

# **QTEROS**

## **Biomass 2010**

**Kevin A. Gray, PhD  
Sr VP and Chief Technical Officer**

**March 30-31, 2010  
Washington, D.C.**

# Outline

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- The U.S. needs to rapidly develop, scale and commercialize advanced biofuels; cellulosic ethanol represents the greatest near-term solution as prescribed by the RFS
- Commercial scale deployment continues to be a challenge due to high capital and operating costs of those processes being developed
- Consolidated bio-processing represents the major step-function change required for the industry to accelerate the broad and profitable commercial-scale deployment of cellulosic ethanol
- Qteros is developing the industry-leading solution for consolidated bio-processing

# Qteros Executive Overview

<b>Headquarters</b>	Marlborough, MA
<b>Company History</b>	While founded in 2006, business acceleration initiated post \$25M Series B financing in 2H 2008; exclusive WW licensee on foundational patent portfolio from University of Massachusetts (Professor Susan Leschine)
<b>Employees</b>	50
<b>Technology</b>	Consolidated bio-processing (CBP) platform focused on cellulosic ethanol production using unique <i>Clostridium phytofermentans</i> microorganism (aka Q Microbe™); other high-value specialty chemical products under development via same organism
<b>Business model</b>	Technology solution provider to the cellulosic ethanol industry. Exploit Q Microbe™ as industry-standard consolidated bio-processing (CBP) solution for <b><u>lowest cost production</u></b> . Create “value sharing” structures with strategic partners
<b>President &amp; CEO</b>	<b>John McCarthy</b> . Former EVP at Verenium Corporation and Chief Business Officer at Microbia. BS Lehigh University; MBA, Harvard Business School
<b>SVP &amp; CTO</b>	<b>Kevin Gray, PhD</b> . Former Director of Biofuels R&D at Verenium Corporation. BS Duke University; PhD, Chemistry, Texas Tech University
<b>SVP &amp; CFO</b>	<b>Kevin McLaughlin</b> . 30 years experience in the biopharma and biotechnology industries. BS, Northeastern University; MBA, Babson College.
<b>VP Business Development</b>	<b>Mick Sawka</b> . Former head of BD, Microbia; Cabot Corp; 3M. BS Chemical Engineering, Stanford; MS Chemical Engineering, MIT; MBA, Univ. of St Thomas (MN)
<b>Major Investors</b>	<b>Venrock, Battery Ventures, BP, Valero, Soros, Long River, Camros Capital</b>

# Qteros' Mission

*Development and integration of the industry-standard consolidated bio-processing (CBP) platform for **lowest-cost** cellulosic ethanol production . . .*



*Field*



*Factory*



*Fuel*

*. . . which serves to catalyze and accelerate the worldwide commercialization of advanced biofuels.*

# The Supply Side Of The Equation Represents The Major Constraint For Commercial-Scale Deployment Of Cellulosic Ethanol

- There are currently no commercial-scale cellulosic ethanol plants
- The first meaningful commercial-scale plants are not expected to be on-line until late 2011 or 2012
- Numerous hurdles remain to be overcome . . .

## Technical

- **Feedstock**
  - Diversity
  - Variability
- **Pretreatment**
  - High capital costs
  - High energy and chemical costs
- **Hydrolysis**
  - High enzyme usage rates and costs
- **Fermentation**
  - C5 and C6 fermentation
  - Inhibitor tolerance
  - Process robustness
- **Biological Scaling**

## Financial

- **Lack of capital / limited credit**
  - Private & public
  - “1<sup>st</sup> plant” technology aversion
  - Consistent Federal policies?
- **Without industry performance benchmarks (due to variations in plant size and performance) it will be difficult for investors to evaluate new proposals**
- **Unpredictable feedstock costs**
  - Lack of LT feedstock supply agreements
  - Undeveloped infrastructure/logistics
- **Requirement for LT off-take contracts**
- **Significant gasoline price variability**

# To Reduce The Technical Risks And Optimize The Viability Of Large-Scale Supply, Qteros Is Investing In The Commercial Deployment Of The Q Microbe™ Process

	Biomass	Pretreatment	Enzyme Production	Fermentation	Ethanol
<b>Q Microbe™ Attribute</b>	<ul style="list-style-type: none"> <li>• Digests a variety of feedstocks (corn stover, fiber, sugarcane bagasse, switchgrass)</li> <li>• Metabolism adjusts to feedstock</li> </ul>	<ul style="list-style-type: none"> <li>• Ferments oligomeric sugars</li> </ul>	<ul style="list-style-type: none"> <li>• Naturally produces all of the enzymes required to digest biomass</li> <li>• Over 100 different genes for plant cell wall degradation</li> </ul>	<ul style="list-style-type: none"> <li>• Co-ferments C5 and C6 sugars</li> <li>• Anaerobic fermentation</li> </ul>	<ul style="list-style-type: none"> <li>• Ethanol is the primary natural product of the Q Microbe's metabolism, at commercially-relevant yields</li> </ul>
<b>Value to Customer</b>	<ul style="list-style-type: none"> <li>• Utilizes low cost non-food /feed raw materials</li> <li>• Maximum raw material and geographic flexibility for site selection</li> </ul>	<ul style="list-style-type: none"> <li>• Less acid</li> <li>• Lower pressure</li> <li>• Less energy</li> <li>• Fewer inhibitors</li> <li>• Less complex engineering and design criteria</li> </ul>	<ul style="list-style-type: none"> <li>• 80% reduction in enzymes used</li> <li>• Elimination of separate unit operations (saccharification, hydrolysis)</li> </ul>	<ul style="list-style-type: none"> <li>• Fewer unit operations</li> <li>• Less water</li> <li>• Less energy</li> <li>• Fewer FTEs</li> <li>• Less maintenance</li> <li>• Higher efficiency</li> </ul>	<ul style="list-style-type: none"> <li>• Lower CAPEX and OPEX due to higher rates, titers, yields, fewer side products</li> </ul>

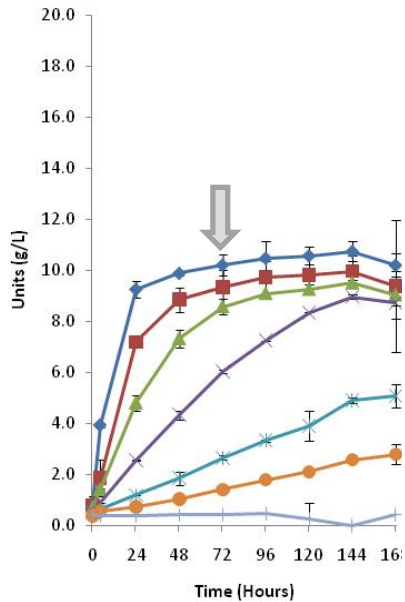


***Consolidated bio-processing represents the major step-function change required to accelerate broad and profitable commercial-scale deployment***

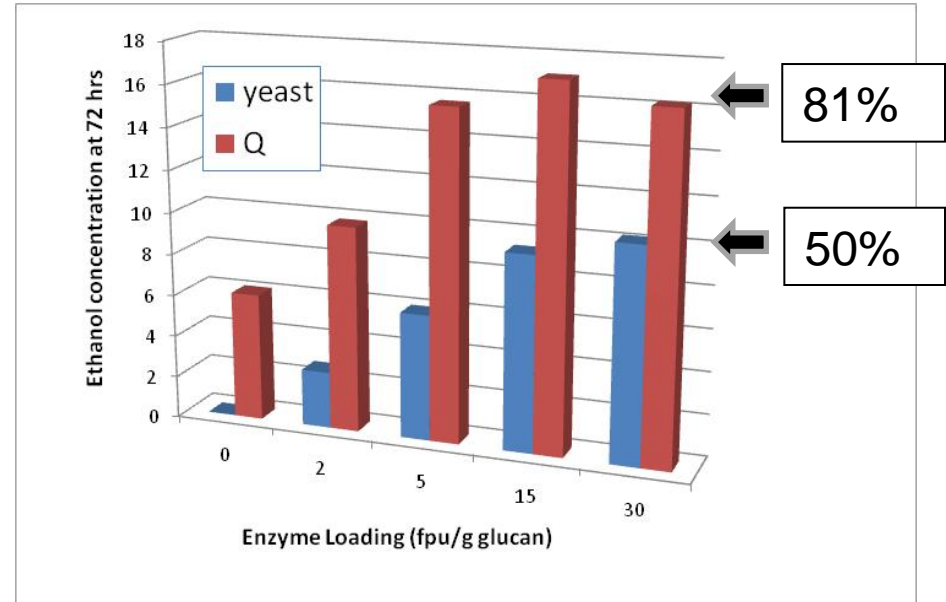
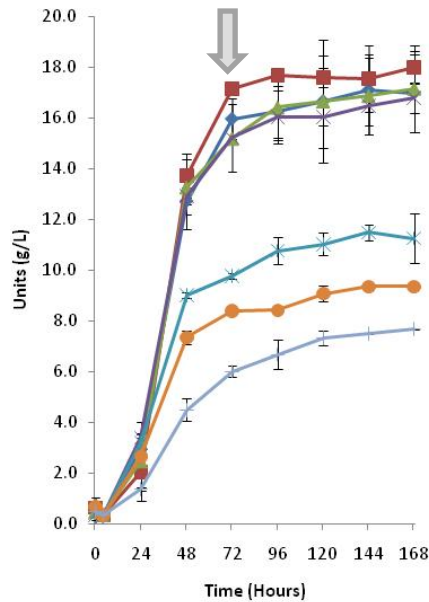
# Q Microbe™ Technical Value Proposition

## *Requires 80% Less Enzyme and Improves Yield*

Yeast



Q microbe™



- Q microbe™ converts both C6 and C5 sugars resulting in overall higher conversion as compared to yeast
- Q microbe™ produces all the requisite enzymes required for fermentation therefore requires far less externally added enzyme as compared to yeast

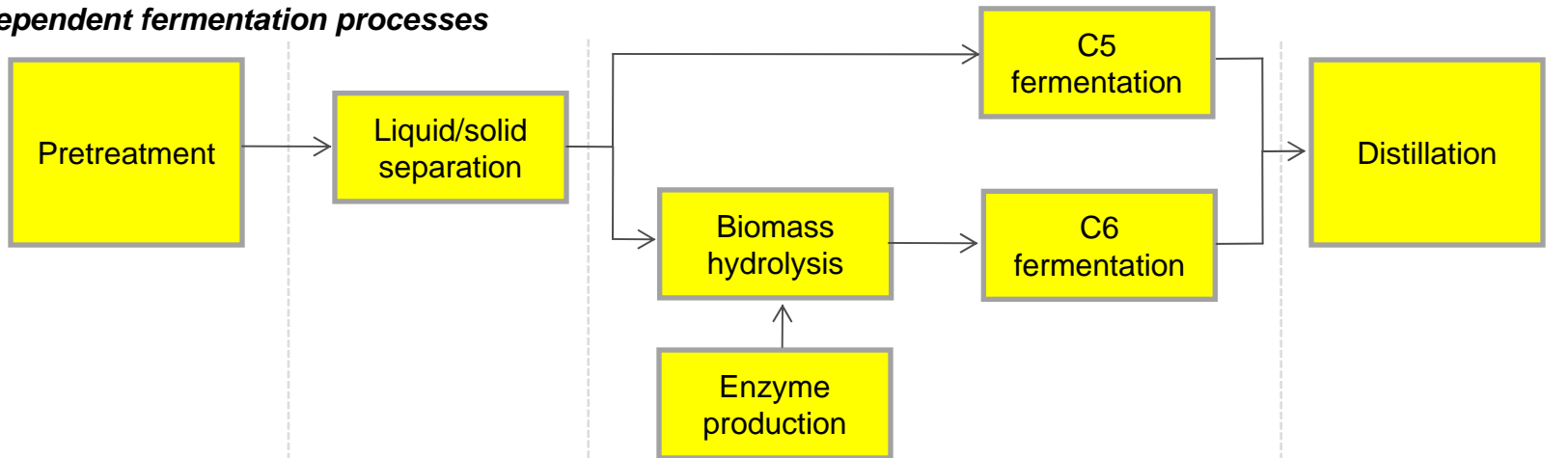
# Commercial CBP Implications

*Efficiency, Industrial-Scale Optimization => Low-Cost Production*

## Traditional Multi-Step Process

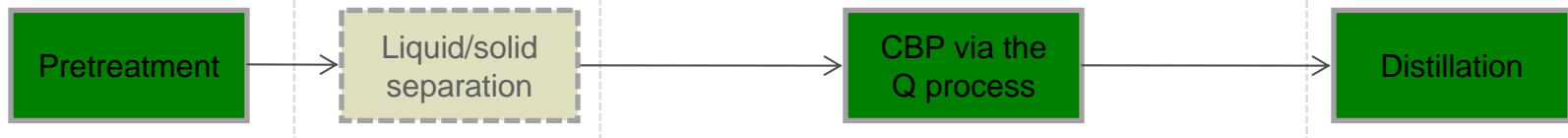
3 seed trains

2 independent fermentation processes



## Qteros CBP Process

Single consolidated process



**Capital Savings\***

**=> \$50 to \$100 million**

**Quantified Cash Operating Cost Savings:**

**=> 25+% lower**

**Unquantified Cash Operating Cost Savings**

**=> TBD, but significant**

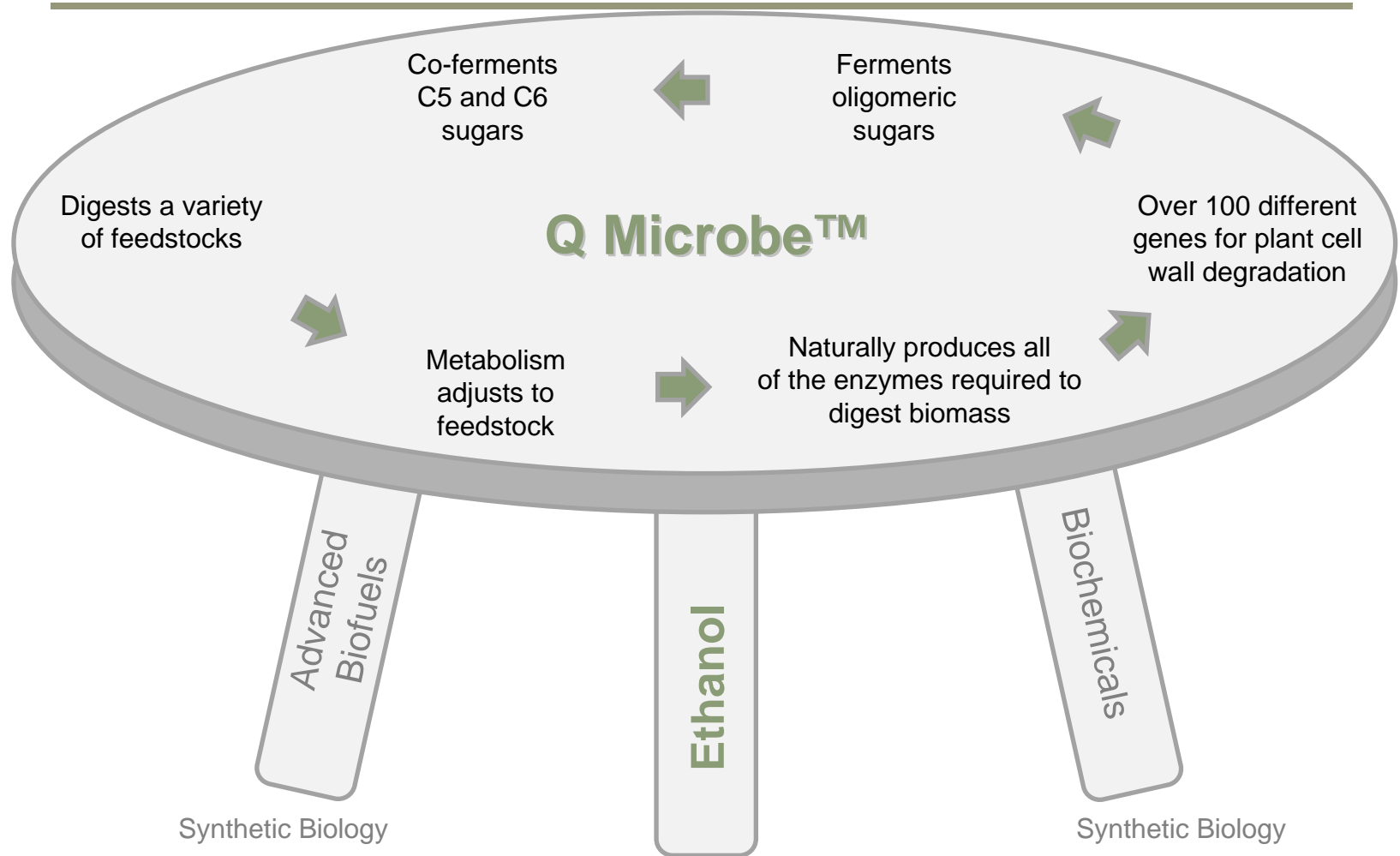
**Incremental Annual Co-Product Revenue**

**=> \$7 to \$10 million**



# Q Microbe™ Consolidated Bio-Processing Technology Platform

## Future development will allow us to produce many other molecules



Ethanol is the primary natural product of the Q Microbe's metabolism at commercially relevant yields