



# Microbiome Science

## The Center for Integrative Microbiome Science at OSU taps into growing national momentum

### Introduction:

There is tremendous potential in microbiome research. It could revolutionize the way we treat health conditions, practice agriculture, and deal with ecological and environmental threats. Oklahoma State University is home to broad, interdisciplinary strengths in areas vital to expanding our understanding of microbiome science, which makes the university a top location to launch the Center for Integrative Microbiome Science (CIMS).

### Definition:

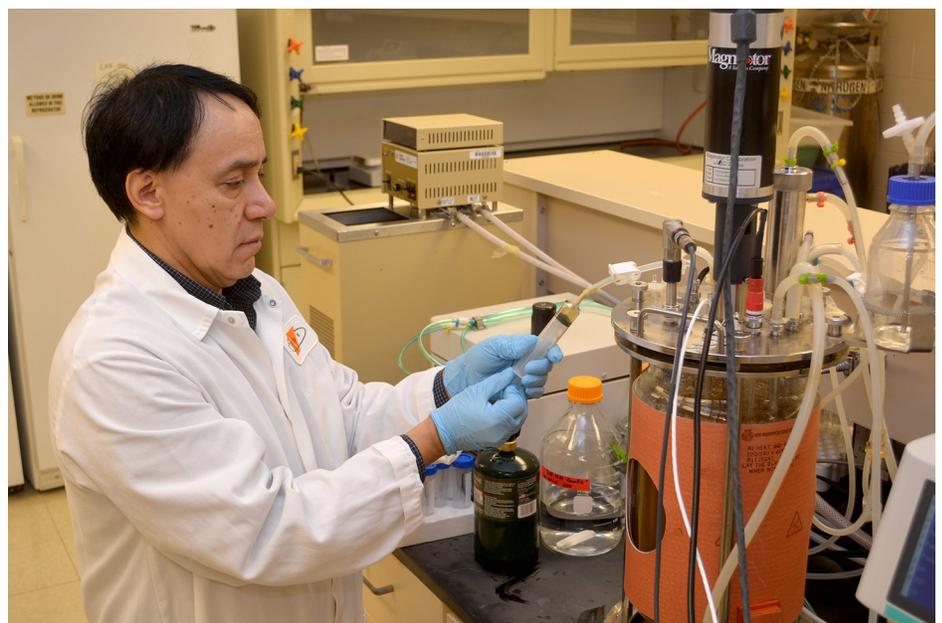
Microbiome science focuses on diverse communities of micro-organisms that exist all around us and impact health systems in people, animals, plants, and the environment. The term “microbiome” refers to the collection of genomes of microbes in a system. A research strength at OSU is the examination of animal and plant micro-organisms and how they positively and negatively affect health. An example is probiotics added as dietary supplements for animals to increase growth rates without the use of antibiotics. In an age of high concern over population growth, threats to the food supply, and antibiotic resistance, advances in microbiome research is critical. In crops and other plants, microbes can

improve production, while research is underway to use algae and other micro-organisms in alternative energy systems and to treat water. The human microbiome includes microbes found in the intestinal tract (often referred to as the “gut” microbiome) that positively affect health; the gut microbiome is the subject of the National Institutes of Health program called the Human Microbiome Project.

### Currently at OSU:

The focus of many microbiome-related research across OSU departments and colleges is expanding existing research through a broad, interdisciplinary base that spans plants,

animals, and ecosystems. Oklahoma State University research programs include investigations in key areas of need identified in a national report, including “human, plant, animal, and environmental health, renewable energy production, water treatment, and manufacturing,” according to the report. OSU is also home to core technologies and facilities already in place that are necessary to advance studies of microbiome communities. Facilities across OSU campuses in Stillwater and Tulsa have attracted key research talent and bring attention to existing strengths. Those centers include the Oklahoma Animal Disease Diagnostic Laboratory, the National Institute for



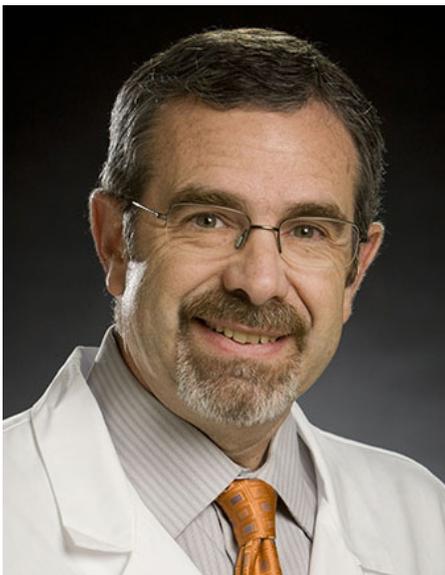
At OSU, visiting professor Alejandro Penalosa, Ph.D., removes probiotic strains from a bioreactor at the Robert M. Kerr Food and Agricultural Products Center. Penalosa worked on a study involving adding probiotics to chicken feed.

Microbial Forensics, Food and Agricultural Biosecurity, and the Food and Agricultural Products Center.

**Potential:**

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OSU has interdisciplinary strengths, critical capability, and specialized facilities to become a national leader in this area through the creation of the Center for Integrative Microbiome Science. The potential at OSU involves developing research initiatives at the nexus of health, food, energy, water, materials, and manufacturing. There are, as yet, undiscovered organisms that have the potential to play roles in all these areas. OSU, and Oklahoma, are positioned to benefit from the growing momentum in federal support for microbi-



Jerry Malayer, Ph.D.  
Director of the Center for Integrative  
Microbiome Science

## ***From FY2012 through FY2014, federal funding for microbiome research reached \$922 million, according to The National Microbiome Initiative***

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ome research. That potential is outlined in The National Microbiome Initiative, a report from the Fast Track Action Committee (FTAC) on Mapping the Microbiome from the National Science and Technology Council. The report concluded that microbiome research is “uncovering an unprecedented potential for the application of microorganisms.” As a state with robust agriculture and energy industries and the ongoing need to improve the health of our citizens, Oklahoma is poised to benefit from increased federal investment in microbiome research. With existing multidisciplinary investigations underway at OSU, our researchers are in a strong position to compete for funding.

**Support Needed:**

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Needs include infrastructure grants to construct facilities, including research laboratories and greenhouses, which would enable interdisciplinary, inter-institutional collaborations among a diversity of scientists. Such a cross-cutting research program would be more likely than traditional, compartmentalized research to elucidate the fundamental principles governing

microbiomes, thereby accelerating progress in all fields. We also need expanded programs to train new experts in the fields of bioinformatics and modeling who can interpret the existing, vast microbiome datasets already gathered.

**Conclusion:**

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FTAC found that from FY2012 through FY2014 federal microbiome research investment reached \$922 million, averaging approximately \$300 million a year. The largest funding agency is the National Institutes of Health, which funded 59 percent of the microbiome research during this period. That investment is expected to increase. With OSU’s foundation of interdisciplinary research, including many disciplines with expertise and infrastructure for the study of microbiota, the ability to stand up a major center for the study of microbes is poised to make OSU a research leader in the US.

*For more information, contact the OSU Vice President for Research at [vpr@okstate.edu](mailto:vpr@okstate.edu) or 405-744-6501.*