Donna Degen, M.S.

Born and raised in San Antonio (and proud of it!)

B.S. Biology UTSA 1981

M.S. UTSA 1984
Concentration in Microbiology, specialty Pathogenic/Medical Microbiology

Background

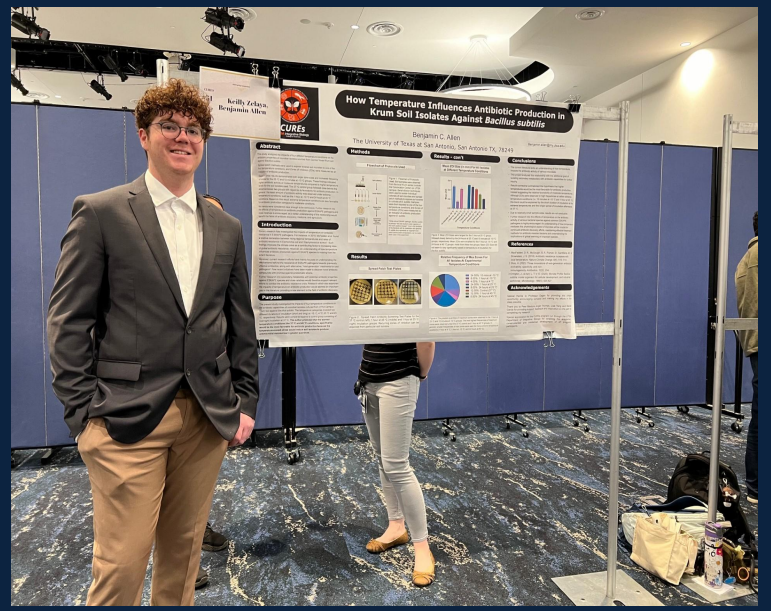
UTSA Microbiology Lab Coordinator three years while in grad school (the 80's!)

Nine years pre-clinical drug development oncology research (lab bench work). One of the first labs to conduct in vitro testing of current drugs like Taxol and Taxotere (breast ca), Gemcytibine (pancreatic ca), Irinotecan (colorectal ca).

Seventeen years clinical drug development research and patient studies: Phase 1, 2 and 3 protocol oversight, data monitoring and collection. Contributed to the approvals of Avastin (colorectal ca) and Ocrevus (MS) for Genentech.

After lots of tiring travel, back to UTSA! Teaching: Intro to Micro, then the CUREs program and…..

the Microbial Diversity and Antibiotic Discovery course!



Microbial Diversity & Antibiotic Discovery CUREs Overview

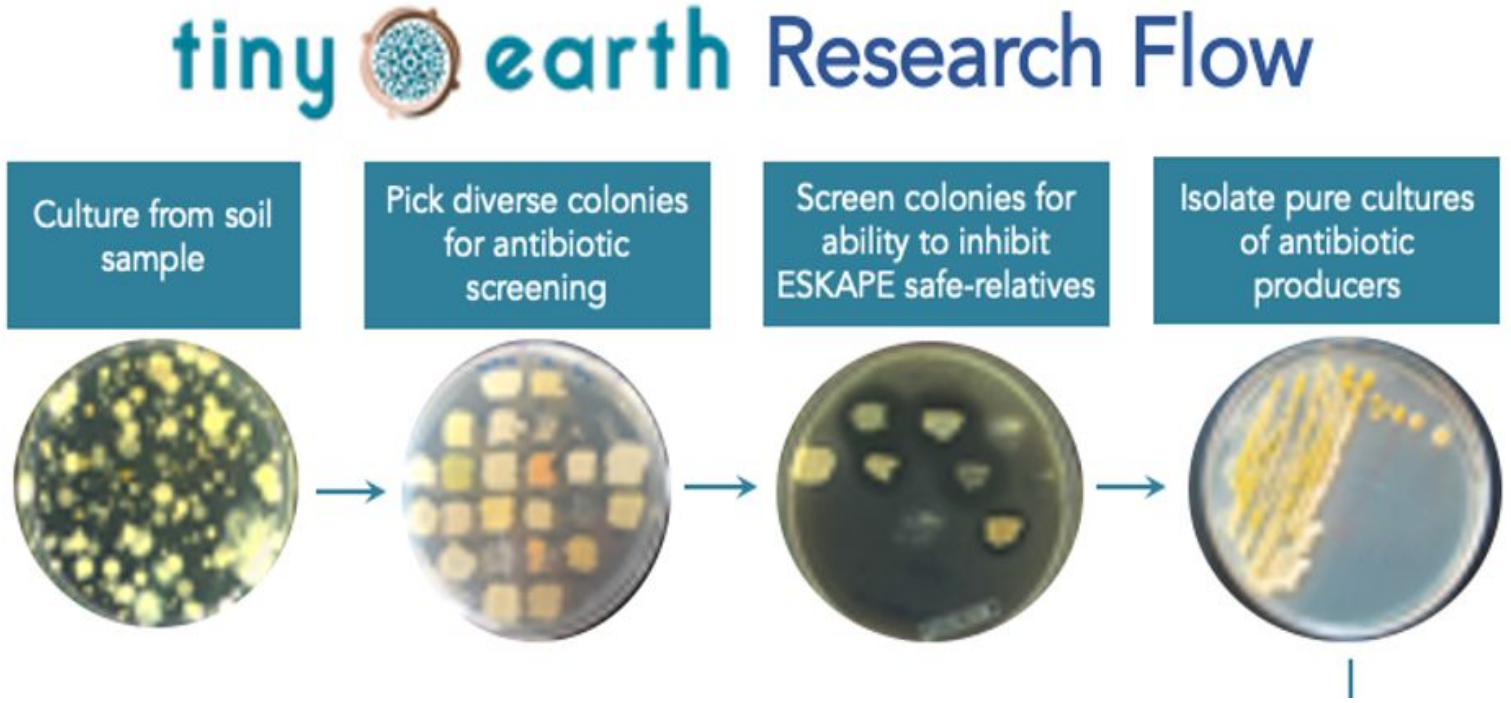
CUREs Program 2024-2025
Department of Integrative Biology

UTSA®
The University of Texas at San Antonio™

What is a CURE?

What is a CURE?

tiny earth


tiny earth Research Flow
Culture from soil sample
Pick diverse colonies for antibiotic screening
Screen colonies for ability to inhibit ESKAPE safe-relatives
Isolate pure cultures of antibiotic producers

Defining the Goals

Defining the Goals

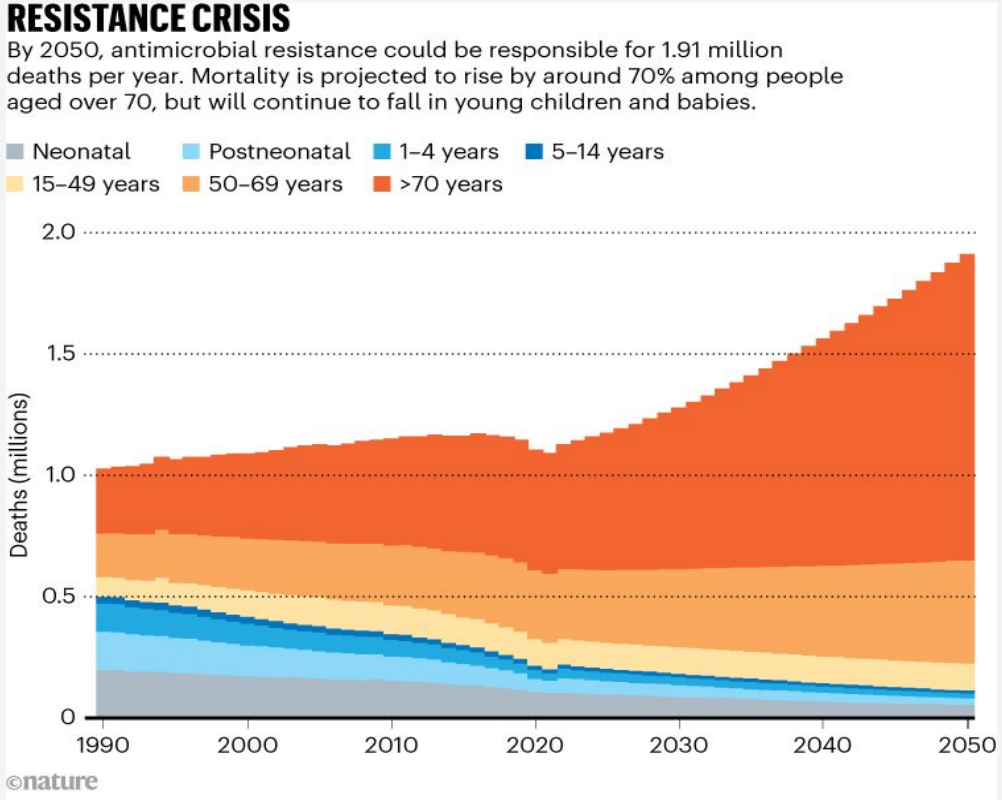
Why?

The Global Antibiotic Crisis

"US Burden of AMR Deaths is Unacceptably High."
-CDC

Antimicrobial Resistance (AMR) is one of the Leading Causes of Deaths Worldwide.

- **1.27 Million AMR Deaths** worldwide
- **4.95 Million AMR Associated Deaths**
- 2.8 Million AMR *infections* in US each year **leading to 35,000 Deaths**



Microbial Diversity & Antibiotic Discovery

Pace of antibiotic discovery is not keeping up with rate of AMR evolution.

Antibiotic Pipeline Step I:

Soil Collection & Microbial Community Characterization

Soil Collection & Characterization

DNA extraction & amplification

Gene Sequencing & Analysis at UTSA's Genomic Core Facility

Over 1,000 species identified in a single gram of soil!

Species Identification

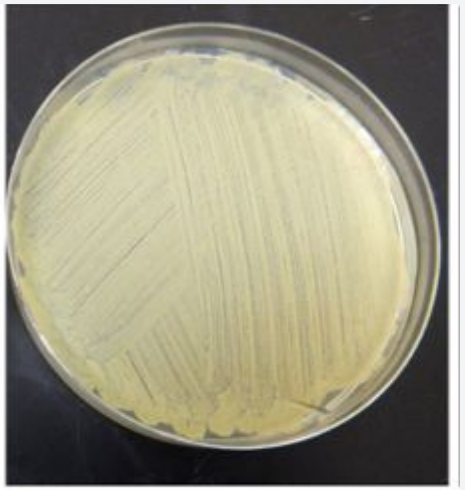
Antibiotic Pipeline Step II:

Isolation of antimicrobial compounds from soil microbes

Tiny Earth
studentsourcing antibiotic discovery

Culture bacteria from soil sample

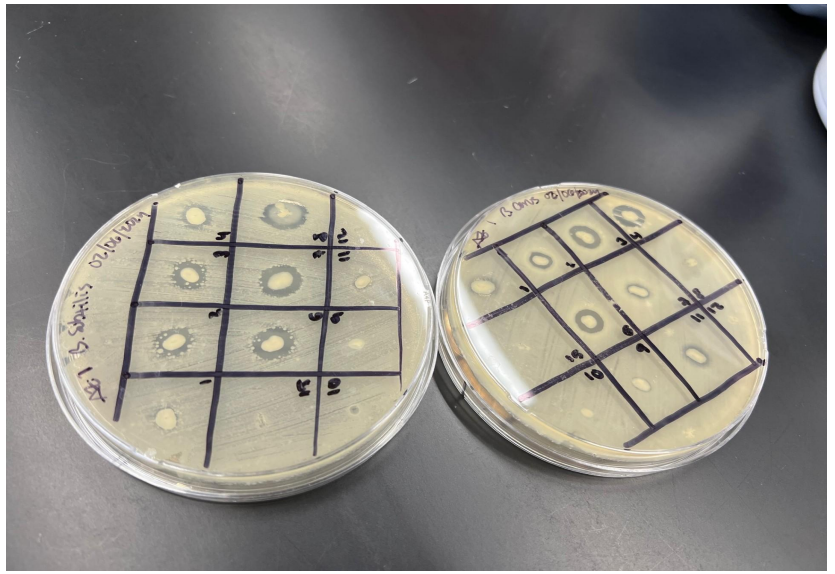
Pick diverse colonies of soil bacteria for antibiotic screening



Create a test layer of "problem" bacteria

Screen colonies for ability to inhibit growth of "problem" bacteria

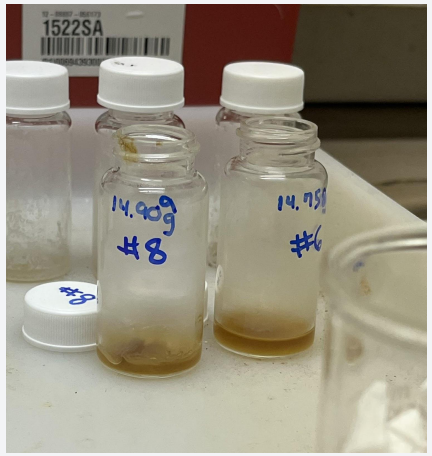
Sanger Sequencing



Antibiotic Pipeline Step III:

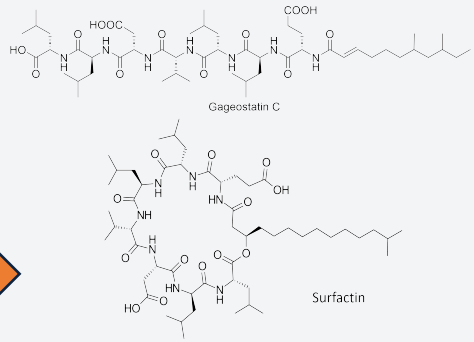
Analysis of chemical compounds from antibiotic-producing soil microbes

Chemical Extraction of Antibiotic Compounds



Separation of bioactive compounds for further study

Chemical, genomic, and metabolic testing at UTSA or sent to UW-Madison



New Antibiotic!

Top Species Classification Results

Classification	Number of Reads	% Total Reads
Unclassified at Species level	93,598	75.87%
Megasphaera hominis	5,657	4.59%
Tepidanaerobacter syntrophicus	2,124	1.72%
Candidatus Scalindua brodae	2,083	1.69%
Kribbella ginsengisoli	966	0.78%
Pelotomaculum isophthalicicum	724	0.59%
Novosphingobium yangbajingensis	568	0.46%
Anaerolinea thermolimosa	555	0.45%

Total Species-level Taxonomic Categories Identified: 662. This table shows the top 8 of 662 classifications.

Note: The "Other" category in this pie chart is the sum of all classifications with less than 3.50% abundance.

Experimental Data

Defining the Goals

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Future Goals

Last Year’s Class

- Thank you!
- Panel Discussion!

GO SPURS GO!!