Mapping the Landscape of Bioscience Innovation

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Clusters

When an industry has thus chosen a locality for itself, it is likely to stay there long as great are the advantages which people following the same skilled trade get from new neighborhood to one another. The mysteries of the trade become no mystery, but are as he were in the air.

— Alfred Marshall
Principles of Economics 1890

The process of industry evolution often breeds new competitive industries and hence trades or streams, yet tends. This pattern of a nation’s economy that extends beyond individual industries and is a powerful force for economic development.

— Michael Porter
The Competitive Advantage of Nations 1990

Global Bioscience Clusters

MnBiNet is the world’s largest regional interactive gateway in life sciences and health care fields, connecting 1,400 organizations and serving 35,000 visitors per month.
...the need for close geographic networks is diminishing. Biotech clusters of the near future are going to be virtual. They will be built on shared needs and proximity of interests, not merely on neighborhood.

Bioscience, globalization and policy

Global Stem Cell Research Centers

Map by William Hoffman. Global clustering of stem cell research centers and institutes. The United Kingdom, Singapore, South Korea and China are investing heavily in the embryonic stem cell field.

Human Embryonic Stem Cell Research Policy

Map by William Hoffman. Countries in blue represent 2.8 billion people. Those in light brown allow research and all others. Those in dark brown allow human embryonic research. All have banned human reproductive cloning.

Human Embryonic Stem Cell Research Policy: Financial Times

Map Source: William Hoffman (MBBNet)
Centers of Regenerative Medicine in China

Map modified from Fig. 2 of "Cultivating regenerative medicine innovation in China." McMahon, Therapeutics. Singapore: Elsevier. Regenerative Medicine 5(11), 2010.

Global Shares of GDP: G7 and the Brics

GDP shares of the G7... ...and the Brics

Emerging biotechnologies with revolutionary potential

Regenerative Medicine: Miromatrix Medical, Inc.

"The breadth and depth of the applications for the Miromatrix technology is staggering. It will assist the replacement of entire organs (e.g., heart, liver, kidney) preserved in non-transplantable organs, however, has either porous or dense, replaced by their cells and localized with either cells from the recipient or compatible cells. The potential role for the Miromatrix organ replacement technology is enormous." - Miromatrix Medical Inc.

Regenerative Medicine: Recreating the Lung


Regenerative Medicine: Recreating the Lung

L 19 orthotopic TX Fluoroscopy

Regenerative Medicine: Recreating the Lung


Exponential Progress in Reading DNA and Writing DNA

DNA Synthesis
DNA Sequencing

Source: Bioibles, www.syntheses.co

“Genetically Modified Stuff” in the US Bioeconomy (2010 est.) >$250B or Equivalent of ~2% of GDP

U.S. Biotech Revenues in $ Billions

GM crops, Bt crops, industrial 19%, biologics 10%, agricultural 10%, industrial 20%. (Sources: Nat.Market, Forbes, TT.Bloomberg) Jabe, ~6% of all work force in US contributed $80B of GDP growth in the years 2000 to 2007. (Bain, M&A, 3rd report). McKinsey and EY estimates for industrial apps range from $10B to $100B.

Innovation: The Multi-Millennial Journey

James Madison on innovation

“And it is asked by what authority this bold and radical innovation was undertaken.”

Commenting on the proposed structure of the national government in the Federalist Papers
No. 59, Jan. 16, 1788

Modification from Fig. 1, “Growing Up with the Economy,” Robert W. Fogel, American Economic Review, March 1999, with the assistance of James Hagedorn