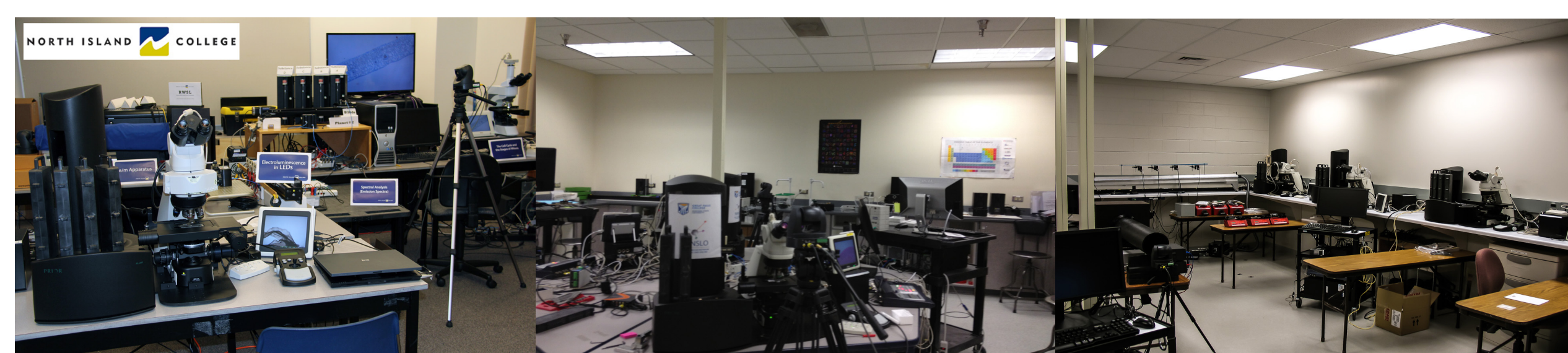


ABSTRACT:

The North American Network of Science Labs Online (NANSLO) is an open source (Creative Commons By License) project that seeks to develop a network of Remote Web-based Science Labs (RWSL) that offers access to high end laboratory equipment for critical gatekeeper courses in Biology, Chemistry, and Physics, to students that normally don't have access because of location, family, and/or work commitments. The NANSLO network currently consists of three labs: the original lab at North Island College, Courtenay, British Columbia, Canada; the second lab at the Colorado Community College System in Denver, Colorado, USA; and the third lab at Montana State University: Great Falls College in Great Falls, Montana, USA. This poster will present data examining the first couple years of Biology labs presented out of the Denver RWSL.



Courtenay, British Columbia, Canada

Great Falls, Montana, USA

Denver, Colorado, USA

HISTORY:

The Denver RWSL was built using funds from a Next Generation Learning Challenges Grant (NGLC). The purpose of this grant was to determine the mobility and reproducibility of the RWSL in Canada. Over the 18 months of this grant an RWSL was built in Denver and 6 labs (2 each in Biology, Chemistry and Physics) were deployed. The results of the project were encouraging and have allowed us to move on to a Trade Adjustment Assistance Community College and Career Training (TAACCCT) grant from the department of labor. This new grant has allowed us to develop new lab procedures, upgrade some of our equipment, and construct a third lab in Great Falls, Montana.



For Additional Information Visit the NANSLO Website

THE NANSLO IDEA:

The NANSLO project seeks to provide students with real time remote control of high quality scientific instrumentation. When designing labs we focus on giving the students control of all the functions of the piece of equipment as they would have if they were physically in front of the equipment. With the microscope below the students can change the objectives, move the stage, focus the stage, load a slide, adjust the light, and capture an image.



Student at Laptop



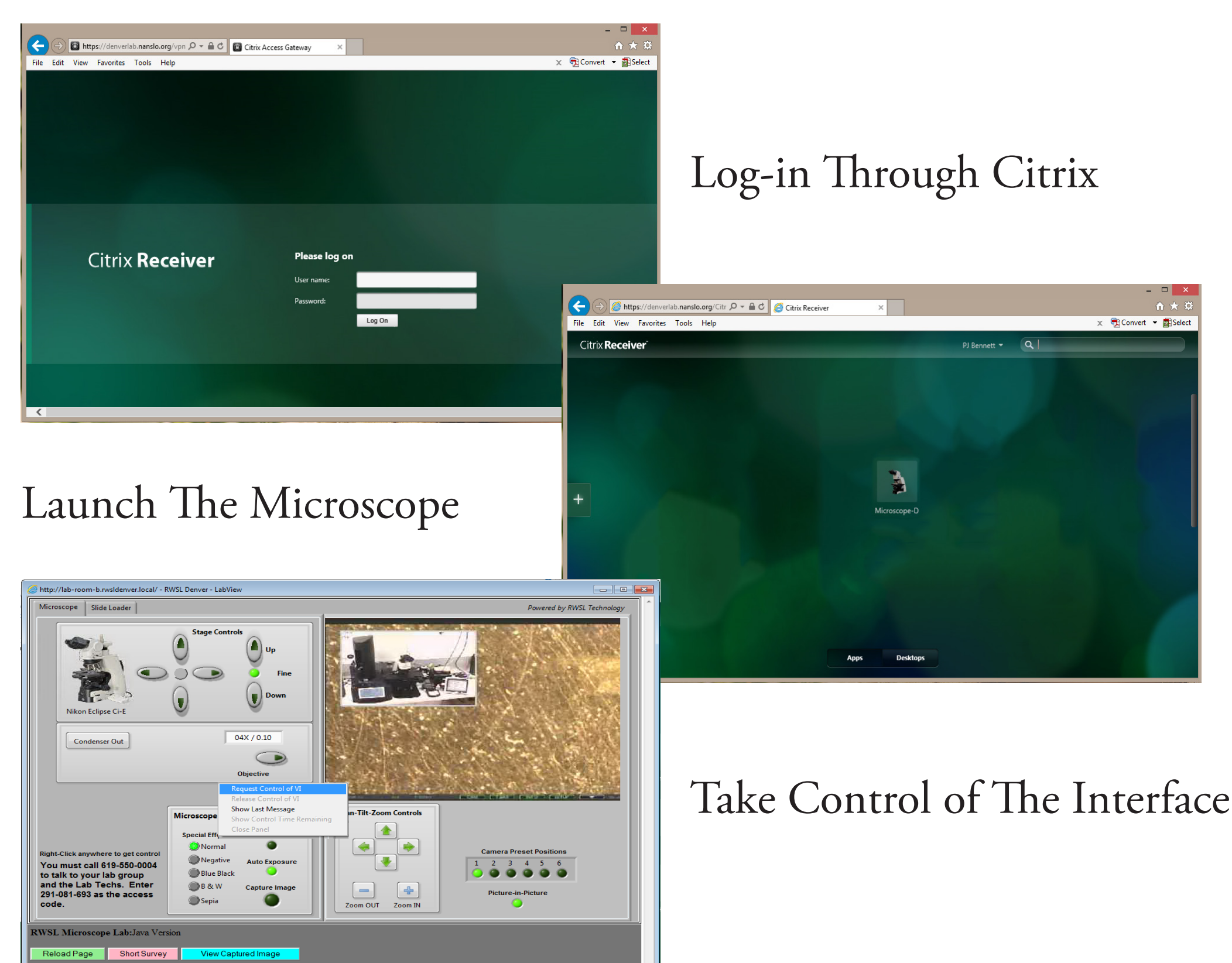
Microscope in Lab

The NANSLO lab in Denver, Colorado has served more than 1000 students.

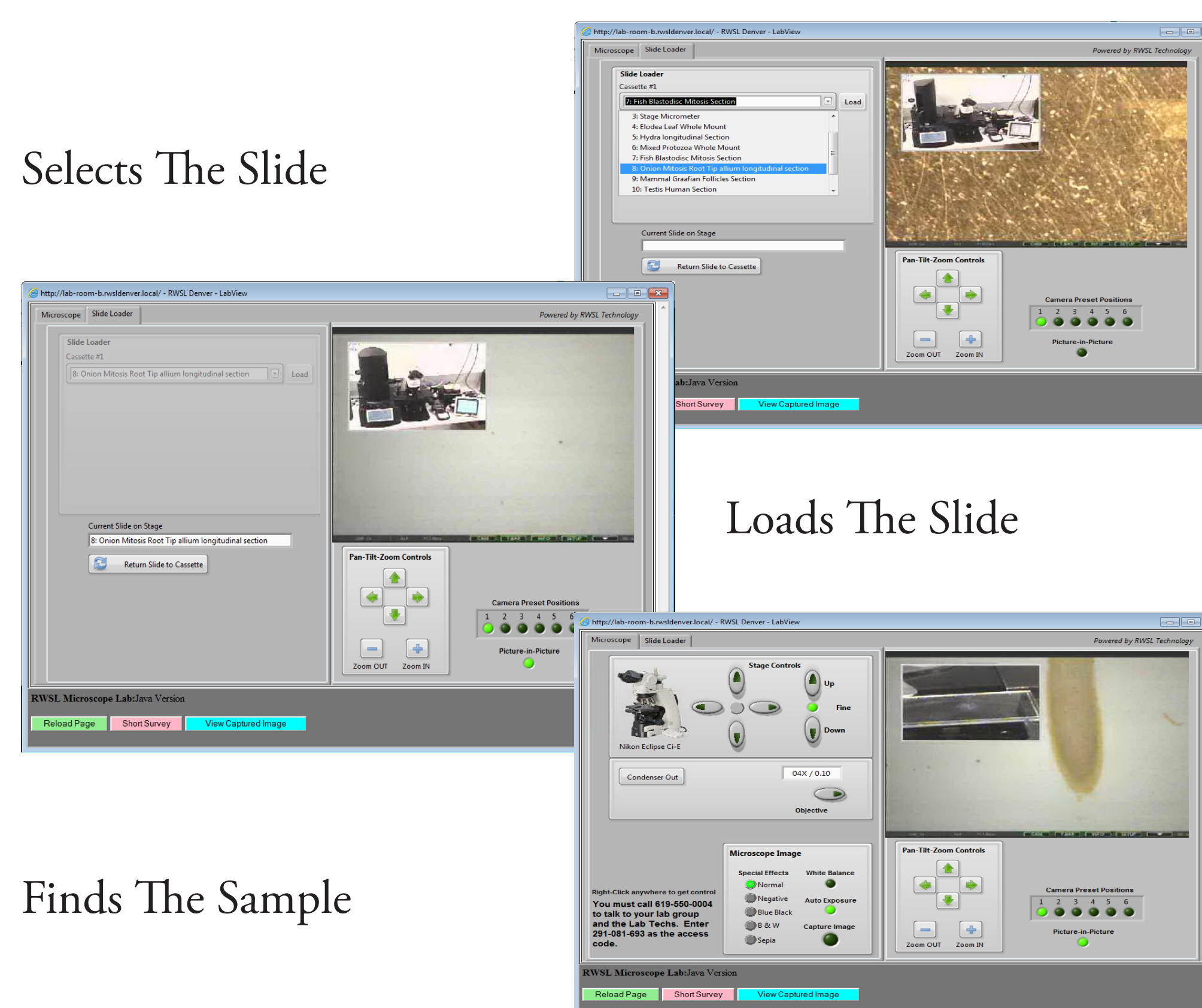
| | Summer 2012 | Fall 2012 | Spring 2013 | Summer 2013 | Fall 2014 | Spring 2014 | Total |
|------------------|-------------|-----------|-------------|-------------|-----------|-------------|-------|
| Biology | 53 | 99 | 144 | NA | NA | 289 | 584 |
| Chemistry | 55 | 23 | 54 | NA | NA | 87 | 219 |
| Physics | 32 | 54 | 31 | NA | NA | 182 | 299 |

The NANSLO lab was off line during the Summer 2013 and Fall 2014 semesters for a relocation and access infrastructure upgrade.

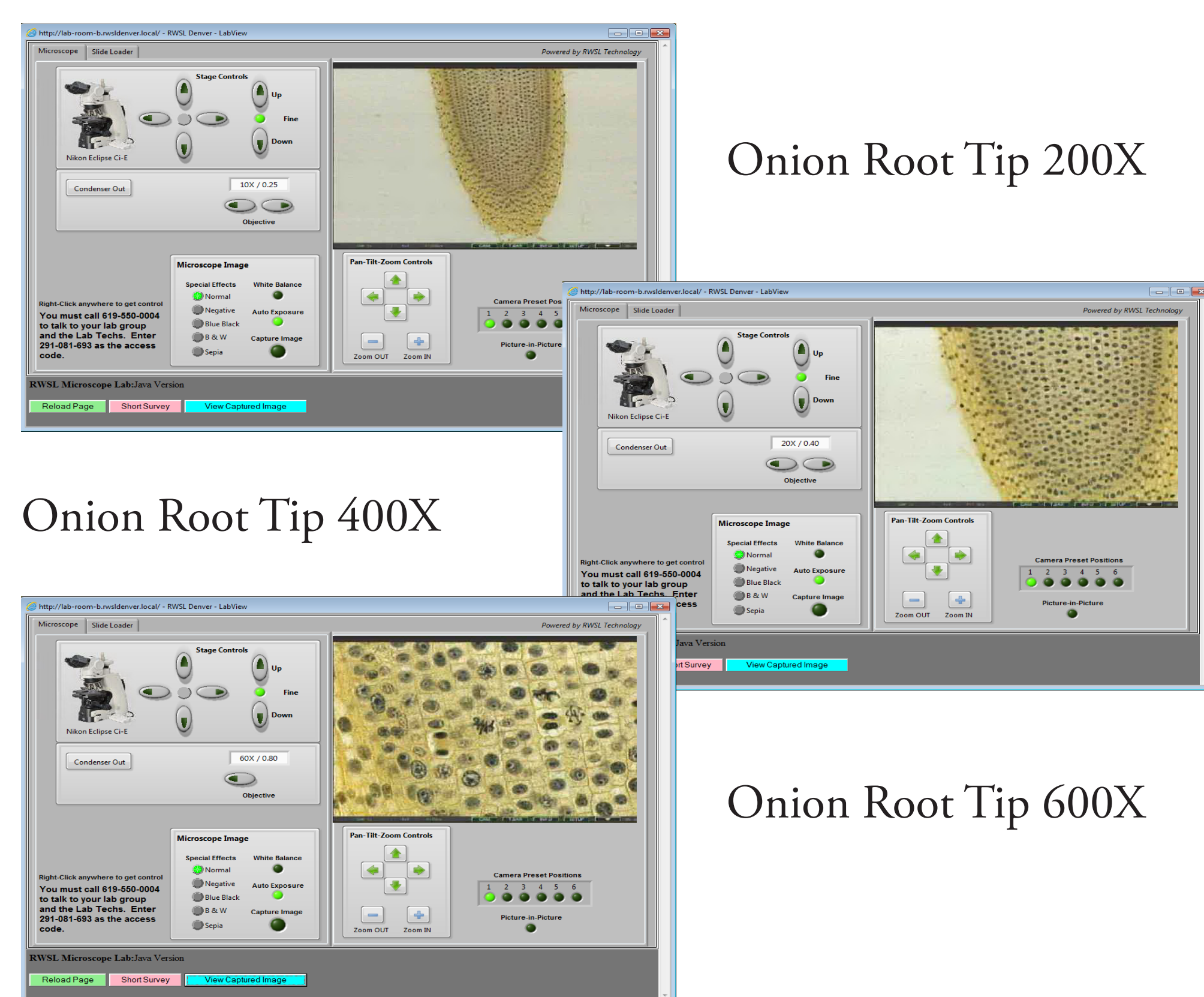
Using The NANSLO Microscope



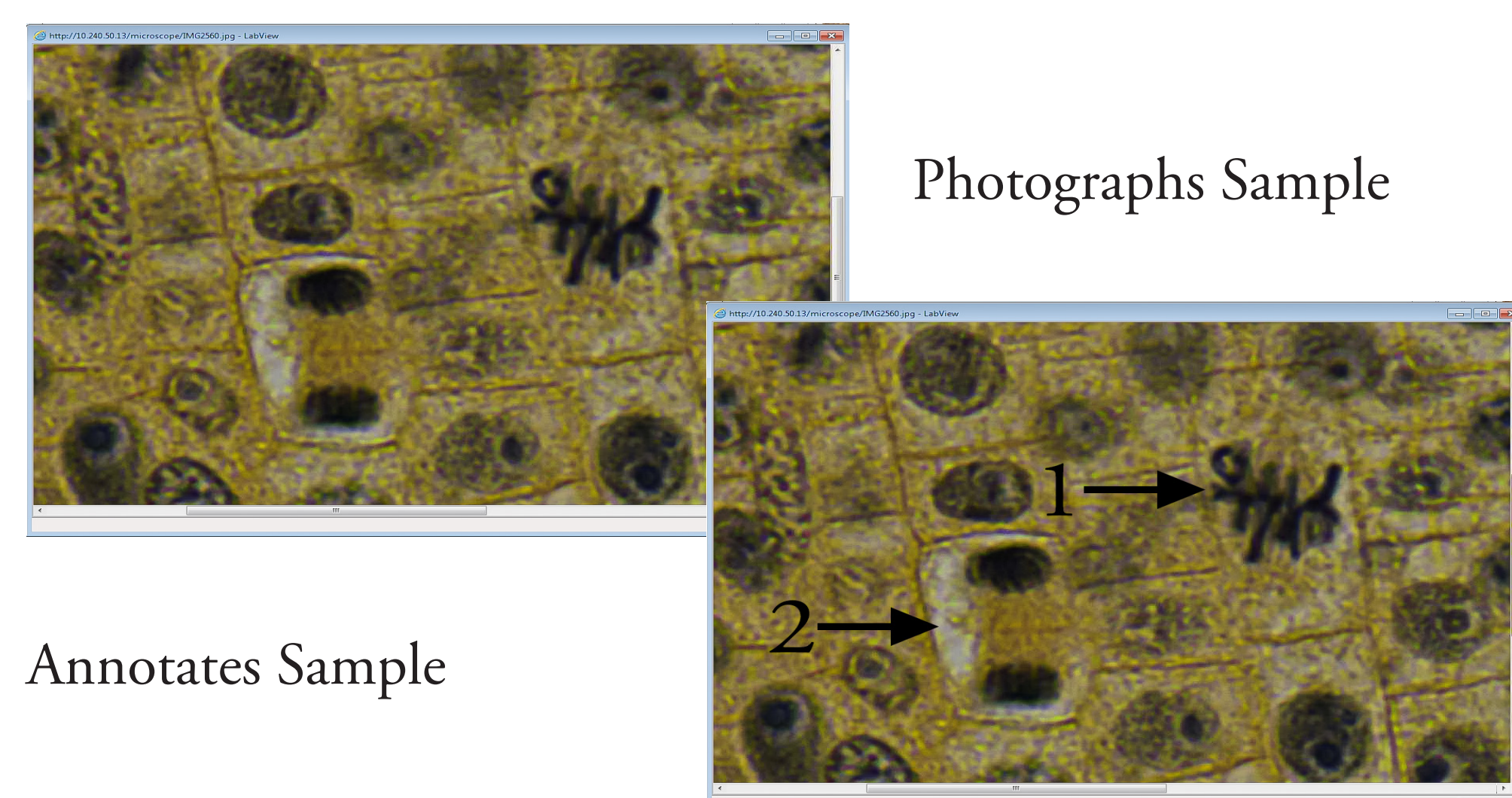
Loading a Slide



Examines The Sample



Collect and Analyze Data



Laboratory Procedures Development:

1. Faculty on Discipline Panels are solicited for ideas about labs they would like to use.
2. NANSLO lab personnel assess these ideas for feasibility in a remote environment.
3. Feasible labs are sent back out to the faculty for a prioritization review
4. NANSLO Lab personnel begin building the hardware while curriculum experts develop draft procedures
5. Draft procedures are sent out to Discipline Panels for review and comment.
6. Changes are made to the procedures, and the new lab activity is ready for deployment.
7. Lab procedures are developed to include high degrees of critical thinking, comparative analysis, and inquiry-based activities.

The NANSLO lab currently has 11 Biology labs that utilize the Microscope

1. Introduction to Microscopy
2. Mitosis & Meiosis
3. Diseased Cell
4. Membrane Osmosis
5. Hematology
6. Histology – Epithelial Tissue
7. Histology - Connective Tissue
8. Histology - Neuronal Tissue
9. Histology - Muscle Tissue
10. Cell Types
11. Parasitology

We are designing labs that will utilize:

1. Gas sensors to measure photosynthesis and respiration
2. UV/VIS Spectrophotometers to calculate enzyme kinetics
3. Fluid delivery systems to perform titrations



Download the Mitosis and Meiosis Lab procedure to see an example of a NANSLO laboratory Procedure

Initial Survey Results:

Since the start of the Spring 2014 semester all students have been asked to fill out survey regarding their NANSLO lab experience.

Were there any technical aspects of the lab that were confusing?

- Yes 18%
- No 82%

Representative Student Comments:

- "I had no idea that there were NANSLO videos to watch, so when I first started this lab I felt extremely stressed."
- "It wouldn't let me take control and it kept freezing a few times"
- "If we were told where our max values were located on the screen would have been helpful"

Having laboratory technicians in the lab is important to the students as seen from these unsolicited comments.

Do you have any other feedback on your lab experience? If yes, please enter below.

We received 108 answers to this question

- 81.75% were positive
- 46.43% were about the lab techs
- We did not receive a single negative comment about the lab techs

Representative Student Comments:

- "The lab technicians were really helpful, knowledgeable, and great to work with!"
- "Exceptional customer service."
- "The lab techs were very patient with me, and I appreciated that."
- "The Lab Techs are the bomb"



For More Information Contact PJ Bennett

