Discover Volvox Development (DVD)

How to manual for mutant screening and documentation
Objectives

- Learn about Volvox biology and its life cycle
- Learn about how studying Volvox contributes to understanding the evolution of multicellularity.
- Learn about mutagenesis and the importance of studying mutants in developmental biology.
- Examine Volvox colonies and identify mutants produced by UV mutagenesis.
- Document relationships between UV light doses, Volvox viability, and rate of mutagenesis.
- Document mutants on Instagram.
- Send requested mutants back to Danforth Center for possible further study.
## List of equipment and supplies

<table>
<thead>
<tr>
<th>Volvox culture</th>
<th>Volvox mutant screening</th>
<th>UV mutagenesis (optional)</th>
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</thead>
<tbody>
<tr>
<td>1. Volvox cultures*</td>
<td>1. multi-well plates*</td>
<td>1. UV crosslinker/UV handlamp</td>
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<tr>
<td>2. LED or grow light (optional)</td>
<td>2. Sharpie</td>
<td>2. Aluminum foil</td>
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<td>3. Wire shelf (optional)</td>
<td>3. Dissecting microscope</td>
<td>3. Tape</td>
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<td>4. Timer switch (optional)</td>
<td>4. Pipettes*</td>
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<td>5. Water bath (optional)</td>
<td>5. Petri dishes*</td>
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<td>6. Standard Volvox Medium*</td>
<td>6. Phone or microscope camera for documentation</td>
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<td>7. Glass culture tubes* and tube racks*</td>
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* Danforth Center can provide
Hands-on: Screening for Volvox mutants
Volvox mutant screening

One mutant per well

- Pour standard volvox medium (SVM) into a 6-well plate
- Pour some of the mutagenized population into a petri dish
- Look for mutants under the dissecting microscope. Use the field guide and see whether you can find known types or new ones.
Volvox mutant screening

Transfer mutants to the multi-well plate with pipets (one mutant per well)

Label each well with date, name, phenotype, and initials

Incubate mutants under diurnal conditions for 4-6 days and see if mutant phenotypes are heritable in offspring
Volvox Mutant Field Guide

**Adult** wild type spheroid

**Mother** spheroid with juveniles

**regA** Somatic regenerator

**regA** Somatic regenerator

**kb1** Kidney bean

**mul1** Multi-gonidia

**inv1** Inversionless

**lagA** Late gonidia
Isolating single colonies for further analysis

This video shows a somewhat disintegrated colony being carefully drawn into a Pasteur pipette and then re-deposited into another drop of liquid. After doing this the second drop of liquid can be examined to make sure only one colony is there, then it can be transferred again to a multi-well plate for growth.
Analyzing Volvox mutagenesis results

• Use a population of un-mutagenized individuals to learn what are the spectrum of normal Volvox culture phenotypes

• Besides being a mutagen, UV light is also a stressor that can cause irregular development and strange looking spheroids to form. Are these true mutants or developmental “monsters”? 

• Mutants breed true after picking an individual and letting it propagate. Do you see more mutant-looking offspring in the population after picking a single individual and letting it grow on its own?

• Temporary developmental monsters will often give rise to normal looking offspring after they propagate.

• Is your mutant a new type, or a previously documented type? Check the field guide. We are especially interested in finding new lag mutants and any other new mutants not in the guide.
Images and documentation

1. Put some colonies of your isolated mutant in a small drop of SVM on a petri dish and find under the dissecting scope

2. Use the mini-microscope phone camera to zoom and take pictures

Tips for success

• Smaller drops of SVM keep the Volvox colonies from moving around too much in the field of view

• If the colonies you want to photograph are still moving too much, try placing the petri plate on a bed of ice or chilling in the fridge to slow them down. Temporary exposure to low temps won’t harm them.

• Take multiple pictures of several colonies from the same mutant. Choose some representative pics that capture the most detail and show the phenotypic range of your mutant
Upload your discoveries!

DiscoverVolvox@gmail.com

@Discover.Volvox

https://www.instagram.com/discover.volvox/?hl=en
Volvox picture submission guidelines

@discover.volvox

#Mutant name #School name

Please @discover.volvox while uploading Volvox mutant pictures

Timing is important. Post pictures the day they are taken.

We will reach out to you if the mutant needs further characterization.
Transfer interesting mutants to the conical tubes containing SVM (1 type/tube)

Label the tubes with strain names, initials, date, and school

Package properly and arrange a drop off @DDPSC
Contact Information

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