The Value of Remote Web-Based Labs (RWSL): Human Biology A100

- ***"New technology is common, new thinking is rare."*** - Sir Peter Blake

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Distance Labs aligning with Quality Matters

1. Learning Objectives

LO

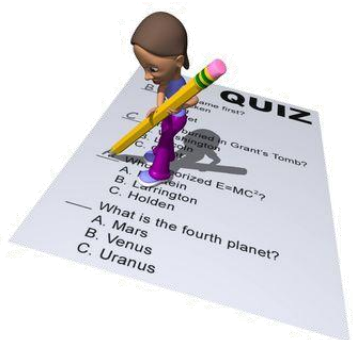
2. Instructional Strategies =

Content/Activities

Content Presentation + Lab Activities

Assessment

3. Assessment



Laboratory _RWSL: Mitosis vs. Meiosis

- Purpose: Compare and contrast meiosis and mitosis using the RWSL laboratory.

Content/Activities

- Use the RWSL lab to be able to manipulate a microscope using your home/school computer. The microscope is located in the NANSLO lab in British Columbia.
- Collect data by "capturing an image" and saving to an individuals' computer. This data collection will be used to analyze and interpret information.
- Laboratory Report.

Assessment

Multi-Modalities

- The lab portion of this experiment uses multiple modalities: tactile, visual, auditory, clinical applications, and critical thinking.
- Emphasis is place on inquiry-based learning.

Learning Objectives

1. Describe the cell cycle
2. Identify the stages of mitosis from prepared slides, this includes: interphase, prophase, metaphase, anaphase, telophase/cytokinesis.
3. Describe the stages of meiosis. Be able to define the differences between haploid and diploid.
4. Display the ability to use a microscope, calculate simple equations, and capture images.

Learning Objectives

5. Complete a lab report using the information from objectives #1-#4. Be able to gather and interpret information to form a concise and objective laboratory report.
6. Label the process of mitosis and meiosis with the captured images and attach them as an Appendix A and Appendix B to the required lab report.

Instructor Preparation

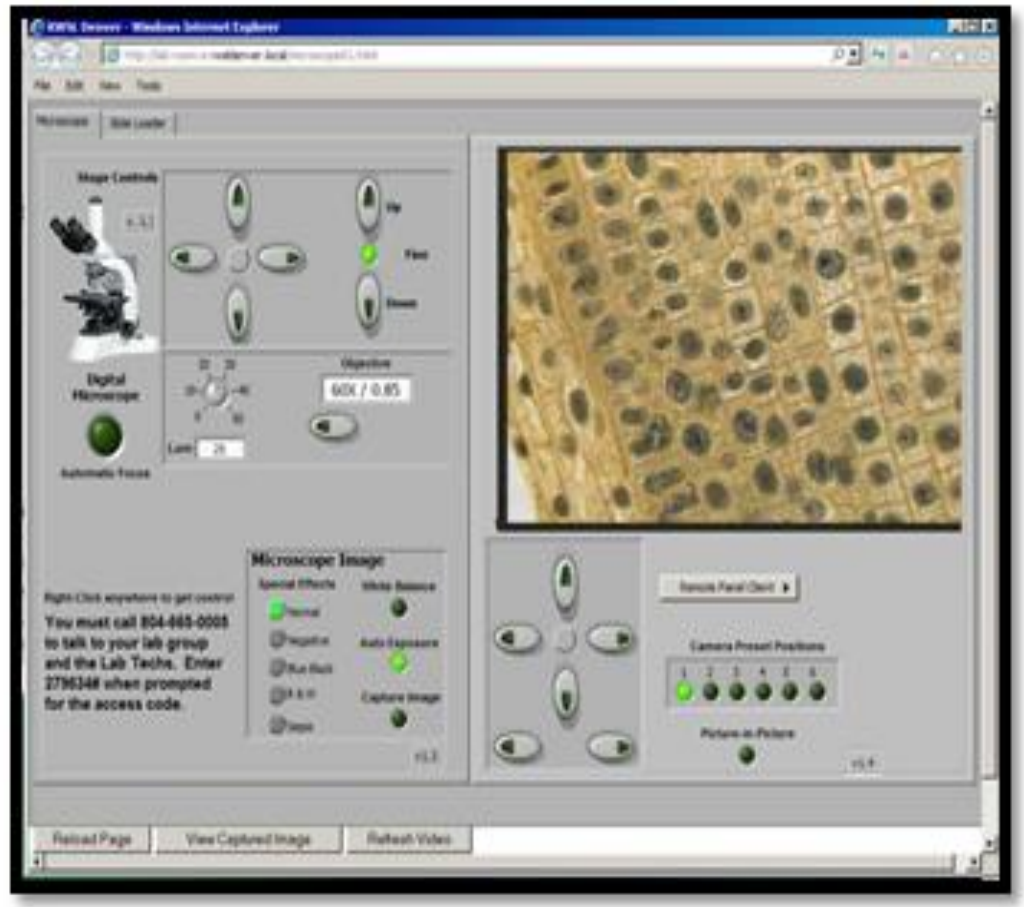
- Testing the RWSL lab, capturing images, and following the instructions for the modified, remote lab.
- Meeting with the Lab Director
- Requesting and accessing materials to assist students.
- Posting preparation material into the Blackboard course.
- Creating a live, synchronous lecture 1 week before lab and a follow-up to discuss questions and expectations for a lab report.
- Scheduling student sessions.
- Preparing a photo gallery.
- Creating a grading rubric.

Video Introduction

1. Short tutorial covering the basics (7 minutes): http://denverlabinfo.nanslo.org/video/microscope.html; OR
2. In-depth tutorial with descriptions of all of the functions of the control panel (21 minutes) - https://www.youtube.com/watch?v=yW_HtlJONoI

Written Instructions

If you are not certain if you have control, right click again. If you see "Remote Panel Client," you have control.



Lab Worksheet

NANSLO REMOTE LAB

SEMESTER: FALL 2013

TYPE OF LAB: REMOTE LAB

TITLE OF LAB: MEIOSIS AND MITOSIS

Lab format: This lab is a remote lab activity.

Relationship to theory: In this lab you will be examining the underlying processes that make up the cell cycle.

LEARNING OBJECTIVES

Picture Gallery

Picture Gallery

Attached Files:

- males testes 1.png (350.841 KB)
- male testes 2.png (479.386 KB)
- male testes 3.png (510.8 KB)
- onion root1.png (280.154 KB)
- Onion root 2.png (525.104 KB)
- Onion root 3.png (382.796 KB)
- Onion root 4.png (556.442 KB)
- ovary.png (415.871 KB)
- whitefish blastula.png (438.197 KB)
- mitosis pictures.jpg (126.213 KB)

Student Preparation

- Review Written Laboratory Report Instructions.
- Attend the live, synchronous, lecture.
- Review the video and written lab procedures.
- Review necessary instructional and reference material.
- Process vs. Perfection.

Clinically Relevant Assessments

- Students are required to use critical thinking skills during assessment. Assessments are in alignment with course instruction, objectives, and materials.
- The ability to collect data, interpret that data, and create an objective lab report that requires the students to analyze data and compose conclusions using the scientific method.
  - Ability to decipher a medical record
  - Ability to read and interpret medical journals
  - Ability to read/write using an objective format

Student Outcomes

- The majority of students were able to produce a clear and concise laboratory report with the expected requirements.
- Feedback to students.

Student Survey

- As this was a small class size (10 students), here is a general summary of their feedback using a 13 question survey.
- The majority of students would agree or strongly agree that:
  - The remote lab was rigorous and challenging; it made me really think
  - The remote lab gave me the opportunity to work with other students
  - I feel like I had help from the instructor when I needed it
  - I feel like I had help from the technical assistants when I needed it
  - The remote lab was convenient and easy to schedule

Student Survey

- The rest of the questions were fairly divided.
- Improvements could be used in the following areas:
  - The remote lab had clear and easy to follow instructions
  - The remote lab was easy to use

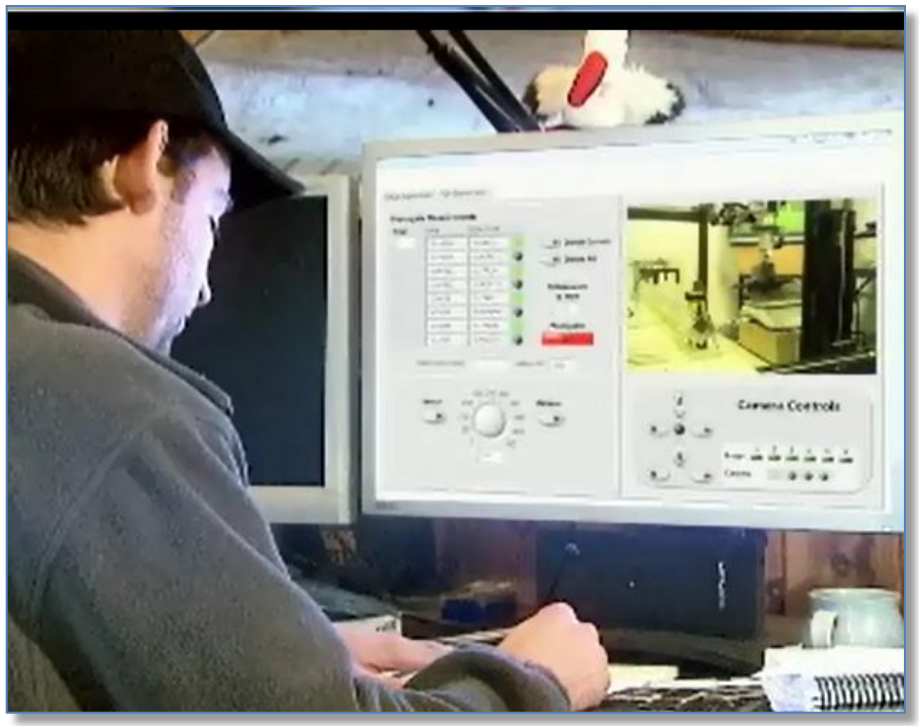
Solutions

- New video recording for students. (completed)
- Pre-laboratory quiz.
- Continue the live lecture with more specifics on how to use the lab, review screen shots.
- Review in detail meiosis vs. mitosis. Review photo gallery and other microscopic slides prior to the lab.
- Continue with a live lecture follow-up after the data collection has been completed.
- Continue with a photo gallery.
- Provide feedback on lab reports (especially for non-science majors).

Conclusion

- While some students felt they had difficulty with the lab, the majority of students reported that help was readily available.
- The majority of students were able to analyze, compare, contrast, and integrate information in a successful manner.
- Student and instructor preparedness is key to a successful and positive lab experience.

RWSL =
Remote & Web-based Science Labs



Kodiak College will be beginning a four year grant program in 2013 with the Consortium for Health Care Education Online. This involves these remote web-based science labs with emphasis on robotics and microscopy. It allows for curriculum development with a technology based structure, one-on-one student advising, funding, support, needs assesment, and placement. We will be providing an Occupation Endorsement for Billing and Coding. A collaborative approach will be used to share information and resources with UAA, UAS, and UAF.

Overview of mitosis

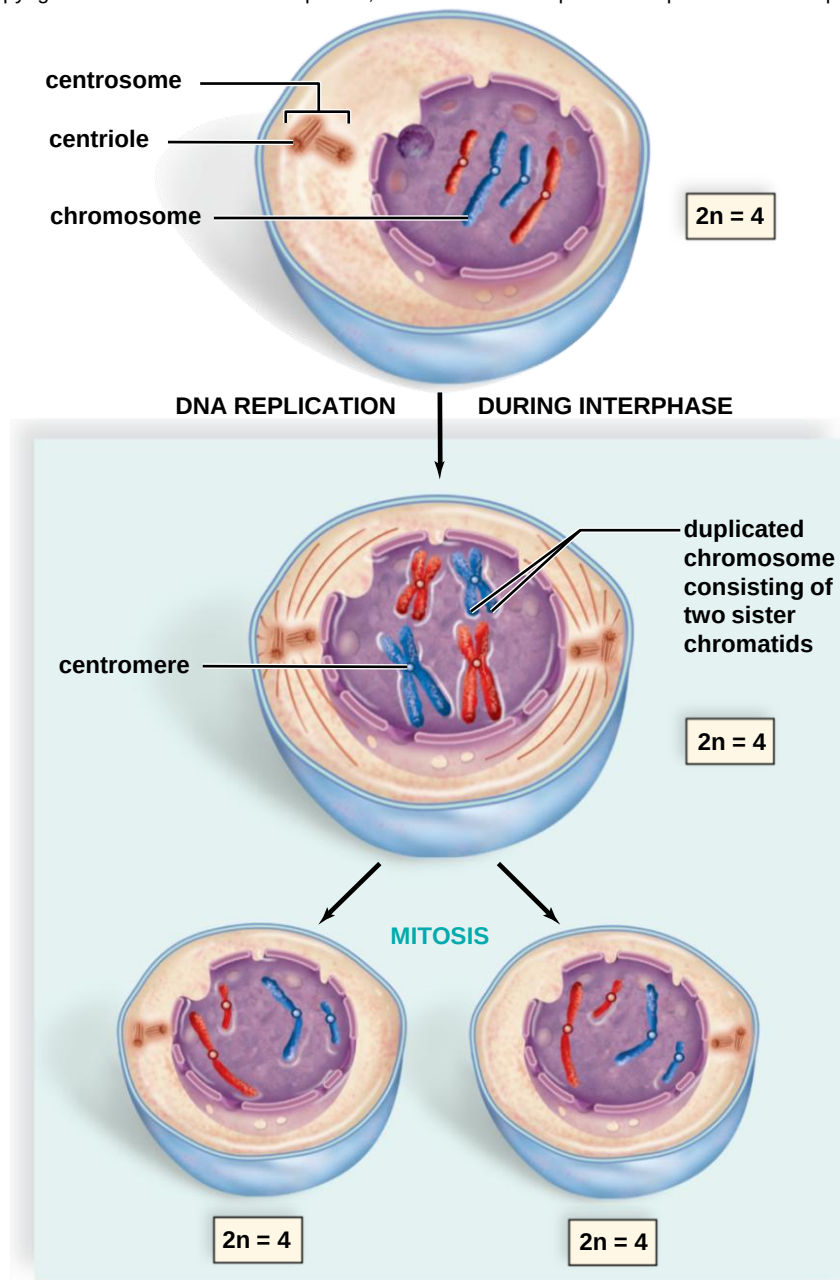
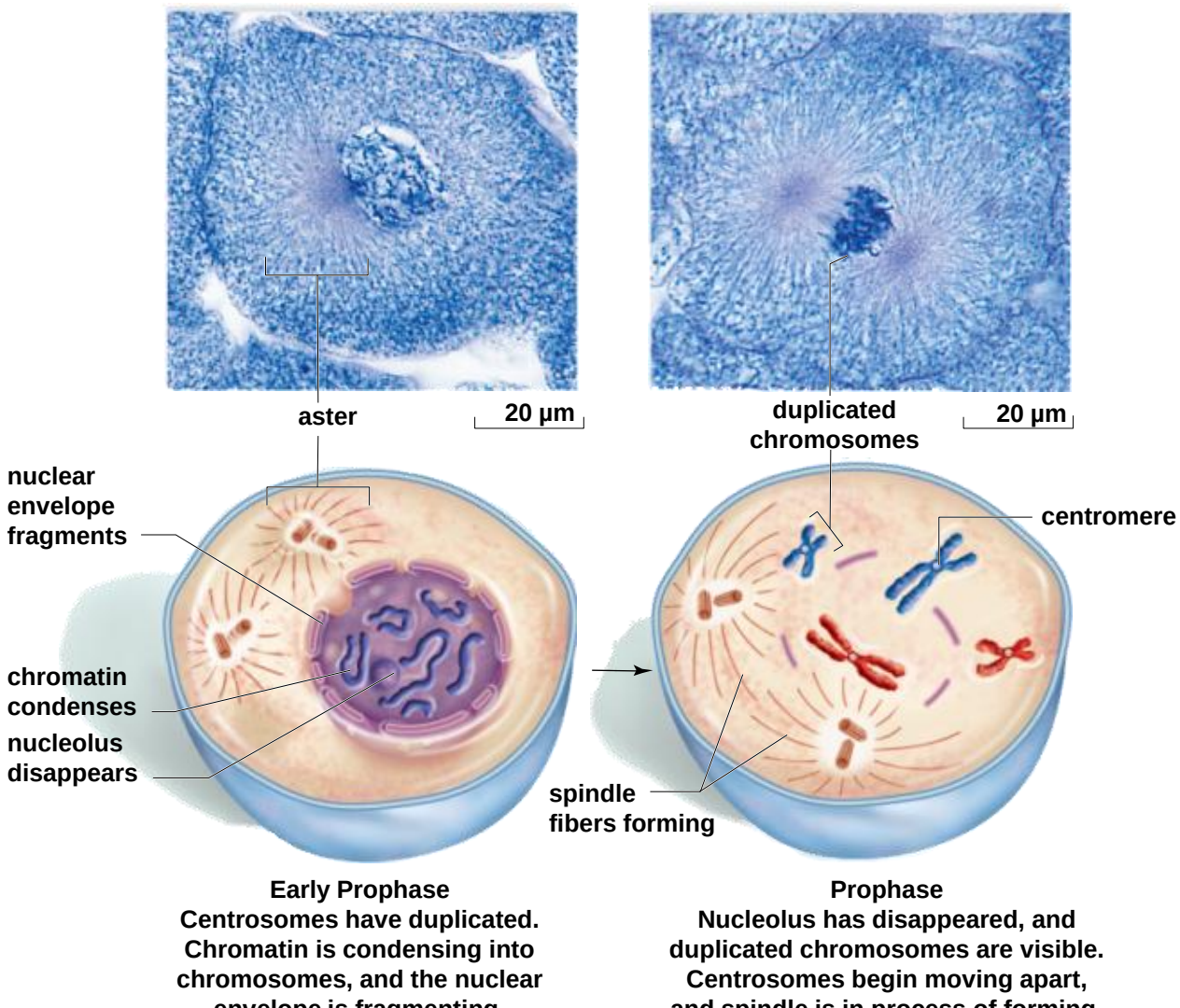


Figure 18.6 An overview of mitosis.

1. Mitosis: Prophase

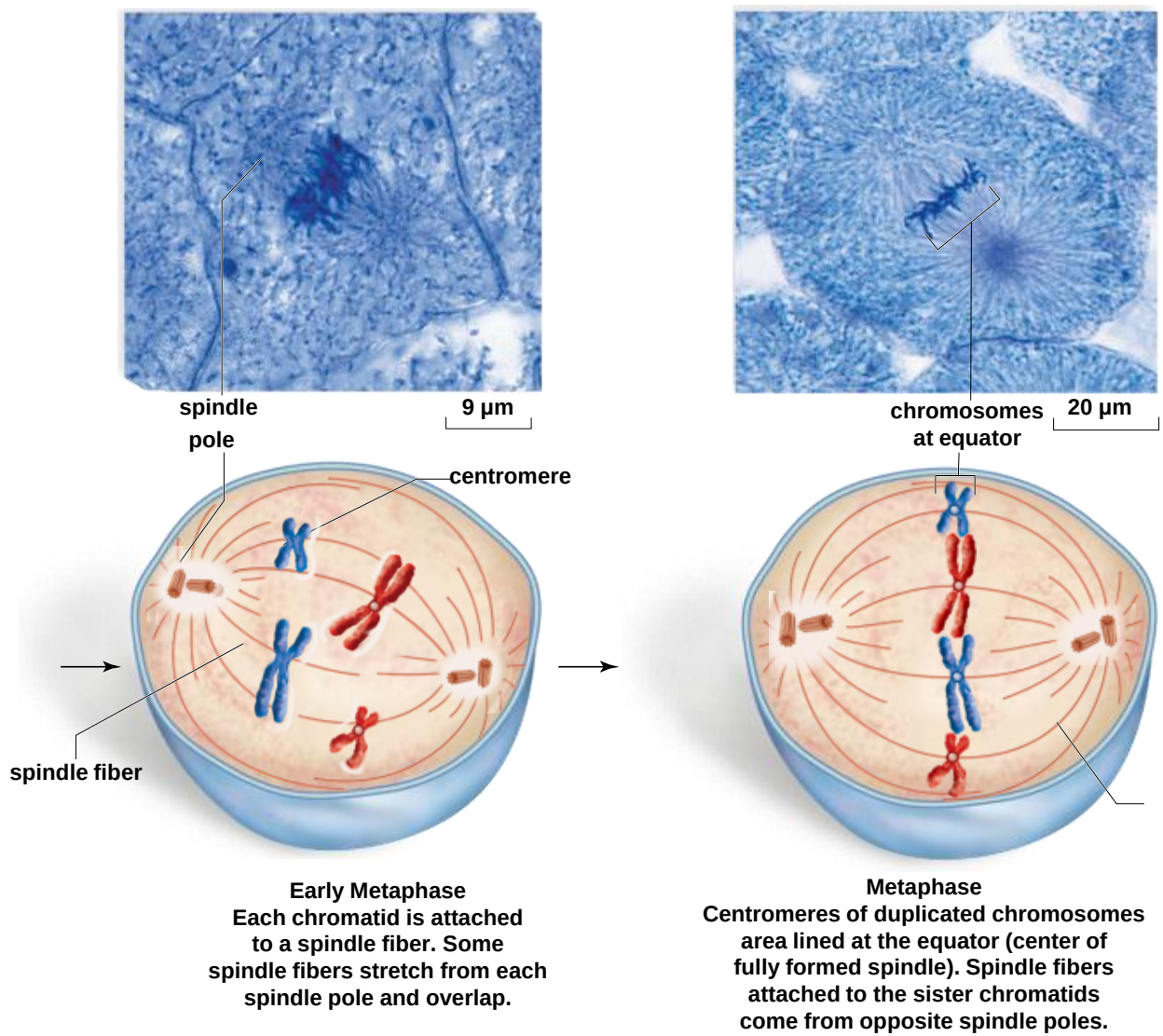


(early prophase, prophase): © Ed Reschke

Figure 18.8 The phases of mitosis.

2. Mitosis: Metaphase

- Chromosomes line up at the middle of the cell (equator).
- Spindle becomes fully-formed.

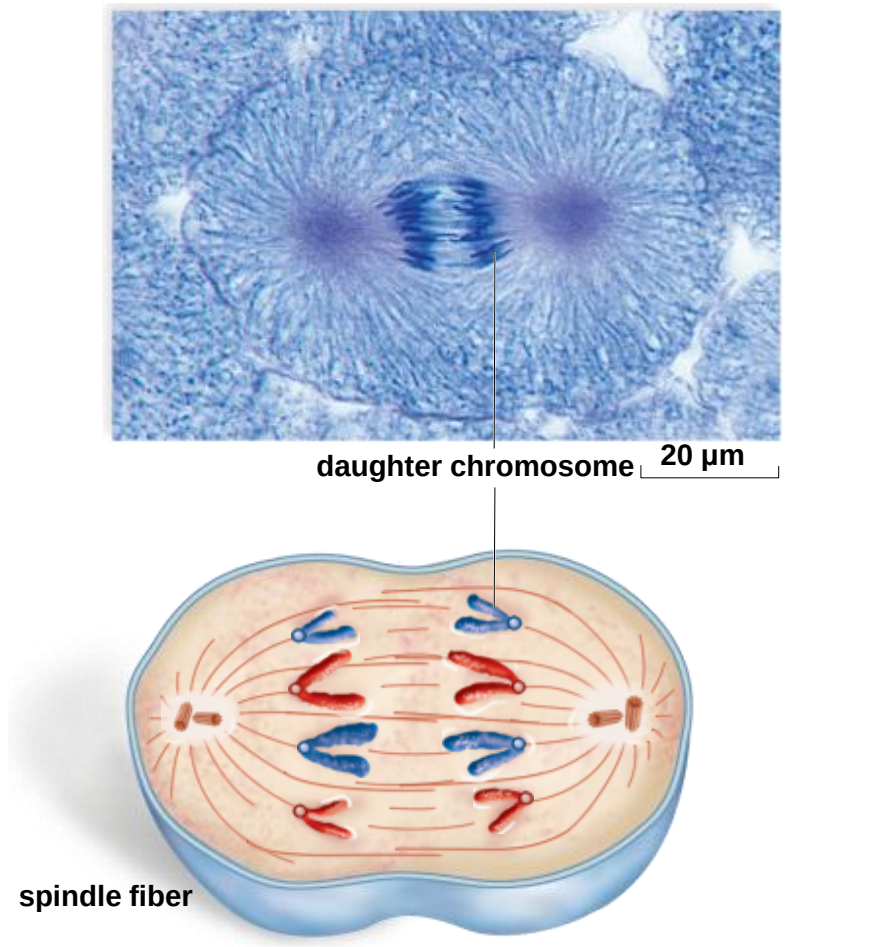


(metaphase): © Ed Reschke; (early metaphase): © Michael Abbey/Photo Researchers, Inc.

Figure 18.8 The phases of mitosis.

3. Mitosis: Anaphase

- Sister chromatids separate at the centromeres and move towards the poles.



Anaphase
Sister chromatids part and become daughter chromosomes that move toward the spindle poles. In this way, each pole receives the same number and kinds of chromosomes as the parental cell.

Figure 18.8 The phases of mitosis.

(anaphase): © Ed Reschke;

4. Mitosis: Telophase and cytokinesis

- Chromosomes arrive at the poles.
- Chromosomes become indistinct chromatin again.
- Nucleoli reappear.
- Spindle disappears.
- Nuclear envelope reassembles.
- 2 daughter cells are formed by a ring of actin filaments (cleavage furrow).

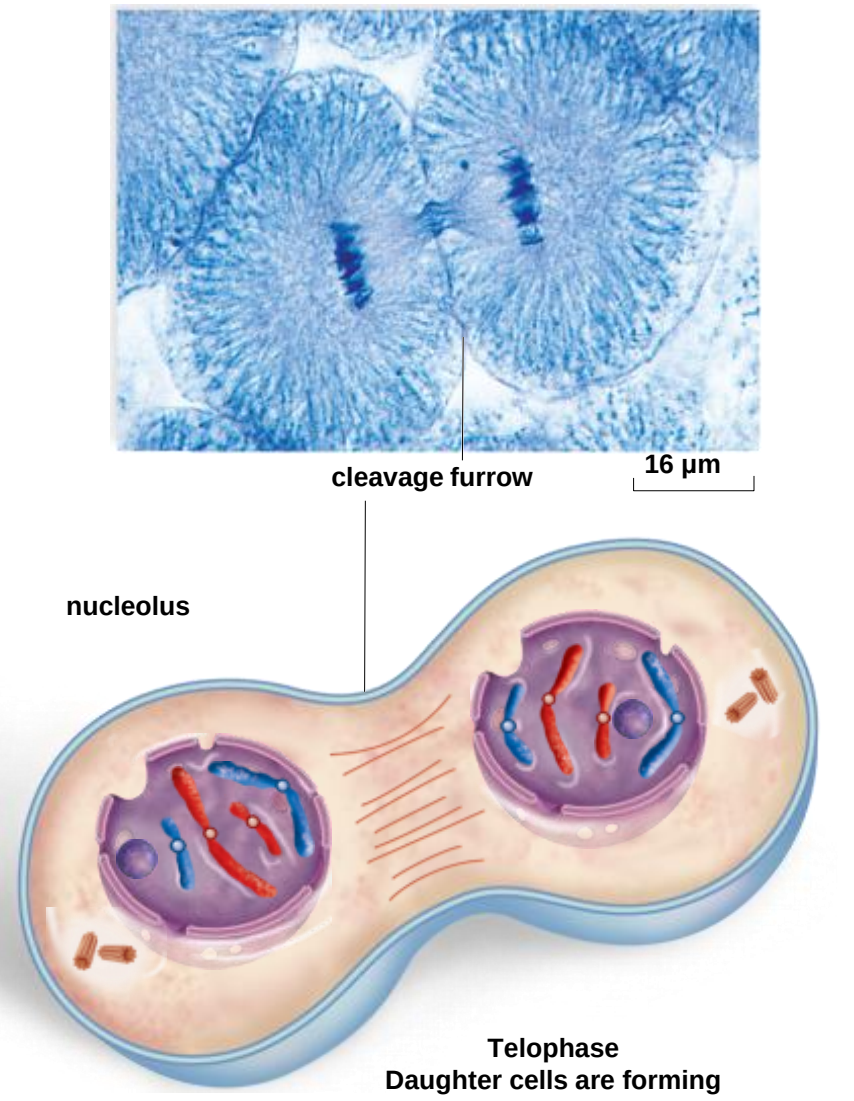


Figure 18.8 The phases of mitosis.

(telophase): © Ed Reschke;