

BioChicago 2010, May 4.
Session ID: 5695
Chicago, Illinois, 60616

Lonza

**Industrial Biotechnology (IB) for
Higher-Value-Added Products**

Hans-Peter Meyer, Lonza AG, 3930 Visp (Switzerland)

The potential of industrial biotechnology?

Industrial biotechnology a dream?

- 2'290 bio US\$ global chemistry market. 3'235 bio US\$ 2015, 4'000 bio US\$ 2020
- ~50 billion US\$ of 2'290 billion US\$ by industrial biotechnology (excluding bio-fuels)
- ~25% of these 50 billion US\$ biotechnology products are fine chemicals.
- ~20% global chemicals by biotechnology in 2020 (16% growth p.a.!)

Meyer, H.-P., Turner N. J. Mini-Reviews in Organic Chemistry (2009), **6(4)**: 300-306. Perlitz, U. *CHEManager* (2008) **14**: 4. Festel, G.; Knoell, J.; Goetz, H.; Zink, H. *Chem. Ing. Tech.*, 2004, **76**:307-312.

Pharma market “quo vadis”?

Hypothetic scenario of long term trends in pharmaceuticals.

Small molecules

Peptides

Nucleotides

<= Protein & mAb =>

Gene therapy

Cell therapy

Tissue repair

H.-P. Meyer, H.-P., Turner N. J. Mini-Reviews in Organic Chemistry (2009), **6(4)**: 300-306

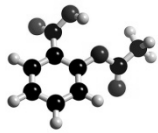
Chemical synthesis can be a nightmare!

Waste generated per kg of product produced in the chemical industry.

Bulk chemicals.....	> 0,1 kg
Fine Chemicals.....	5 to 50 kg
Pharmaceuticals.....	25 to 100 kg
Oligonucleotides.....	<1000 kg
Peptides.....	<1000 kg
Oligosaccharides.....	<1000 kg

Meyer H.-P., Werbitzky O., Biocatalysis for Green Chemistry and Process Development. Tao & R. J. Kaazalauskas (Eds), John Wiley & Sons, Inc (2010), in press. Woodley, J.M. TIBTEC, (2008), **26**: 321-327].

Small molecule markets

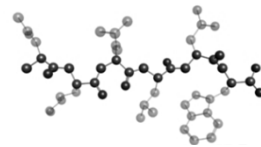


■ Small Molecules

2009 Market

Patient Market Size: **\$548bn**
 287,400MT
 SM Drugs¹: **7660**
 SM Innovators: **>1000**

(Biotransformation &
 Bioconversion &
 fermentation)



■ Peptides

2009 Market

Patient Market Size: **\$8.5bn**
 1.2MT
 Peptide Drugs¹: **500**
 Peptide Innovators: **300**

(Biotransformation &
 bioconversion &
 fermentation)

■ Antibody Drug Conjugates

2009 Market

Patient Market Size: **\$50m**
 ~20kg
 ADC Drugs¹: **42**
 ADC Innovators: **5**

(Monoclonal antibody
 technology &
 microbial fermentation)

[1] preclinical through commercial

How could an investor look at IB?

Biotransformation and biosynthesis for complex fine chemicals suffer from several technological gaps.

Pharmaceuticals (red biotech pharma)

E.g. antibody – one product, one “standard” cell line, standardised DSP...for a market of ~25 billion US\$

“Uniform” processes and product.

Industrial biotechnology (white biotech pharma)

Variety* of products, processes, enzymes, strains, markets...for a >50 billion US\$ market

*Human & animal pharmaceuticals, Fine chemicals, Nutraceuticals, Cosmeceuticals, novel Materials... besides commodity applications such as Bulk chemicals & Fuels.

Limited R&D resources!

Current R&D expenditures versus future markets for biotechnology

Application	Share of total OECD business expenditures on biotech R&D in 2003	Estimated potential share of total biotechnology gross value added (GVA) in the OECD area for 2030
Health	87%	25%
Agriculture	4%	36%
Industry	2%	39%
Other	7%	-
Total	100%	100%

The Bioeconomy to 2030. OECD (2009)

SIBC: an innovative form of co-operation

The Swiss industry decided to act and founded the SIBC (Swiss Industrial Biocatalysis Consortium)

- Shorten the lead time by a “Consortium” approach
- Founding members: CIBA, GIVAUDAN, LONZA, NOVARTIS, ROCHE, SAFC, (SYNGENTA)
- Consortium contract with clearly defined rules and MTAs
- Consortium members share information on their individual strain collections
- Consortium strain databank created - Consortium members exchange strains
- Consortium is a forum & think tank for IB
- Cooperation with SBA for a national IB roadmap & scenarios

SIBC**Swiss Industrial Biocatalysis Consortium**

Members of the SIBC:

Givaudan^o**Lonza****SIGMA-ALDRICH**

NOVARTIS

**Swiss Biotech
Association**

Platform Industrial Biotech