

Address to the Class of 2008

M.S. in Biotechnology

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Ralph Waldo Emerson wrote: *"Hitch your wagon to a star."*

I am delighted to stand here today before you, the Class of 2008. Each of you has indeed hitched your wagon to a star, the star of biotechnology. That this is the lodestar of our future can no longer be doubted. No lesser personage than one of the most famous physicists of our time, Freeman Dyson, has written that *"It has become part of the accepted wisdom to say that the twentieth century was the century of physics and the twenty-first century will be the century of biology. Two facts about the coming century are agreed on by almost everyone. Biology is now bigger than physics, as measured by the size of budgets, by the size of the workforce, or by the output of major discoveries; and biology is likely to remain the biggest part of science through the twenty-first century. Biology is also more important than physics, as measured by its economic consequences, by its ethical implications, or by its effects on human welfare."*

Each of you has chosen to study biotechnology from all these perspectives – applications, economics and ethics. You have distinguished yourselves from those who take a narrower view, and by this have made yourselves uniquely valuable to the communities of science, law and business.

The value of this broad-education may not yet be apparent to you. The specific laboratory techniques for forensic DNA analysis, the finer philosophical points

about the nature of property rights, the political interplay between executive and legislative branches of government, or the theological hair-splitting over the meaning of life may all seem far afield from the day to day concerns in your particular jobs.

But if there is one thing we know about science, and about biotechnology in particular, it is that we don't know, indeed cannot even imagine, what we don't know.

It is no secret to all of you that I am an inveterate Trekkie, so trust me when I tell you that we have no way to predict the future.

Like the Borg, we may soon be injecting ourselves with nano-bio-bots that repair and enhance our bodies from the inside out. We may be re-sequencing the genetic codes within our embryos, or terra-forming the most desolate places on earth. Perhaps even beyond.

Your future may contain molecular computing systems that make today's computers as obsolete as hieroglyphics.

It might involve embedded personal identity systems that lead us either into a dystopian future of constant surveillance or a utopian future freed from tyranny of paperwork, passwords and account numbers. Or perhaps both.

It might involve plants and microbes designed to propagate throughout the environment, powering our homes, cleaning up our messes and building new

surroundings for our profit and our pleasure.

And speaking of pleasure, by the time you have grandchildren, first graders may be using off the shelf chemicals and biobricks to design new pets for themselves, and their parents may be dressing for dinner by lathering on lotions that trigger the emergence of colors and patterns on their skin.

I don't know whether any or all of these things will come to pass. But I do know that your education has prepared you. Not by teaching you everything you need to know to manage each of these developments, but rather by introducing you to the breadth of concerns that must be addressed for each of these developments.

Give a man a fish, it is said, and you feed him for a day. Teach him to fish, and you feed him for a lifetime. Those of us on the faculty of the Masters in Biotechnology program would like to think that we have taught you how to learn, and thereby educated you for a lifetime of serendipity and wonder in the world of biology.

And although I cannot know what those wondrous developments might be, I do have a fundamentally optimistic vision of the future that biotechnology will bring us. I do not discount the fears of ecological displacements or unsavory uses in human reproduction or bioterrorism. But to take a page from one of the greatest biologists in history, Louis Pasteur: "I am utterly convinced that science and peace will triumph over ignorance and war, that nations will eventually unite not to destroy but to edify, and that the future will belong to those who have done the most for the sake of suffering humanity."

Each of you has it within you to save the world through science. I wish for you a career filled with opportunities that excite you, challenges that engage you, and results that remake the world.

To leave you with one last quotation, from one of history's finest writers and observers of humanity, Mark Twain, "Twenty years from now you will be more disappointed by the things you didn't do than by the ones you did. So throw off the bowlines. Sail away from the safe harbour. Catch the trade winds in your sails. Explore. Dream. Discover."