety, ecological impacts, and ethical issues - particularly in regard to reproduction. I don't think all the policies are necessarily the best ones - some are inadequate, some are excessively restrictive - but the challenges are within the capability of democratic governments.

I am much less confident about society's ability to deal with the equity questions - such as (in the case of increased life expectancy) who gets to live longer and who does not. This is, I believe, the most potentially ex-

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plosive area of biotechnology policy, to which neither the advocates nor the critics are paying sufficient attention. Molitor touches on this in relation to developments such as golden rice, but I would like much more about it - perhaps in a future article.

The one part of Molitor's paper that I strongly disagree with is the treatment of population growth - both the dismissal of projections that it will level off in this century, and the assertion that high densities can be satisfactorily accommodated everywhere. In regard to the former, it is worth keeping in mind that that there are as many new developments in birth control methods as there are in technologies for reducing the death rate. In regard to the latter, there are many problems connected with supporting dense populations that have never been entirely solved - even by Monaco - without merely displacing them onto other areas.

Nevertheless, this is an admirably thorough survey of a whole range of developments which, viewed as a whole, indicate that we stand at the brink of a massive evolutionary transition, probably the largest such change humanity has ever dealt with in such a short period of time. The more we are all made aware of that and challenged to prepare for it, the better.