Overview of MSU’s Research and Technology Transfer Program

Dr. Tom McCoy
Vice President for Research, Creativity and Technology Transfer
Overview of Research at Montana State University

- MSU in top tier of nation's research universities
- 1 of 94 research universities with "very high research activity" according to the 2006 Carnegie Foundation for the Advancement of Teaching
- $105 million in grants and contracts expenditures in FY06
- In FY05 had our first $10 million department, Veterinary Molecular Biology
Overview of Research at MSU

- MSU is committed to the integration of learning and discovery/teaching and research.
- Our new Core 2.0 requires all students have a meaningful research/creativity experience as an undergraduate.
- MSU is a top school in terms of the number of Goldwater scholars.
INVESTMENTS & INCENTIVES

- Focus is on strategic investments to build specific research areas.
- KEY INVESTMENT/INCENTIVE sources.
  - Recovered F&A
    - 1989 Legislative Intent
    - Distribution Formula
  - IDeA/EPSCoR Programs
Additional Important Factors in Building MSU’s Research Enterprise

- Multidisciplinary and multi-investigator
- Entrepreneurial Spirit of the entire campus
- No barriers between departments and colleges
- Ability to recruit and retain top tier faculty
- Environment/Culture/Lifestyle
And of Great Importance

- PARTNERSHIPS
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  - INCLUDING
    - PRIVATE SECTOR
    - NATIONAL LABS
    - OTHER UNIVERSITIES
Funding Sources

- NIH $23.7 million (24.1%)
- NSF $13.5 million (13.7%)
- USDA $9.8 million (9.9%)
- DOD $9.5 million (9.6%)
- Private $7.3 million (7.4%)
- NASA $7.2 million (7.3%)
- DOI $5.7 million (5.8%)
- DOE $4.2 million (4.3%)
- DoEd $2.8 million (2.9%)
- DOT $2.7 million (2.8%)
- EPA $2.2 million (2.3%)
Examples of Research Programs

- Energy Projects – FutureGen
  - HiTEC
  - ZERT
- Infectious Diseases – Zoonotic
- Biofilm Engineering
- Thermal Biology
- Bio-Inspired Nanomaterials
Ceramic Processing and SOFC Fabrication

Advanced Coatings and Characterization

Electrical Performance Modeling and Advanced Control Schemes

Materials Characterization (Brookhaven Synchrotron)
2.0015 2.0020 2.0025 2.0030 2.0035 2.0040
0.76 0.80 0.84 0.88 0.92 0.96 1.00

Measured from Hitran

A tuning of 18.7GHz/C was used to convert from temperature to wavelength.

CO2 CO2 CO2 CO2 CO2

H2O H2O

Transmission Wavelength (µm)

LIDAR CO2 Detection

Biofilm Seepage Mitigation

Geologic Site Characterization

Modeling and Risk Assessment (National Labs)
Veterinary Molecular Biology
Countering Infectious Disease

Examples of infectious agents:

- Anthrax bacilli
- Intestinal pathogens
- Plague bacterium

Collaborators:
Mark Quinn, VMB
Michele Hardy, VMB
David Pascual, VMB
LigoCyte Pharm.

Photographs: Courtesy of the NIH
Three ongoing drug discovery efforts focused on identifying novel adjuvants that enhance:

- Lung and gut phagocytes
- Mucosal epithelial cells
- γδ T cells
Center for Biofilm Engineering

- Initiated in 1989 as an NSF Engineering Research Center
- NSF funding ended five years ago yet CBE is a viable and highly successful ERC
- Biomedical (persistent infectious disease) and Environmental foci
- 32 graduate students/36 undergraduates
- Highly successful Industrial Associates program 22 member companies
- Project work sponsored by 30 companies
Biofilm in Chronic Wounds
Thermal Biology Institute

Basic Questions…

- How does life exist in these extreme environments?
- What are the unique life-processes occurring?
- What does it tell us about possible life in the universe?
- Can we apply knowledge for practical purposes?
Novel Virus from YNP Acidic Thermal Environment

- Sulfolobus Thermal Icosahedral Virus (STIV)
  - $T = 85-90 \, (~200^\circ F)$
  - pH = 2-3
Center for Bio-Inspired Nanomaterials

- Faculty and students from chemistry/biochemistry, plant sciences, physics
- Focus on organisms and proteins from extreme environments
- Results published in PNAS, Chemistry and Biochemistry
- Applications
  - magnetic materials
  - targeted drug delivery
Business Assistance Programs

- TechLink
- MMEC
- MilTech
- TechRanch
- SBIR Assistance
Montana Manufacturing Extension Center

From July 2000-June 2004
As a result of direct MMEC services, clients reported:

- Business impact: $66.3 million
- Increased/retained sales: $28 million
- Cost savings: $14.3 million
- Increase in capital investment: $8.5 million
- Manufacturing jobs created: 450

* From independent survey & analysis process approved by the National Institute of Standards & Technology (NIST)
TechRanch

**Partnership Highlights**
- 42 start-ups in 5 years; 14 MSU spin-outs
- 250 high paying technology jobs
- Nine Graduates:

**Graduates:**
- BACTERIN
- DP
- EnviroZyme
- Elk River Systems
- Nervonix
- MPA Technologies
- TEXBASE
- Ongers
- Hyperspectives
Partnership Highlights Cont’d…

- $5,000,000+ raised for clients from VCs and angel investors
- Proprietary angel network (featured in THE WALL STREET JOURNAL)
- Major venture capital conference in Big Sky; August, 2006
- Nationally-ranked student entrepreneur resources being shared across Montana.
Montana State University Data

- 85 Patents Issued
  - 47 U.S.
  - 38 Foreign
- 146 Patents Pending
  - 86 U.S.
  - 60 Foreign
- 11 Plant Variety Protection (PVP) Certificates
- 106 Active Licenses – 66 with Montana Companies
Phillips Environmental Products, Inc.

- Makes portable toilet units--FEMA, DOD, Forest Service, Park Service, campers, truckers
- 2 MSU College of Ag technologies licensed for use in toilets to sanitize and degrade compounds
- As of March, these organisms are “in the bag”
- Sold 5 million bags last year--expect to double this year
- FEMA ordered ALL bags in stock for hurricane Katrina
Montana Success Stories

LigoCyte Pharmaceuticals, Inc.

- focus is adjuvant, vaccines, and anti-inflammatory
  - 50 person drug development company in Bozeman
  - MSU spin-out
  - 6 technologies licensed from MSU
  - ~ $15 million in collaborative research with MSU
  - Provides internships and hires MSU grads
MSU Success Stories

MPA Technologies, Inc.

- Laser technology developed in chemistry and physics depts.
- Can be used for non-invasive diagnostic and treatment for cancers
- Venture capital – seed and series A round
- Set for animal studies to validate technology
MSU Success Stories

S2 Corporation

- S2 Corp’s primary focus is on improved radar for defense applications
- Work collaboratively with MSU
- $13 million in contracts
- Currently 15 employees
- More than 30 MSU students have worked with S2; from the Physics, Engineering and Business departments