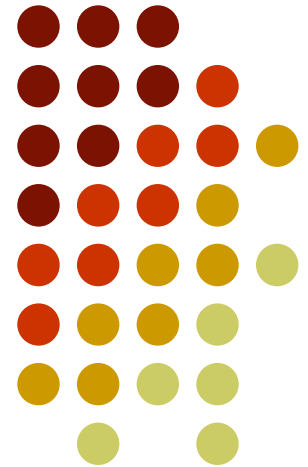


Dyadic International



**Programmable Scalable
Enzyme Technology**





Safe Harbor Statement

Certain statements contained in this presentation are forward-looking statements. These forward-looking statements involve risks and uncertainties that could cause Dyadic's actual results, performance or achievements to be materially different from any future results, performance or achievements expressed or implied by such forward-looking statements. Except as required by law, Dyadic expressly disclaims any intent or obligation to update any forward-looking statements.



Overview

Patented and proprietary enabling biotechnologies for multi-billion dollar markets to develop biofuels, biotherapeutics, industrial enzymes and other bioproducts

❖ **“One-Stop Shop”**

❖ Gene discovery to product manufacturing

❖ **Dyadic INSIDE[®]**

❖ Cutting edge C1 technology to develop and manufacture diverse enzymes and proteins for existing and emerging industries



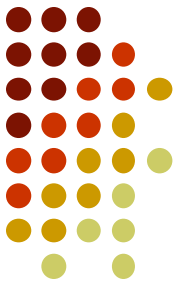
Investment Highlights

- ❖ **Patented Technology platform with vast potential**
 - ❖ C1 fungus-based expression system offers significant advantages over other microbial and cell culture-based systems
 - ❖ One-stop shop, same organism from discovery to production
 - ❖ Operating conditions, cost, scalability and yield
- ❖ **Risk-mitigated strategy to leverage platform into biofuels and biopharmaceuticals**
 - ❖ Platform capabilities have been validated in industrial enzymes and biofuels through partnerships with key players
 - ❖ Near-term potential to enter patent-protected markets in biopharmaceuticals through production of scientifically and commercially validated proteins, antibodies and vaccines
- ❖ **Experienced management & scientific teams**
- ❖ **Stable financial condition**



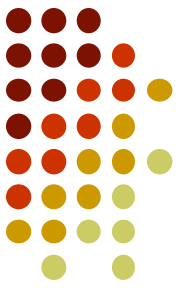
Management Team

<u>Name</u>	<u>Title</u>	<u>Experience</u>
<u>Key Management</u>		
Mark A. Emalfarb	President and CEO Chmn. of the Board/Founder	Dyadic International, Inc.
Thomas M. O'Shaughnessy	VP Sales & Marketing	Hexion Specialty Chemicals/ Occidental Chemical/GE
Richard H. Jundzil	VP Operations	Genzyme
Anne E. Whitehead	Executive Director Strategic Alliances	Shearman & Sterling/Skadden Arps
Michael J. Faby	VP Finance	Perry Slingsby/ PricewaterhouseCoopers
Adam J. Morgan, Esq.	VP General Counsel & Bus. Dev. / Secretary	Rexall Sundown/Advance Publishers
<u>Dyadic Netherlands</u>		
Wim van der Wilden, Ph.D	General Manager	TNO Nutrition and Food Research Institute (the Netherlands)
Jan Wery, Ph.D	Director, Science	Netherlands Organization for Applied Scientific Research



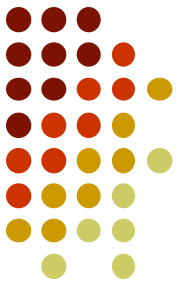
Scientific Advisory Board

<u>Name</u>	<u>Title</u>	<u>Experience</u>
Richard Lerner, MD	Chairman of SAB	President of the Scripps Research Institute
Carlos Barbas, Ph.D	Advisor	Scripps Research Institute, Chair in Molecular Biology and Chemistry
Arnold Demain, Ph.D	Advisor	Fellow at Charles A. Dana Institute for Scientists Emeriti/MIT /Merck & Co.
Peter Punt, Ph.D	Advisor	TNO Nutrition and Food Research Institute (the Netherlands)
Arkady Sinitsyn, Ph.D	Advisor	Head of Dept. of Enzymology, Moscow State University (Russia)
Cees van den Hondel, Ph.D	Advisor	Professor of Fungal Genetics, Leiden University



Partnerships

- ❖ **Important validation of C1 Platform Technology**
- ❖ **Provide near-term cash flow to further advance platform capabilities**
 - ❖ Leverages the capabilities and European reach of Dyadic Netherlands, Dyadic's R&D arm
- ❖ **Expanding pipeline of potential licensees**



Licensees



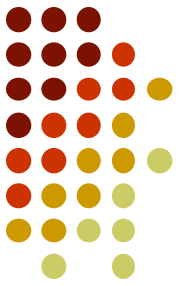
- ❖ Non-exclusive license agreement
- ❖ Covers use of C1 expression system for large-scale production of enzymes in biofuels, chemical and pharmaceutical intermediate production
- ❖ Upfront payment of \$10 million
- ❖ Milestone payments, facility fees and enzyme volume fee due to Dyadic upon certain events



Licensees

ABENGOA BIOENERGIA
The Global Ethanol Company

- ❖ Non-exclusive licensee agreement
- ❖ Covers use of C1 expression system for large-scale production of enzymes for use in manufacturing biofuels, power and chemicals
- ❖ \$10 million investment in Dyadic common stock
- ❖ R&D program led to non-exclusive license agreement
- ❖ Facility fees and royalties due to Dyadic upon commercialization
- ❖ Currently focused on enzymes for lignocellulosic bioethanol production
- ❖ Biomass Pilot Plant (US) in 2007 - 0.02 Mgal/yr capacity
 - ❖ Objective: competitive process with grain ethanol culture-based systems
- ❖ Biomass Demonstration Plant (Spain) in 2008 – 1.3 Mgal/yr capacity
 - ❖ Objective: demonstrate commercial-scale process systems
- ❖ Commercial Plant (US) in 2012
 - ❖ Objective: production at a cost line competitive



Collaboration with Scripps

- ❖ **One of the world's largest and most reputable biomedical research organizations**
 - ❖ Dr. Richard Lerner, President of Scripps and Chairman of Dyadic's Scientific Advisory Board
- ❖ **C1 genome sequencing and annotation – 2005-2008**
- ❖ **Re-sequencing and re-annotation – 2009-2010**
 - ❖ Expanding knowledge of C1 genetics
 - ❖ Provides information and knowledge to improve C1 Technology Platform – to do more for less at higher yields.
 - ❖ Provides new product candidates and enzyme catalysts to improve manufacturing processes
 - ❖ Enter new markets



Dyadic Netherlands

- ❖ **Dyadic's Research & Development Subsidiary**
 - ❖ 16 employees – 6 with Ph.D.'s
 - ❖ Participation in a number of funded international projects

- ❖ **Located in Wageningen**
 - ❖ Wageningen University and Research Institutes
 - ❖ Centre of excellence for Life Sciences research

- ❖ **Management Team**
 - ❖ Wim van der Wilden, Ph.D. – General Manager
 - ❖ Former Director of R&D, Industrial Pharmaceutical Products Division Gist-brocades/DSM, TNO Quality of Life
 - ❖ Jan Wery, Ph.D. – Director, Science
 - ❖ Former Sr. Scientist, Netherlands Organization for Applied Scientific Research



Dyadic Netherlands

❖ Core competencies in:

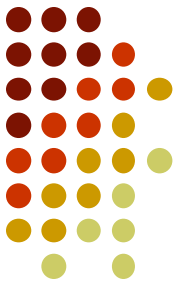
- ❖ Enzymology
- ❖ Fungal High Throughput Robotic Screening*
- ❖ Gene Expression
- ❖ Fermentation



❖ Goal is:

- ❖ To apply technology to more industries and uses
- ❖ To manufacture vast quantities of diverse enzymes and proteins at higher yields and lower costs

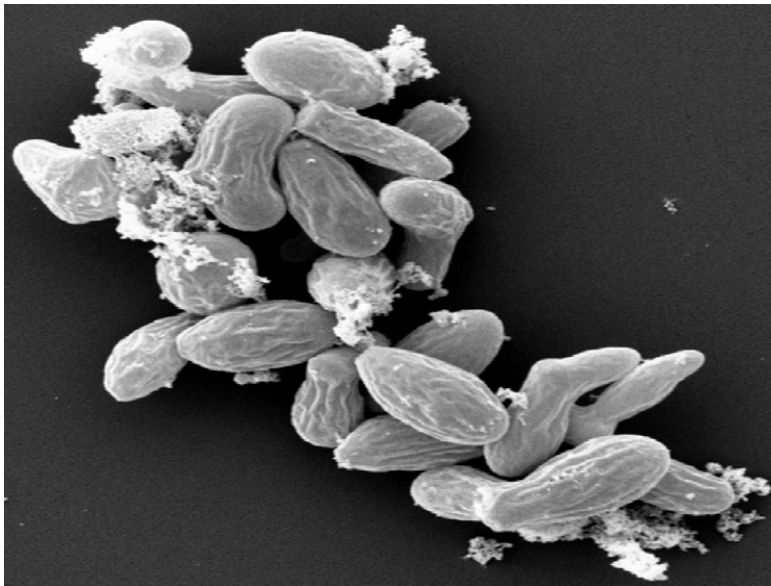
** Further development needed*



Patented Technology Platform

*Chrysosporium lucknowense** (C1)

System for gene discovery, expression and protein production



A fungus isolated from alkaline soil
in Eastern Russia

Platform for enzyme and protein production

- favorable fermentation characteristics
- high yield

Highly versatile

- can be used to produce a growing
number of enzymes or proteins

**Agency Response Letter GRAS Notice No. GRN 000292, CFSAN/Office of Food Additive Safety: The C1 strain was initially deposited with the International Depository of the All Russian Collection of Microorganisms of the Russian Academy of Sciences, and was assigned Accession Number VKM-3500D and classified as Chrysosporium luckowense based on morphological characteristics and subsequently reclassified as M. thermophila based on genetic tests.*



C1 Technology Platform

From Gene to Product in a Single Host Strain

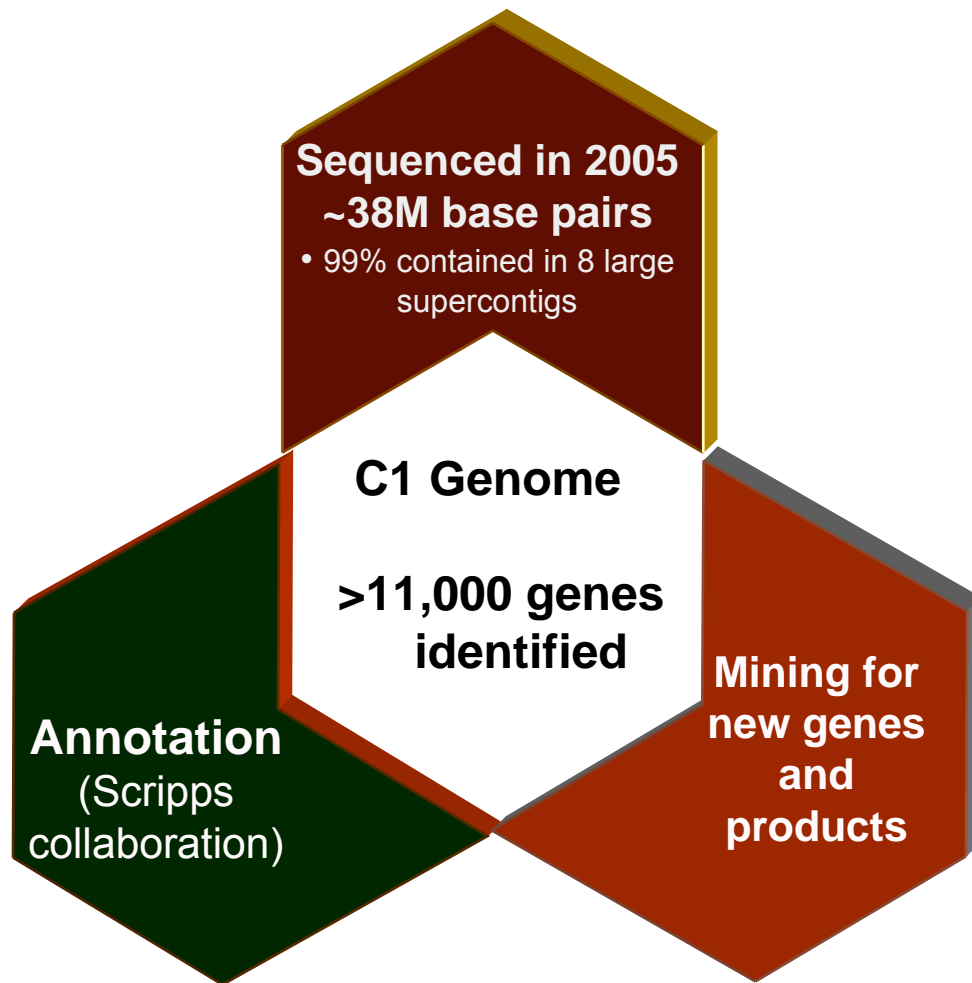
From Promise to Product in 5 Steps:

- ❖ **Gene discovery**
 - ❖ Access the full spectrum of biodiversity
 - ❖ Robotic high-throughput screening
- ❖ **Gene expression**
 - ❖ Functional expression to identify genes
- ❖ **Characterization**
- ❖ **Optimization**
- ❖ **Commercial Manufacturing**
 - ❖ Easy scale-up to 150,000L





C1 Gene Discovery



Over 200 genes encoding putative carbohydrate-active enzymes:

- cellobiohydrolases
- endo-/exo- β -glucanases
- endo-/exo-xylanases
- xyloglucanases, mannanases, arabinases, galactanases
- pectinases (pectin-/pectate lyases, polygalacturonases, etc.)
- α -amylases, glucoamylases
- glycosidases (α -/ β -glucosidases, α -/ β -xylosidases, α -/ β -galactosidases, α -L-arabinofuranosidases, α -/ β -mannosidases, etc.)
- ferulic acid esterases, cutinases, esterases, polyesterases



A Rich Source of Hydrolytic Enzymes

70 genes have been expressed and partially characterized to date

Annotated enzyme	Number of enzymes in C1	Number of enzymes in <i>T.reesei</i> (JGI data base)
β -Galactosidases/1,4-galactanases	6	2
β -Glucosidases/ β -xylosidases	11	12
Endoglucanases/cellobiohydrolases	18	7
Xylanases	11	5
Endoglucanases	26	10
α -Galactosidases	2	8
Polygalacturonase	2	4
Arabinases/arabinofuranosidases/ β -xylosidases	10	2
Arabinofuranosidases	4	1
α -Glucuronidase	2	1
Xyloglucanase	1	1
Exo-arabinases	2	-
Acetyl xylan esterases/ferulic acid esterases	13	2
Acetyl esterases/ pectin methyl esterase	3	-
Lyases	7	-
Total	115	55



High Productivity-Proven Scalability

FERMENTATION

**Inexpensive fermentation media
Wide pH and temperature range tolerated**

SCALABILITY

**Scalable to 150,000 L
Grows in 1/3 the time vs. CHO cells**

PURIFICATION

**Target protein secreted into media
under low viscosity**

**Lower cost, greater yield
Improved productivity**



C1 Safety Profile: FDA GRAS

C1 strain

- Pathogenicity and toxicogenicity data: strain is non-infectious/no known toxins are produced
- Peer-reviewed scientific literature: No known pathogenicity
- No mycotoxins found

C1-Enzyme preparation

- *In vivo* feeding trials:
 - 14 day dose study in rats
 - 13 week subchronic rat study
- Genotoxicity testing:
 - AMES bacterial mutagenesis
 - Chromosomal aberration test
 - Genetic mutation test
- No adverse effects observed

C1 Safety Profile: GRAS status acknowledged by the FDA



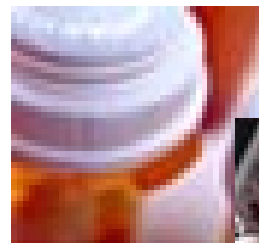
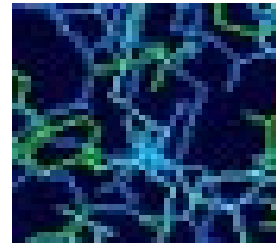
Strong Intellectual Property

- ❖ **5 issued U.S. patents**
 - ❖ broad claims blocking use of C1
- ❖ **10 pending U.S. patent applications**
- ❖ **60 issued foreign patents**
- ❖ **34 pending foreign applications**



Applications

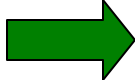
- ❖ Biofuels
- ❖ Biopharma
- ❖ Agriculture
- ❖ Chemicals
- ❖ Food
- ❖ Animal Feed
- ❖ Cosmetics
- ❖ Nutraceuticals

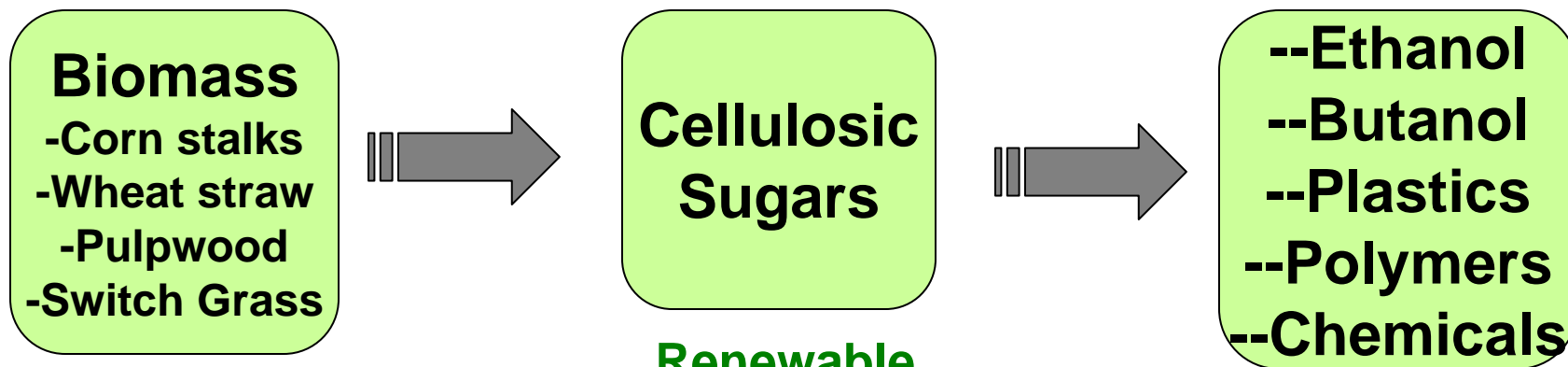




Biofuels

Energy Independence and Security Act of 2007

Requirement to increase the volume of renewable fuel
9 billion gallons in 2008  36 billion gallons by 2022



Renewable
Environmentally friendly
Reduces dependence on imported oil



Biofuels: the Vision

- ❖ **Development of proprietary enzymes for cellulosic bioethanol production**
 - ❖ Discovery and optimization of new enzymes
 - ❖ Improve performance
 - ❖ Lower costs

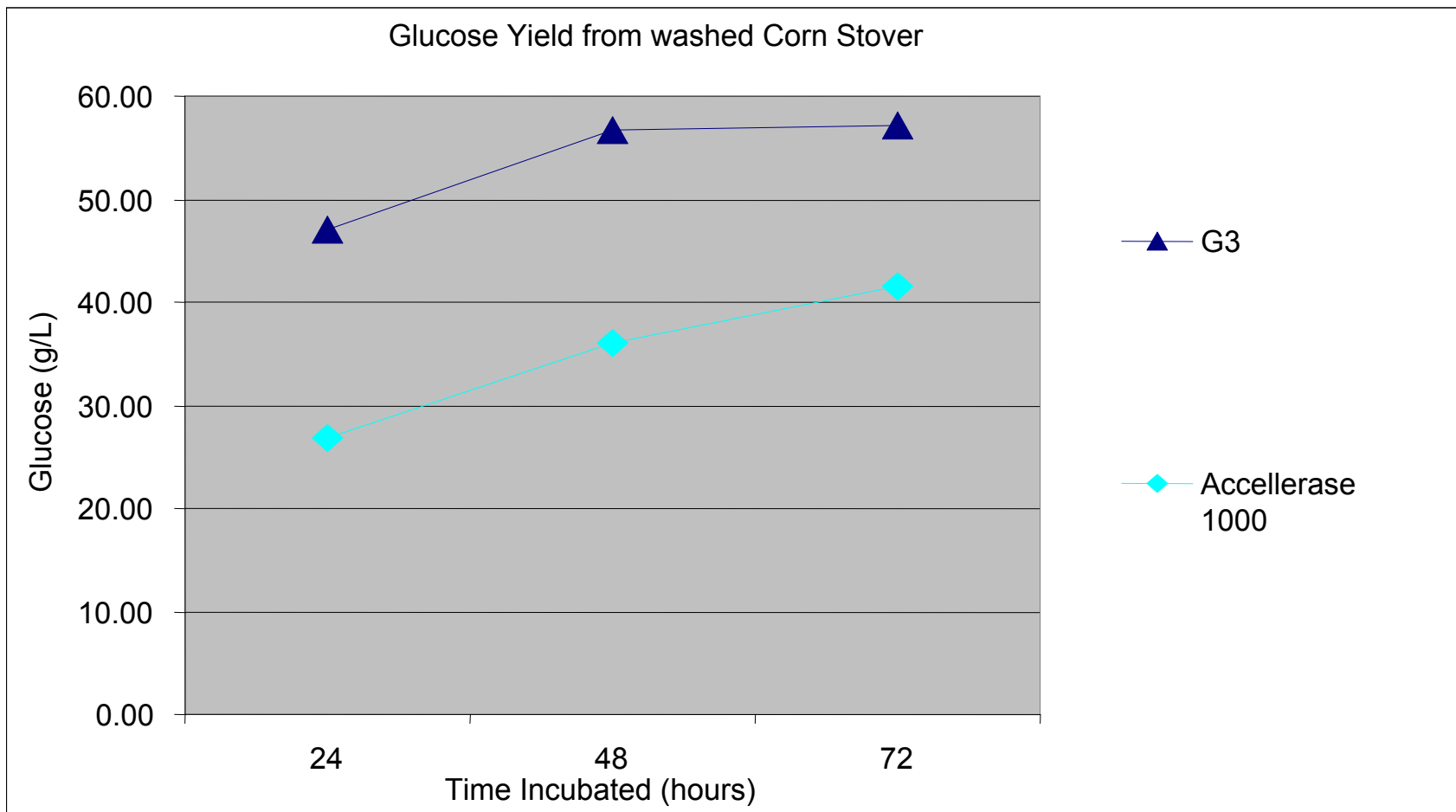
Performance of Dyadic's C1 Enzyme vs. Genencor's Accellerase™ 1000*

Enzyme Preparation	Protein dose (mg protein/g total solids) **	Temp (°C)	pH	Total Solids (% wt)	Glucose productivity (g/Lh ⁻¹)***	Relative Glucose productivity (%)
Dyadic C1 (Chrysosporium sp)	20	50	5.0	10	0.86	97
	20	50	6.0	10	0.89	100
Accellerase™ 1000 (Trichoderma reesei)	20	50	5.0	10	0.73	82
	20	50	6.0	10	0.46	52

*Substrate: pretreated hardwood, **protein measured by BCA, *** 96h reaction

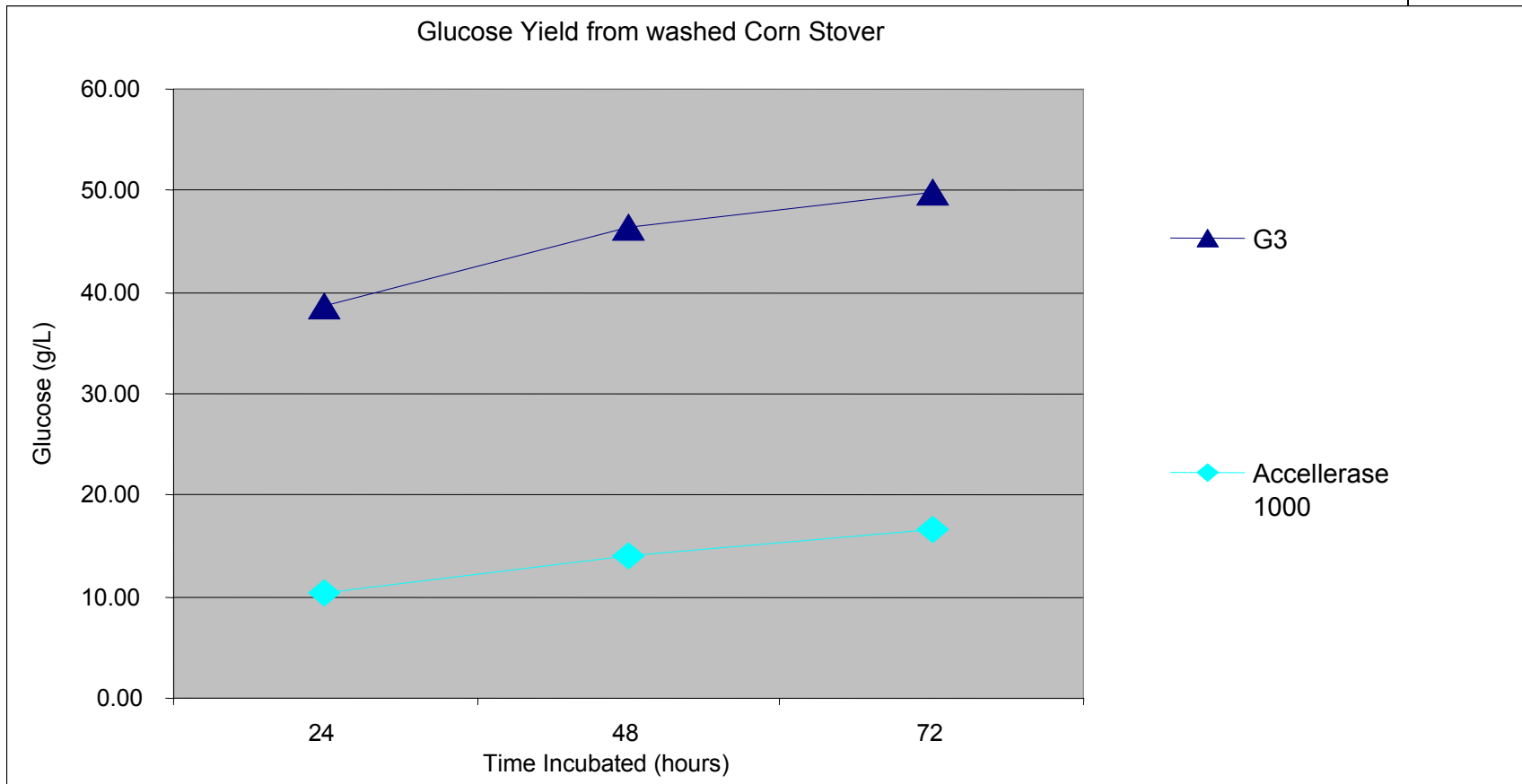


C1 vs. Accellerase™ 1000 at pH 5

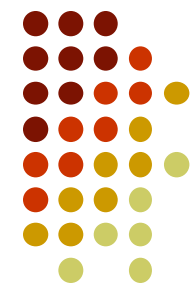




C1 vs. Accellerase™ 1000 at pH 6

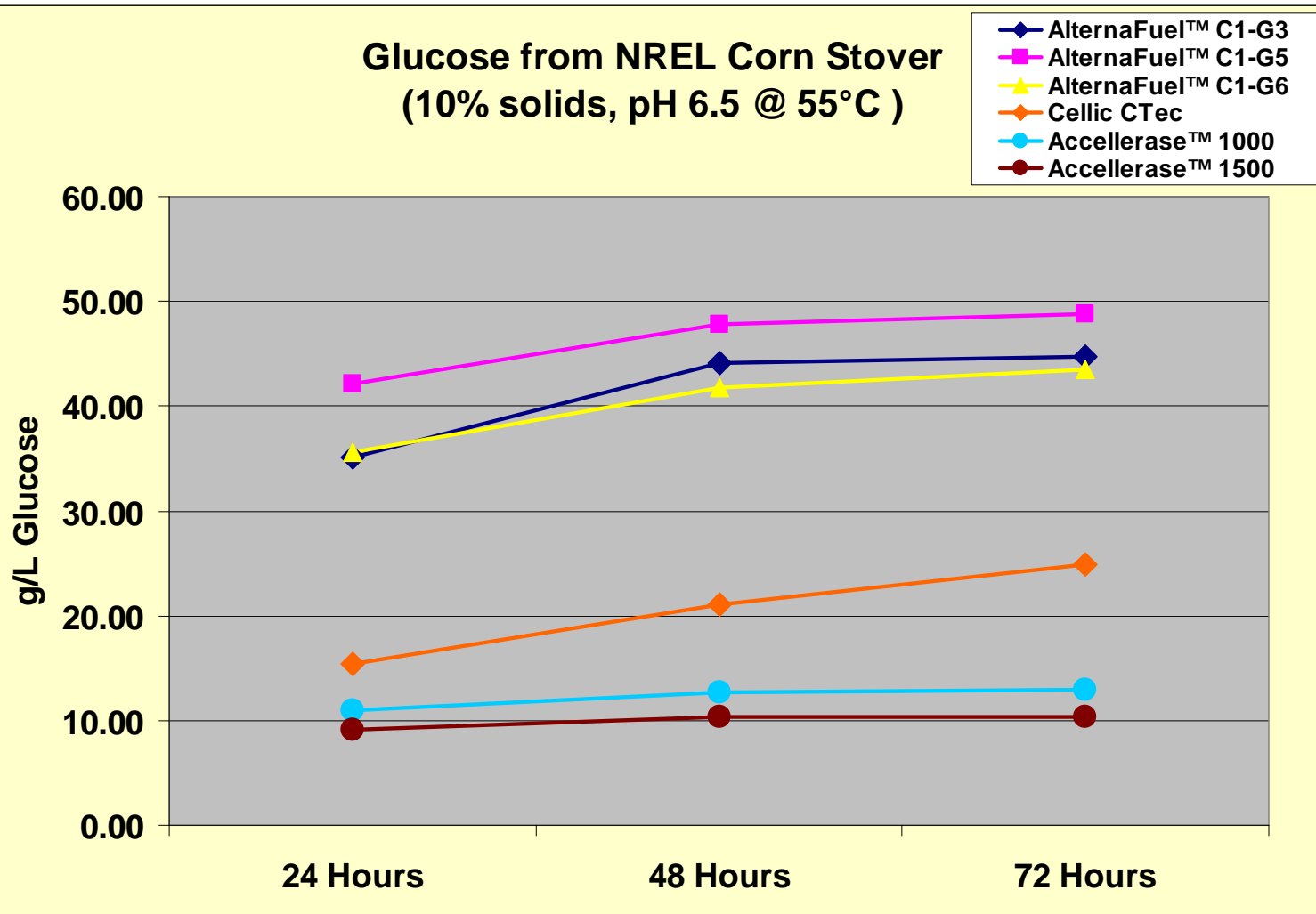


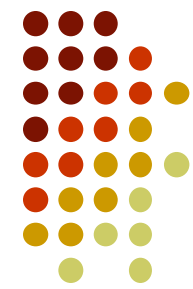
Accellerase at pH 6 is ~ 50% less effective than at pH 5
C1 enzymes provide broader operating conditions



C1 vs. Genencor & Novo at pH 6.5

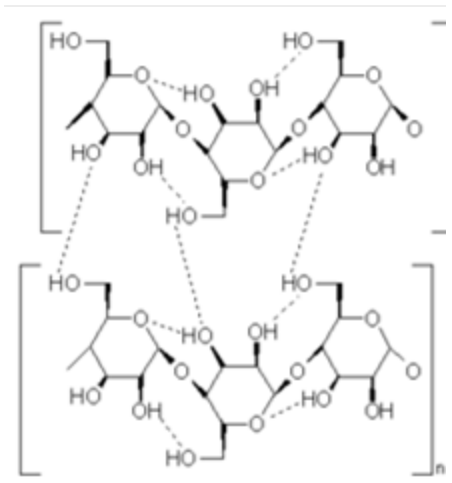
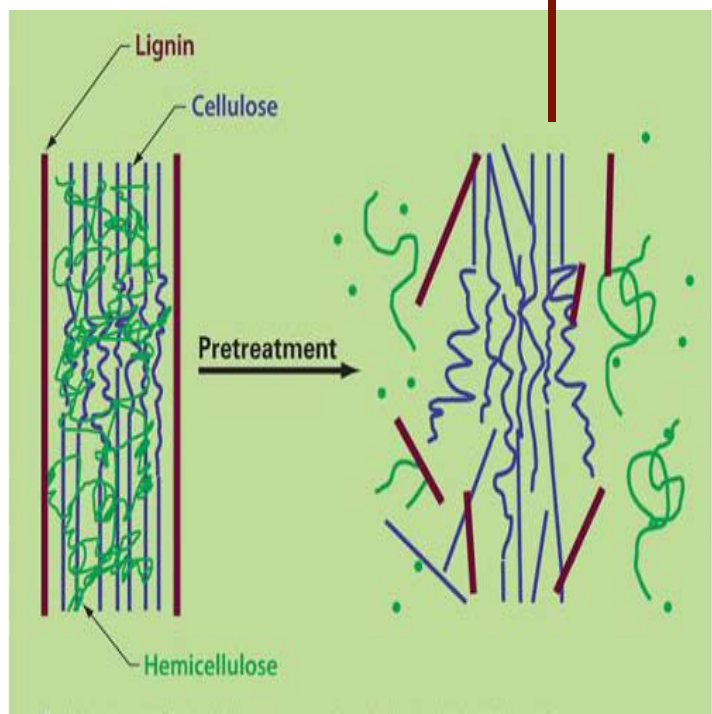
Glucose from NREL Corn Stover
(10% solids, pH 6.5 @ 55°C)





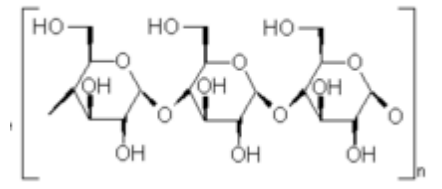
Enzymes for Biomass Saccharification

Cellulases



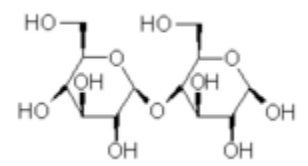
Crystalline cellulose

Endo-glucanases
Accessory enzymes



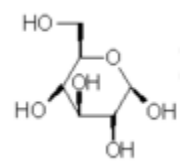
oligomers

Exo-glucanases/
cellobiohydrolases



cellobiose

B-glucosidase



glucose

Fermentation

ETHANOL



Comparison of C1 and Trichoderma

Comparison of the lignocellulolytic potential of C1 and *Trichoderma reesei* (the main industrial source for biofuel enzymes, e.g. Accellerase™)

	C1	<i>T.reesei</i> **
Cellulases	~ 55	~ 35
Cellulose binding domains (CBM1)	~ 46	~11#
Xylanases	~ 11	~ 5
Arabinofuranosidases/arabinases	~ 14	~ 3
Esterases (Axe, Fae)	~ 10	~2#

** From the JGI database

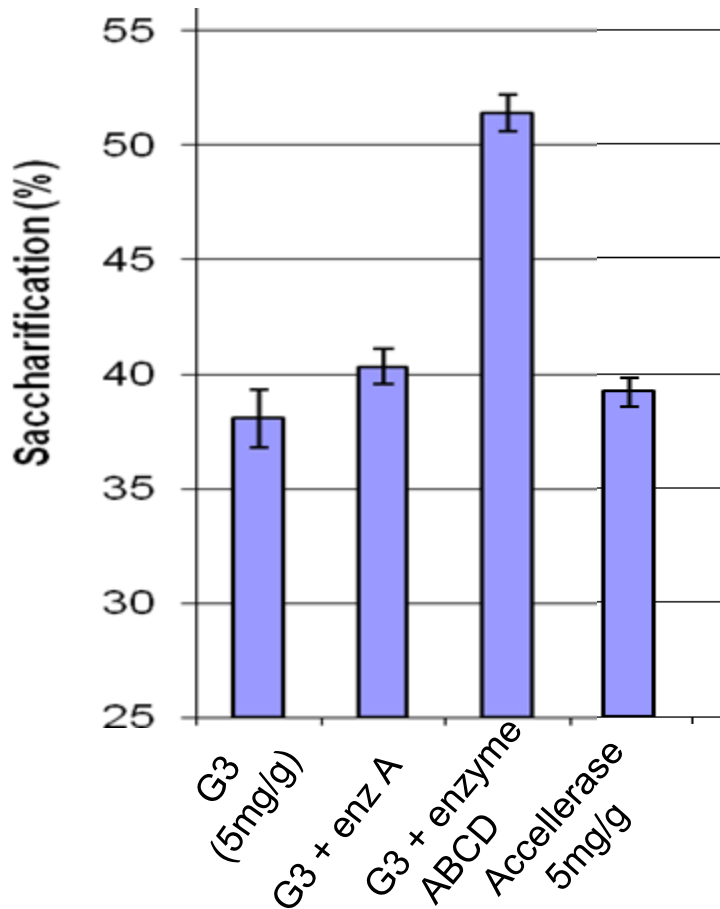
Based on literature and JGI database searches

C1 is a rich source of lignocellulolytic enzymes!



C1 Strain Improvement

Substrate: Pretreated corn stover



G3: An improved C1 strain for Biofuel Production

Further improvements:

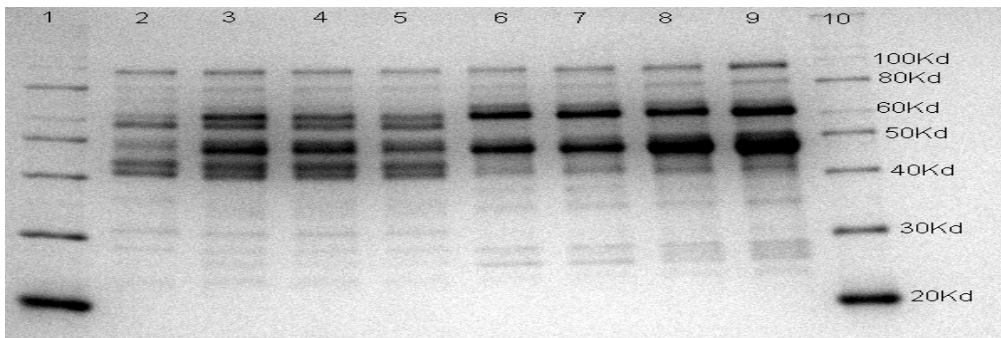
- ❖ Addition of distinct C1 cellulases to increase saccharification efficiency
 - ❖ discovery of new enzymes (genomics)
 - ❖ directed evolution of key single enzymes
- ❖ A single C1 strain producing optimized mix of enzymes
- ❖ Improve production yield from enzyme mixtures



Productivity Improvement

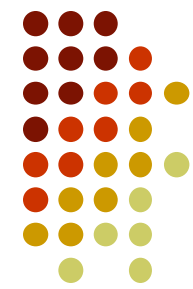


Ferm. No.	Strain	Medium Density	AzoCMC U/g	BCA Protein g/l
EG2-17	UV18#100.fΔalp1	1x	728	n/a
EG2-18	EG2#65	1x	3,054	n/a
EG2-124	EG2#65	1.86x	3,507	68
EG2-125	EG2#257	1x	5,456	77
EG2-126	EG2#257	1.86x	6,457	86
14 Liters	EG2#257	1.86x	8,625	102



Protein production by optimized strain = 102g/L

~ 2X improvement over current strain



Commercial Enzymes

- ❖ **Dyadic has manufactured commercial enzymes since 1994**
- ❖ **Sales exceeded 1,300 metric tons through November 2009**
- ❖ **Over 50 products sold to customers in over 35 countries**
- ❖ **Excellent customer service and technical support**
 - ❖ **dedicated sales personnel in North and South America, Europe, Asia**



**Food, Brewing
Animal Feed**



**Paper,
pulp**



Textiles



Commercial Enzymes

Food, Brewing, Animal Feed	Pulp and Paper	Textiles
CeluStarCL	FiberZyme LBL CONC	ROCKSOFT™ BioACE PLUS
Cellulase PLUS	FiberZyme PBL 100	ROCKSOFT™ BioACE 2X
Cellulase CP CONC	FiberZyme LBR	ROCKSOFT™ ACE P150
BrewZyme LP	FiberZyme PBR 100	ROCKSOFT™ Ultra L2500
β Glucanase BP CONC	FiberZyme LDI	ROCKSOFT™ ACL CONC
Xylanase PLUS	FiberZyme PDI 100	ROCKSOFT™ ANTARCTIC LTC
Xylanase 2XP CONC		ROCKSOFT™ NCE L600
AlphaStar CO		ROCKSOFT™ NCE 2X
Protease AP CONC		ROCKSOFT™ NCE 3000
GlucoStar 400L		



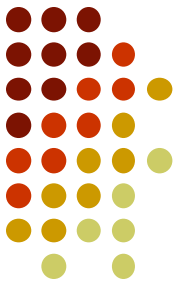
Biopharma Opportunity

❖ **Therapeutic proteins and antibodies**

- ❖ Over \$100 billion market
- ❖ Numerous patent expiries over the next decade
- ❖ No clear pathway for generics
- ❖ Opportunity to apply proprietary technologies to create differentiated products
 - ❖ Potential for efficacy improvements
 - ❖ New IP

❖ **CHO-based manufacturing system has limitations**

- ❖ Bottlenecks in development of master cell bank, scale up
- ❖ Other systems (plants, yeast) have faster growth cycles, but incorrect glycosylation



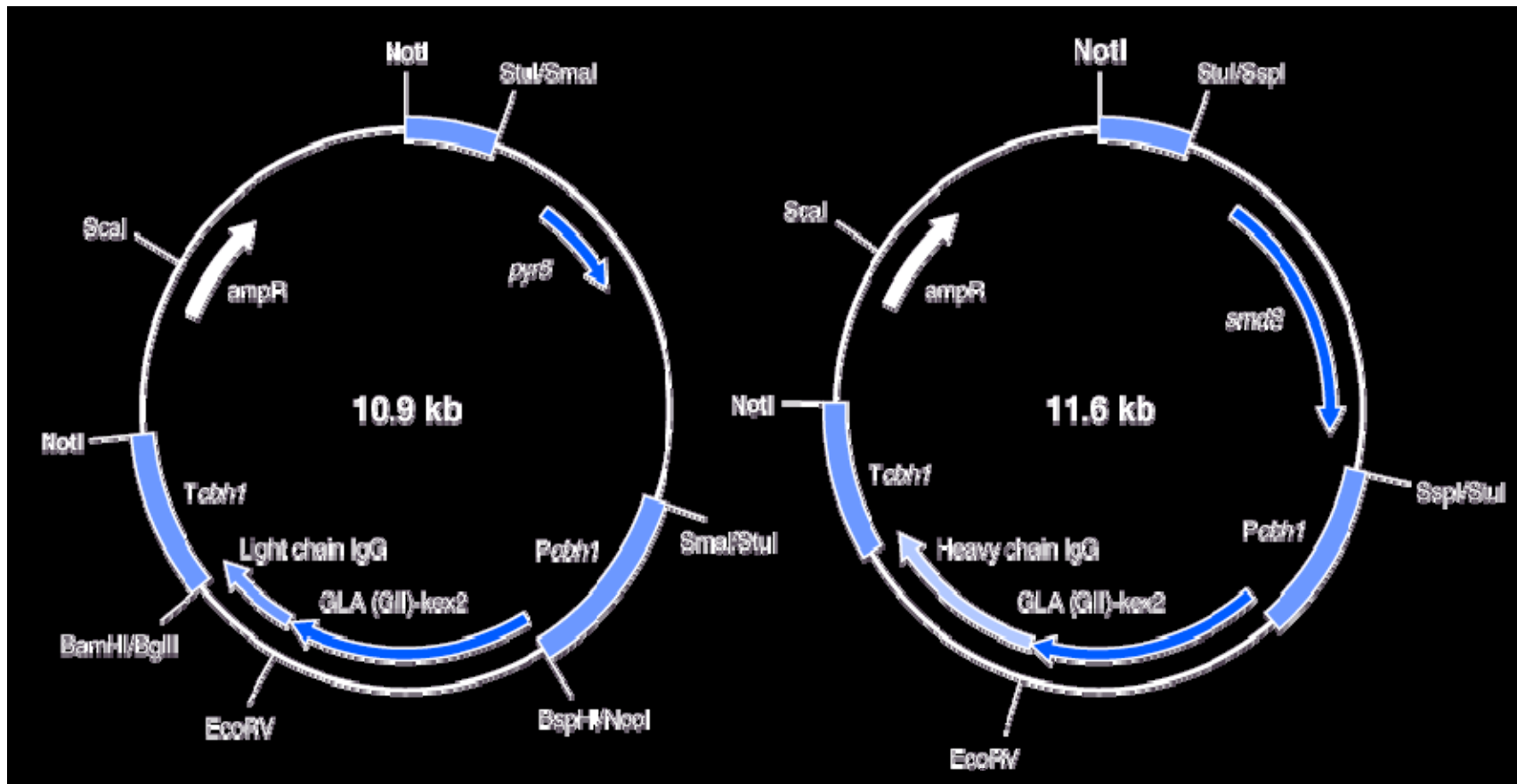
C1 for Protein and Antibody Production

- ❖ High level of protein expression and secretion achieved
- ❖ To do:
 - ❖ Development of protease/cellulase KOs
 - ❖ Promoter optimization
 - ❖ Yield Improvements
 - ❖ Glycoengineering
 - ❖ C1 glycoprofile is more similar to human than traditional fungi
 - ❖ Further humanization required
 - ❖ Unglycosylated proteins can be made
- ❖ Advantages over GlycoFi's Pichia (acquired by Merck)
- ❖ Safety: Agency Response Letter GRAS Notice No. GRN 000292 (Received September 29, 2009)



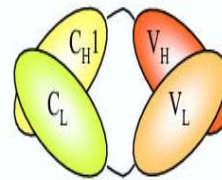
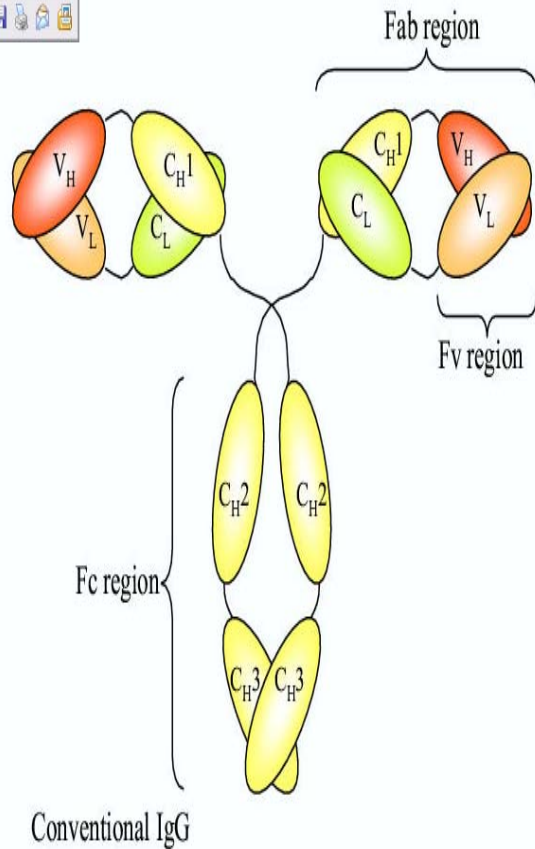
Antibody Production in C1

Construction of C1 Strains Expressing Full-length Human Antibodies

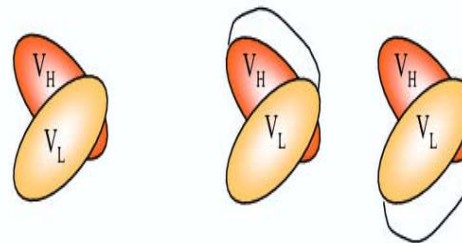




Antibody Production in C1



Fab fragment



Fv fragment

scFv fragment

Antibody production level

>1 g/l levels reached in initial strain/process optimization

Improved copy number host strains

2-fold increase (>2 g/l) in production reached

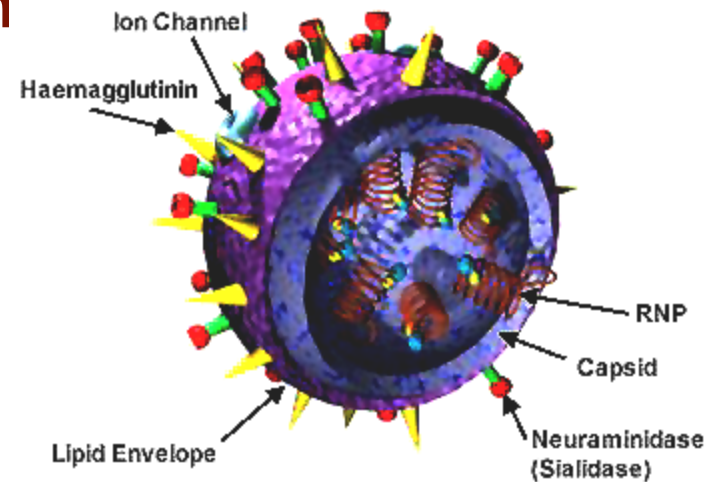
Room for improvement

5-10 g/l achievable in about 1 year

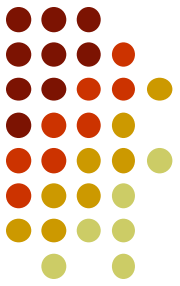


Vaccines: Opportunity

- ❖ Vaccine market exceeds \$10 billion
- ❖ Dominated by seasonal flu vaccine
 - ❖ Made in chicken eggs, using old technology
 - ❖ Six month production cycle
- ❖ Opportunity to manufacture in C1
 - ❖ Improve cycle time, yield and cost
- ❖ Non-flu vaccines
 - ❖ Improve protection by altered glycosylation



INFLUENZA VIRUS



Financial Summary

- ❖ **Shares Issued and Outstanding (3/31/10)** **31.0 million**

- ❖ **Cash Position (3/31/10)** **\$7.8 million**

- ❖ **Debt (3/31/10)** **\$1.4 million**

- ❖ **Total Revenue (FY 2009)** **\$21.4 million***
- ❖ **Total Revenue (Q1 2010)** **\$2.0 million***
 - ❖ **30% increase in product revenues from Q1 2009**

** Includes license revenue, product revenue and research revenue. Revenue will vary significantly quarter to quarter based on Dyadic's ability to secure additional partnerships.*



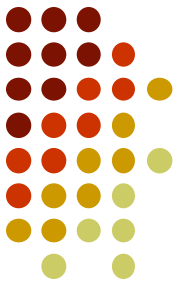
Comparable Companies

<u>Company</u>	<u>Sector</u>	<u>Ann. Rev.</u>	<u>Acq. Price/Market Cap</u>
Codexis	Enzymes	\$83M	\$490M
Verenium	Enzymes	\$66M	\$48M
Crucell	Biopharma	\$475M	\$1.7B
Glycofi	Biopharma		\$400M
Maxygen	Biopharma	\$36M	\$208M
Protalix	Biopharma	\$388K	\$536M



Key Milestones

- Received \$10 million equity investment and entered into an R&D collaboration with Abengoa Bioenergy
- Non-exclusive license agreement with Abengoa
- Entered into a non-exclusive license agreement with Codexis
- Received \$10 million upfront payment from Codexis Bioenergy
- Received GRAS notice from the FDA
- Extended collaboration with Scripps
- R&D funding – private and public sources
- Additional license agreements, partnerships for biofuels, industrial enzymes, feed, food, cosmetics, nutraceuticals, biopharmaceuticals
- Receipt of milestone fees, facility fees and royalties - existing agreements



Summary

- ❖ **Patented Technology platform with vast potential**
 - ❖ C1 fungus-based expression system offers significant advantages over microbial and cell culture-based systems
 - ❖ One-stop shop, same organism from discovery to production
 - ❖ Operating conditions, cost, scalability and yield
- ❖ **Risk-mitigated strategy to leverage platform into biofuels and biopharmaceuticals**
 - ❖ Platform capabilities have been validated in industrial enzymes and biofuels through partnerships with key players
 - ❖ Near-term potential to enter patent-protected markets in biopharmaceuticals through production of scientifically and commercially validated proteins, antibodies and vaccines
- ❖ **Experienced management & scientific teams**
- ❖ **Stable financial condition**