Foods for Health Institute

Building the Science, Technologies and Education to Guide Diet and Health and create value for Agriculture in the 21st Century
Evolutionary Nutrition

What evolved under the Darwinian Pressure to be Nourishing?
Evolving a cost – benefit solution for Health
Bifidobacterium Infantis

B. infantis 2,832,748 Mb

Glc, Gal, GlcNAc, Neu5Ac

Fucosidase, Hexosaminidase, Galactosidase, Sialidase
What have we learned:
We’re not alone!
Opportunity: BioProfessionals

Our minions!
Science: How does a microbial ecosystem work?

3 Simple Principles

Who is There

What are they Eating

What are they Making

All 3 are highly integrated
Ecosystems
The Truth of the Intestine

- Its dark, wet, competitive
- Who eats - wins
Where’s the flaw
Mammals have embraced bacterial transfer
Modern Life has stopped microbial transfer
The Human Premature Infant Microbiome and a Changing Paradigm in Infant Nutrition

David J. Kyle
CEO
Evolve Biosystems Inc
Davis, CA, USA
Rescuing the Natural Microbiome
Proof of Concept: adding back the Baby Bifidobacteria

IMPRINT Trial

- 70 babies
- 30% C-Section
- 70% V-Delivered
- Treatment – Baby Bif
- Control – standard of care

Confidential
Hi-Bif babies: a different “colonic terroir”

LoBif “Dysbiotic State”

- pH = 6.0
- Stools: 33% watery
- Frequency: 4.0/d

HiBif “Natural State”

- pH = 4.5
- Stools: 20% watery
- Frequency: 1.8/d

Steve Frese, PhD
Scientific Director

Confidential
Gut Health Across Mammalian Species

GlycoGuard to be launched at AAEP Dec 3-7 Orlando

GlycoGuard reduces *Clostridium difficile* diarrhea in nursing foals

- Healthy
- Transient Non-*C. difficile* diarrhea
- *C. difficile* diarrhea
- Death

$p < 0.0001$ by Fisher’s Exact Test
Implications to Ag 2.0

- Selective Polysaccharides will become a new component of human diets.
- Estimate of daily dose ~ 10% of calories
- Total opportunity ~ 1 trillion calories per day worldwide
- A new quality target for agriculture: structure/function designed polysaccharides
Opportunity: ‘Bugs’ of Delight

From chocolate to coffee, wine to beer, yogurt to cheese, bread
Today

Half of agricultural production and one third of food is currently simply lost or wasted*  
FAO 2011*
Food & Future

Diet is about to **Change**

Why?

3 BIG advances
1 Detailed understanding and precision measurement of complex biological processes
2 Diet as an ensemble of molecular components and mechanisms
3 Computational Algorithms linking Cloud Big Data to Individual Users
Modernization of Food

Food will soon become a Knowledge industry
Knowledge Based Diet & Health

What does a knowledge based system look like
Transportation: Google Maps
Transportation: Google Maps

Personal
Transportation: Google Maps
Dynamic
Transportation: **Google Maps**

Annotated
Value Proposition of Google Maps

Where am I?
Where do I want to go?
How do I get there?
Health Knowledge

What is my Health Status now?

What would I like it to be?

How do I get there?
How it works

Annotated Database of Food Chemicals

Interrogated by individual users
What will we gain?

**Precision:**
- ✓ Health
- ✓ Delight
- ✓ Safety
- ✓ Inventory
- ✓ Performance
- ✓ Ethics
- ✓ Nourishment
Thank You
The Vision

Baby’s Health
linking 3 generations
Health effects so profound that future scientists can detect it when they dig us up
Hunter Gatherers

- Hunter Gatherer’s lives:
  - Carnivorous
  - Nomadic
  - Athletic
  - Short, brutal
Agriculturalists

- Early Agriculture:
  - Cereal based
  - Poorly nourished
  - Feeble, thin, small
Animal Domestication

Domestication lifestyle:
- Robust
- Healthy
- Dedicated
- Domesticated
English Bowman

- **Weapons of Mass Destruction:**
  - Lifelong
  - Focused athleticism
20th Century Nutrition

- Lifespan extension:
  - 3 lifetimes
  - Healthy
21st Century - Future

- **Lifestyle enhancement:**
  - Diversity of Aspiration
  - Extending the Human Condition