

Tiny Earth Database Student Tutorial

A step-by-step guide for
students entering soil,
culture, and isolate data
into the global database





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If you have questions or encounter issues with the database, email tinyearth@wid.wisc.edu.



What is Tiny Earth?

Tiny Earth, Big Impact

- A Course-based Undergraduate Research Experience taught in 30 countries and 45 U.S. States & Territories
- A global network of over 700 instructors with 14,000+ taking the course per year





Tiny Earth, Big Goals



The Tiny Earth Antibiotic Discovery Pipeline



Instructors



Worldwide network of instructors teach evidence-based hands-on science.

700+

Instructors Worldwide

80+

Trained Yearly

25%+

Historically Excluded Groups



Students



Students study microbes from local soils with interactive research.

14,000+

Students per Year

517

Institutions



Database



Pathogen-inhibiting isolates are recorded in the global Tiny Earth Database and shared.

13,741

Total Isolates

335

Isolates from Outside the U.S.



Chemistry Hub



Students share samples with the Chemistry Hub scientists for genomic and metabolomic analysis.

23

Contributing Institutions

3100+

Isolates in the Collection

125

Complete Genome Sequences

305

Metabolomes Analyzed

22

High Priority Isolates



Antibiotic Structures



Identifying antibiotic compounds to combat the resistance crisis.

10+

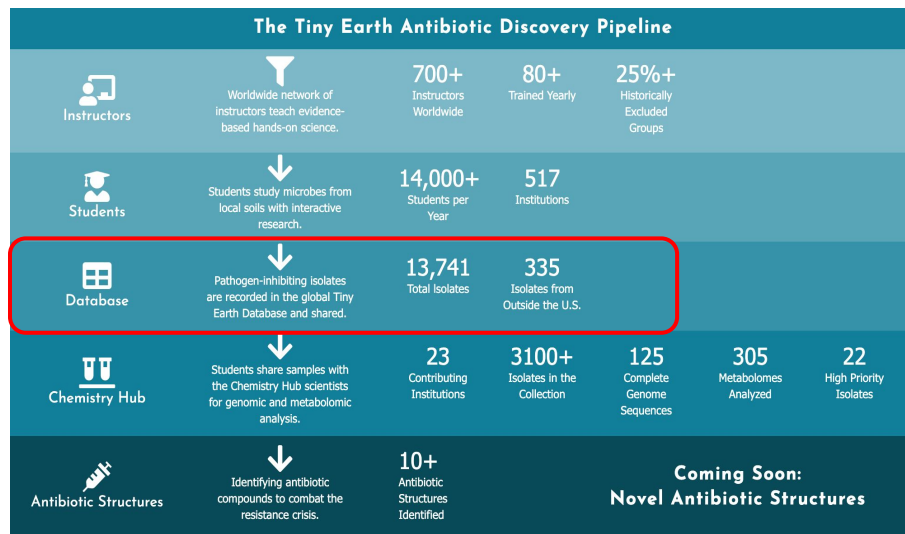
Antibiotic Structures Identified

**Coming Soon:
Novel Antibiotic Structures**



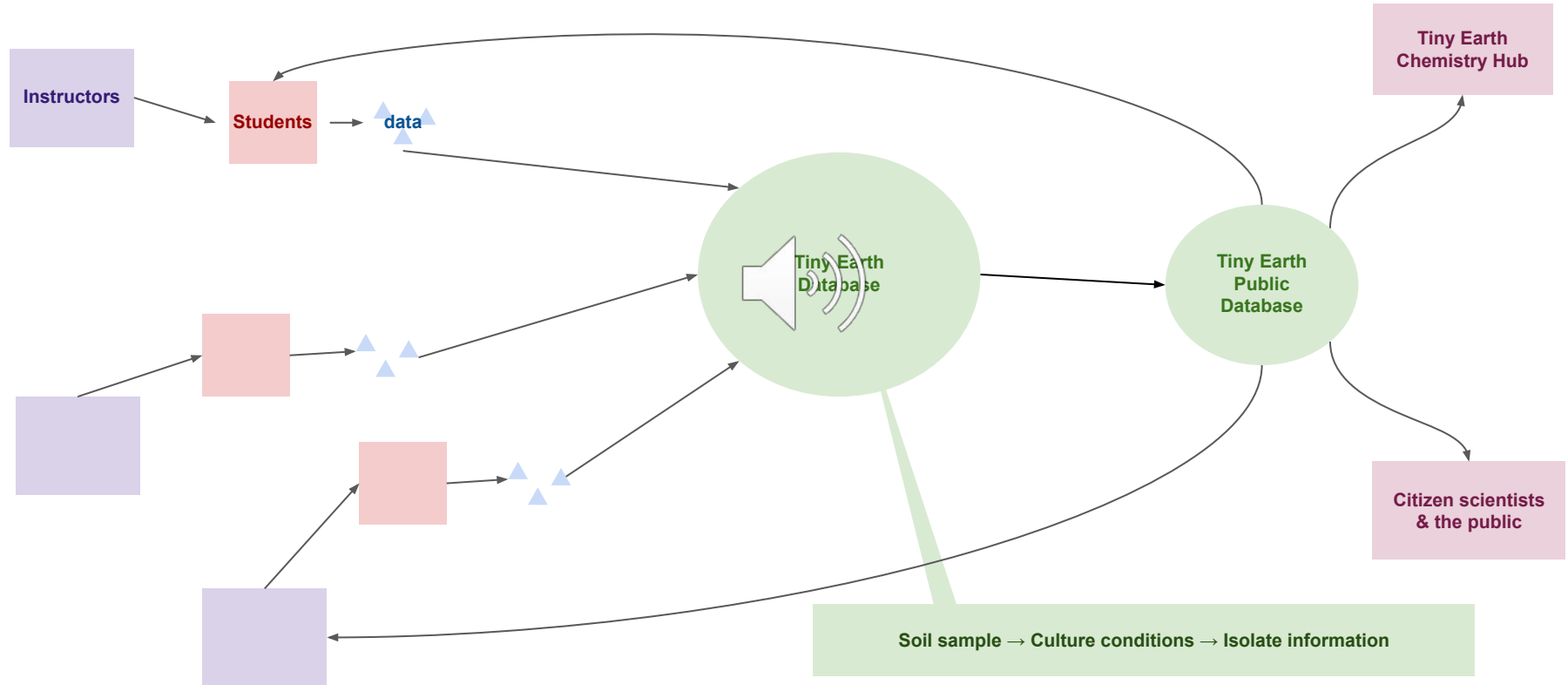
What is the Tiny Earth Database?

- Critical step in discovering new antibiotics
 - Uniform data collections for data comparisons and standardized global record keeping
- Resource to log and share information
 - Data moves into public database and can be shared to several audiences
- Data analysis for Tiny Earth Chemistry Hub
 - Screen and test studentsourced isolates for further research
- Provide public data for future research





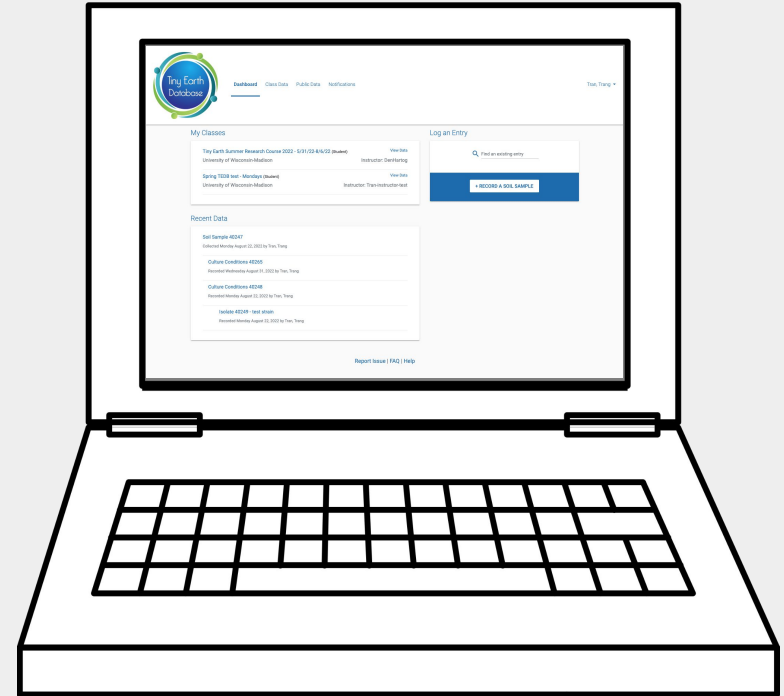
How does the database work?





Using the Tiny Earth Database

- Entering data
- Overview of the Public Database
- Downloading data





How to use the Tiny Earth Database For Students

This is a guide for students using the Tiny Earth Database. The Database is a resource for students, instructors, and the public, therefore accurate and thorough information is expected. The more we know about your isolates, the further we can chase their antibiotic capabilities.

Some information in this database is required, but some is optional based upon what data you are collecting in your classroom, so don't worry if you are missing information for some fields on the site. Please fill in all data your instructor had you collect and/or relevant to your particular experiments.

You are encouraged to take photos of your samples--soil, plates, tubes, individual isolates--along the way, as there are several opportunities to upload photos to the Database. Please follow appropriate PPE (personal protective equipment) guidelines for your lab when taking photos.

Once your data is entered into the Database and the Tiny Earth Chemistry Hub (TECH) receives your isolates, data may be updated with further analysis completed at TECH. So stay connected!



What can I enter into the Tiny Earth Database?

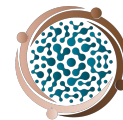
In the Tiny Earth Database, you will submit data about your...

1. Soil sample collection site and soil characteristics
 - a. Most students will work with one soil sample over their Tiny Earth course
2. Culturing conditions
 - a. You may have one culture condition or multiple per soil sample. Be sure to record all culture conditions and keep isolates aligned with their culture conditions.
3. Isolate information
 - a. Once you have found an antibiotic producer and tested it against at least one ESKAPE safe-relative, you may have many types of data about the isolate. Isolate ESKAPE screen data is required, but there are options to enter 16S rRNA PCR results, chemical extract screens, and eukaryotic tests.
 - b. You may have more than one Isolate per culture condition.

The screenshot displays a database entry for 'Soil Sample 38096'. The entry is marked as 'Published' and was collected on Friday, April 29, 2022, by Ward, Alaina. Below the sample information, there are three culture conditions listed, each also marked as 'Published' and recorded on the same date by the same person. Each culture condition is associated with one or more isolates. The first culture condition, 'Culture Conditions 38113', is associated with 'Isolate 38181'. The second culture condition, 'Culture Conditions 38116', is associated with 'Isolate 38152'. The third culture condition, 'Isolate 38140', is listed separately. The isolates are also marked as 'Published' and recorded on the same date by the same person.

Soil Sample 38096	Published
Collected Friday April 29, 2022 by Ward, Alaina	
Culture Conditions 38113	Published
Recorded Friday April 29, 2022 by Ward, Alaina	
Isolate 38181	Published
Recorded Friday April 29, 2022 by Ward, Alaina	
Culture Conditions 38116	Published
Recorded Friday April 29, 2022 by Ward, Alaina	
Isolate 38152	Published
Recorded Friday April 29, 2022 by Ward, Alaina	
Isolate 38140	Published
Recorded Friday April 29, 2022 by Ward, Alaina	

Experimental & Data Entry Workflow



SOIL SAMPLE 1

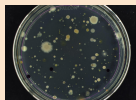
Collect sample
Enter SOIL DATA



SOIL DATA

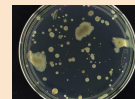
Soil and environmental characteristics, sample date and location

CULTURE CONDITION 1



Isolate bacteria
Enter CULTURE DATA
Media: PDA
Temperature: 28C
Incubation time: 24 hours

CULTURE CONDITION 2



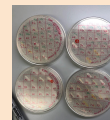
Isolate bacteria
Enter CULTURE DATA
Media: PDA
Temperature: 28C
Incubation time: 24 hours

CULTURE DATA

Media and other culture conditions, number of bacteria screened against ESKAPE relatives, optional antibiotic resistance testing.

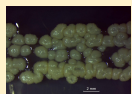
Screen against ESKAPE relative. Identify antibiotic producing isolates.

Screen against ESKAPE relative. Identify antibiotic producing isolates.



ISOLATE 1

Characterize isolates
Enter ISOLATE DATA



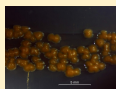
ISOLATE 2

Characterize isolates
Enter ISOLATE DATA



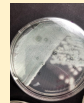
ISOLATE 3

Characterize isolates
Enter ISOLATE DATA



ISOLATE 4

Characterize isolates
Enter ISOLATE DATA



ISOLATE 5

Characterize isolates
Enter ISOLATE DATA



ISOLATE DATA

ESKAPE screen results, including ESKAPE strains with positive and negative results.

Option to enter 16S rRNA PCR, chemical extraction, and eukaryotic test data.



Helpful Hints

The screenshot displays the Tiny Earth Database interface. At the top, there is a navigation bar with links for Dashboard, Class Data, Public Data, and Notifications. The main content area is divided into two sections. The left section, titled 'Soil Sample 40247', provides details about the sample, including its location (University of Wisconsin-Madison), collection date (Thursday, August 18, 2022), and a map showing the location. The right section, titled 'Associated Entries', lists related entries: 'Soil Sample 40247', 'Culture Conditions 40265', 'Culture Conditions 40248', and 'Isolate 40249'. A red box highlights the 'ADD CULTURE CONDITIONS' button at the bottom of the sample details. A red circle highlights the '0 - 50 of 3100' pagination control in the top right corner. Red arrows point from the text hints to these specific elements.

Soil Sample 40247 University of Wisconsin-Madison
Collected Thursday, August 18, 2022 at 12:39 PM by Tran, Trang

Location
43.0813926, -89.3828841

Site Description
Soil from James Madison Park near Mendota Lake and the rhizosphere of some bushes and shrubs. The soil was slightly damp but still crumbly.

Air Temperature
22.0°C

Depth
5.0 cm

Type of Soil
loamy

Humidity
50.0%

Soil Temperature
23.0°C

pH of Soil
6.0

Water Content
50.0%

ADD CULTURE CONDITIONS

Associated Entries

- Soil Sample 40247**
Collected Monday August 22, 2022 by Tran, Trang
- Culture Conditions 40265**
Recorded Wednesday August 31, 2022 by Tran, Trang
- Culture Conditions 40248**
Recorded Monday August 22, 2022 by Tran, Trang
- Isolate 40249**
Recorded Monday August 22, 2022 by Tran, Trang

[Report Issue](#) | [FAQ](#) | [Help](#)

For the rest of the tutorial, most images are zoomed into the focus area as highlighted here.

On pages that include data lists use the arrow found in the top right corner to navigate pages

Most clickable text is *blue*, but not always!



Creating an account



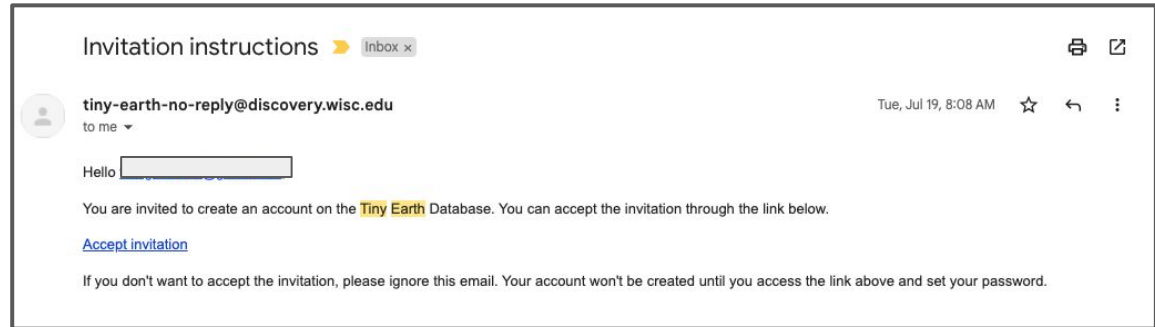
How do I create an account?

Accounts are created on an invitation basis. Your instructor must invite you to the Tiny Earth Database to create an account.

You should receive an email from tiny-earth-no-reply@discovery.wisc.edu inviting you to create an account on the Tiny Earth database.

Click on the “Accept Invitation” link and you’ll be directed to www.data.tinyearth.wisc.edu to set up your account.

Creating an account and entering your Tiny Earth data will ensure your soil isolates stay in the antibiotic pipeline.




Create an account


How do I create an account?

Enter your name and create a password.

Password should be at least 8 characters, and contain at least 1 character from 3 of the following categories: Uppercase (A-Z), Lowercase (a-z), Digit (0-9), Special Characters (#?!@\$%^&~)*



data.tinyearth.wisc.edu



Tiny Earth Database

First Last

Password

Confirm password

[LOG IN](#)

[Tiny Earth Homepage](#)

The Tiny Earth Database is made possible
by a generous grant from the Alfred P. Sloan Foundation.

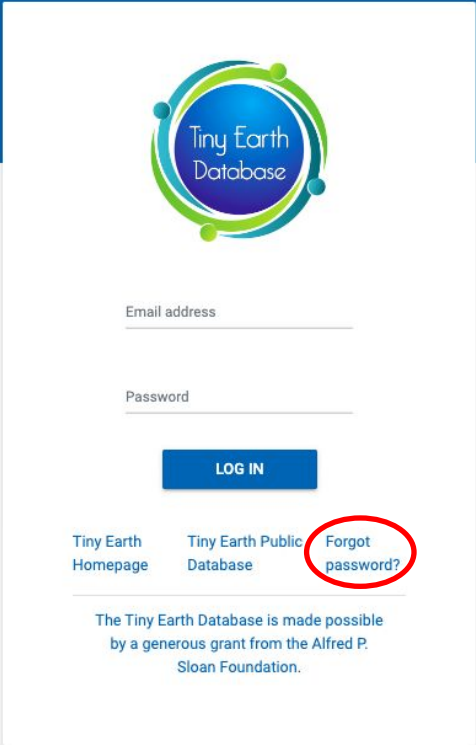


What if I forgot my password?

Your username will always be the email used by your instructor to invite you to the course

To reset your password, go to the login page and click “[Forgot Password?](#)”

Follow the instructions from there

A screenshot of the Tiny Earth Database login page. The page has a blue header and a white body. At the top center is the Tiny Earth Database logo, which consists of a blue circle with green and yellow dots around it. Below the logo are two input fields: "Email address" and "Password". Below these fields is a blue button labeled "LOG IN". At the bottom of the page, there are three links: "Tiny Earth Homepage", "Tiny Earth Public Database", and "Forgot password?". The "Forgot password?" link is circled in red. Below the links, there is a small text block that reads: "The Tiny Earth Database is made possible by a generous grant from the Alfred P. Sloan Foundation." data-bbox="585 220 832 910"/>

Tiny Earth
Database

Email address

Password

LOG IN

Tiny Earth
Homepage

Tiny Earth Public
Database

Forgot
password?

The Tiny Earth Database is made possible
by a generous grant from the Alfred P.
Sloan Foundation.



Entering Data



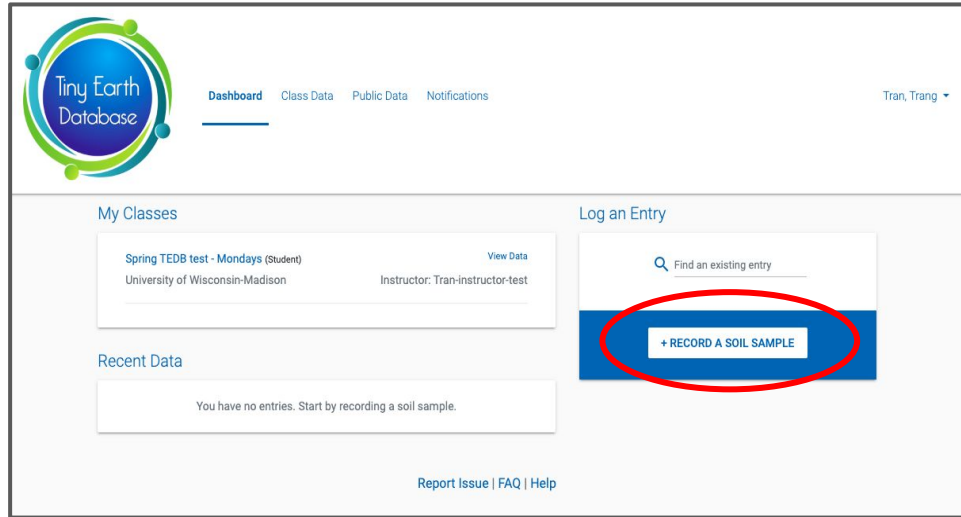
Enter Soil Data

How do I enter soil sample data?

The first step to recording any data is entering your soil sample information.

To begin entering data, click “+
RECORD A SOIL SAMPLE.”

*You cannot record any isolate data
without recording a soil sample.*





Enter Soil Data

How do I enter soil sample data?

Step 1: Enter the location

Type an address in the search bar or drop a pin on the map and drag the pin to adjust the specific location. You can navigate to a different location by dragging anywhere on map.

Ensure the coordinates match the location of pinned location, especially if you change the location.

Click “NEXT”

Soil Sample

Step 1 2 3

Find location by name or click on the map*

Coordinates: 43.06806275641095, -89.40412744722558

Map Satellite

Madison

Shorewood Hills

Hoyt Park

Westmorland Park

James Madison Park

Dane County Farmers' Market

Trader Joe's

GREENBUSH

DUDGEON-MONROE

Lake Wingra

Olin Park Pavilion

W Olin Ave

Map data ©2022 Google

NEXT CANCEL

Soil Sample

Step 1 2 3

Lakeshore Path

- The Howard Temin Lakeshore Path Madison, WI, USA
- Howard Temin Lakeshore Path Parkrun Langdon Street, Madison, WI, USA
- Lakeshore Court Madison, WI, USA
- Lakefront Trail Chicago, IL, USA
- LakeShore Boulevard West Etobicoke, ON, Canada

powered by Google

UW Speech and Hearing Clinic

UW Marching Band Field

Dejepe Residence Hall

- Kronshage Residence Hall
- Humphrey Hall
- Near East Fields
- Parking Lot 57
- Map data ©2022 Google
- Terms of Use
- Report a map error

NEXT CANCEL



Enter Soil Data

How do I enter soil sample data?

Step 2: Enter environmental conditions

Select the date and time of your collection


Click on the calendar icon to select from the calendar and clock.

Describe the area surrounding the soil collection site

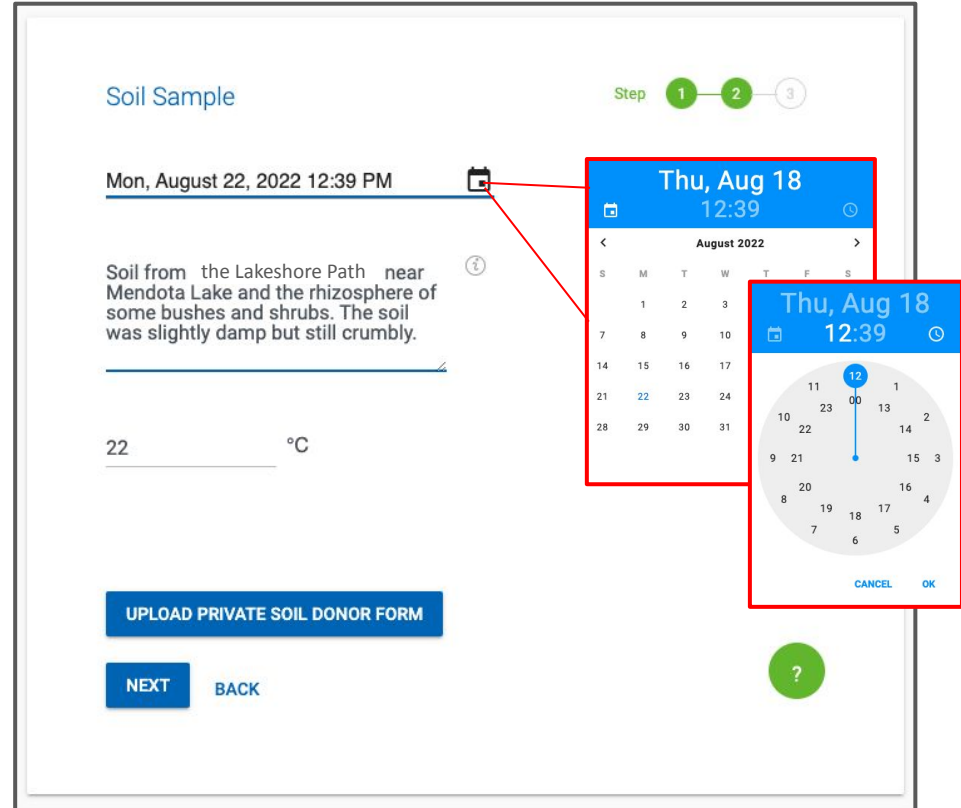
Provide information regarding vegetation, traffic, weather conditions, etc.

Enter air temperature in Celsius

Optional: If soil was collected from private land, click **“[UPLOAD PRIVATE SOIL DONOR FORM](#)”** and upload signed soil donor form.

Click on the  to find a link to download the private soil donor form template.

Note: clicking on the “i” (on any page) will clue you as to what should be included in that field.



The screenshot shows the 'Soil Sample' data entry form. At the top, there are three steps: Step 1 (green), Step 2 (green), and Step 3 (grey). The form is titled 'Soil Sample'. Below the title, the date and time are set to 'Mon, August 22, 2022 12:39 PM'. A calendar icon is next to the date, and a clock icon is next to the time. A red box highlights the calendar and clock interface, showing the date 'Thu, Aug 18' and time '12:39'. The description field contains the text: 'Soil from the Lakeshore Path near Mendota Lake and the rhizosphere of some bushes and shrubs. The soil was slightly damp but still crumbly.' Below the description, the temperature is set to '22 °C'. At the bottom, there is a blue button labeled 'UPLOAD PRIVATE SOIL DONOR FORM', a blue button labeled 'NEXT', and a green button labeled 'BACK'. A green circle with a question mark icon is located at the bottom right of the form.



Enter Soil Data

Do I need to upload a private soil donor form?

Step 2: Enter environmental conditions & Upload a private soil forms

If you collected soil from private land, you **MUST** submit a form with approval from the land owner to use the soil.

The soil donor form must be approved by your instructor.

Questions? Email tinyearth@wid.wisc.edu

You can help!

Instead of taking small samples from soil on campus, **Tiny Earth** students are maximizing microbial diversity and collecting soil samples from across our region.

(Photo by Bryce Richter / UW-Madison)



We'd like a piece of your dirt!

If you agree to donate a soil sample to our research, we will update you throughout the semester on our findings, including description of the antibiotic-producing bacteria discovered. At the end of the semester, we will invite you to our poster session on campus where **Tiny Earth** students will explain details of our findings and you can explain the soil's unique characteristics and uses.

Thank you for supporting **Tiny Earth**!

Soil Donor's Information:

Name: _____

Email Address: _____

Signature: _____

In return for your donation, we promise that any money we may earn on discoveries made using your dirt will be used exclusively for non-profit education and research.



Enter Soil Data

How do I enter soil sample data?

Step 3: Record soil sample characteristics

Enter

- Depth of sample collection
- Type of soil
 - Choose from the drop-down menu
- Air humidity
- Soil temperature
- pH of soil
- Soil water content

Include your partner's name in “additional attribution” if another person was involved with making or using these isolates.

Click “[SUBMIT](#)”

Soil Sample

Step 1 2 3

Depth cm

Soil temperature °C

Type of Soil

Type of Soil

clay

loamy

sand

silt

Air humidity % ⓘ

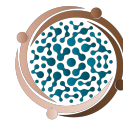
pH of soil ⓘ

Water content % ⓘ

Additional Attribution ⓘ


[SUBMIT](#) [BACK](#)

?



What exactly should I enter for Type of Soil, Air Humidity, Water content, etc?

Step 3: Record soil sample characteristics

For extra assistance with entering soil characteristic data, click on  and more information for each field will appear.

Tips

Type of Soil

Soil type usually refers to the different sizes of mineral particles such as sand (particle size $> 63 \mu\text{m}$), silt (particle size $> 2 \mu\text{m}$) and clay (particle size $< 2 \mu\text{m}$). Sandy soil is composed mostly of sand. Loamy soil is composed mostly of a mix of sand and silt. Clay soil is mostly composed of clay. Silt soil is mostly composed of silt.

Air Humidity

Air humidity is the amount of water vapor present in air, and it is presented as the percentage of the current absolute humidity to the highest possible absolute humidity. Air humidity can be easily found on a weather app.

Soil Temperature

Measuring soil temperature requires inserting a thermometer into the soil at the time and point of collection.

pH of Soil

Soil pH can be measured in the lab using a pH meter or test strip.

Water Content



Soil water content can be measured by comparing wet mass of soil to dry mass of soil (soil can be dried in an oven or by leaving at room temperature for a period of time).



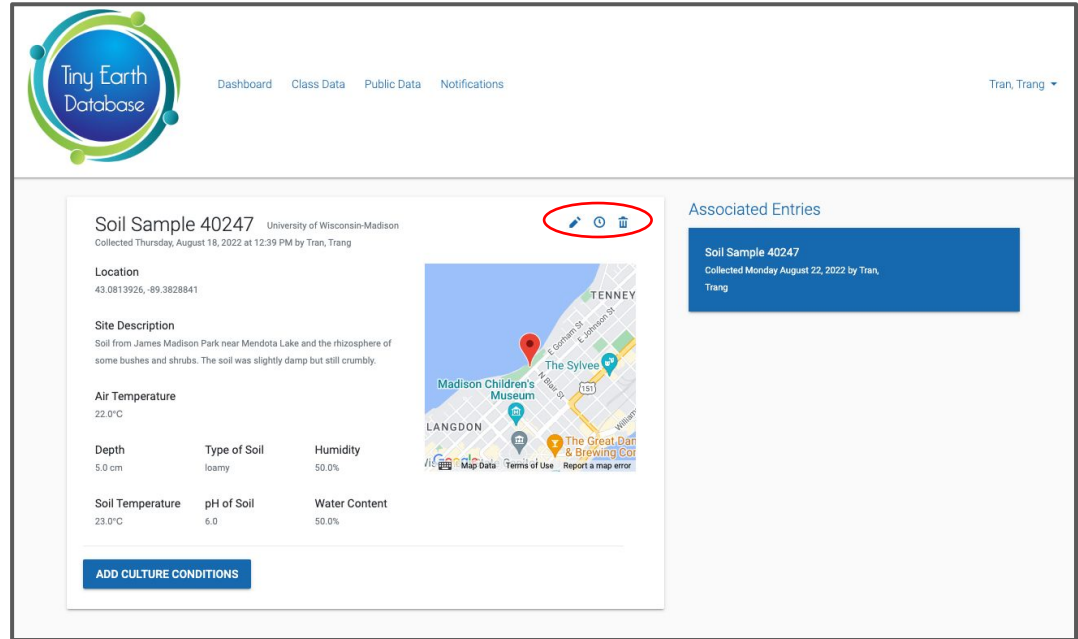
Enter Soil Data

How do I edit soil sample data?

Once you have completed all 3 steps for soil sample data entry, you will be directed to a page that looks like this.

You can always go back and edit information for this sample by clicking on the  or deleting the entry by clicking on the .

The soil sample number, in this case 40247, is specific to your soil sample and can be searched in the database by others in your class.



The screenshot shows the Tiny Earth Database web interface. At the top, there is a navigation bar with links: Dashboard, Class Data, Public Data, and Notifications. The user's name, Tran, Trang, is displayed in the top right corner. The main content area displays details for Soil Sample 40247, collected at the University of Wisconsin-Madison on Thursday, August 18, 2022, at 12:39 PM by Tran, Trang. The sample location is 43.0813926, -89.3828841. The site description mentions James Madison Park near Mendota Lake. A map shows the location near Madison Children's Museum and The Sylvee. A table lists sample details: Air Temperature (22.0°C), Depth (5.0 cm), Type of Soil (loamy), Humidity (50.0%), Soil Temperature (23.0°C), pH of Soil (6.0), and Water Content (50.0%). A blue button labeled 'ADD CULTURE CONDITIONS' is at the bottom. On the right, a section titled 'Associated Entries' shows another entry for Soil Sample 40247, collected on Monday, August 22, 2022, by Tran, Trang. A red circle highlights the edit (pencil), view (eye), and delete (trash can) icons in the top right corner of the sample details card.

Parameter	Value
Air Temperature	22.0°C
Depth	5.0 cm
Type of Soil	loamy
Humidity	50.0%
Soil Temperature	23.0°C
pH of Soil	6.0
Water Content	50.0%



Enter Culture Conditions

How do I record culture conditions?

Step 1: Record Media and number of isolates

On the Soil Sample page, click “**ADD CULTURE CONDITIONS**”

First, select the media you grew your soil dilutions on. If your media is not on this list, you may type a different media and click on blue highlighted text that appears.

Be sure to fully spell out any media used not on this list.

Next, enter the total number of isolates you tested.

Do not include replicates of the same isolate.

The image shows two overlapping screenshots from a web application. The top screenshot is the 'Soil Sample 40247' page, which includes details like 'University of Wisconsin-Madison', 'Collected Thursday, August 18, 2022 at 12:39 PM by Tran, Trang', and a map of the location. It lists 'Air Temperature' (22.0°C), 'Depth' (5.0 cm), 'Type of Soil' (loamy), 'Soil Temperature' (23.0°C), and 'pH of Soil' (6.0). A blue button labeled 'ADD CULTURE CONDITIONS' is visible. The bottom screenshot is the 'Culture Media and Conditions' form for 'Soil Sample 40247'. It features a 'Find or create media used by just typing' search bar with a dropdown menu showing 'Media Used*'. Below this is a list of media options: '10% Tryptic Soy Agar (TSA)', '50% Tryptic Soy Agar (TSA)', 'All Culture', and 'Brain Heart Infusion'. The form also includes fields for 'Temperature of bacterial incubation' (°C), 'Colony Forming Units per gram' (CFU*/gram), and 'Antibiotic Resistance Frequency' (Percent %). A 'NEXT' button is at the bottom.



Enter Culture Conditions

How do I record culture conditions?

Next, enter

- Temperature (in celsius) of incubation between the time you plated your soil dilution and counted CFUs
- Colony forming units (CFUs)/gram of soil. CFUs must be entered in scientific notation, for example 1.82e5
- Total number of bacterial isolates tested (aka screened against at least one ESKAPE safe-relative)
- Total number of antibiotic producers you discovered in your screening

Note: If isolates were tested for antibiotic resistance, against streptomycin for example, record the percent that are resistant out of those tested and indicate which antibiotic was used on Step 2.

Culture Media and Conditions

Step 12

Soil Sample 40247

Find or create media used by just typing

Media Used*

Temperature of bacterial incubation

Temperature* °C

Colony Forming Units per gram

CFU* /gram ⓘ

Total Number Isolates Tested

Total Isolates Tested*

Total Number of Antibiotic Producers

Total Antibiotic Producers*

Antibiotic Resistance Frequency

Percent % ⓘ

NEXT CANCEL



Enter Culture Conditions

How do I record culture conditions?

Step 2: Upload and describe soil dilution plates

You are encouraged to upload photos of your dilution plates here.

Click “[UPLOAD PHOTOS](#)”

Describe the photo, noting specific characteristics or unique qualities.

Some things to include:

- Hours or days of growth
- Dilution factor
- Antibiotic used for testing resistance
- Other variables you tested for

Include your partner's name in “additional attribution” if another person was involved with making or using these isolates

Click “[SUBMIT](#)”

Culture Media and Conditions

Step 1 — 2

Soil Sample 40247

UPLOAD PHOTOS

Optional. Limit of five photos.

Describe any notable characteristics observed on your serial dilution plate(s).

Additional Attribution ?

SUBMIT

BACK



How do I create multiple culture conditions?

Again, you can always edit or delete Culture Condition entries.

You may also go back to the Soil Sample entry and create multiple culture conditions under one soil sample.

Click “**ADD ISOLATE RECORD**” to enter data for single isolates.

The screenshot shows a web interface for creating culture conditions. The main section is titled "Culture Condition 40248" and includes the following information:

- Soil Sample 40247 / Culture 40248
- University of Wisconsin-Madison
- Collected Monday, August 22, 2022 at 18:19 PM by Tran, Trang
- Media: Nutrient Broth
- Temperature of bacterial incubation: 28°C
- Colony Forming Units per gram: CFU/g
- Total Number of Isolates Tested: 4
- Total Number Antibiotic Producers: 10 (250%)
- Antibiotic Resistance Frequency: 50%

At the bottom of the main section is a blue button labeled "ADD ISOLATE RECORD".

On the right side, there is a section titled "Associated Entries" which includes:

- Soil Sample 40247: Collected Monday August 22, 2022 by Tran, Trang
- Culture Conditions 40248: Recorded Monday August 22, 2022 by Tran, Trang



New Isolate Record

How do I enter a new isolate?

Enter a “nickname” for your antibiotic-producing isolate. You may call it whatever you’d like.

Once your isolates are published, the nickname you give it will be accessible to the public. Choose something that helps you identify your isolate. The Database will give your isolate a number which will be linked to this nickname. Keep both identifiers for your records.


Include an “additional attribution” if another person was involved in finding this isolate.

Click “[NEXT](#)”

New Isolate

Culture 40248

Nickname for this isolate (Optional. Limit 20 characters)

Additional Attribution 

[NEXT](#) [CANCEL](#)



New Isolate Record

How do I enter Isolate ESKAPE Screen results?

Select appropriate box for ESKAPE screen.

If the isolate showed antibiotic activity against a specific ESKAPE, click “yes” and enter the hours between plating and reading the screen and the type of media screened on

If you tested an isolate against an ESKAPE pathogen, but isolate did not show antibiotic activity, click “no”

If an ESKAPE was not tested, click “not tested.”

If you screened your isolate against a bacteria that is not on the list, click “[Add another bacteria](#)” and enter the species and screening results.

Once finished, click “[NEXT](#)”

Isolate ESKAPE Screen

Culture 40248

Step 1

Antibiotic Activity*

Mycobacterium smegmatis	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not tested	24	hours	10% Tryptic Soy A...
Enterobacter aerogenes	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Not tested			
Pseudomonas putida	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Not tested			
Acinetobacter baylyi	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Not tested			
Escherichia coli	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not tested	24	hours	10% Tryptic Soy A...
Staphylococcus epidermidis	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not tested	24	hours	10% Tryptic Soy A...
Enterococcus raffinosus	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Not tested	24	hours	
Bacillus subtilis	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Not tested			
other	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Not tested			

[Add another bacteria](#)

Media Used*

- 10% Tryptic Soy Agar (TSA)
- 50% Tryptic Soy Agar (TSA)
- All Culture
- Brain Heart

[NEXT](#) [CANCEL](#)

Note: Knowledge of which ESKAPEs your isolate has been screened against will help the Tiny Earth Chemistry Hub greatly. Thank you!



New Isolate Record

How do I enter Isolate ESKAPE Screen results?

On Step 2 of Isolate ESKAPE Screen, enter any defining characteristics of the screen, such as size of zone of inhibition (measured from edge of isolate growth to furthest point of the zone).

Upload photos of the screen plates.

Click “**SUBMIT**”

The screenshot shows a web form titled "Isolate ESKAPE Screen" with a progress indicator showing "Step 1" and "2", where "2" is highlighted. Below the title, the text "Culture 40248" is displayed. There is a blue button labeled "UPLOAD PHOTOS". Below this button, the text "Optional. Limit of five photos." is shown. Further down, the text "Describe any notable observations from your ESKAPE screen(s)." is followed by a text input field with a placeholder line. At the bottom of the form, there are two blue buttons: "SUBMIT" and "BACK".



What are my other data entry options?

Once you have entered Isolate ESKAPE Screen data, you can also enter

- 16S rRNA PCR results,
- Chemical extraction result
- Eukaryotic test results

You can add and edit other test results at any time by navigating back to your specific isolate page.

Soil Sample 40247 / Culture 40248 / Isolate 40249

Isolate 40249 test strain University of Wisconsin-Madison

ESKAPE Test
Recorded Monday, August 22, 2022 by Tran, Trang

Additional Collection Attribution
spring 2022

Add Test Results

- ESKAPE
- 16S rRNA TEST
- ANTIBIOTIC ACTIVITY OF EXTRACT
- EUKARYOTIC INHIBITION

Associated Entries

Soil Sample 40247
Collected Monday August 22, 2022 by Tran, Trang

Culture Conditions 40248
Recorded Monday August 22, 2022 by Tran, Trang

Isolate 40249
Recorded Monday August 22, 2022 by Tran, Trang



New Isolate Record

How do I add test results for... 16S rRNA?

Clicking on “[16S rRNA TEST](#)” under “Add test results” will bring you to this page.

Enter the genus of your isolate by choosing from the dropdown menu or typing in a genus that is not present. *Include the full genus name. E.g. Aeromonas*

Copy and paste the 16S rRNA sequence

Click “[UPLOAD SEQUENCING FILES](#)” to submit the original files from 16S sequencing

Click “[SUBMIT](#)”

16S rRNA Test

Isolate 40249

Find or create genus*

Paste FASTA Sequence

UPLOAD SEQUENCING FILES

Describe any notable observations about your sequence (percent identity, primer used, etc.)

SUBMIT CANCEL



New Isolate Record

How do I add test results for... antibiotic activity of an extract?

Step 1: Solvent and screening

Back on the isolate homepage, you will see a link to “[ANTIBIOTIC ACTIVITY OF EXTRACT](#)” under “Add test results.”

Here, select the solvent used for extraction, or enter a different one if yours does not appear on the dropdown menu.

Select appropriate boxes for screening with the chemical extract and incubation time, following the same procedure as the “Isolate ESKAPE Screen” previously outlined

Click “[NEXT](#)”

Antibiotic Activity of Extract

Isolate 40249

2-butanol

Shown Antibiotic Activity?*

Bacillus subtilis	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Not tested
Mycobacterium smegmatis	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> Not tested
Enterobacter aerogenes	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> Not tested
Pseudomonas putida	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> Not tested
Acinetobacter baylyi	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> Not tested
Escherichia coli	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> Not tested
Staphylococcus epidermidis	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> Not tested
Enterococcus raffinosus	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> Not tested

Add another bacteria

NEXT

CANCEL

Step 12

24.0 hours

Nutrient Broth



New Isolate Record

How do I add test results for... antibiotic activity of an extract?

Step 2: Describing the procedure

Describe your procedure for chemical extraction on Step 2 of “Antibiotic Activity of Extract.”

Note if there were any deviations from the protocol described in the Tiny Earth Manual.

Click “**SUBMIT**”

Antibiotic Activity of Extract

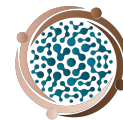
Step 1 2

Isolate 40249

Describe your experiment design: ⓘ

Describe any notable observations from your Antibiotic Activity of Extract test(s)

SUBMIT BACK



How do I add test results for... Eukaryotic Inhibition?

Step 1: Record tested organisms

Back on the isolate homepage, you will see a link to “[EUKARYOTIC INHIBITION](#)” under “Add test results.”

List the organism that your isolate or extract was tested against.

Indicate “yes” or “no” if there was inhibition.

List as many organisms as you tested.

Click “[NEXT](#)”

A screenshot of a web form titled "Eukaryotic Inhibition". In the top right corner, there is a progress indicator showing "Step 1" in a green circle and "2" in a grey circle. The form contains the following elements: the text "Isolate 40249", the question "Tested against which eukaryotic organism?", a text input field labeled "Eukaryotic organism*", a section titled "Eukaryotic inhibition" with two radio buttons labeled "Yes" (which is selected) and "No", a blue link that says "LIST ANOTHER EUKARYOTIC ORGANISM", and at the bottom, two buttons: a blue "NEXT" button and a grey "CANCEL" button.

Eukaryotic Inhibition

Isolate 40249

Tested against which eukaryotic organism?

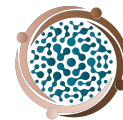
Eukaryotic organism*

Eukaryotic inhibition

☒ Yes ☐ No

[LIST ANOTHER EUKARYOTIC ORGANISM](#)

[NEXT](#) [CANCEL](#)



How do I add test results for... Eukaryotic Inhibition?

Step 2: Record experimental design

Describe, in detail, your experimental design on Step 2 of “Eukaryotic Inhibition.”

Click “**SUBMIT**”

Eukaryotic Inhibition

Isolate 40249

Describe your experiment design:

Description

SUBMIT

BACK

Tips

For example:
The potential eukaryotic inhibition activity of Isolate #1 was tested by evaluating the growth of Arabidopsis thaliana. A. thaliana seeds were surface sterilized and put in sterile soils for germination. Seedlings were inoculated with liquid culture of the isolate, and growth was evaluated over 1 week measuring the stem against a control plant with no bacterial inoculation.



How do I review data from my classmates?

To see data from your class, click on “**Class Data**” from any page.

You can browse by clicking the ➤ button next the page #

OR search for a specific isolate ID # or nickname

To filter your search click the “**FILTER**” button

Click on any **isolate** to review the data

Tiny Earth Database

Dashboard **Class Data** Public Data Notifications

Tran, Trang ▾

FILTER search isolate id or nickname **DOWNLOAD ALL** **0 - 50 of 200** ➤

Class: TINY EARTH SUMMER RESEARCH COURSE 2022 - 5/31/22-8/6/22 ▾

all none	Entry	Date Collected ▾	Institution	Key Data
<input type="checkbox"/>	Isolate 39515 - HW1-1	June 6, 2022 07:55 AM	University of Wisconsin-Madison	ESKAPE
<input type="checkbox"/>	Isolate 39524 - HW1-2	June 6, 2022 07:55 AM	University of Wisconsin-Madison	ESKAPE
<input type="checkbox"/>	Isolate 39525 - HW1-3	June 6, 2022 07:55 AM	University of Wisconsin-Madison	ESKAPE
<input type="checkbox"/>	Isolate 39529 - HW1-9	June 6, 2022 07:55 AM	University of Wisconsin-Madison	ESKAPE
<input type="checkbox"/>	Isolate 39530 - HW1-15	June 6, 2022 07:55 AM	University of Wisconsin-Madison	ESKAPE
<input type="checkbox"/>	Isolate 39531 - HW1-14	June 6, 2022 07:55 AM	University of Wisconsin-Madison	ESKAPE
<input type="checkbox"/>	Isolate 39533 - HW1-13	June 6, 2022 07:55 AM	University of Wisconsin-Madison	ESKAPE
<input type="checkbox"/>	Isolate 39536 - HW1-19	June 6, 2022 07:55 AM	University of Wisconsin-Madison	ESKAPE
<input type="checkbox"/>	Isolate 39539 - HW1-21	June 6, 2022 07:55 AM	University of Wisconsin-Madison	ESKAPE
<input type="checkbox"/>	Isolate 39547 - HW2-4	June 6, 2022 07:55 AM	University of Wisconsin-Madison	ESKAPE



How do I add test results to a classmate's isolate?



If your instructor gives you the option to 'adopt' an isolate from a classmate, you can add test results without making a duplicate entry of the isolate.

After following the previous steps ('How do I review data from my classmates?') to find your adopted isolate, you can add test results as you would for your own isolate.

You cannot edit another student's soil sample, culture conditions, or isolate nickname.

Soil Sample 39185 / Culture 39190 / Isolate 39515

Isolate 39515 HW1-1 University of Wisconsin-Madison

> ESKAPE Test  
Recorded Wednesday, August 31, 2022 by Tran, Trang

> ESKAPE Test
Recorded Wednesday, June 15, 2022 by Wierschke, Hollie

Add Test Results

- ESKAPE
- 16S rRNA TEST
- ANTIBIOTIC ACTIVITY OF EXTRACT
- EUKARYOTIC INHIBITION



How do I filter an isolate search?

On any data page (Class Data or Public Data), you can filter based on

- SOIL SAMPLE
- CULTURE MEDIA & CONDITIONS
- ISOLATE TEST RESULTS

Select as many or as few criteria as you like. Enter your criteria as you would for a data entry.

SOIL SAMPLE CULTURE MEDIA & CONDITIONS ISOLATE TEST RESULTS

Media Used

Media Used

Media Used

Temperature of Incubation

Temperature of incubation

Temperature of incubation

APPLY FILTERS CANCEL ⓘ

SOIL SAMPLE CULTURE MEDIA & CONDITIONS ISOLATE TEST RESULTS

Institution

Institution

Institution

Country

Country

Country

State

State

State

Date Range

Before Date

After Date

Start Date

End Date

APPLY FILTERS CANCEL ⓘ

SOIL SAMPLE CULTURE MEDIA & CONDITIONS ISOLATE TEST RESULTS

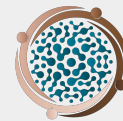
ESKAPE Test

16S rRNA Test

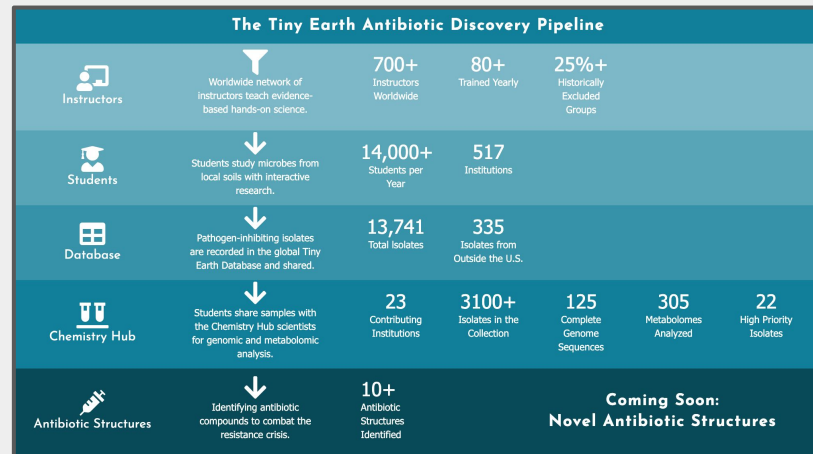
Antibiotic Activity of Extract

Eukaryotic Organism Tested

APPLY FILTERS CANCEL ⓘ



Tiny Earth Public Database





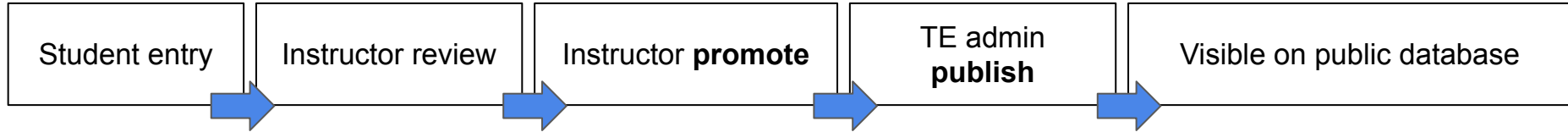
What is the public database?

A resource for...

- **Citizen science**
 - Anyone can use the public data to analyze and inform their independent research
 - See real-time results from students' research
- **Student's research**
 - Compare and contrast your data to expand on the 'discussion' or 'future studies' components of your project
 - Inform independent research projects guided by your instructor
- **Tiny Earth Chemistry Hub (TECH)**
 - Informs TECH on which isolates to conduct further research on
 - Analyze where high priority isolates are coming from and what conditions produce antibiotic activity



Database Flow



Promoting

- Instructors 'promote' students' isolates (not soil or culture record)
- I.e., flags for review when isolate entry is complete

Publishing

- After promotion, the isolate record can be published by Tiny Earth admin
- Once published it moves to the public database

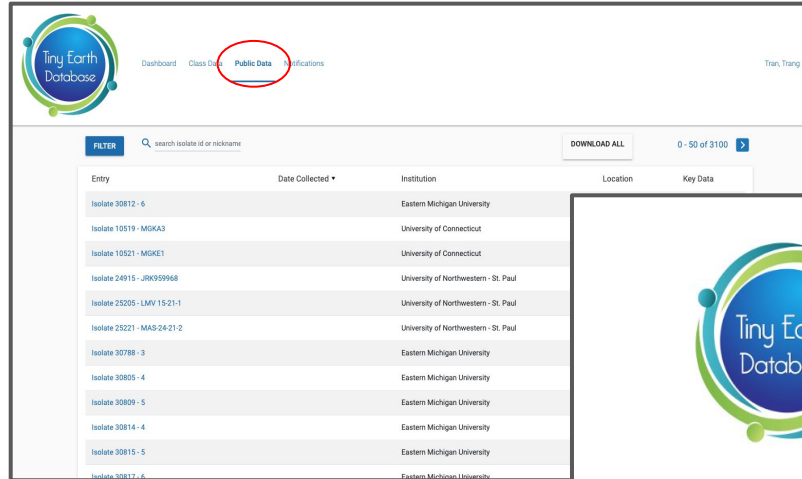


How do I access the Public Database?

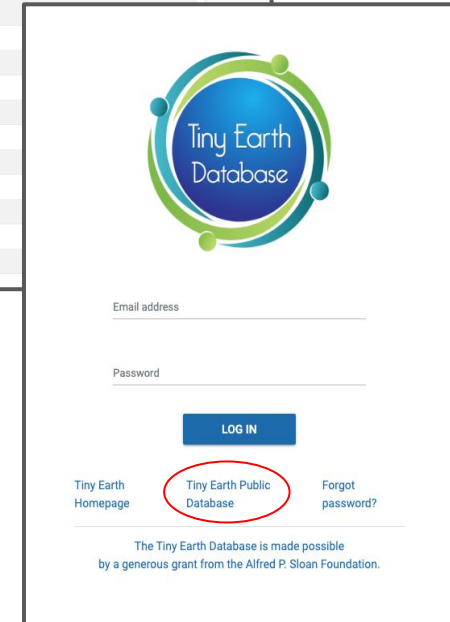
From any page, click “**Public Data**” to see all published data from Tiny Earth students


Those who don't have accounts (E.g., citizen scientists, friends & family, community) can click “**Tiny Earth Public Database**” on the login page

Refer to ‘How do I filter an isolate search?’ to filter your search



Entry	Date Collected	Institution	Location	Key Data
Isolate 30812 - 6		Eastern Michigan University		
Isolate 10519 - MGKA3		University of Connecticut		
Isolate 10521 - MGKE1		University of Connecticut		
Isolate 24915 - JRK939968		University of Northwestern - St. Paul		
Isolate 25205 - LMV 15-21-1		University of Northwestern - St. Paul		
Isolate 25221 - MAS-24-21-2		University of Northwestern - St. Paul		
Isolate 30788 - 3		Eastern Michigan University		
Isolate 30805 - 4		Eastern Michigan University		
Isolate 30809 - 5		Eastern Michigan University		
Isolate 30814 - 4		Eastern Michigan University		
Isolate 30815 - 5		Eastern Michigan University		
Isolate 30817 - 6		Eastern Michigan University		





Email address

Password

LOG IN

[Tiny Earth Homepage](#) [Tiny Earth Public Database](#) [Forgot password?](#)

The Tiny Earth Database is made possible by a generous grant from the Alfred P. Sloan Foundation.



Downloading Data



Downloading Data

What kind of data can I download?

You can download

- From “Class Data” or “Public Data”
- Full datasets or filtered datasets

The screenshot shows the Tiny Earth Database interface. The 'Public Data' tab is selected and circled in red. The table below lists various isolates with their respective details.

Entry	Date Collected	Institution	Location	Key Data
Isolate 30812 - 6		Eastern Michigan University	Michigan	ESKAPE
Isolate 10519 - MGKA3		University of Connecticut	Connecticut	ESKAPE
Isolate 10521 - MGKE1		University of Connecticut	Connecticut	ESKAPE
Isolate 24915 - JRK959968		University of Northwestern - St. Paul	Minnesota	ESKAPE
Isolate 25205 - LMV 15-21-1		University of Northwestern - St. Paul	Minnesota	ESKAPE
Isolate 25221 - MAS-24-21-2		University of Northwestern - St. Paul	Minnesota	ESKAPE
Isolate 30788 - 3		Eastern Michigan University	Michigan	ESKAPE
Isolate 30805 - 4		Eastern Michigan University	Michigan	ESKAPE
Isolate 30809 - 5		Eastern Michigan University	Michigan	ESKAPE
Isolate 30814 - 4		Eastern Michigan University	Michigan	ESKAPE
Isolate 30815 - 5		Eastern Michigan University	Michigan	ESKAPE
Isolate 30817 - 6		Eastern Michigan University	Michigan	ESKAPE



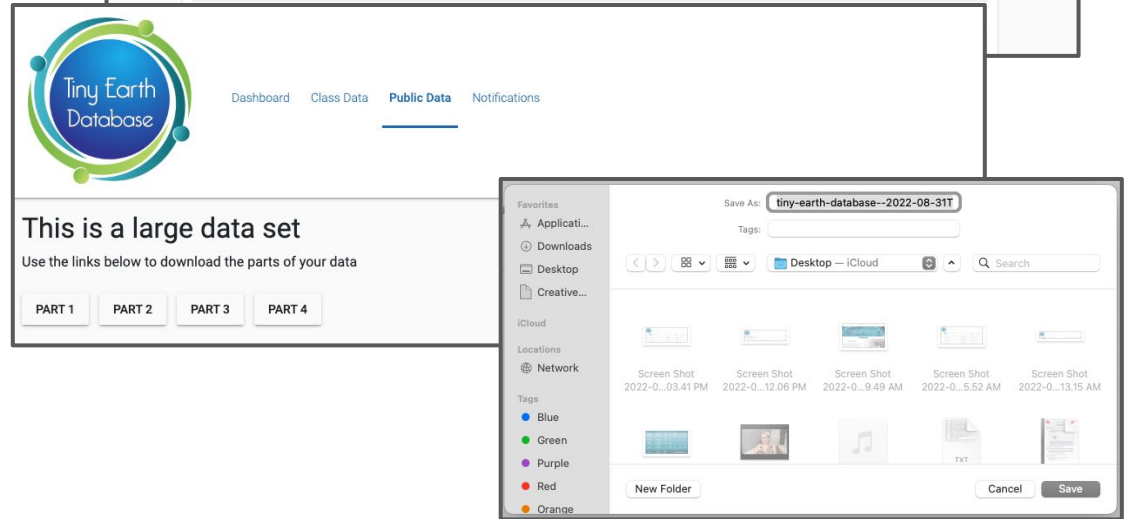
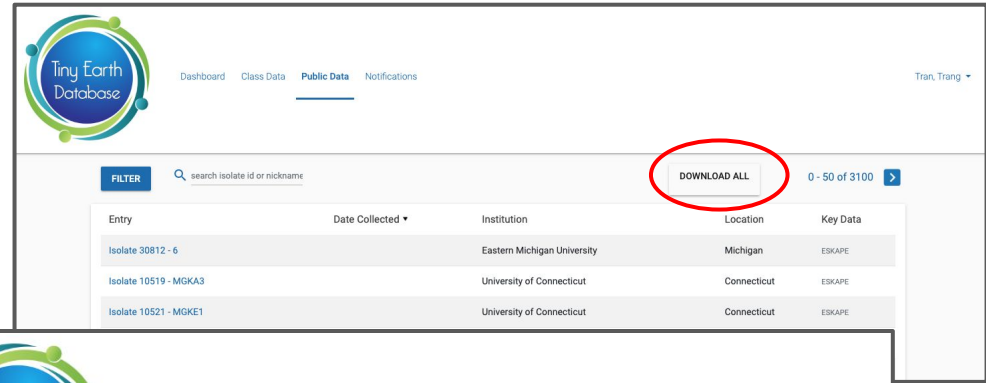
Downloading Data

How do I download data?

Optional: filter the data first for the desired dataset

Click “**DOWNLOAD ALL**”

Click “**PART #**” to download; be sure to download all parts of the data set (you can combine them in excel later).





The Tiny Earth Antibiotic Discovery Pipeline



Instructors



Worldwide network of instructors teach evidence-based hands-on science.

700+
Instructors
Worldwide

80+
Trained Yearly

25%+
Historically
Excluded
Groups



Students



Students study microbes from local soils with interactive research.

14,000+
Students per
Year

517
Institutions



Database



Pathogen-inhibiting isolates are recorded in the global Tiny Earth Database and shared.

13,741
Total Isolates

335
Isolates from
Outside the U.S.



Chemistry Hub



Students share samples with the Chemistry Hub scientists for genomic and metabolomic analysis.

23
Contributing
Institutions

3100+
Isolates in the
Collection

125
Complete
Genome
Sequences

305
Metabolomes
Analyzed

22
High Priority
Isolates



Antibiotic Structures



Identifying antibiotic compounds to combat the resistance crisis.

10+
Antibiotic
Structures
Identified

**Coming Soon:
Novel Antibiotic Structures**

You are directly contributing valuable data that will inform antibiotic resistance awareness to the public in addition to future research that may lead to the discovery of novel antibiotics. Through your research you have the opportunity to help solve a public health crisis that affects the entire globe. It takes a massive effort to do this type of work, and as a network we are grateful to have such exceptional and curious students to collaborate with.

THANK YOU for all your hard work!



Questions?

If you encounter issues with the database, email tinyearth@wid.wisc.edu.