LAS POSITAS COLLEGE

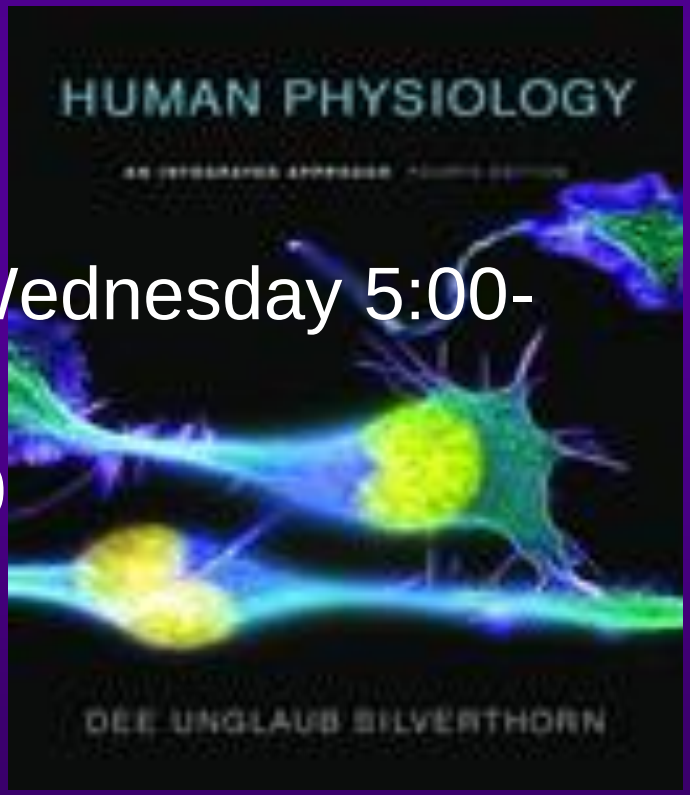
Physiology I: Human Physiology

Fall 2007

Rooms 1810

Lecture: Monday Wednesday 5:00-6:15

Lab: MW 6:30-9:20



Developed by
John Gallagher, MS, DVM

LAS POSITAS COLLEGE

John Gallagher, BS, MS, DVM

- Colorado State University
  - BS, Animal Sciences, 1974
  - MS, Clinical Sciences, 1976
  - DVM, Veterinary Medicine, 1980

A Few Details:

Turn off your Cell Phone!

Review the new Safety Rules in the syllabus.

Don’t bother to telephone me.

There are new guidelines for microscope use.

Email:
jgallagher@laspositascollege.edu

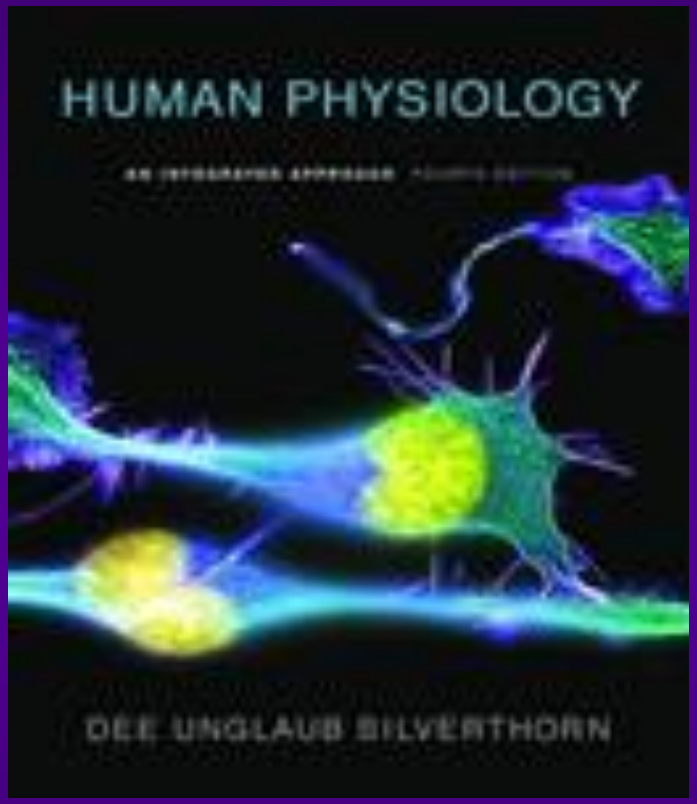
My web site:
http://lpc1.clpccd.cc.ca.us/lpc/jgallagher/index.htm

Blackboard: http://clpccd.blackboard.com/

First Assignment!
Send me an email before Sunday, 11:00PM, the first week of class
(3 points!)

- Always put Physiology in the subject line.
  - Why are you taking this class?
  - Do you plan a career in the medical field?
  - What special interests do you have?
  - What is your college background?
  - Do you have a job? Where?
  - Who was your Bio 31 instructor? Anatomy?

Textbook, some special features:



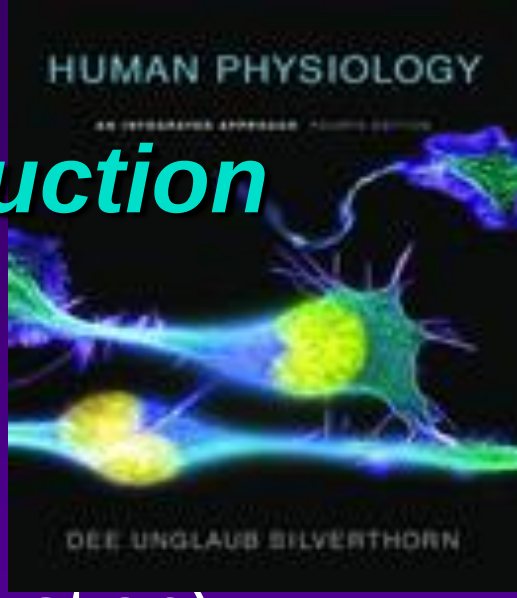
- Background basics
- RUNNING PROBLEM
- Concept checks
- EOC questions and Explorations
- Silverthorn web site (**http://www.aw-bc.com/physiologyplace/, or Google physiology place**

Course Introduction

Lectures and exams are textbook based

Lecture Notes: Posted on my website.

About Chapter 1: Introduction to Physiology



- What is physiology?
- From cell to human (levels of organization)
- A review of the organ systems
- Introduction of the concept of homeostasis
- Themes in Physiology
- The science of Physiology
  - Experimental design
  - Data

Physiology is

- the study of the **function** of all plants and animals in their normal state.
- an integrative science

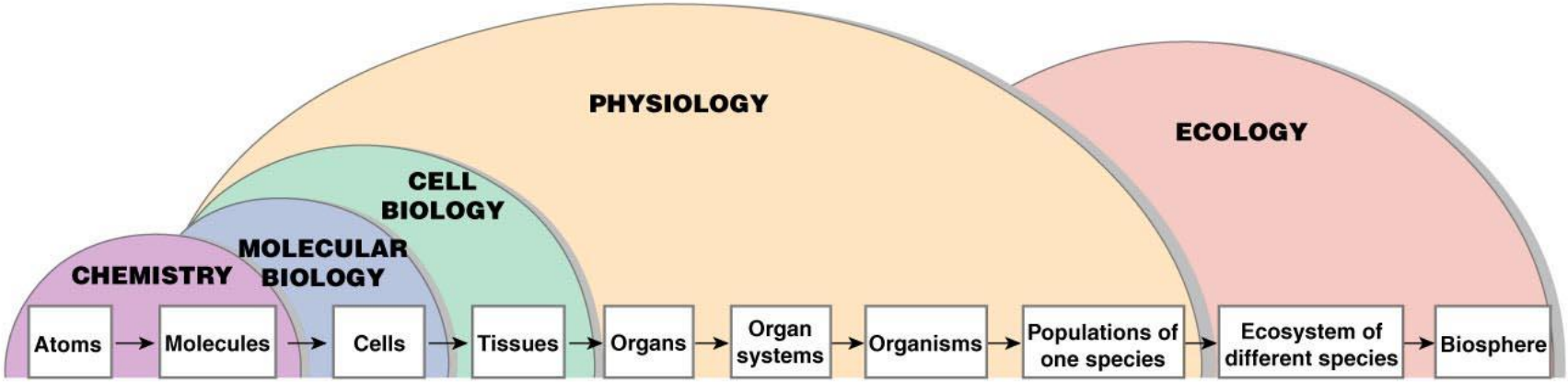
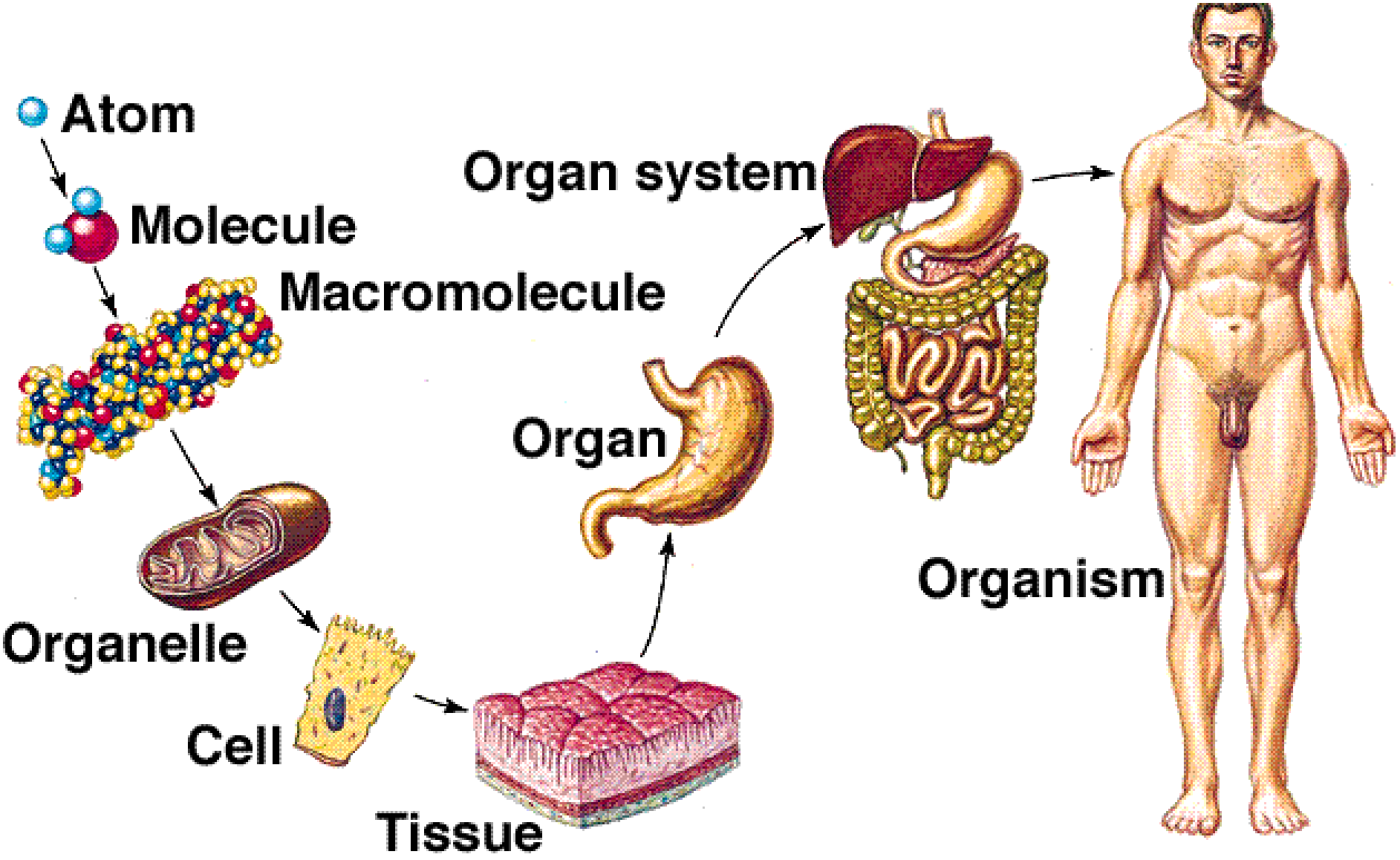


Figure 1-1: Levels of organization and the related fields of study

Review Levels of Organization

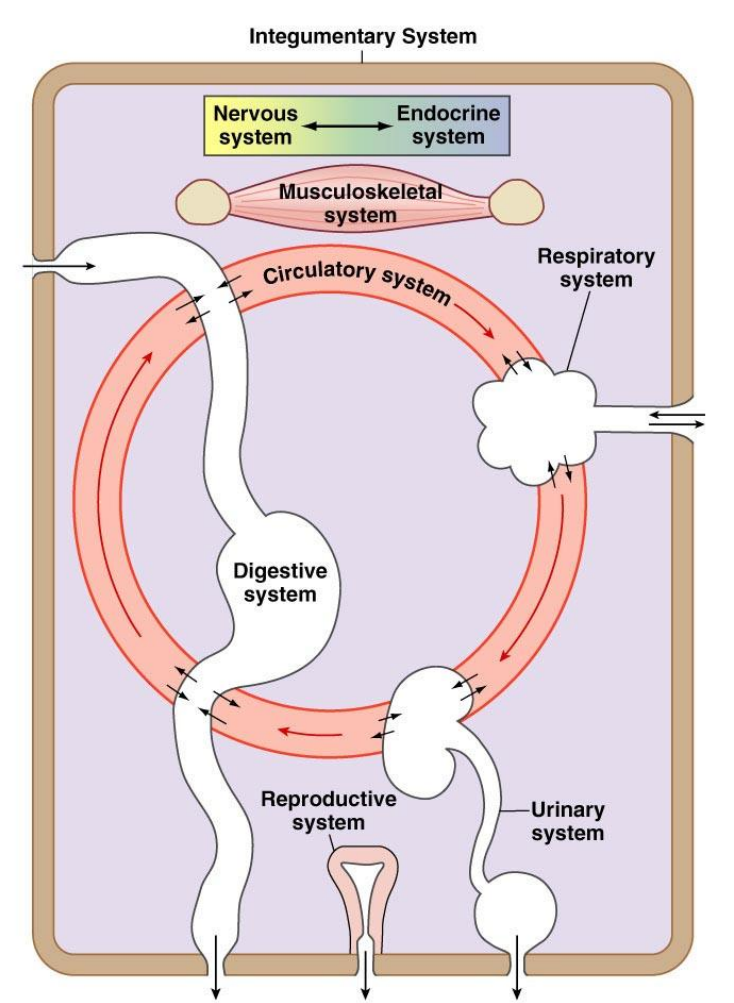


Organ Systems

- operate as **integrated** units
- How many? Can you list them?

Examples:

- **Regulation of**
  - **Plasma calcium concentration**
  - **Blood pressure etc.**



Function and Process: Teleological vs. Mechanistic Approach to Science

Teleological:

- **What is purpose or function?**
- **Why does something exist?**
- **Why does it need to be done?**

Mechanistic:

- **What are processes involved?**
- **How does something work?**

Distinguish between **Process** & **Function**

How do we breathe?

How does blood flow?

How do RBCs transport O_2?

Why do we breathe?

Why does blood flow?

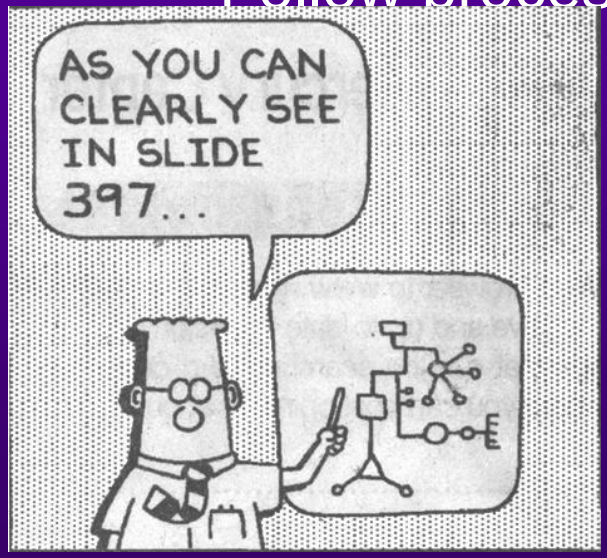
Why do RBC transport O_2?

Integrate both for complete picture!

Focus on . . . . (Concept) Mapping

1. Structure – function maps
2. **Process maps or Flow charts**

Follow process in sequence



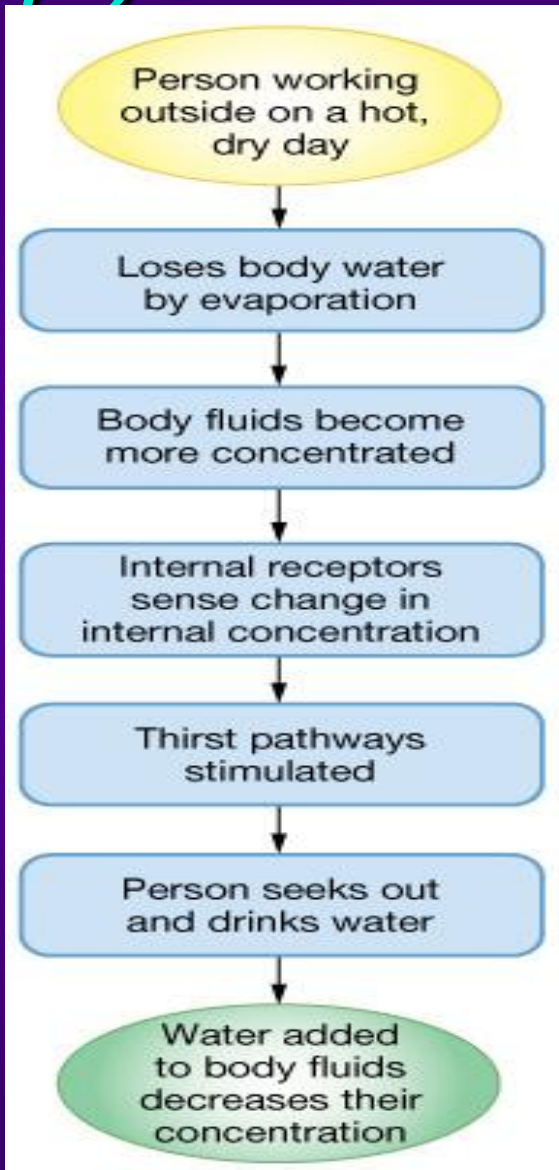


Fig 1-5b

Key Themes in Physiology:

1. **Homeostasis (Chapter 6)**

   Body systems work together (Integration of function)

   Internal vs. external failure of homeostasis

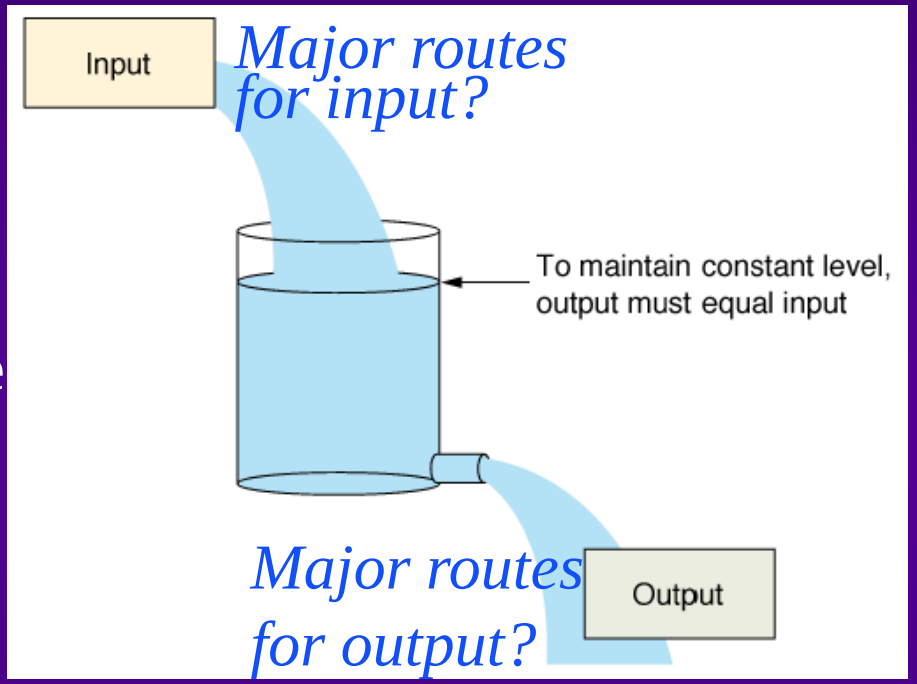
2. **Communication and movement across cell membranes**

   Vital to integration & homeostasis

   Cells communicate with other cells, tissues & organs

Energy Flow and Law of Mass Balance

All living processes require constant input of energy
Where from? - How is it store
How is it used to do work?



Total amount of substance in body = intake + production - output

What substances are maintained through law of mass balance?

The Science of Physiology is *based on the Scientific Method*

Review:

1. **Basic steps of scientific method**
2. **Parameters to consider**
3. **Experimental design**
4. **Anecdotal evidence**

Basic Steps of Scientific Method:

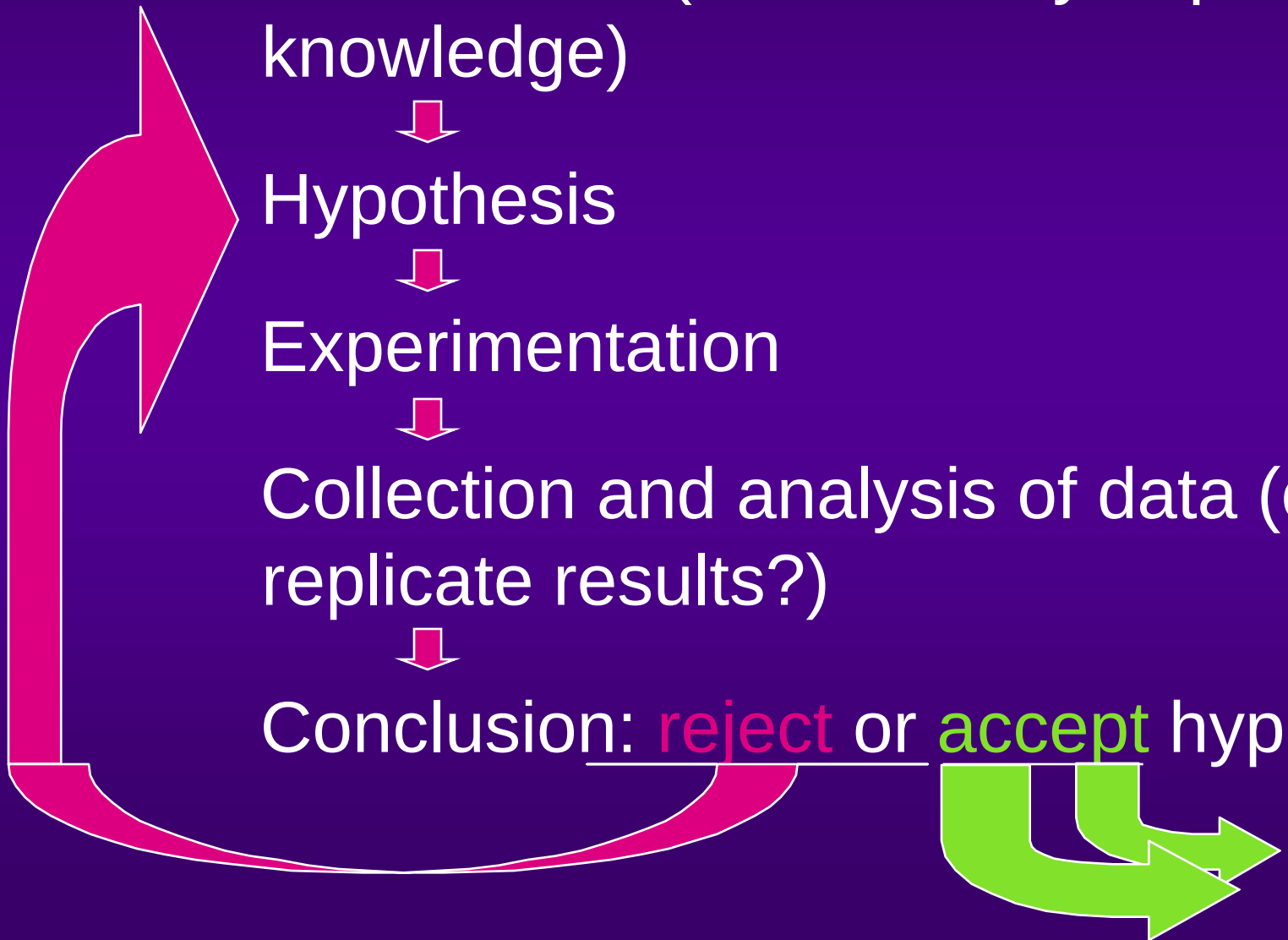
Observation (and/or study of prior knowledge)

Hypothesis

Experimentation

Collection and analysis of data (can you replicate results?)

Conclusion: reject or accept hypothesis



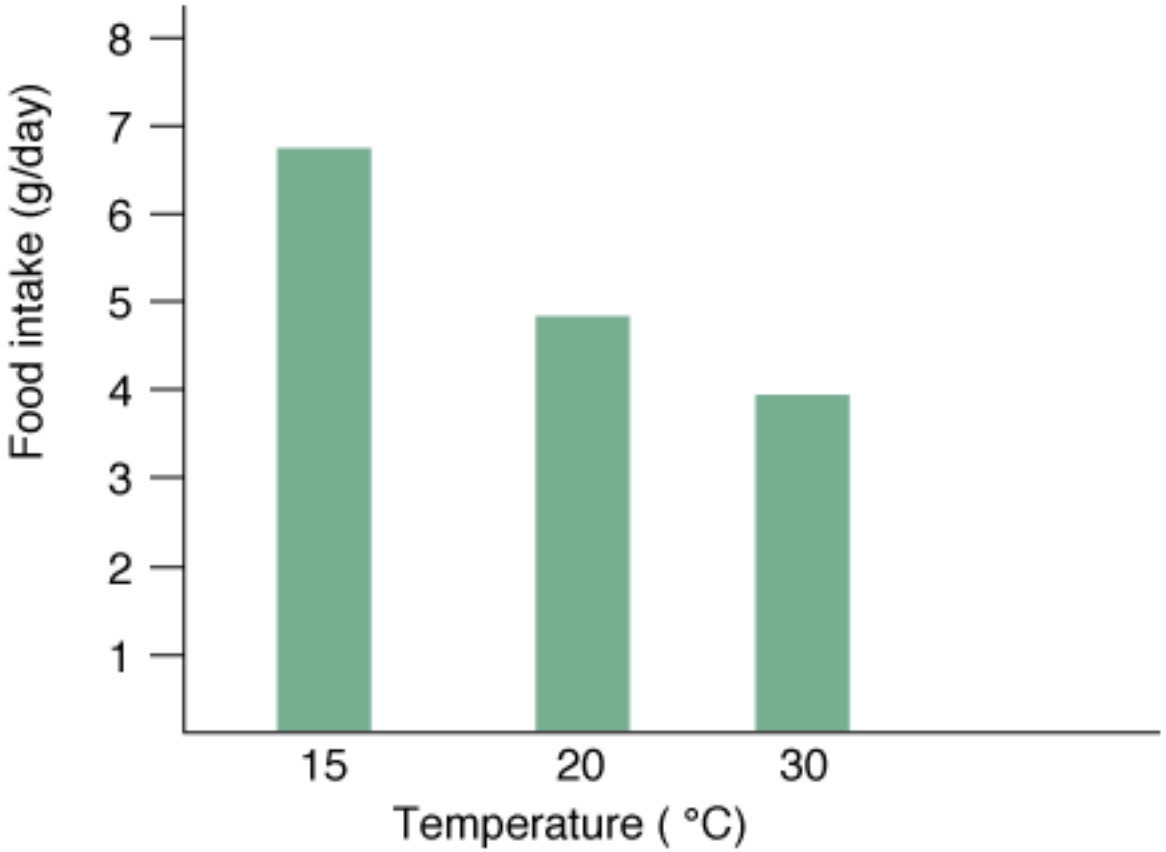
theory

Parameters to consider:

Independent vs. dependent variables

Controlled by experimenter	**Responds to independent variable: gives results.**

Experimental group vs. control group:
only one independent variable is changed



Canaries were acclimated to the temperatures shown, and their food intake was monitored for three weeks.

Independent variable (= manipulated, altered variable) = ?

Dependent variable (= responding to independent variable) = ?

Example:

Company has found new artificial sweetener (S)

Prior knowledge:

Some food additives are not safe.

Hypothesis: ?

Experiments: ?

Collect and analyze data

Conclusion

Animal vs. Human Experimentation

- In Physiology most knowledge is derived from animal experimentation.
- Sometime human experimentation necessary.
- **Difficulties of Human Experimentation:**
  - **Very dissimilar test subjects**
  - **Psychological aspects (placebo and nocebo effects)**
  - **Ethical questions (is it o.k. to withhold potential drug from seriously ill?)**

Experimental Design for Human Studies

Blind study (subjects do not know if they get treatment or placebo)

Double blind study (subjects & administrators . . .)

Cross over study (each subject participates in experimental AND control group)

Double blind cross over study

Experimental Design for Human Studies cont.

Longitudinal studies

Prospective studies

Cross-sectional studies

Retrospective studies

Meta-analysis

Development of pharmaceutical drugs (not in book)

In vitro

few

***In vivo* tests on lab animals**

< 10%

***In vivo* human clinical trials (3 phases)**

FDA approval

Focus on Graphs

- **Data are often presented in form of a graph**
- **For examples see *Fig 1-8***

the end