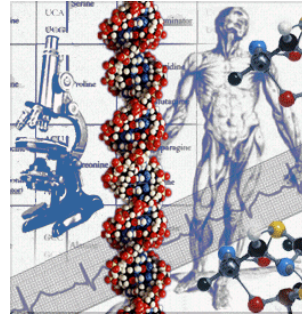


Biology 1200 Introduction

Vancouver Community College
Instructor: Maria Morlin

Welcome to Biology 1200!

- TODAY...
 - Introduction
 - Forms
 - Course overview
 - Cell chemistry



Handouts

Pick up:

1. Name card
2. Course outline
3. Student information questionnaire
4. Student conduct agreement

Reasons to take the course

- Biology 1200 - the second half of first year general biology
- Gain an understanding of the world around you
- Get a solid background for future science careers
- Laboratory experience
- Writing proficiency



This course applies to many fields of study

- Molecular Biology
- Pharmacology (drug design)
- Agriculture
- Biotechnology
- Clinical medicine
- Anthropology
- Forensic science
- Chemical industries (detergent industries, etc.)
- Conservation
- Research in zoology and botany

Resources

Cafeteria
Bookstore
Library
Learning Centre: one on one, groups, study skills
Counsellors – 4th floor
Information Centre: calendars, brochures

Financial aid office – 4th floor
emergency loans, bursaries, scholarships
work study aide, programs
Health Services – 3rd floor
Room 3002
T: 604.871.7187

Showers – ground floor, auto trades
Car repair

Resources at VCC-CC

Cafeteria, JJ's restaurant, bakery
Haircut, perm, manicure

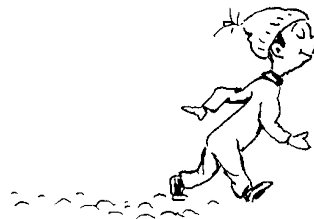
To do:

- Discuss protocol, expectations, exams.
- Introduce lab demonstrators
- Textbooks & lab manuals



You have brains in your head
You have feet in your shoes
You can steer yourself
In any direction you choose

Dr. Suess



Organization & studying

1. Studying

- Study schedule – creates freedom
- Desk by a window (have a clean desk policy)
- Files and bookshelves
- FIRST – read chapter quickly
- THEN – learn what you don't know

- Make notes from text: hi light
- Answer chapter questions
- Use flash cards
- Study buddy or group
- Music, atmosphere

2. Attitudes

- Positive, motivated, involved

3. Goals

- Short, medium and long-term

Exercise & nutrition

- Aerobics, jogging, steps, sports, swimming, walking, dancing
- Cardio 3X weekly for 20 minutes
- WHY? Discussion
- Eat healthy



Drink lots of water!



Course Overview



Cell chemistry & cells



DNA & genetic engineering



Botany



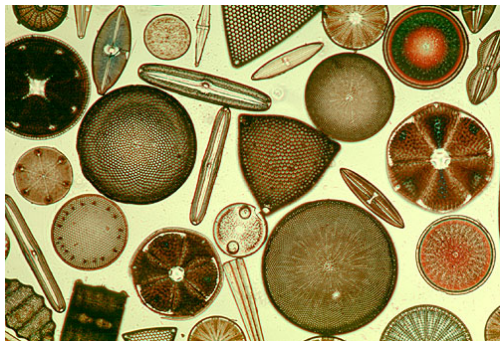
Animal anatomy & physiology

Course overview

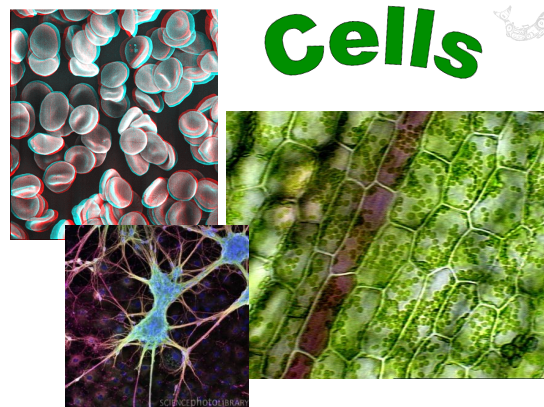
- Cellular chemistry
- Cell structure & function
- Bioenergetics and enzymes
- Cellular respiration
- Photosynthesis
- DNA
 - molecular basis of inheritance
 - DNA technology
- Plant structure & physiology
- Animal structure & physiology

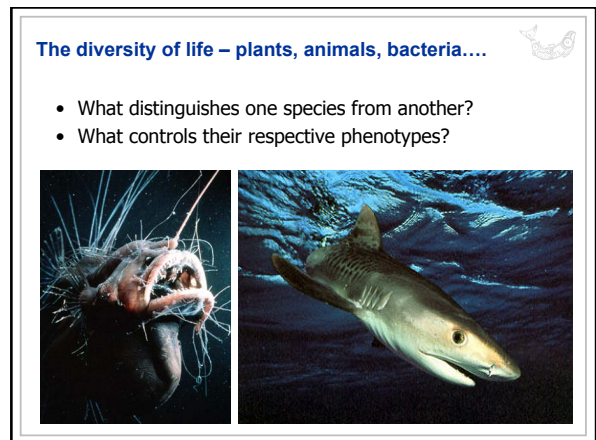
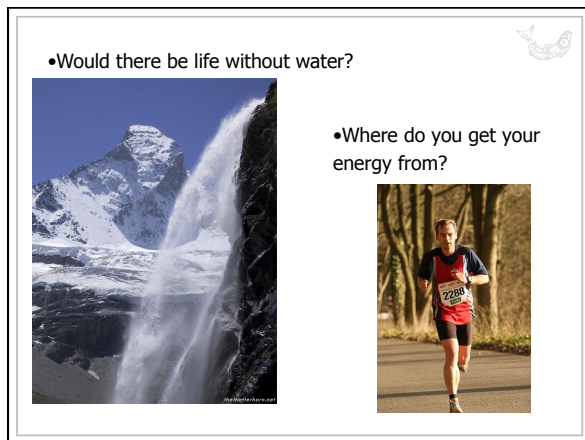
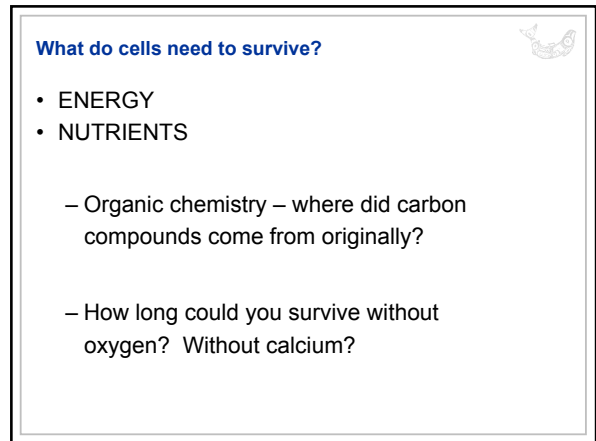
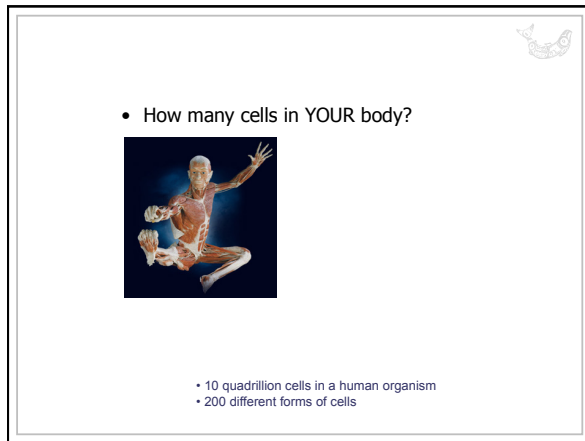
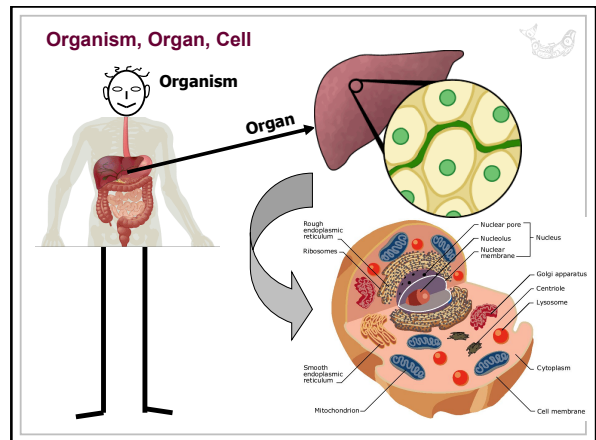
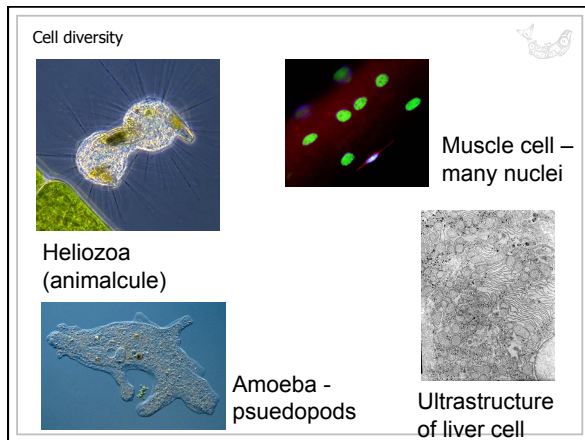
Course overview

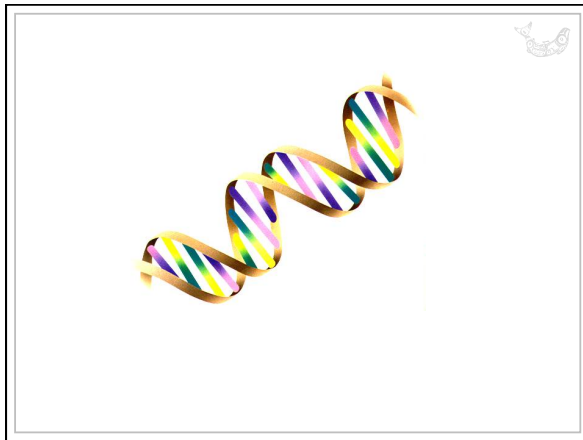
- Extending from your last course
- Biodiversity



Cells







• Do ALL cells in your body have the same DNA?

• All cells have the instructions for liver cells, but you're not a giant liver!! Why not?

The Human Genome -- 26 June 2000

DNA

base pairs:
 $C \equiv G$
 $T = A$

hydrogen bond

sugar phosphate backbone

exon

intron

- ~3.2 billion base pairs in every cell build the human genome
- genes form only 1,5% of the human genome
- a gene is a segment of the DNA, that encodes the construction plan for a protein
- in humans there are ca. 30,000 genes only

Chromosome

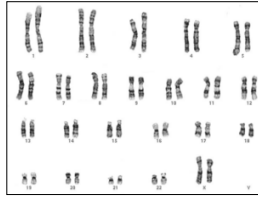
A *chromosome* is a very long, continuous piece of DNA, which contains many genes, regulatory elements and other intervening nucleotide sequences.

Chrom.	Genes	Bases	Chrom.	Genes	Bases
1	2588	245,202,898	18	766	77,753,555
2	2288	243,315,028	19	1454	63,780,865
3	2032	199,411,731	20	927	63,644,868
4	1297	191,610,523	21	303	46,976,537
5	1643	185,967,295	22	288	49,476,872
6	1963	175,740,541	X	1184	152,634,166
7	1443	158,431,299	Y	231	59,361,297
8	1127	145,908,738			
9	1289	134,505,819			
10	1440	135,488,874			
11	2053	134,578,784			
12	1622	133,464,424			
13	746	114,151,656			
14	1098	105,311,216			
15	1122	105,114,055			
16	1098	89,995,999			
17	1576	81,691,216			

<http://www.igyc.org/NTC04044/M000a.htm>

Chromosome

Species	# of chromosomes
Fruit Fly	8
Human	46
Rye	14
Ape	48
Guinea Pig	16
Sheep	54
Dove	16
Horse	64
edible snail	24
Chicken	78
Earthworm	32
Carp	104
Pig	40
Butterflies	~380
Wheat	42
Fern	~1200



Karyogram of human female

<http://www.answers.com/topic/human-karyogram-png>

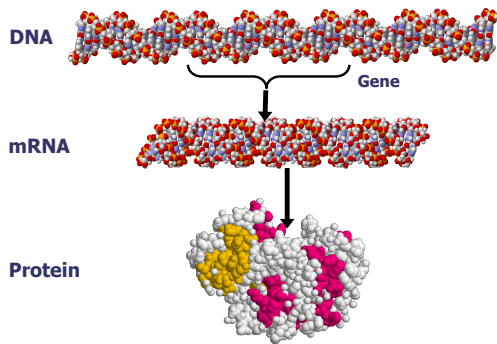
DNA - Sequence

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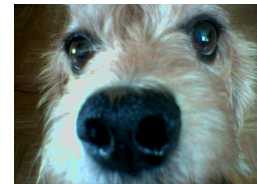
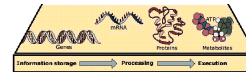
... .acctc ctgtgcaaga acatgaaaca cctgtggttc ttccttctcc
tgggtggcagc tcccagatgg gtccgtgtccc aggtgcaccc gcaggagtgc
ggcccaggagc tggggaagcc tccagagctc aaaacccccc ttggtgacac
aactcacaca tgcccacggt gccagagcc caaatcttgt gacacaccc
ccccgtgcc acggtgcccc gagcccaaat cttgtgacac accccccca
tgcccacggt gccagagcc caaatcttgt gacacaccc ccccggtccc
ccggtgcccc gcacctgaac tcttgggagg accgtcagtc ttcctcttc
ccccaaaacc caaggatacc cttatgattt cccggacccc tgaggtcacg
tgctgtgtgg tggcgtgag ccacgaagac cccgaggtcc agttcaagtgc
gtacgtggac ggcgtggagg tgcataatgc caagacaaaag ctgctgggag
agcagtacaa cagcagcttc cgtgtgtgca gcgtctcac cgtctgcac
caggactggc tgaacggcaa ggagtacaag tgcaaggtct ccaacaaagc
aaccaagtca gcctgacctg cctggtcaaa ggcttctacc ccagcgacat
cgctgtggag tgggagagca atggggcagc ggagaacaac tacaacacca
cgctctccat gctggactcc gacggctcct tcttctctca cagcaagctc
accgtggaca agagcaggtg gcagcagggg aacatcttct catgtccgt
gatgcatgag gctctgcaca accgctacac gcagaagagc ctctc....

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From Genes to Proteins



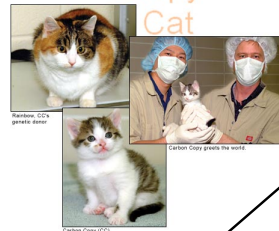
From DNA to eye colour



- What are embryonic stem cells?
- Can you clone a human?



Copy Cat

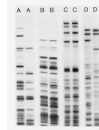


October 15, 2006 - After six years in the pet-cloning business, Genetic Savings and Clone is closing its doors. Despite research and spending millions, the company had only minor success. It cloned a few cats, but was never able to replicate a dog. Neil Boyce reports.

What is cloning?

- The creation of an organism that is the exact genetic copy of another. There are human clones among us now!

Not made in a lab!



Identical twins have the same DNA

Cloning in nature - a potato tuber on a potato plant

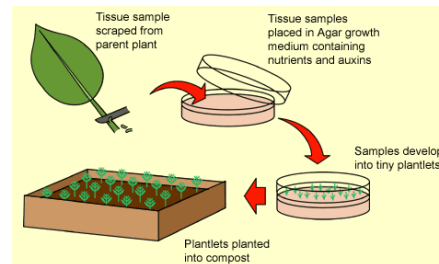


- Other examples of natural clones?

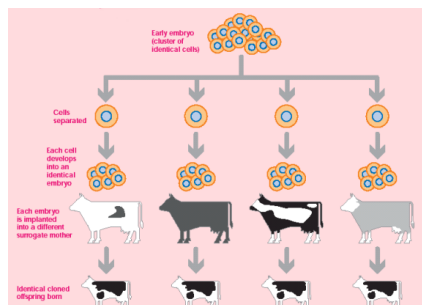
How is artificial animal cloning done?

- Artificial embryo twinning
- Somatic cell nuclear transfer

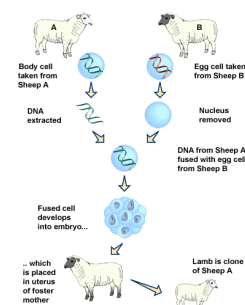
Artificial plant cloning



Artificial embryo twinning



Somatic cell nuclear transfer





Why clone?

1. Cloning for medical purposes
 - Cloning animal models of disease
 - Cloning stem cells for research
 - "Pharming" for drug production
2. Reviving endangered or extinct species
3. Reproducing deceased pets
4. Cloning humans

Reviving endangered species



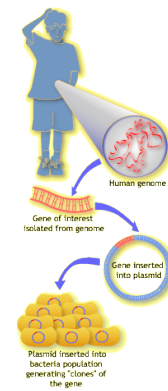
Adult Gaur



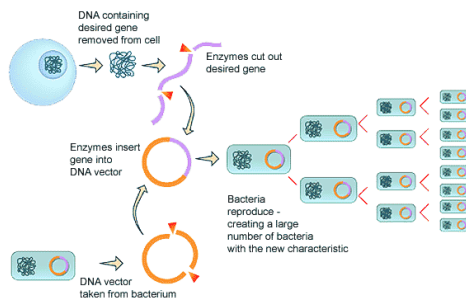
Noah the cloned Gaur

Images courtesy of Advanced Cell Technology

Is cloning an organism the same as cloning a gene?



Genetic engineering



Much controversy exists around cloning and stem cell research



What are the risks of Cloning?



1. High failure rate
2. Problems during later development
3. Abnormal gene expression patterns
4. Telomeric differences

What are some issues in cloning?



- Ethical
- Legal
- Social

Consider these questions:



- **Who has the right to have children, no matter how they are created?** Who doesn't? Why?
- **Is human cloning "playing with nature?"** If so, how does that compare with other reproductive technologies such as *in vitro* fertilization or hormone treatments?
- **Does cloning to create stem cells, also called therapeutic cloning, justify destroying a human embryo?** Why, or why not?
- **If a clone originates from an existing person, who is the parent?**
- **What are some of the social challenges a cloned child might face?**
- **Do the benefits of human cloning outweigh the costs of human dignity?**
- **Should cloning research be regulated?** How, and by whom?

Cloning and genetic engineering



1. Which of the following statements is true of clones?
 - a. Clones show variation
 - b. Clones have identical DNA to the parent
 - c. Clones are formed as a result of meiotic division
2. Complete the sentences below using the following words: (use each word once)
asexual
binary fission
bulbs
cuttings
identical
A clone is genetically [] to the parent. Clones are produced as a result of [] reproduction. Naturally-occurring examples of cloning are [] in amoebas, formation of runners in strawberry plants, and [], tubers and rhizomes. Plants can also be cloned artificially by taking [] and dipping them in rooting powder to encourage growth.

3. Tissue culture is a technique used to produce a large number of identical plants quickly. Put the steps involved in the correct order: (enter the correct order into the text box e.g. abcdef)
- a. Add growth hormones to stimulate cells division
 - b. Take a few cells from the parent plant
 - c. Add growth hormones to get plantlets
 - d. Transfer the small masses of cells to new nutrient jelly
 - e. Transfer plantlets to potting compost
 - f. Place cells in plates containing sterile nutrient agar jelly

4. Which of the following statements is true of identical twins?
- a) Identical twins develop when an egg is fertilised by two sperms
 - b) Identical twins develop when two eggs are fertilised by two sperms
 - c) Identical twins develop when a fertilised zygote splits into two
 - d) Identical twins are formed from the same egg and sperm
- b
a
c and d
a and b

5. Name the process by which 'Dolly' the sheep was developed.

6. Name one advantage of using the embryo transplant technique.
- a. Gametes can be screened for defects
 - b. No opportunity for natural selection
 - c. Allows for the expansion of the gene pool
 - d. Eliminates the possibility for disease
7. Which of the following disadvantages applies to embryo transplanting?
- A. Adds variety
 - b. Plenty of opportunity of natural selection
 - c. Danger of reducing gene pool
 - d. Offsprings display hybrid vigour

8. "The main difference between cloning and genetic engineering is that whereas cloning produces exactly the same genetic make-up, genetic engineering produces a totally unique set of genes" True or False?

True
False

9. Put the following steps for producing genetically engineered insulin into the right order: (type the letters in the correct order into the box e.g. abcde)

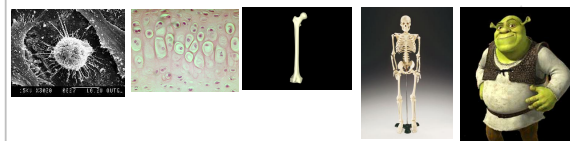
- Reinsert the hybrid plasmid into the bacterial cell
- Isolate, cut and remove the gene for making insulin from human cell
- Remove a plasmid from a bacterial cell and again cut the DNA
- Leave the bacterial cell to produce clones with the human gene
- Insert the human gene into the bacterial DNA

10. Which of the following have been genetically engineered?

- Plant produced from a cutting
- Plants produced from part of a plant being grafted into another
- Disease resistant crops



Space Plants



Cell → Tissue → Organ → System → Organism
Osteoblast → Connective → Bone → Skeletal → Ogre

Function hierarchy of the skeleton