

Kick the Costly Software Habit: Free/Libre and Open Source Software (FLOSS) for Classroom and Laboratory

Chris Stieha

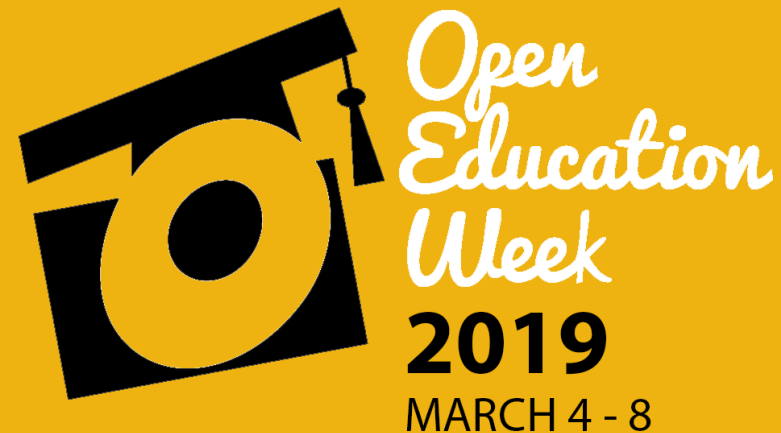
Millersville University

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13 August 2019

Teaching and Learning Symposium

#MvilleOpensUp



<https://www.millersville.edu/cae/open-education-week/index.php>

Where I am going to take you today

- What is FLOSS?
- Pros and Cons of FLOSS
- Where to find FLOSS
- Examples of FLOSS for everyday activities and some non-everyday activities
- My use of FLOSS in teaching and research
 - Image Manipulation
 - Diagram and Handout Creation
 - Statistics
 - Population Modeling

What is Free/Libre and Open Source Software (FLOSS) Mean?

Free as in No Cost, gratis

Often no or minimal cost to download

Community-driven as opposed to company-driven

Companies can charge for support or more services

Free/Libre as in Freedom

Free to use as you wish

Open source:
can view the source code

Free to pass it along

Free to modify it

You Already Have Experience with FLOSS

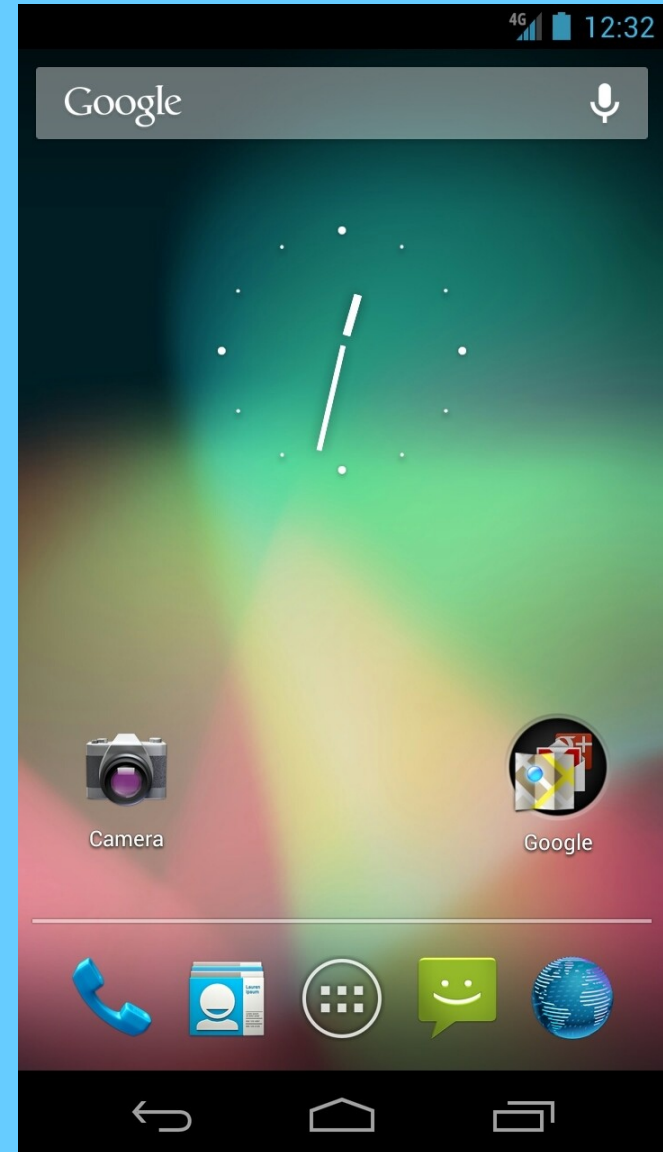


Apple iOS:

works on Apple hardware
Cannot view source code

Google Android:

works on many devices
Can view source code
Each company has a flavor
CyanogenMod/LineageOS



Pros and Cons of FLOSS

Advantages

- Free cost (often)
- Free to view code
- Free to modify and distribute
- Save files often standardized
- Skills and concepts transfer
- Community-driven
- Agile and adaptive
- Always have access (even after graduation)

Disadvantages

- No company support
 - other companies may fill the gap
- Documentation often sparse
 - Users create tutorials
- May not help with legacy files
 - some cross compatibility
- Collaboration and cross-OS compatibility
 - getting much better

How to Find Software

alternativeto.net

alternativeTo
Crowdsourced software recommendations

Which app do you
want to replace?



I want to replace...

Find apps

66,709 apps 623,543 likes 422,785 opinions about alternatives.

Reviews, comments and recommendations. Sign up with [Facebook](#), [Twitter](#), [GitHub](#) and [and more](#).

MSIX

The best technology for installing
applications on Windows

- Inherits UWP features
- Application customization
- More container security options
- Supports all Windows applications

**New MSIX package format
supports Win32 packages
for Microsoft Store and
more**

2 hours ago · March 7th was
Microsoft's [Windows Developer
Day]

[Read more >](#)

[MSIX Packaging SDK alternatives >](#)

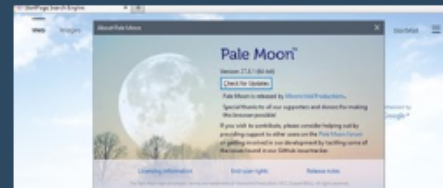


**Google Chrome 65
released, includes tab-
under blocking**

Yesterday · Google has started to
roll out the latest version of its
Chrome web browser. Desktop

[Read more >](#)

[Google Chrome alternatives >](#)



**Pale Moon version 27.8
released, improves
autocorrect and emoji
support**

2 days ago · Moonchild Productions
has released a new update to its
flagship web browser

[Read more >](#)

[Pale Moon alternatives >](#)

Windows 10 Spring Creators Update will
implement Windows Timeline and more

Featured User List: Best Personal Media
Apps

GitHub survived the largest DDoS attack in
history

Privacy-conscious email providers to keep
your correspondence safe


Swype is dead, long live the alternative
Android keyboards!


AlternativeTo: Your Awesome Feedback =
More Improvements

[News archive](#)


How to Find Software

alternativeto.net

 Secure | <https://alternativeto.net/software/windows-10/>



1928


 Like

Ubuntu

Ubuntu is a Linux-based Debian-derived open source operating system for desktop computers.

Free

Open Source


 Linux

Based on Debian


OTA Updates

Support for Unicode


[+ Add a feature](#)



Very user-friendly, stable and come with many free softwares
mehdishokoohi • Jun 2017 • 4 agrees and 1 disagrees



Ubuntu is free of charge but you can support them by buying a cap, polo, shirt etc. It is a light OS, not buggy, no virus, a beautiful philosophy! No spyware etc. You can remove the Amazon plugin with the Synaptic Manger.
linuxien • Nov 2016 • 5 agrees and 2 disagrees



It's open source, has great user interface and is easy to use
mmpoiu • Jul 2017 • 2 agrees and 0 disagrees

How to Find Software

alternativeto.net



Ubuntu

Ubuntu is a Debian Linux-based open source operating system for desktop computers. Created by Canonical Ltd.

2091

Free Open Source

Windows

Linux

Windows S

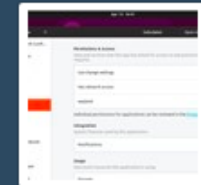


Like



Ubuntu is a community developed, Linux-based operating system that is perfect for laptops, desktops and servers. It contains all the applications you need - a web browser, presentation, document and spreadsheet software, instant messaging and much more.

The latest release is 19.04 ("Disco Dingo"), and the most recent long-term support release is 18.04 LTS ("Bionic Beaver"), which is supported until 2023 under public support and until 2028 as a paid option.



Ubuntu is listed in

Linux Apps, Runtime & OS, Web Dev for Windows, Switching from Windows to Linux, and My top linux software

Apps for Ubuntu

Ubuntu is also a platform with 45 apps listed on AlternativeTo. Browse all 45 apps for Ubuntu.

Links to official Ubuntu sites

Official Website Facebook Twitter Source

Free Software Foundation, fsf.org



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[about](#) [campaigns](#) [licensing](#) [membership](#) [resources](#) [community](#) [donate](#) [shop](#)

The Free Software Foundation (FSF) is a nonprofit with a worldwide mission to promote computer user freedom. We defend the rights of all software users. [Read more.](#)

Free software developers guarantee everyone equal rights to their programs; any user can study the source code, modify it, and share the program. By contrast, most software carries fine print that denies users these basic rights, leaving them susceptible to the whims of its owners and vulnerable to surveillance.

- The FSF provides critical infrastructure and funding for the [GNU Project](#), the foundation of the popular GNU/Linux family of free operating systems and the keystone of the Internet.
- Our [Campaigns Team](#) creates educational materials about free software, convenes the yearly [LibrePlanet conference](#) and goes toe to toe against powerful interests that threaten computer user rights.
- Our [Licensing & Compliance Lab](#) defends freely licensed software from proprietary hoarding, advises on licensing issues, and certifies devices that [Respect Your Freedom](#).



Free Software Foundation, fsf.org

Collection:Windows

Translations needed

The GNU Webmaster translators are welcome to start these pages:

- <https://directory.fsf.org/wiki/Collection:Windows.de> based on <https://www.gnu.org/software/for-windows.de.html>
- <https://directory.fsf.org/wiki/Collection:Windows.fr> based on <https://www.gnu.org/software/for-windows.fr.html>
- <https://directory.fsf.org/wiki/Collection:Windows.hr> based on <https://www.gnu.org/software/for-windows.hr.html>

Microsoft's software is malware, we urge all Windows users to switch to a free **GNU/Linux distribution** as soon as possible.

Here is a list of popular free software applications that run on Microsoft Windows — along with the proprietary applications they replace. If you are still a Windows user, you can take a first step towards free software by installing these applications.

When we say these application programs are **free software**, we're talking about freedom, not price. It means that you are free to use these programs constructively, either alone or in a community, while respecting the freedom of others. The source code is available, so that you can study the software, adapt it to your needs, fix bugs, and release versions with new features. You can also convince or pay others to do these things for you. You are also free to give away and free to sell copies, under the terms of the applicable free software license. These programs are free software because you have freedom in using them. Free software develops under the control of its users.

<https://directory.fsf.org/wiki/Collection:Windows>

FLOSS Software

(programs that I am familiar with)

- Operating Systems
 - Phones: Android
 - Computers: Linux
- Web browsing
 - Firefox and Chromium
- Office Software
 - Office Suite: LibreOffice
 - Desktop Publishing: Scribus
- Image Manipulation
 - Raster: GIMP
 - Vector: Inkscape
- Consuming Audio/Video
 - VLC
- Manipulating Audio
 - Audacity
- Scientific Computing
 - Statistics: R
 - Programming: Octave
- Geographical Information System
 - QGIS, GrassGIS, Diva-GIS



Web Browsing

Firefox: www.mozilla.org

Millersville University - Welcome to Millersville University - Mozilla Firefox

File Edit View History Bookmarks Tools Help

Millersville University - v x +

www.millersville.edu

Search

Current Students Faculty & Staff Site Index People Finder

Millersville University

Select Language Search web & directory

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- Housing
- Alumni
- Giving to Millersville
- Athletics
- Experience our Arts



Web Browsing

Chromium (Open-source Chrome)

<https://www.chromium.org/>

Millersville University - Center for Academic Excellence - Chromium

Millersville University x

www.millersville.edu/cae/

Apps OpenStax Pressbooks | Cre Metafinder Search CC Search OER Commons Settings 2018 Mar 2 2018 Jan 7 2017

Current Students Faculty & Staff Site Index People Finder

Millersville University

Select Language Search web & directory

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Center for Academic Excellence

CAE Home

CAE Home
About the Center
Types of Programs
Professional Development Sessions
Teaching & Learning
Universal Design for Learning
Innovative Practices Spotlight
Camp IDEA
Adjust Information

CENTER FOR ACADEMIC EXCELLENCE

Office Software: Office Suite

LibreOffice: libreoffice.org

Create:



Writer Document



Calc Spreadsheet



Impress Presentation



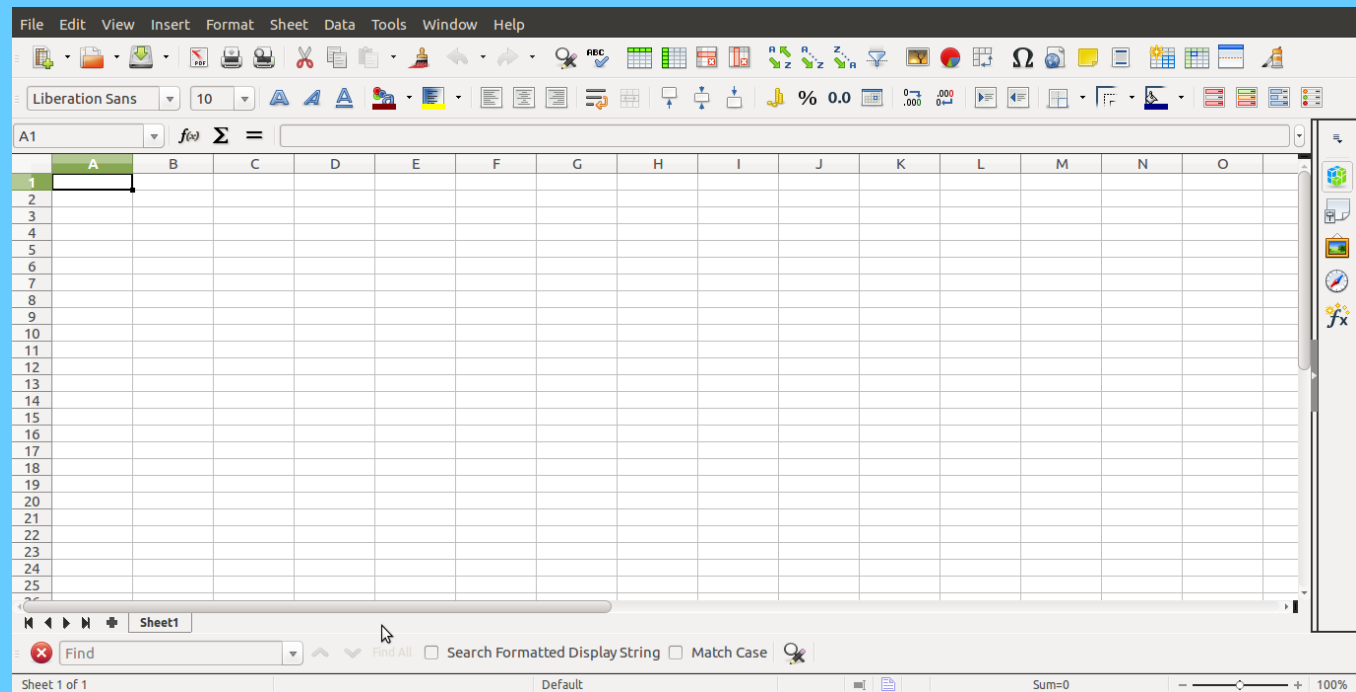
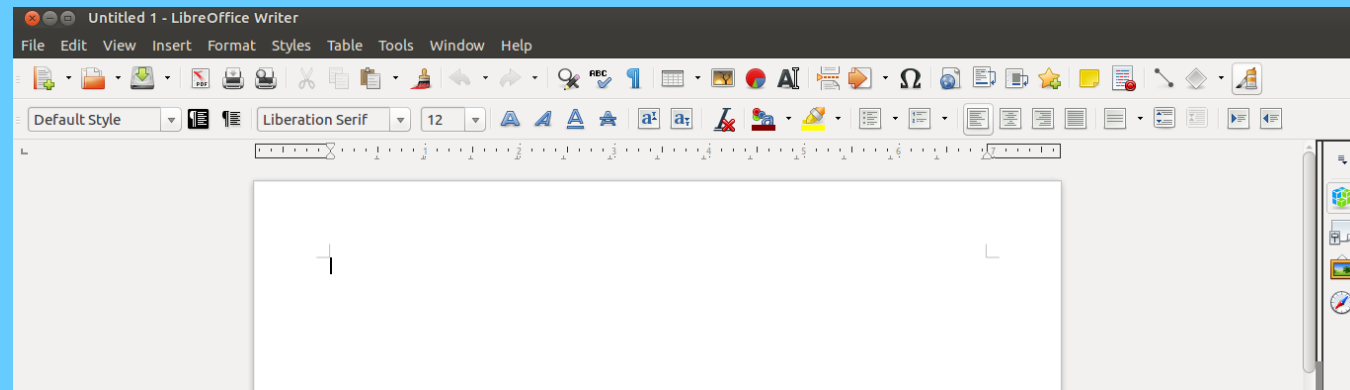
Draw Drawing



Math Formula



Base Database



Office Software: Desktop Publishing

Scribus: www.scribus.net

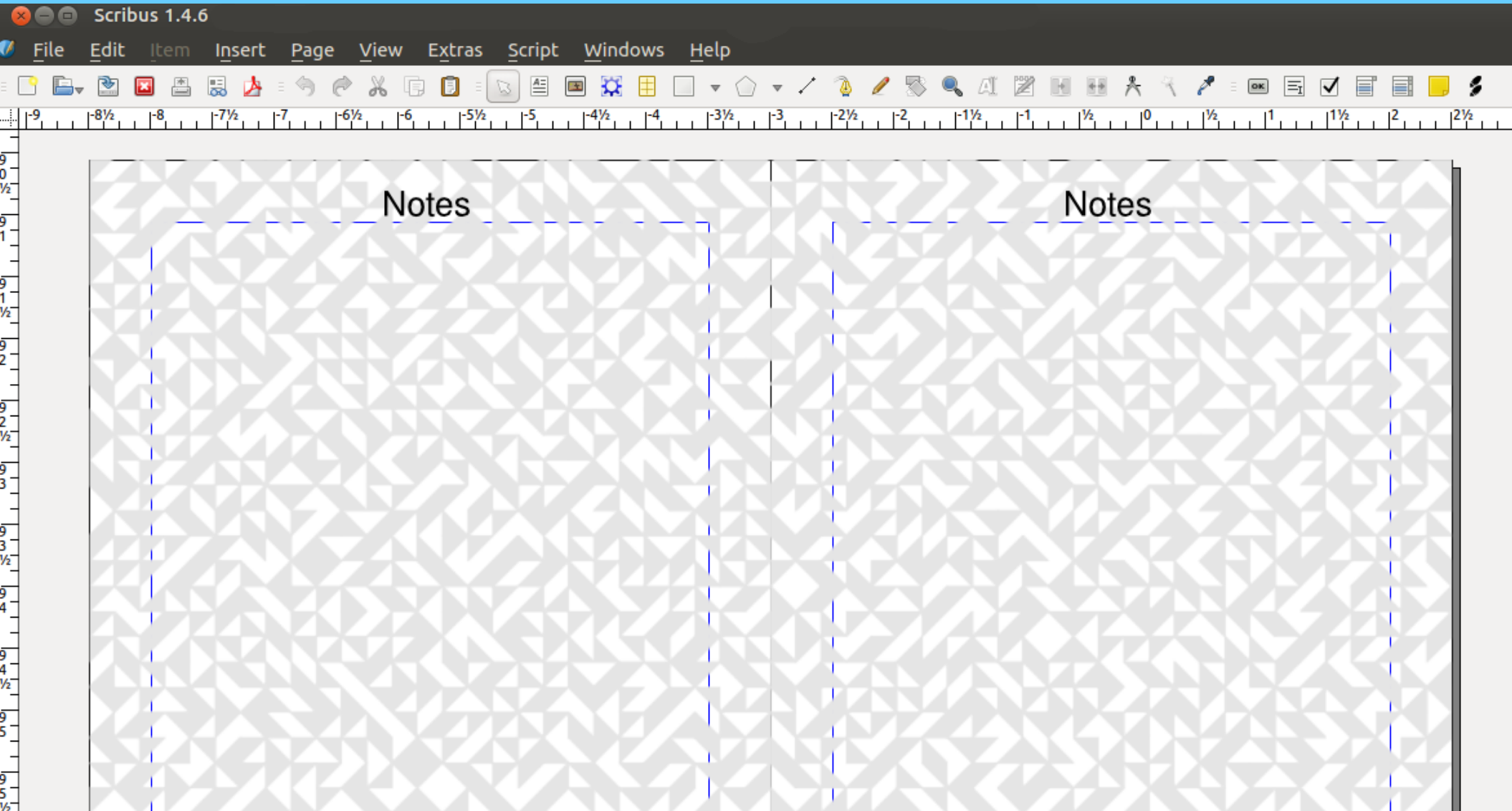
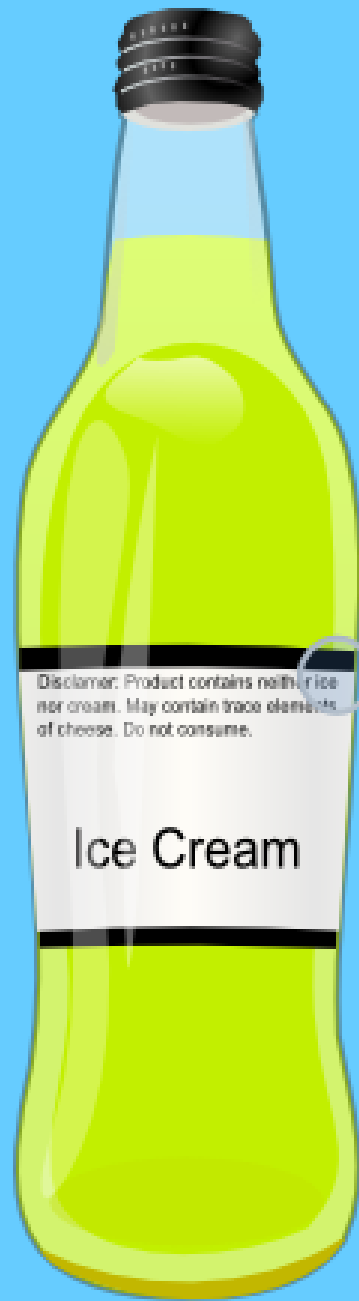
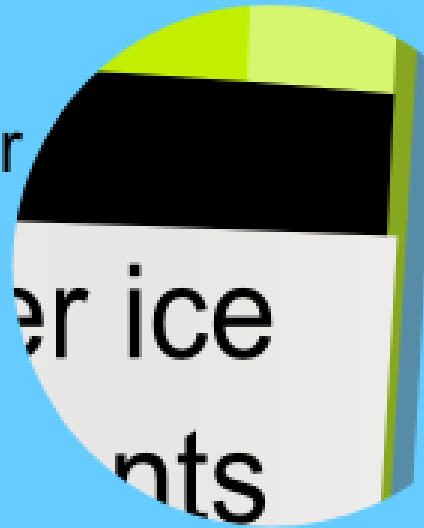


Image Manipulation: Rasters vs Vectors

7x Magnification



Vector



.svg
Maybe .pdf

Bitmap



.bmp
.jpg
.png
.gif

Image Manipulation: Rasters

GIMP: GNU Image Manipulation Program

www.gimp.org

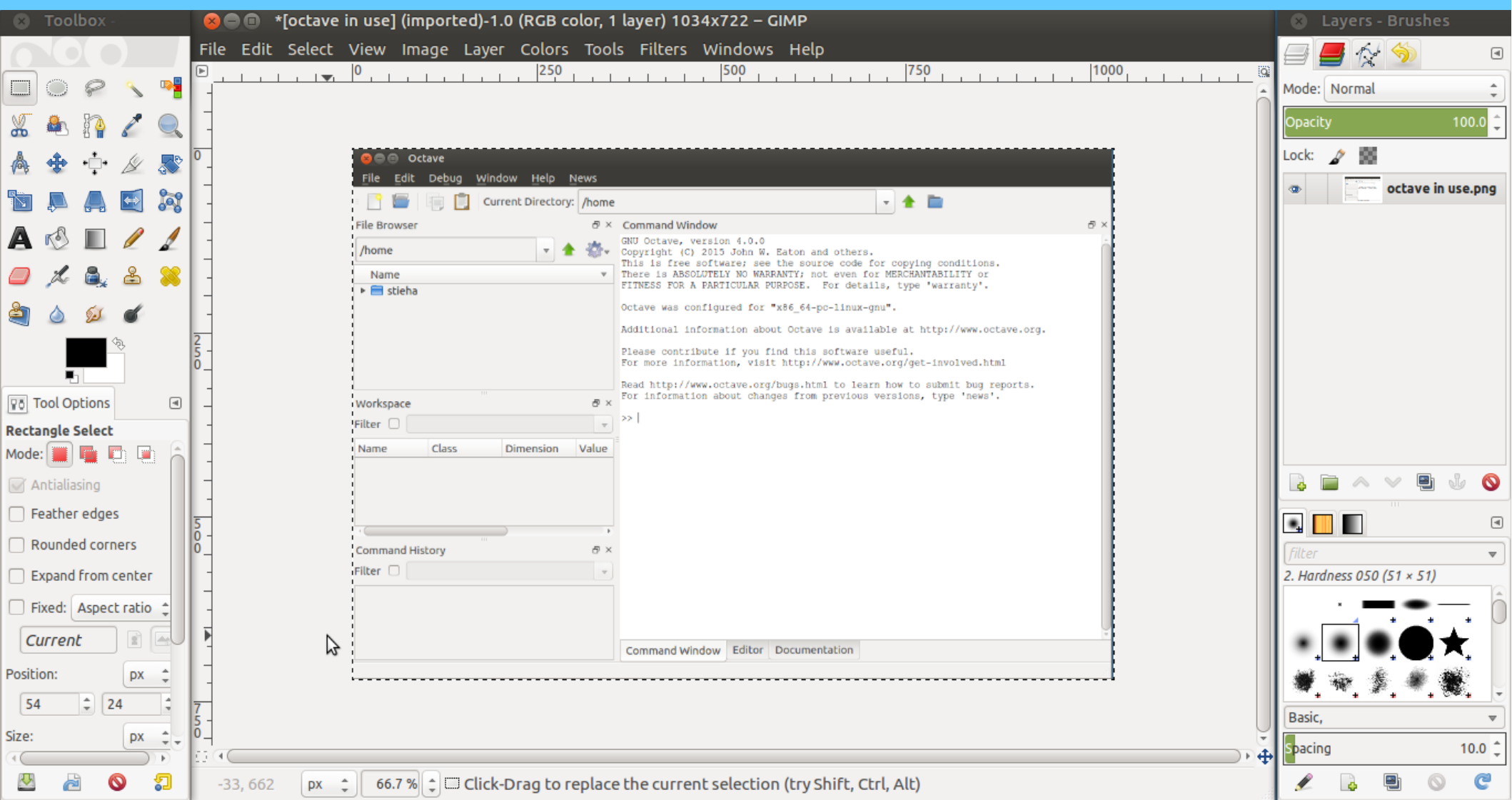
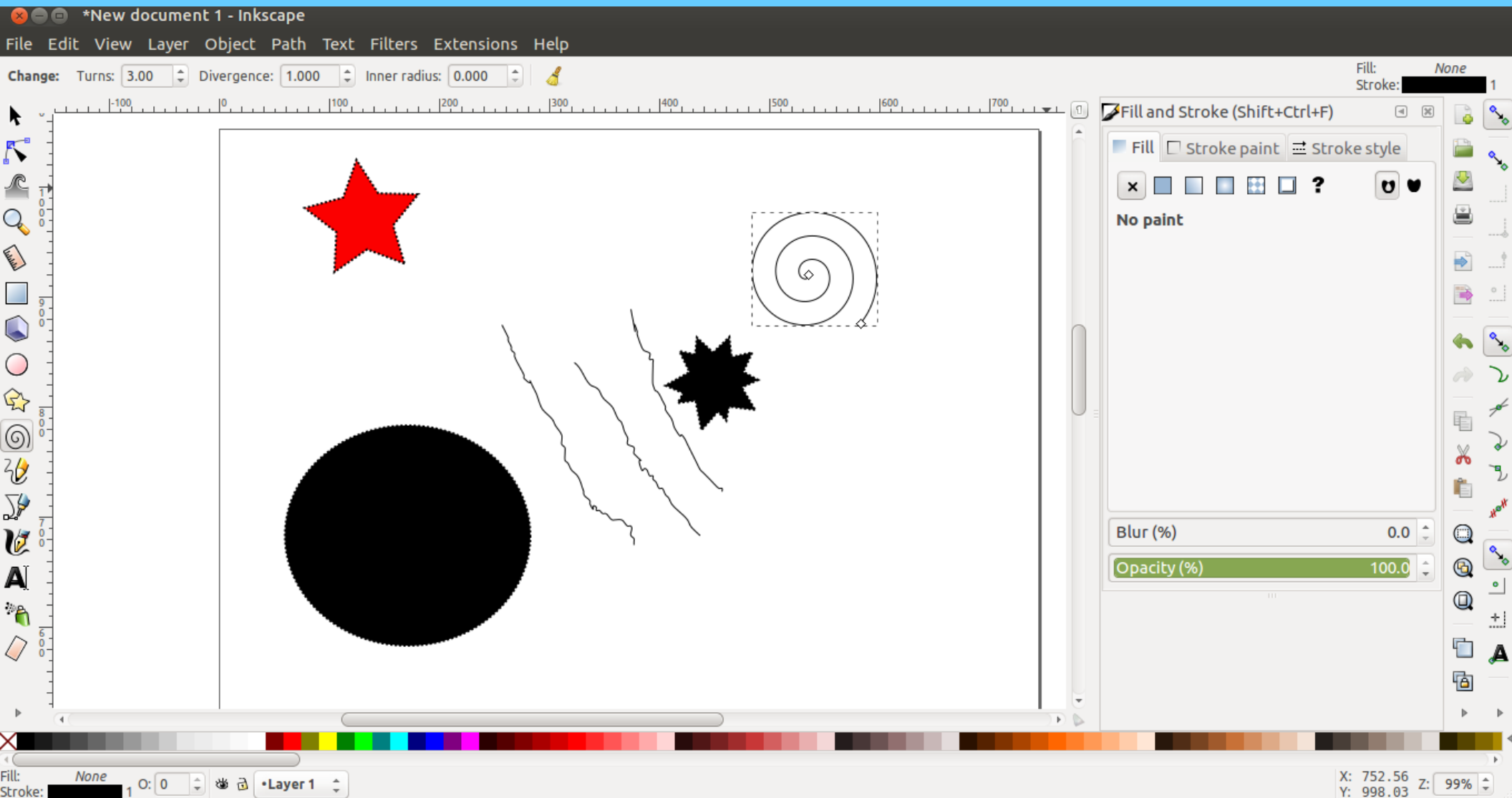


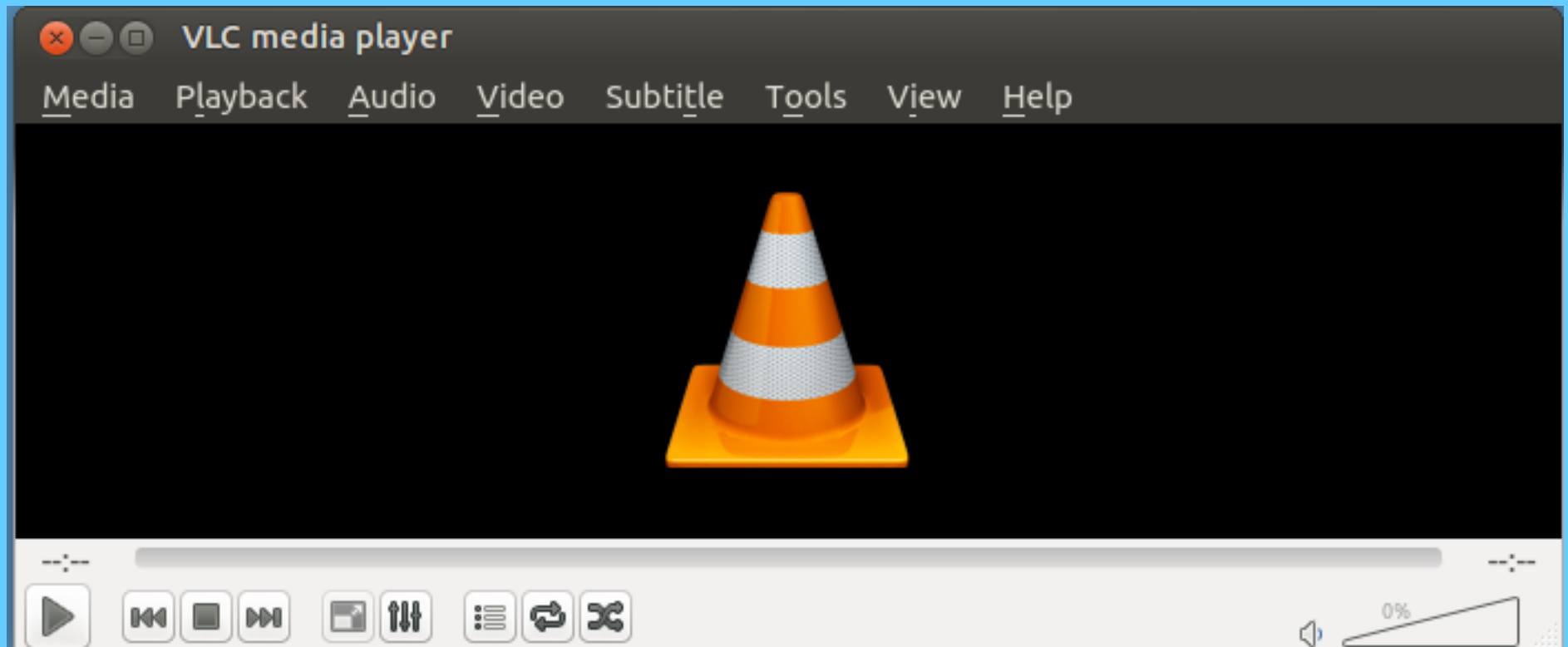
Image Manipulation: Vectors

Inkscape: inkscape.org



Audio/Video Consuming VLC

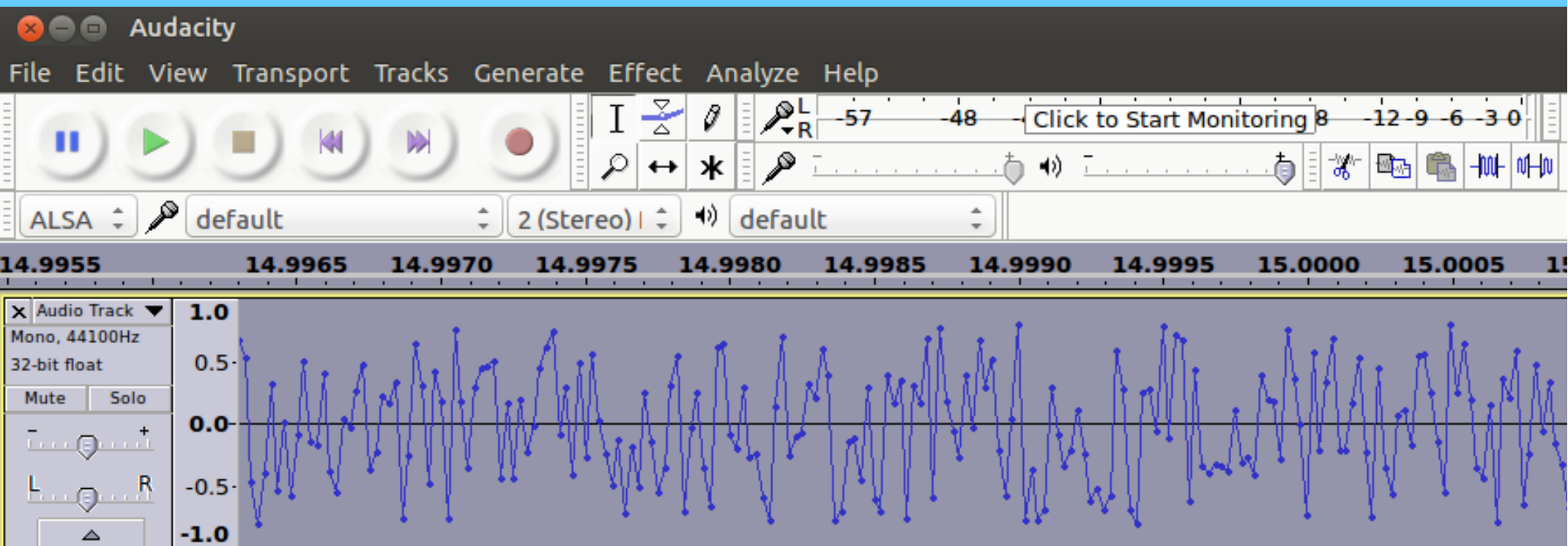
www.videolan.org



Audio: Manipulation

Audacity

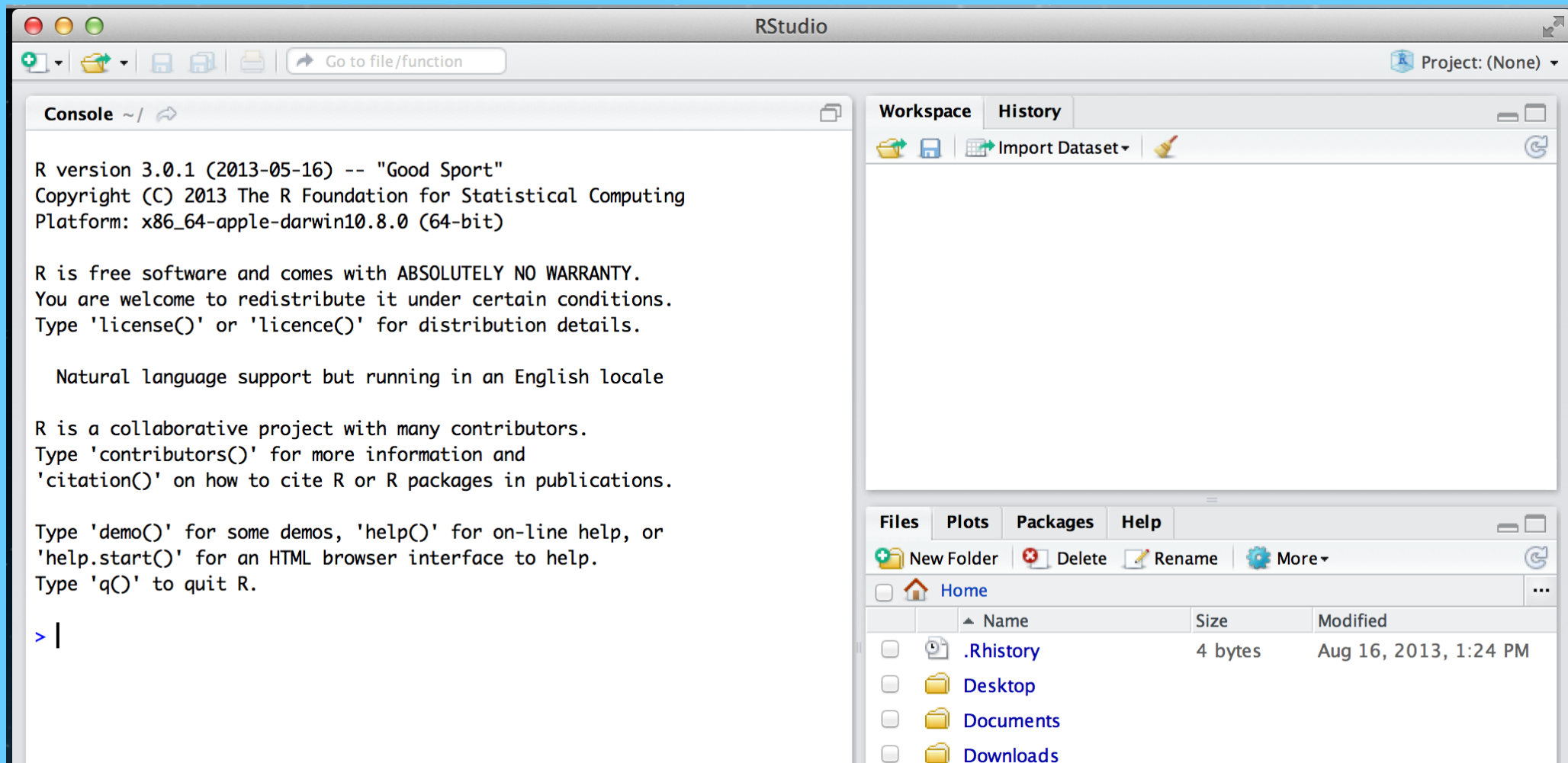
www.audacityteam.org



Scientific Computing: Statistics

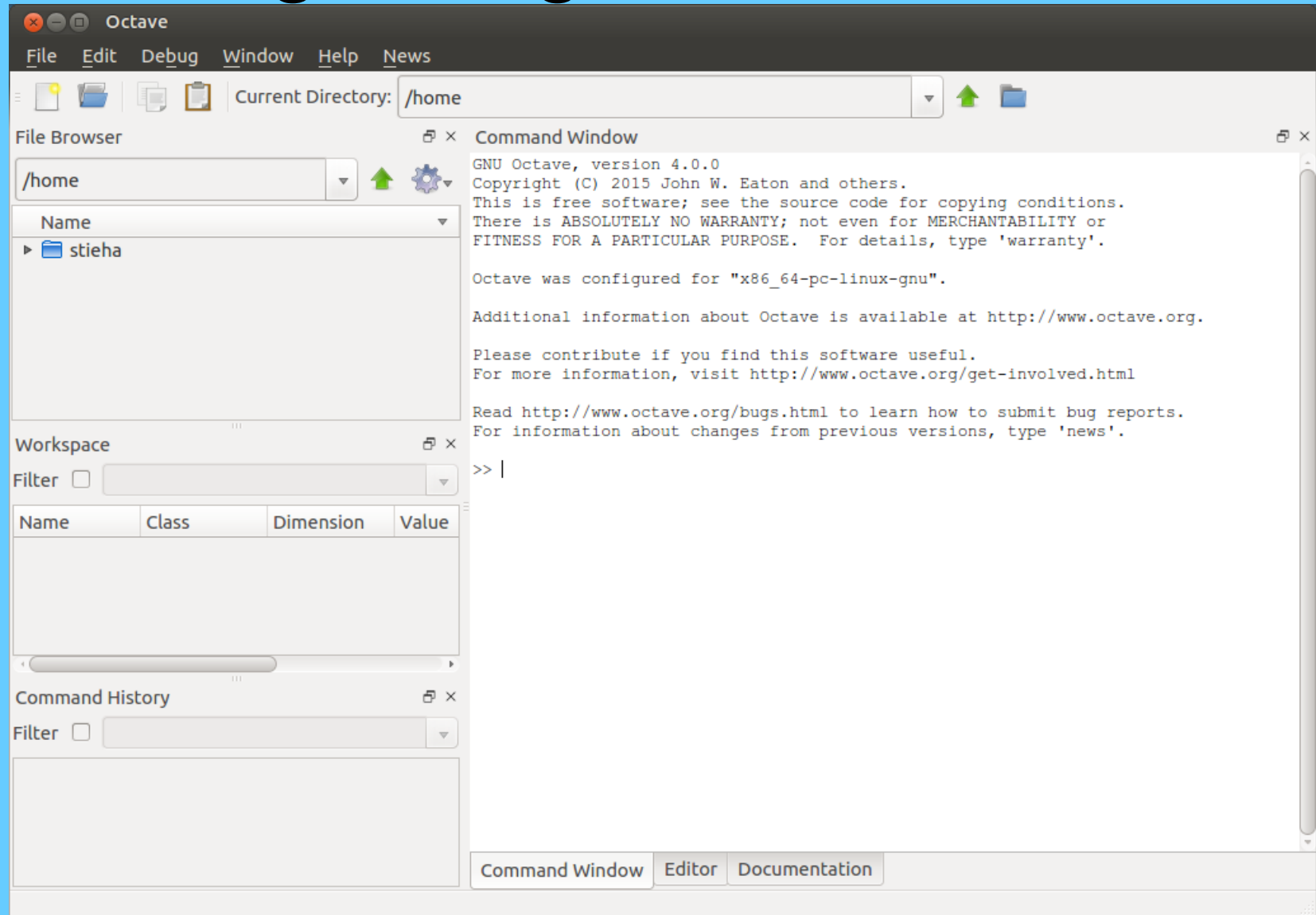
R: cran.r-project.org

RStudio: www.rstudio.com



Scientific Computing: Programming Octave

www.gnu.org/software/octave/

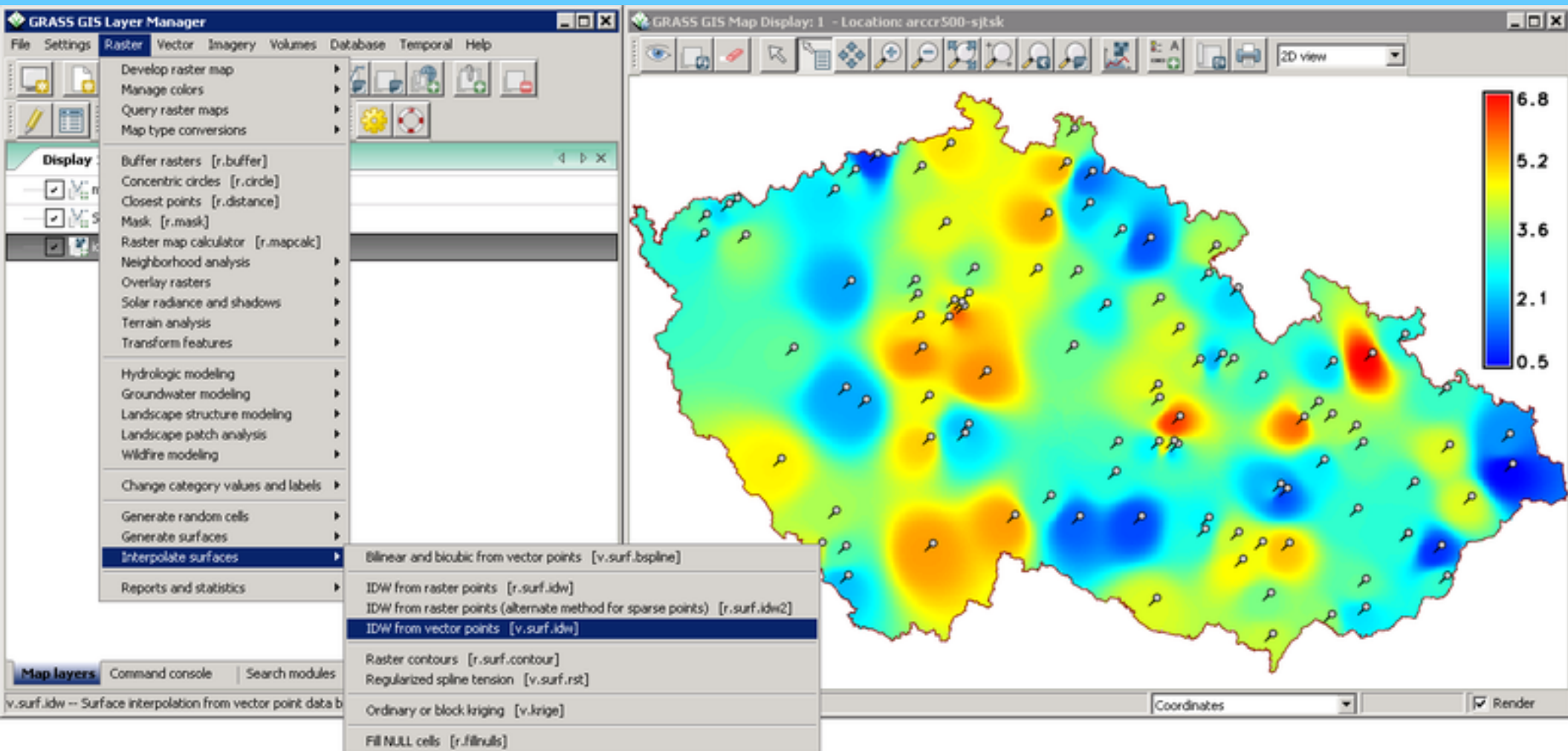


Geographical Information Systems

Grass GIS: grass.osgeo.org

DIVA-GIS: diva-gis.org

QGIS: qgis.org



FLOSS in my classroom

Image Manipulation: Rasters

GIMP: GNU Image Manipulation Program

Modifying images for lectures

Adding information to images: markers and contrast

Image Manipulations: Vectors

Inkscape

Image and diagram development

Handout development

Running Statistical Analyses and Making Figures

R Statistical Software and LibreOffice

Class Activities and Publications

Programming Population Models

R Statistical Software

A Field Guide to Programming

Image Manipulation: Rasters in GIMP

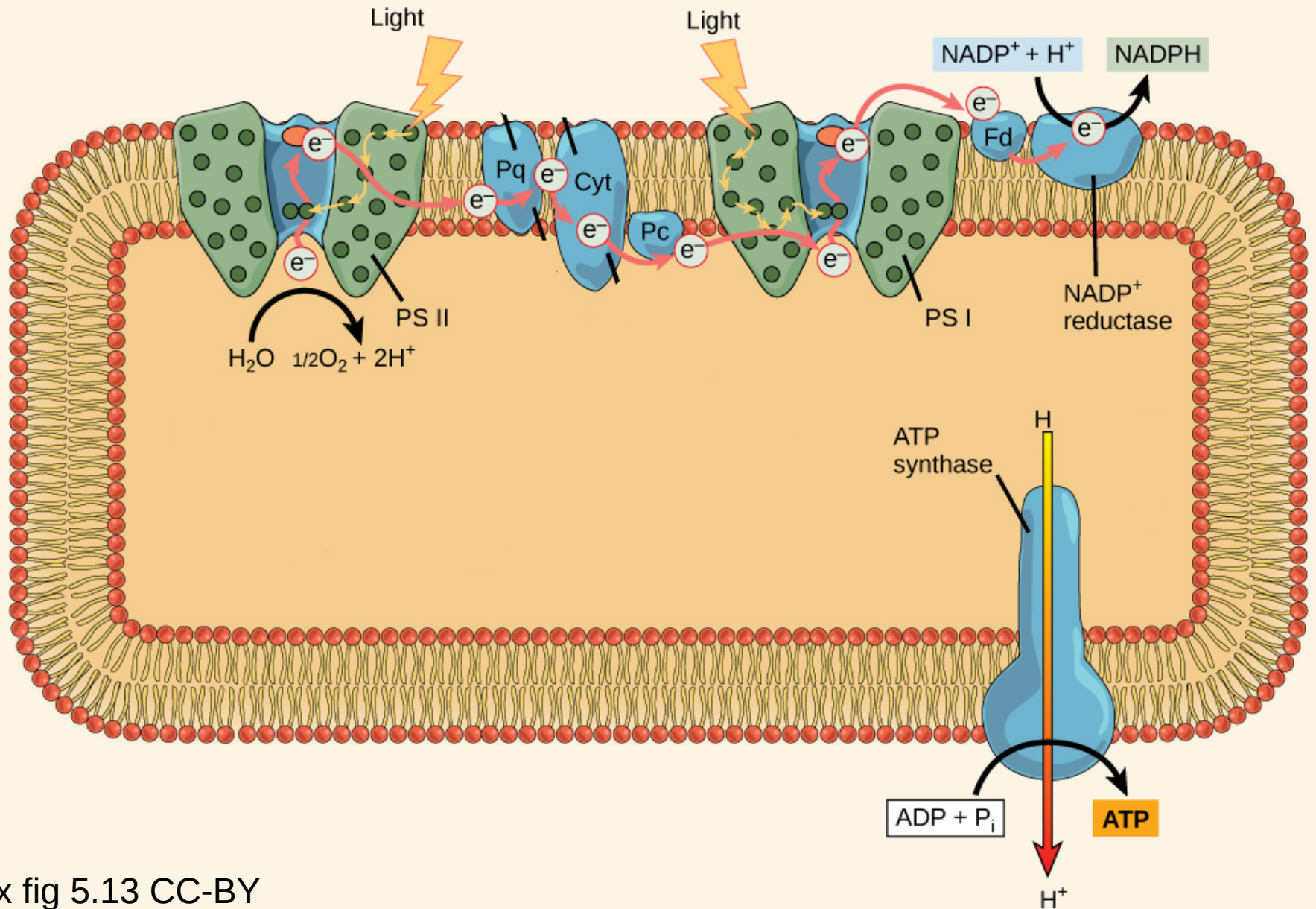


Image Manipulation: Rasters in GIMP

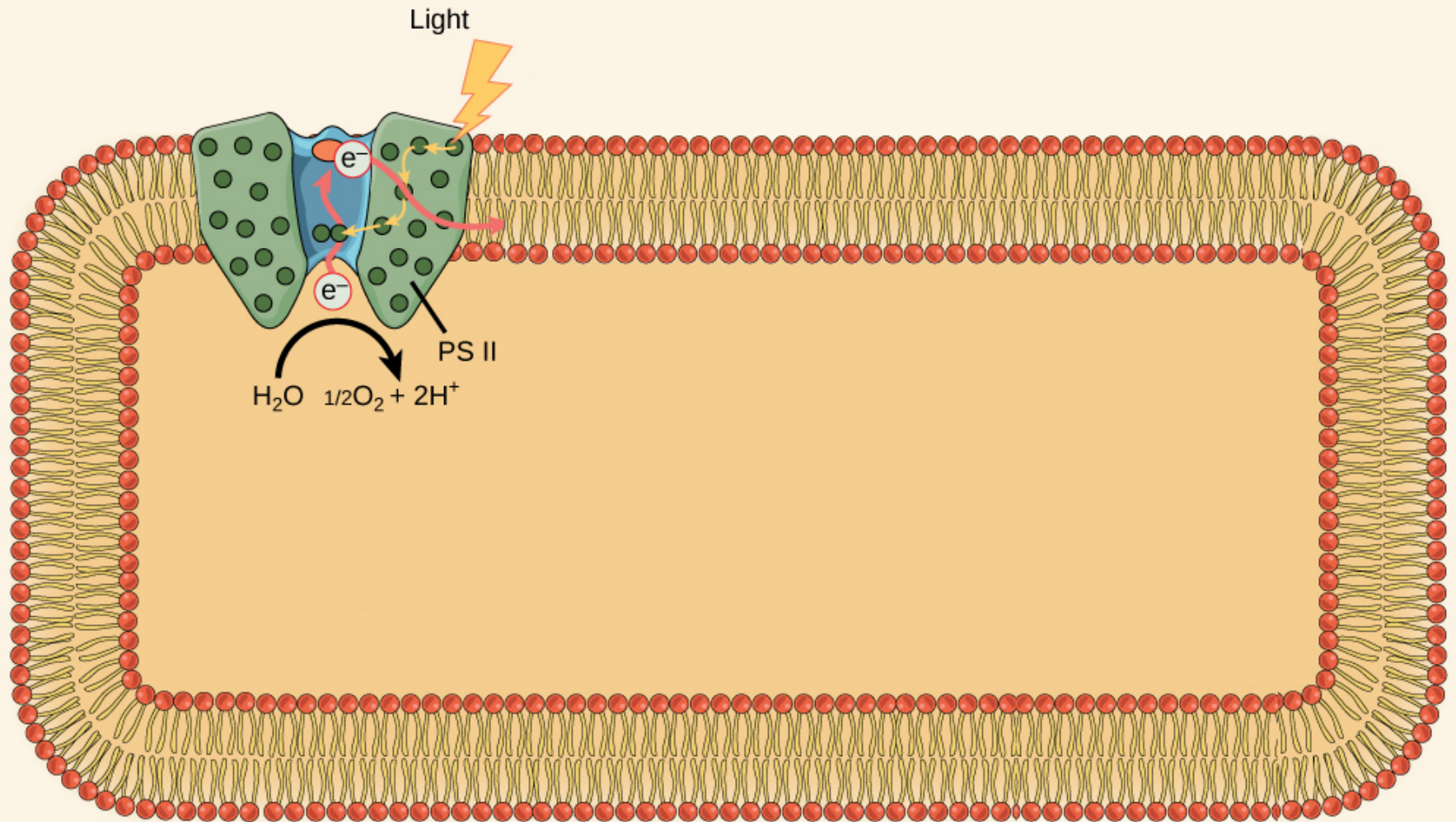


Image Manipulation: Rasters in GIMP

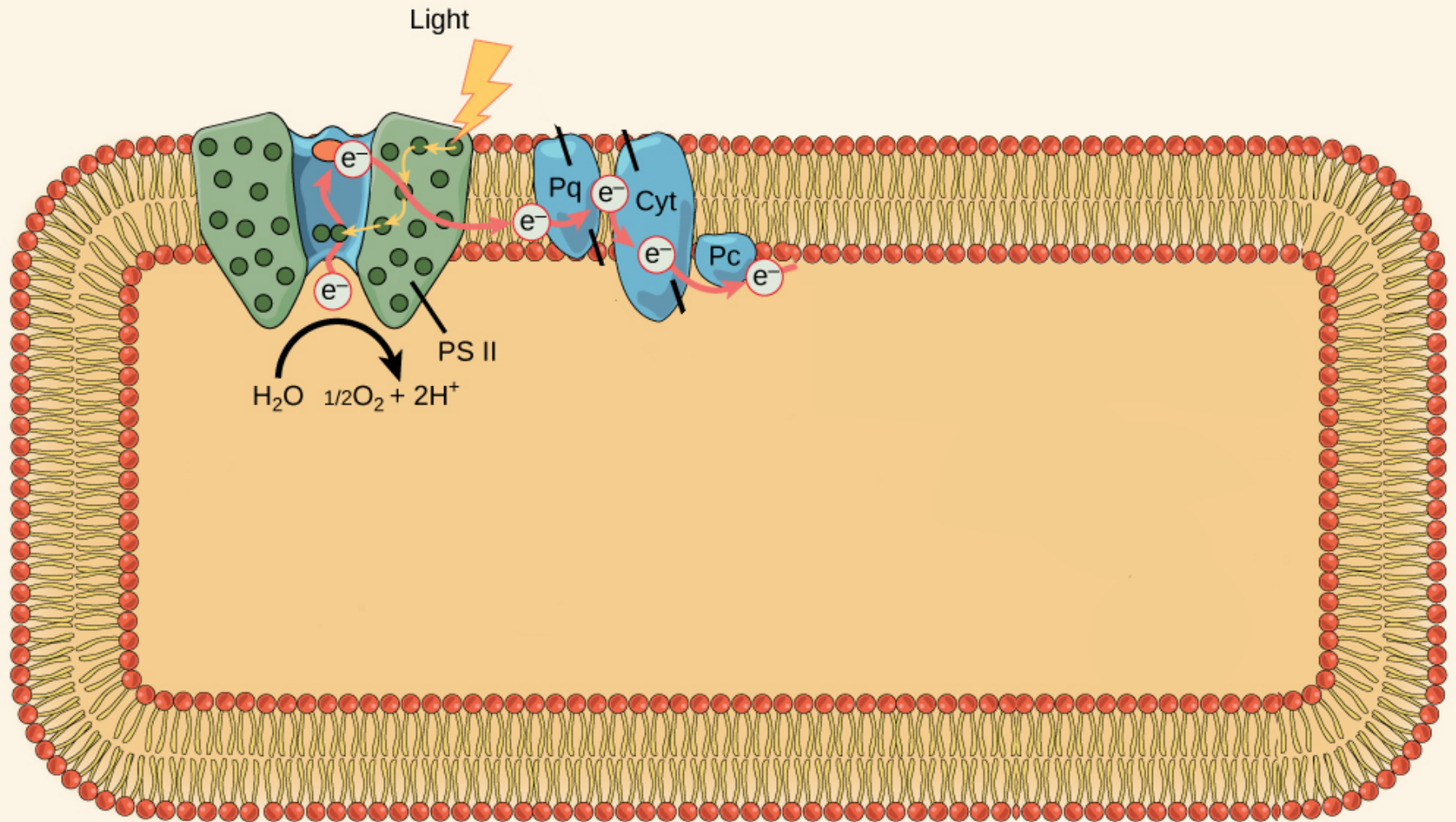


Image Manipulation: Rasters in GIMP

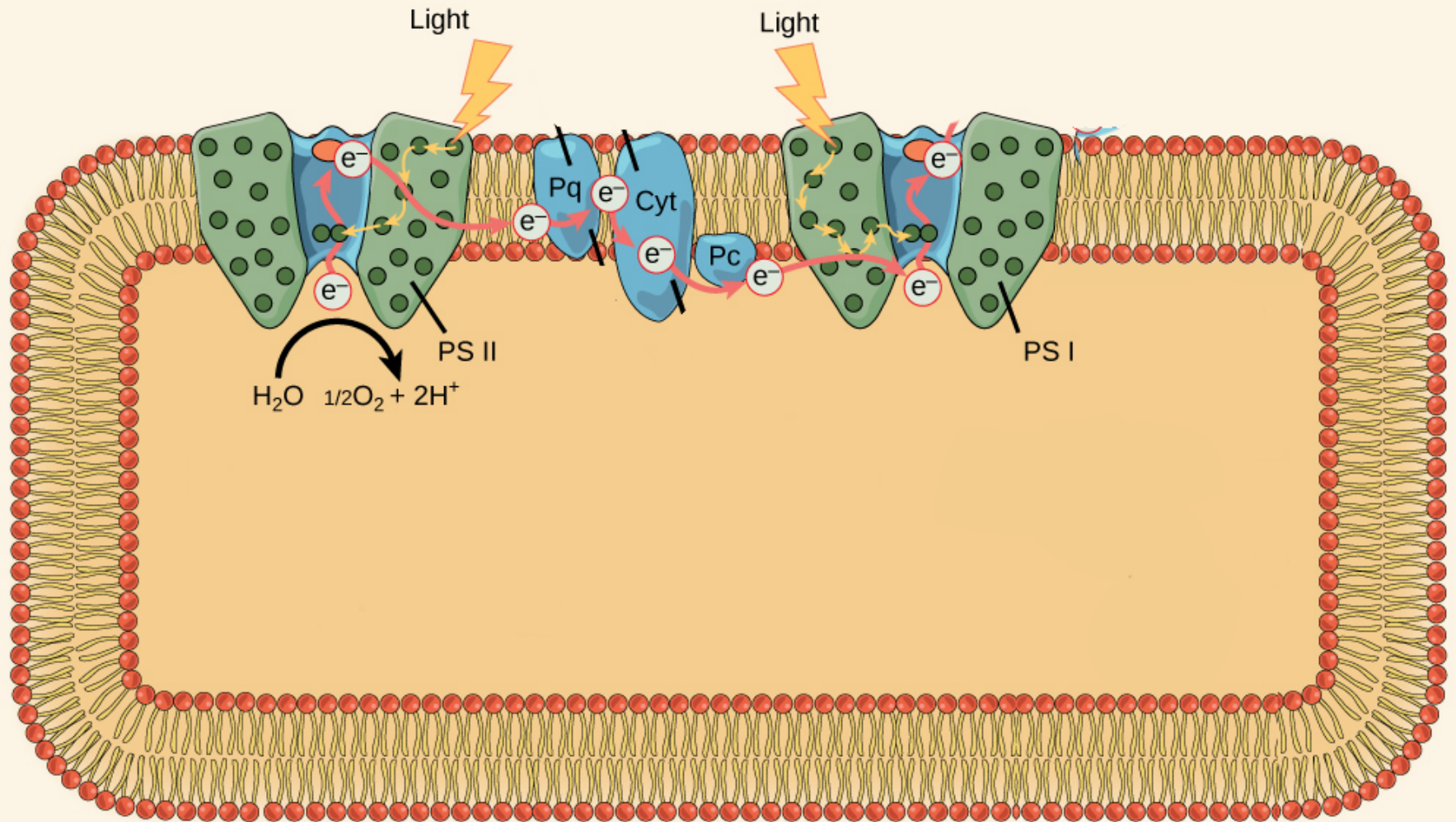


Image Manipulation: Rasters in GIMP

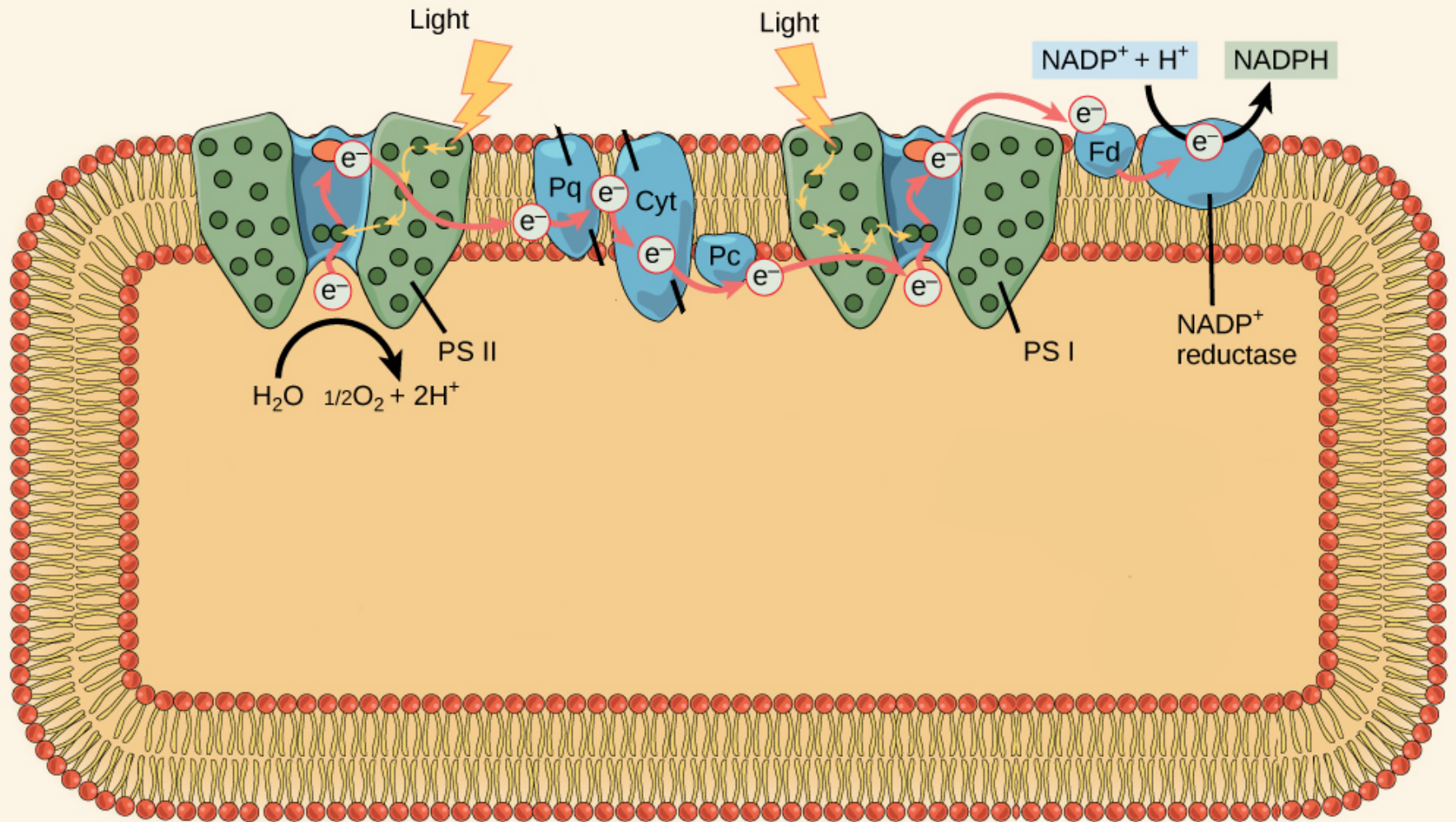


Image Manipulation: Rasters in GIMP

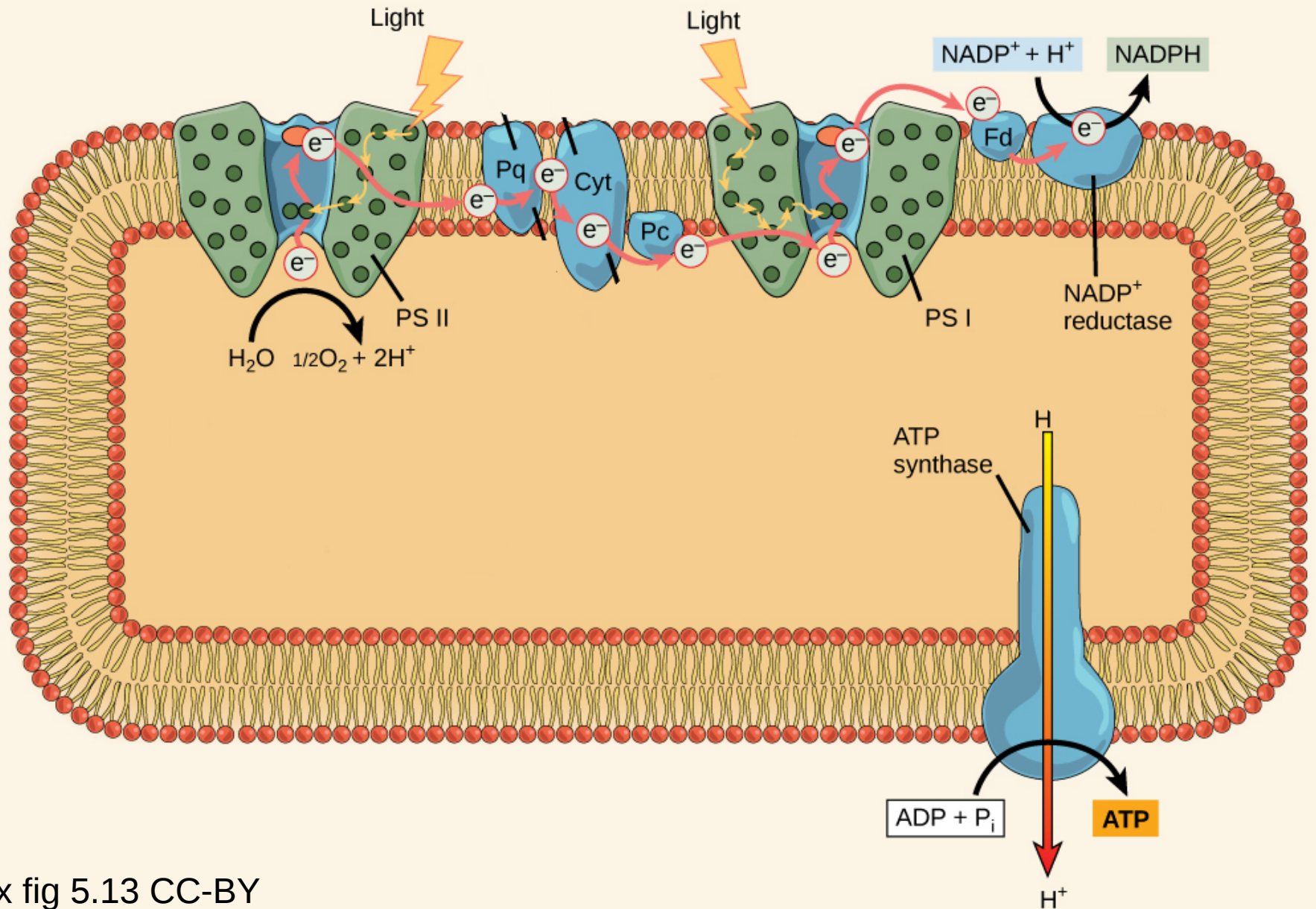


Image Manipulation: Rasters in GIMP

Markers and Contrast

Resource Group,
a series of photos

Before and after
photos of streams
impacted by
construction

We told a story
We commented
on each photo

We did have to change the
contrast and brightness of
some photos

Degradation of a Tropical Stream [resource group]

<http://ecoed.esa.org/index.php?P=AdvancedSearch&Q=Y&FK=%22Degradation+of+a+Tropical+Stream%22&RP=50&SR=0&ST=Quick>

A series of photographs showing the widening of a road that then caused an increase in the sediment load in the streams below the road. Tropical rainforest, an example of a stream with increased sediment load, and before and after photographs of pools along the stream (with still had an increased sediment load).

Primary or BEN resource type:

Teaching strategies & guidelines

Format:

jpeg

Resource Group:

Degradation of a Tropical Stream

Discipline Specific Core Concepts:

Ecological Core Concepts -- Human impacts
Ecological Core Concepts -- Ecosystems

Audience:

Grades 6 - 8
Grades 9 - 12
Undergraduate lower division 13-14
Undergraduate upper division 15-16

Pedagogical Use Description:

The photos can be used to show the effects of increased sediment load on a stream of bedrock to soil to tropical rainforest.

Keywords:

Tropical rainforest, Tropical streams, Human Impact

Life science discipline (subject):

Ecology

Primary Author Controlled Name:

Christopher Stieha

<https://ecoed.esa.org/index.php?P=FullRecord&ID=492>

Image Manipulation: Rasters in GIMP

Markers and Contrast

Resource Group,
a series of photos

Before and after
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some photos



2005

2007

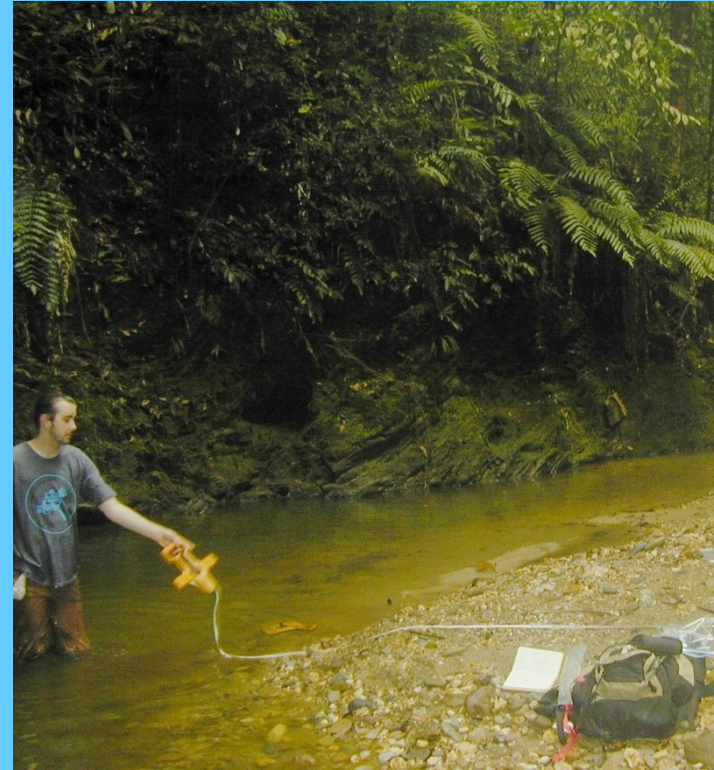


Image Manipulation: Rasters in GIMP

Markers and **Contrast**



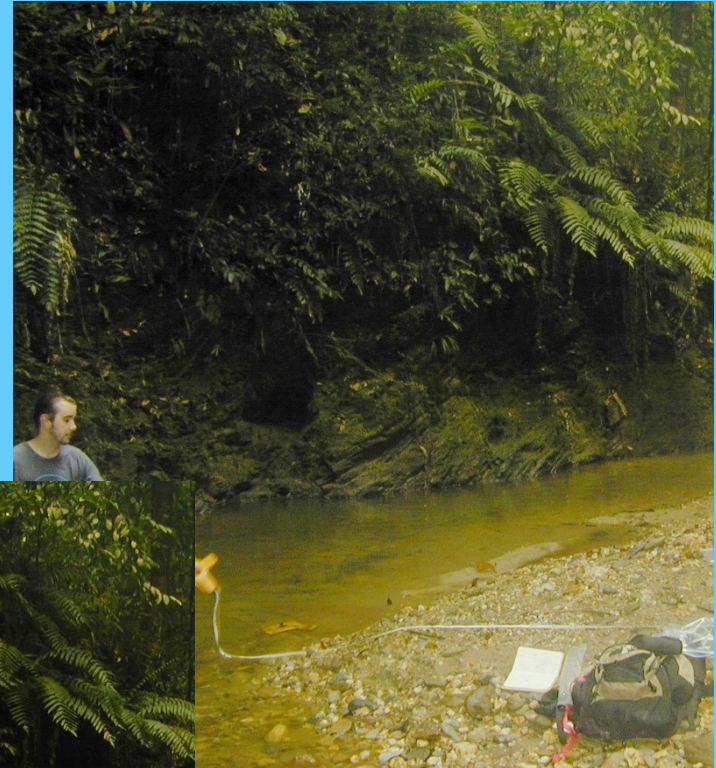
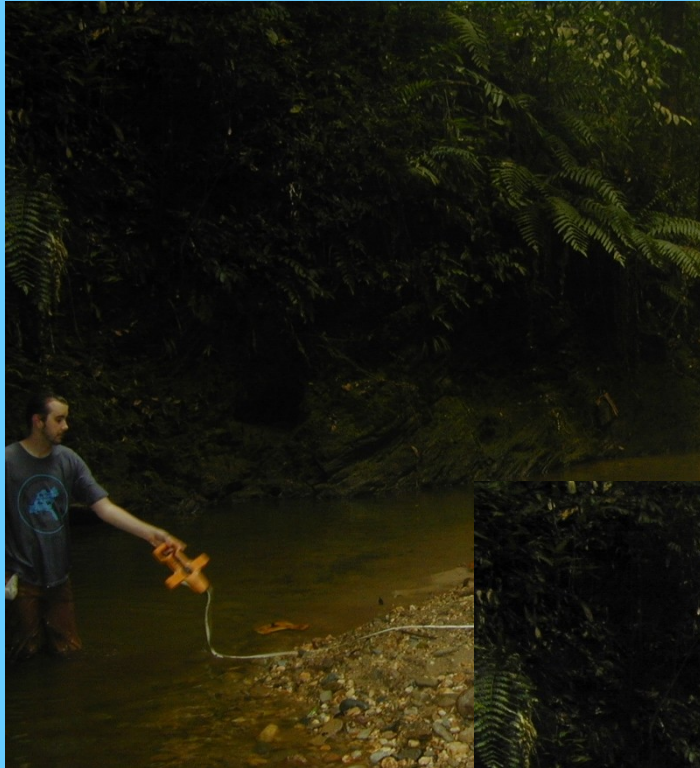
Original
Focus on the foreground



Focus on the background





































Image Manipulation: Rasters in GIMP

Markers and **Contrast**

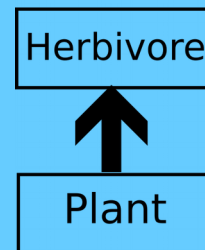


Vector Images in Inkscape

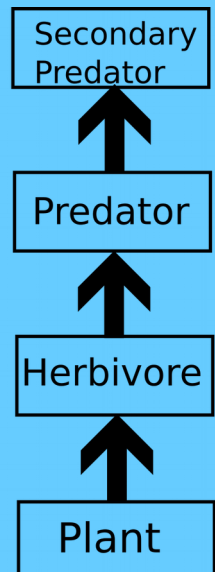
Image and Diagram Development

Control	Sample at crime	Suspect A	Suspect B	Suspect C	Suspect D
					
					
					
					
					
					
					
					

Introductory Biology for Non-majors



Population and Community Ecology



Vector Images in Inkscape Image and Diagram Development

OHIO STATE UNIVERSITY EXTENSION

Tick ID

Tick Identification and Disease Information:

Ticks are blood-feeding parasites that may infect people and pets with diseases. Preventing tick bites is the best protection from tickborne disease. The risk of infection is much higher if tick is attached for more than one day.

For more information: u.osu.edu/bite

Unless indicated, photos courtesy of TickEncounter Resource Center

Black-Legged 'Deer' Tick

Can transmit Lyme Disease (most often by the nymph), Anaplasmosis, Babesiosis

Actual Size

Adult
2-3 mm unfed
Nymph
1.5 mm unfed



How to remove a tick

1. Apply rubbing alcohol to bite area.
2. Using POINTY TWEEZERS, grab the tick as close to the skin as possible.
3. Pull straight upward with steady, even pressure.
4. Apply more rubbing alcohol.
5. Store tick



Statistics and Biometry in R

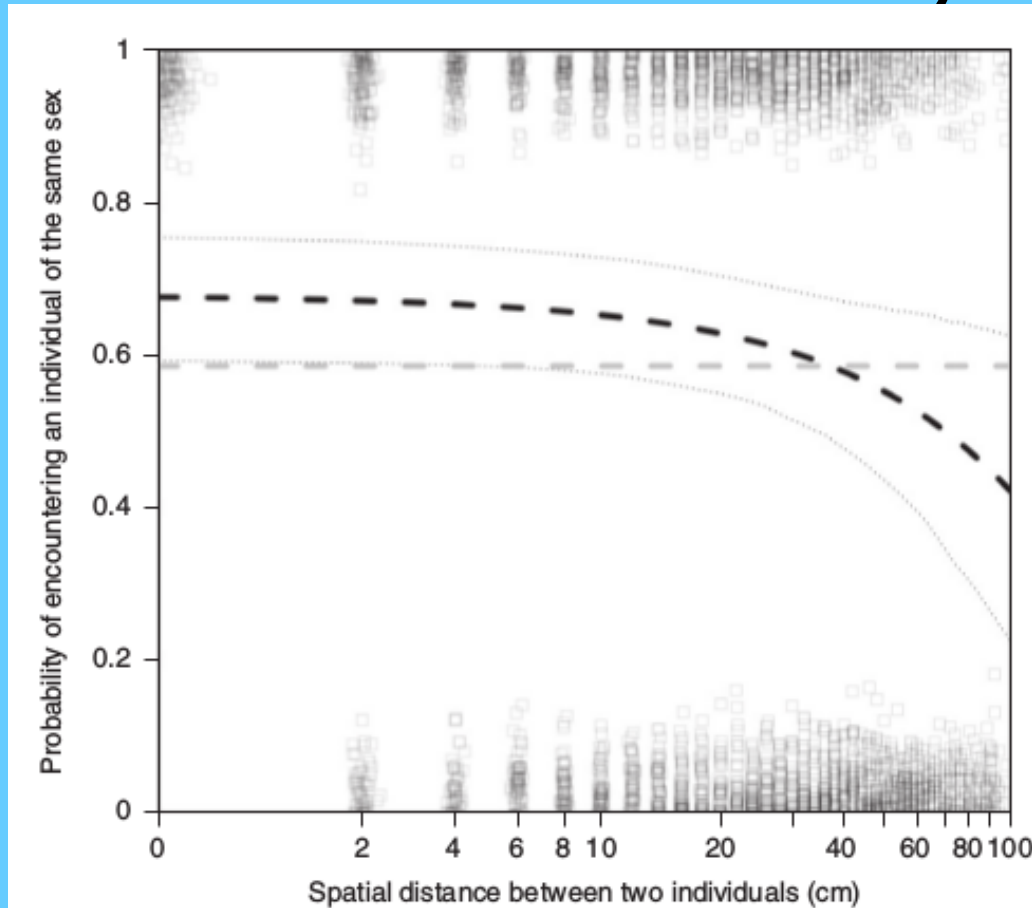


TABLE 3. *Statistical tests for both the comparison between the sexes and the comparison among genotypes*

	Term	Base model	Δ deviance	d.f.	<i>P</i>
Comparison between the sexes	Distance \times sex \times size	Distance + sex + size + distance \times sex + distance \times size + sex \times size	1.0756	1	0.2997
	Sex \times size	Distance + sex + size + distance \times sex + distance \times size	0.2151	1	0.6428
	Distance \times sex	Distance + sex + size + distance \times size	1.0556	1	0.3042
	Distance \times size	Distance + sex + size	1.6034	1	0.2054
	Size	Distance + sex	7.4035	1	0.00651
	Ssex	Distance + size	7.4035	1	0.00651
	Distance	Sex + size	7.4035	1	0.00651

Statistics and Biometry in R

Biometry: 6-sided dice experiment

six-sided dice.ods - LibreOffice Calc

File Edit View Insert Format Sheet Data Tools Window Help

LibreOffice Calc toolbar icons

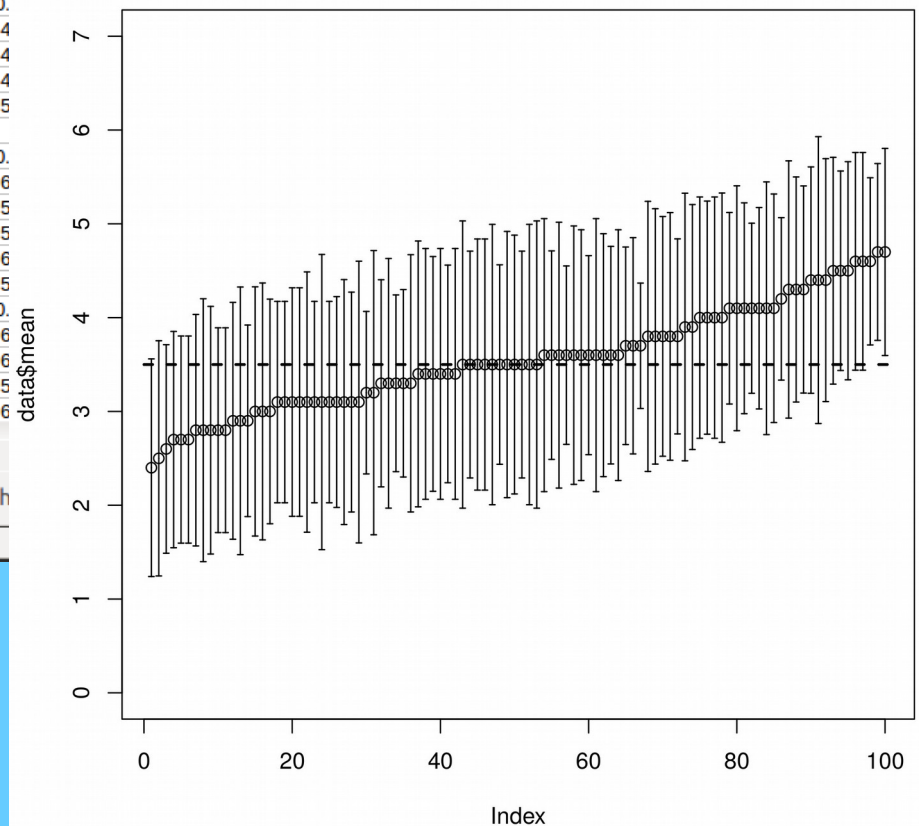
Formula bar: B92 = 4

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
1	sample	roll1	roll2	roll3	roll4	roll5	roll6	roll7	roll8	roll9	roll10	mean	stddev	stderror	lower95CI	upper95CI
2	1	4	6	2	1	1	5	1	6	6	3	3.5	2.173067468	0.687184271	1.968953444	5.031046556
3	2	4	6	2	1	5	1	3	2	6	6	3.6	2.065591118	0.653197265	2.144676494	5.055323506
4	3	3	2	4	4	1	5	1	5	3	5	3.3	1.567021236	0.495535625	2.195946628	4.404053372
5	4	5	3	4	5	3	2	4	2	2	2	3.2	1.229272594	0.387683537	2.500000000	3.899999999
6	5	2	4	5	4	6	4	1	6	1	1	3.4	2.011080417	0.603045175	2.195946628	4.804053372
7	6	6	2	4	1	2	1	1	3	3	1	2.4	1.646545205	0.520725625	1.354053372	3.445946628
8	7	2	2	4	3	6	1	1	1	5	4	2.9	1.791957341	0.550725625	1.895946628	4.004053372
9	8	1	1	2	3	3	2	2	5	6	2	2.7	1.636391694	0.500725625	1.695946628	3.804053372
10	9	2	4	3	5	6	3	1	4	5	4	3.7	1.494434118	0.470725625	2.795946628	4.694053372
11	10	3	6	3	2	6	4	3	1	4	4	3.6	1.577621275	0.490725625	2.695946628	4.594053372
12	11	6	3	1	5	5	3	4	5	4	5	4.1	1.449137675	0.450725625	3.195946628	5.194053372
13	12	1	3	2	6	6	2	2	2	2	2	2.8	1.751190072	0.510725625	1.495946628	3.894053372
14	13	2	3	2	6	3	1	6	3	6	2	3.4	1.897366596	0.570725625	2.195946628	4.404053372
15	14	2	4	4	5	1	4	5	2	3	1	3.1	1.523883927	0.480725625	2.195946628	4.104053372
16	15	5	2	3	1	6	6	1	3	6	3	3.6	2.011080417	0.603045175	2.195946628	4.804053372
17	16	3	5	3	6	2	6	1	6	3	5	4	1.825741858	0.520725625	1.354053372	3.445946628
18	17	6	2	2	4	1	5	2	3	5	5	3.5	1.715938357	0.530725625	2.095946628	4.394053372
19	18	3	5	3	1	1	6	6	5	2	3	3.5	1.900292375	0.560725625	2.195946628	4.404053372
20	19	3	2	6	4	5	1	6	2	2	3	3.4	1.776388346	0.510725625	2.195946628	4.404053372
21	20	1	4	2	6	3	3	3	2	2	5	3.1	1.523883927	0.480725625	2.195946628	4.104053372
22	21	1	1	1	4	4	5	5	5	6	6	3.8	2.043961296	0.610725625	2.195946628	4.804053372
23	22	1	1	1	1	2	3	4	4	6	6	2.9	2.024845673	0.600725625	2.195946628	4.804053372
24	23	1	1	1	3	3	3	4	4	5	6	3.1	1.728840331	0.530725625	2.195946628	4.404053372
25	24	1	1	1	1	2	3	3	4	6	6	2.8	1.988857852	0.590725625	2.195946628	4.404053372

Sheet1

Find

Sheet 1 of 1



Programming Population Dynamics in R

Field Guide to Programming

Upper-level undergraduate lecture and lab course

Introduction to
the Field Guide

Field Guide to
Programming
MATLAB
R
Word Document
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Code
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A Field Guide to Programming: A Tutorial
for Learning Programming and Population
Models

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Population models; Ecology; Discrete time model; Introduction to
programming

Abstract
Programming skills and concepts are best taught within an applied framework in the students' discipline. However, many tutorials teach the skills and concepts, but alienate the applications and usefulness. We have produced a Field Guide to Programming, a tutorial that uses the discrete time population growth model as a concrete example to introduce and explain programming concepts. We equate our Field Guide to the beginning chapters of any naturalist's field guide, where the use of the guide is explained. This Field Guide covers a range of topics from simple mathematical expressions and assigning variables to functions and solvers for ordinary differential equations. We wrote and have used this Field Guide individually for self learners, as introductory and supplementary material for courses, as the outline for workshops, and a guide for multiple hands-on recitations within a course. After working through this Field Guide either alone or in a workshop

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Programming Population Dynamics in R

```
r = 2;
n0 = 20; # initial population size
n1 = n0 * r; # population size at t = 1
n2 = n1 * r; # population size at t = 2
n3 = n2 * r; # population size at t = 3
n4 = n3 * r; # population size at t = 4
n5 = n4 * r; # population size at t = 5
```

Programming Population Dynamics in R

```
r = 2;
n0 = 20; # ini
n1 = n0 * r; # po
n2 = n1 * r; # po
n3 = n2 * r; # po
n4 = n3 * r; # po
n5 = n4 * r; # po

#####
# Section 2: Time Series Analysis
#####

# these lines of code take the parameter values at the top of the script file
# and stick them in to our equations so that we can use them
parms.eqn.x <- Model2String(var.eqn.x, parms = model.parms, supress.print = TRUE)
parms.eqn.y <- Model2String(var.eqn.y, parms = model.parms, supress.print = TRUE)

model.state <- c(x = 1, y = 2) # initial condition
model.sigma <- 0.05 # the level of noise
model.time <- 1000 #12500 # the length of the simulation
model.deltat <- 0.025 # the time step

ts.ex1 <- TSTraj(y0 = model.state, time = model.time,
  deltat = model.deltat, x.rhs = var.eqn.x, y.rhs = var.eqn.y,
  parms = model.parms, sigma = model.sigma)

TSPlot(ts.ex1, deltat = model.deltat)

#We can view the times series plotted along on the state variables by setting dim = 2:
TSPlot(ts.ex1, deltat = model.deltat, dim = 2)

TSDensity(ts.ex1, dim = 2)

# with stochasticity

model.state <- c(x = 1, y = 2) # initial condition
model.sigma <- 0.05 # the level of noise
model.time <- 1000 #12500 # the length of the simulation
model.deltat <- 0.025 # the time step

ts.ex1 <- TSTraj(y0 = model.state, time = model.time,
  deltat = model.deltat, x.rhs = var.eqn.x, y.rhs = var.eqn.y,
  parms = model.parms, sigma = model.sigma)

TSPlot(ts.ex1, deltat = model.deltat)
```


FLOSS in Charlie's classroom

@charlie3 #MvilleOpensUp @pennmanor



www.pennmanor.net



<https://www.millersville.edu/cae/open-education-week/index.php>

FLOSS, OER, and me

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