Cell and Developmental Biology Module BS1003

Cell and Developmental Biology

1. Introduction

2. Animal CDB

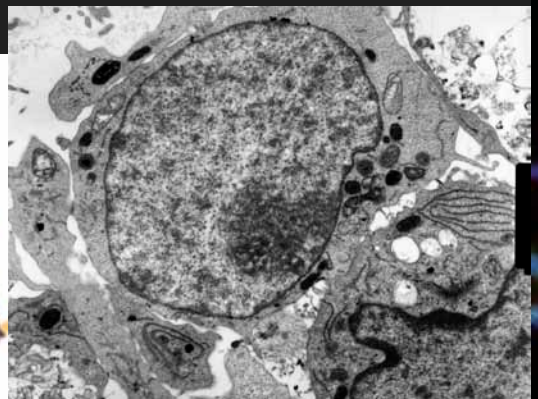
3. Plant CDB

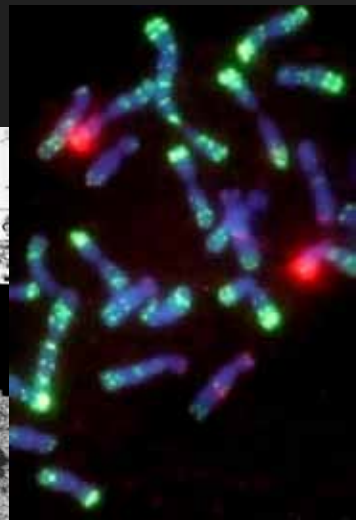
Dr Alex Patel
ap147@le.ac.uk

Prof Pat Heslop-Harrison
phh4@le.ac.uk

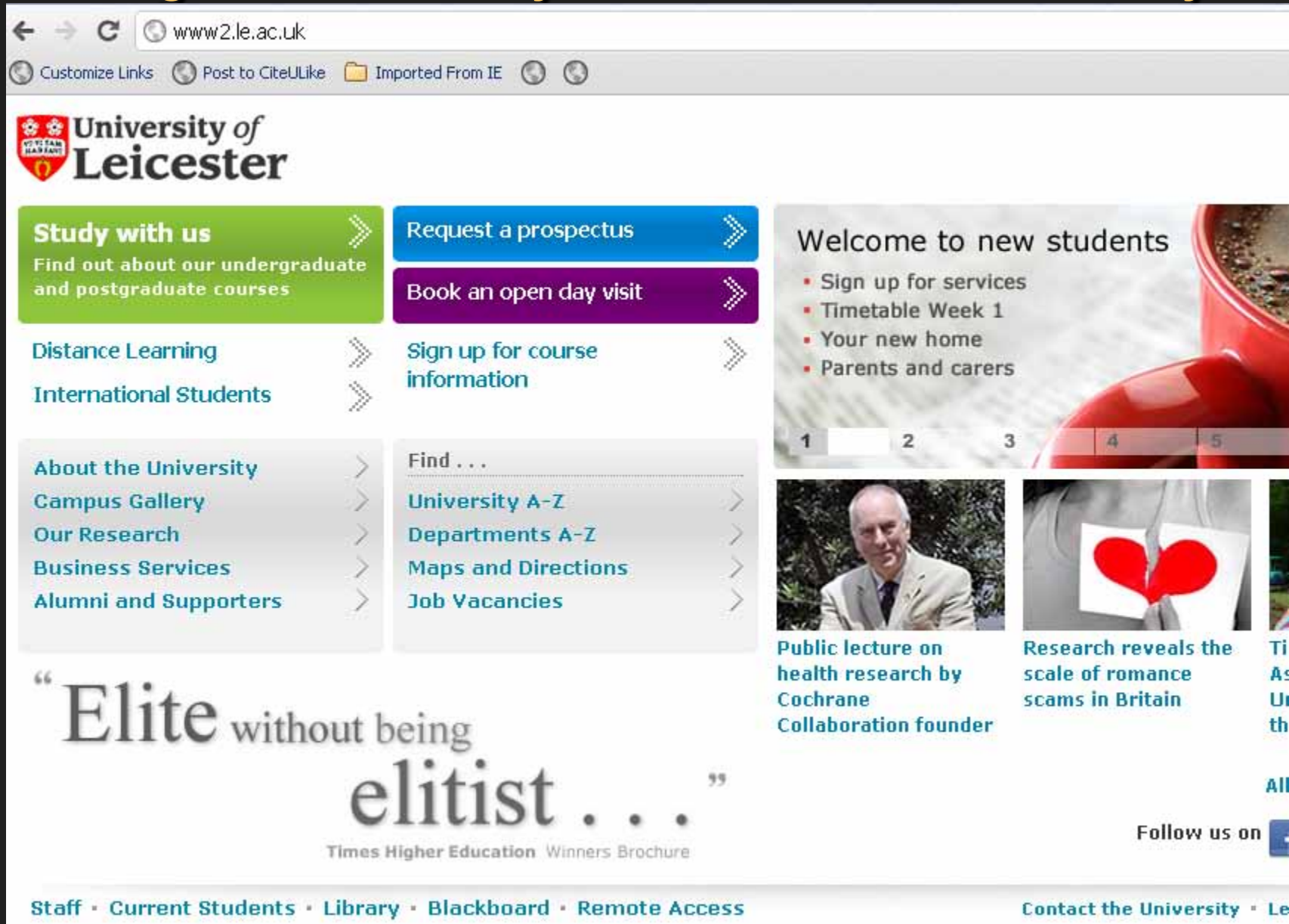








This Lecture:
Thinking about how you learn at University



Cell & Developmental Biology

Aim: To develop your knowledge and understanding of some of the key concepts in cell and developmental biology and to set the scene for more advanced studies in the subject

>> Links logically to BS2025

Objectives: You should be able to describe….

- Cells and their basic characteristics
- How to study cells
- What we know about cells and how they work
- Approaches to learning at Leicester

- The first university was founded almost one thousand years ago

- Universities have changed over the years, but their *role* has changed little: (1) provide knowledge content, (2) offer a learning community that can help students understand the meaning of this content, and (3) certify students who prove that they have mastered this knowledge.

EDUCAUSEReviewMagazineVolume46 - OpenEducationalResources

CURIOSITY and THINKING

www.google.co.uk/ig

Customize Links | Post to CiteULike | Imported From IE

+Pat **Web** Images Videos Maps News Gmail more

iGoogle

Google Reader (327)

All items (327) refresh mark all as read

- A cushion of Thylacospermum caespitosum
  from Annals of Botany: Plant Science
- Unusual augmentation of germline genome size
  from Chromosome Research (Online First™)
- Pathh1: LSE blog & PDF: A guide to using
  from Twitter / Pathh1
- Genetic diversity of ancient olive trees
  from AoB Blog
- annbot: Another look at science graduates: how
  from Twitter / annbot

AoB Blog

- Genetic diversity of ancient olive trees
- Food Crisis in 2050?
- On our Scoop It between September 21st and September 30th

Date & Time

MicrobiologyBytes

- Hendra Virus Diversity
- What do human parasites do with a chloroplast?
- Flavivirus-induced antibody cross-reactivity

Science of the Invisible

- Sharing The Circle - how to polish your Google+ Personal Learning Network



The recently introduced "Share this Circle" feature on Google+ is proving to be very useful for facilitating student networks. Since this feature...

- Discussions on Google+
- Bye Bye Billy

Nature - Issue - nature.com science feeds

- One up, one down
- Blackened names
- Heritage threats

Gatsby Plants | Plant News feed

- Plants 'confused' by late summer heat
- Autumn colours in North America and Europ
- Europe's First Biomass Exchange to Open i November

BBC News - Science & Environment

- Europe to lead daring Sun mission



The European Space Agency approves the Solar Orbiter mission, a joint venture with Nasa to study t Sun from a position closer to our star than...

- Nobel for expanding Universe find
- Cleaners set to spy on dopers

Weather

Leicester, Leicester

18°C Current: Clear
Wind: W at 40 km/h
Humidity: 40%

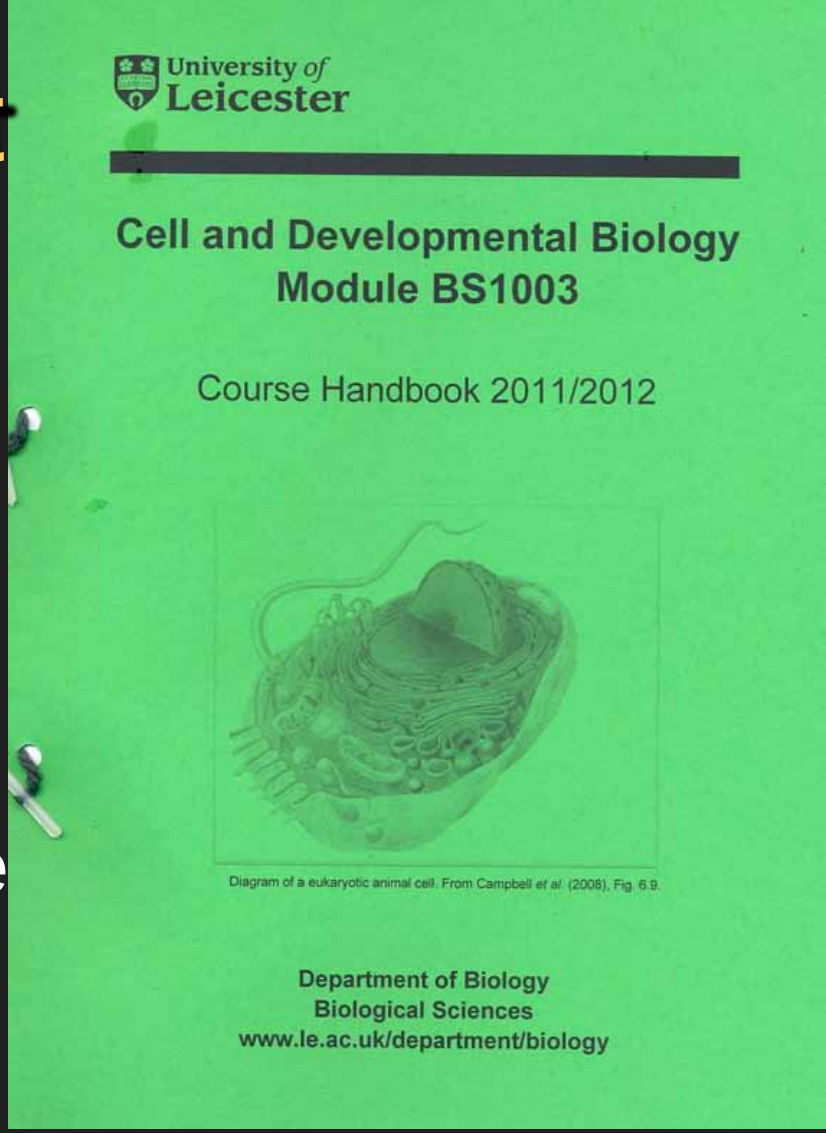
Tue	Wed	Thu	Fri

The Module Booklet

- Collect from Biology Department office Top floor of Adrian Building

Find Out

- Your Practical time for Friday's practical
- Your Tutorial Group and time



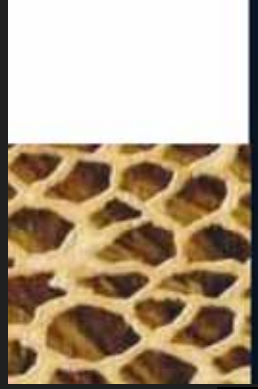
Practical on Friday

- Read Practical in Module Booklet
- Bring Module Booklet and Lab Coat

macromolecules (dead) vs cells (alive)

What are living things?

- All living things are made of cells
- Cells are the basic units of life
- Cells originate from other cells





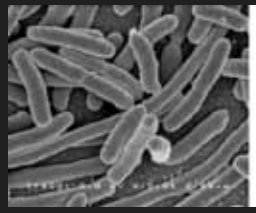
The Cell Theory

1838 Schleiden and Schwann

Foundation of modern cell and developmental biology

The Living Kingdoms

- Prokaryotes
  - Bacteria, mycoplasmas, blue-green algae

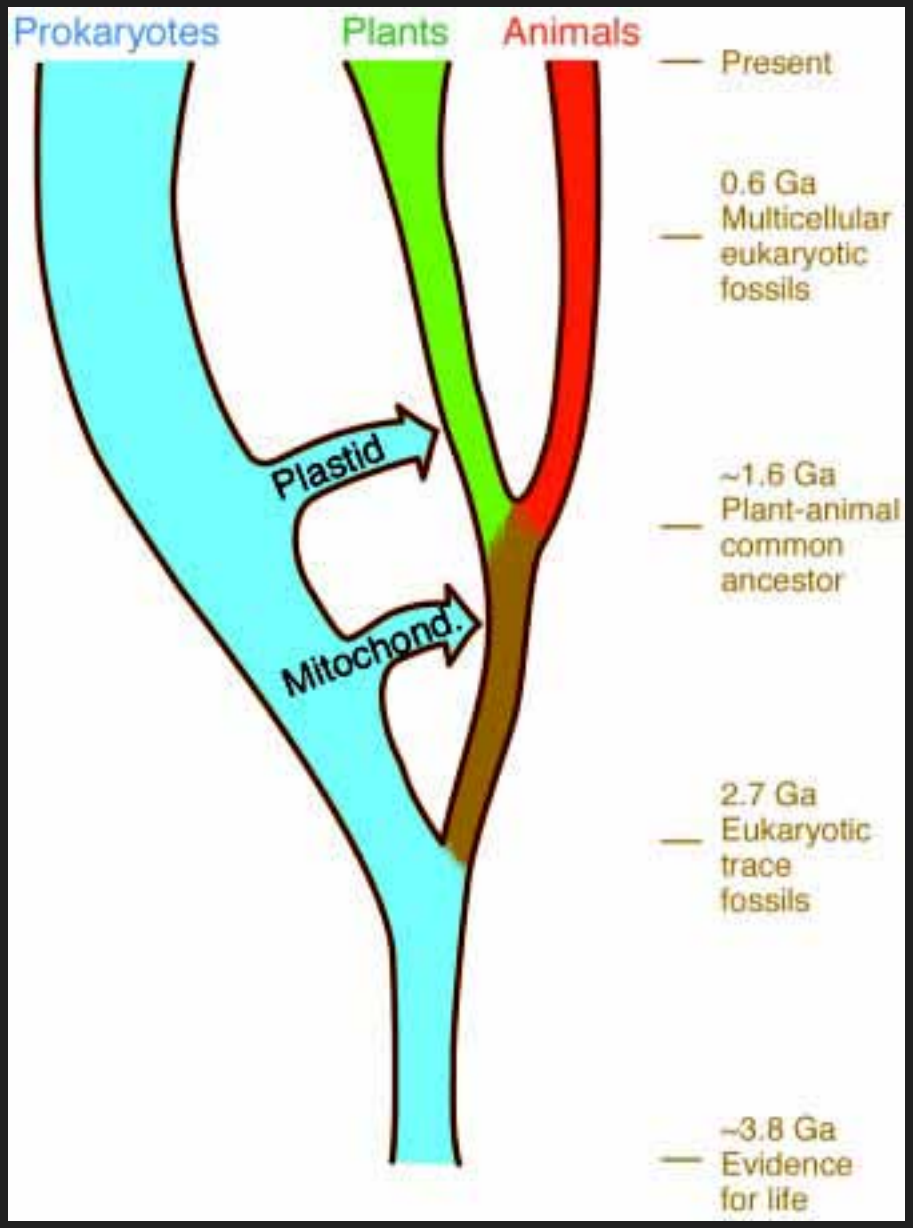




- Eukaryotes
  - Animals
  - Plants
  - Fungi

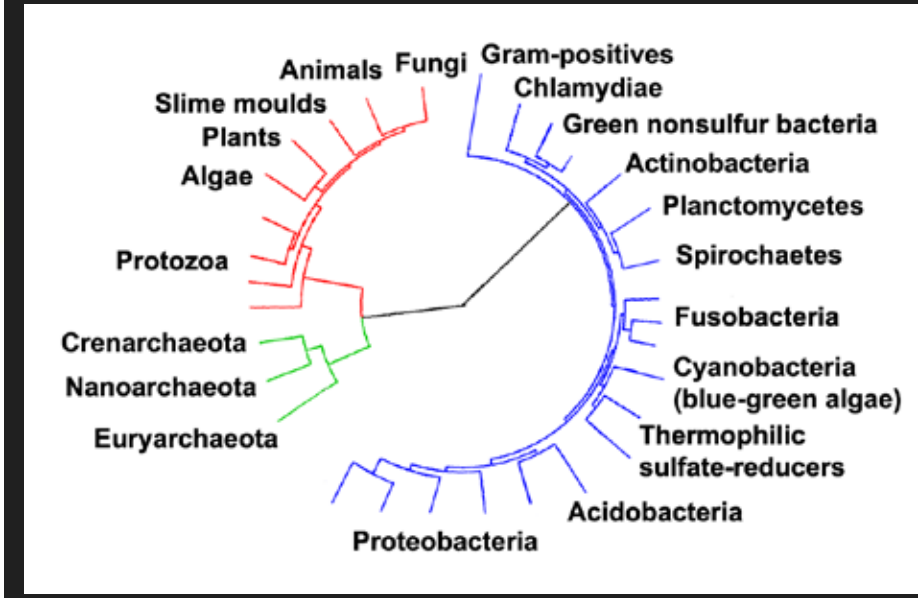



Evolutionary perspective



Plants and animals diverged ~ 2 billion years ago from a common single celled ancestor

Independent evolutionary routes to achieve multicellularity



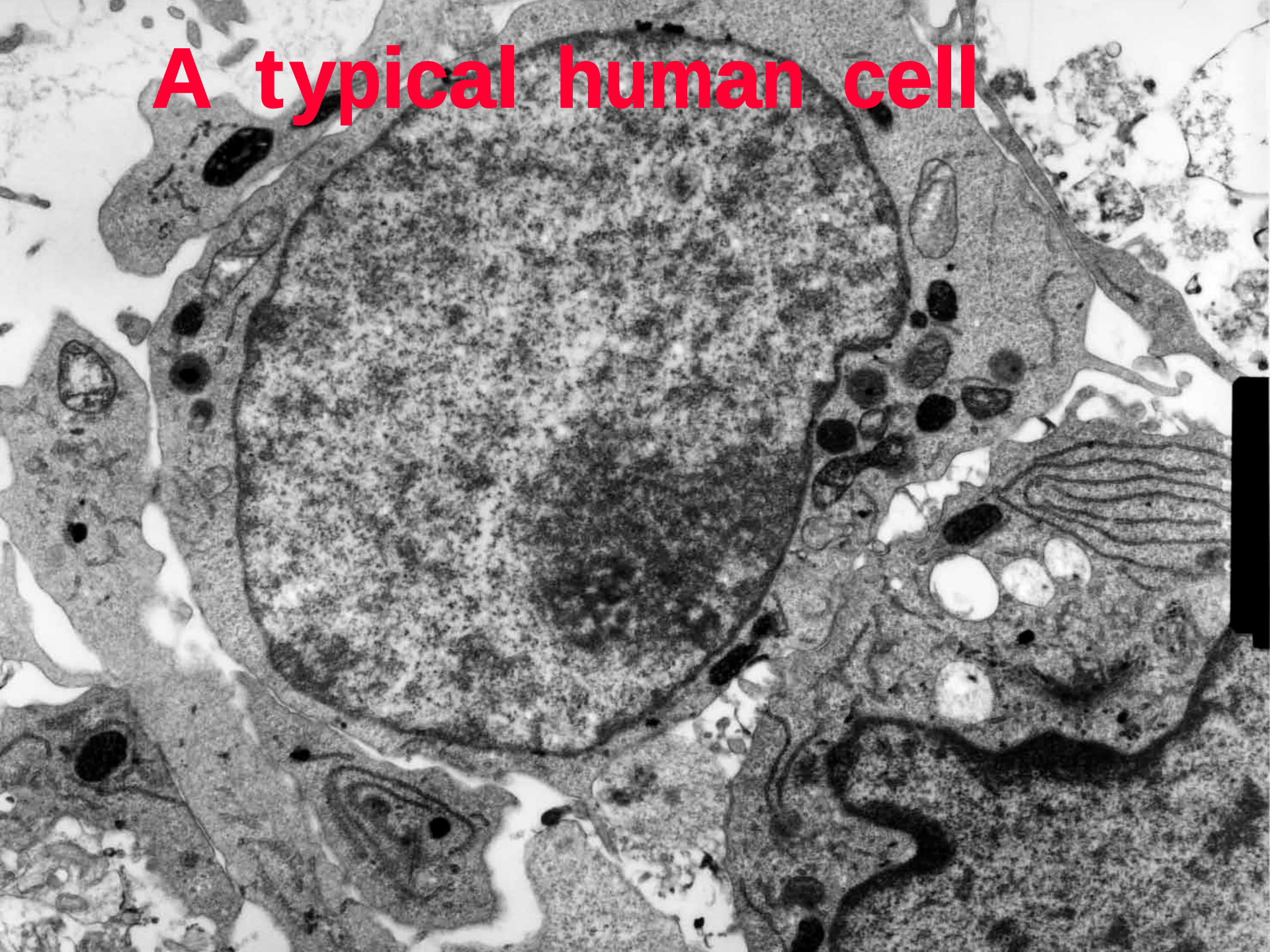
Meyer Science 245 (2002)

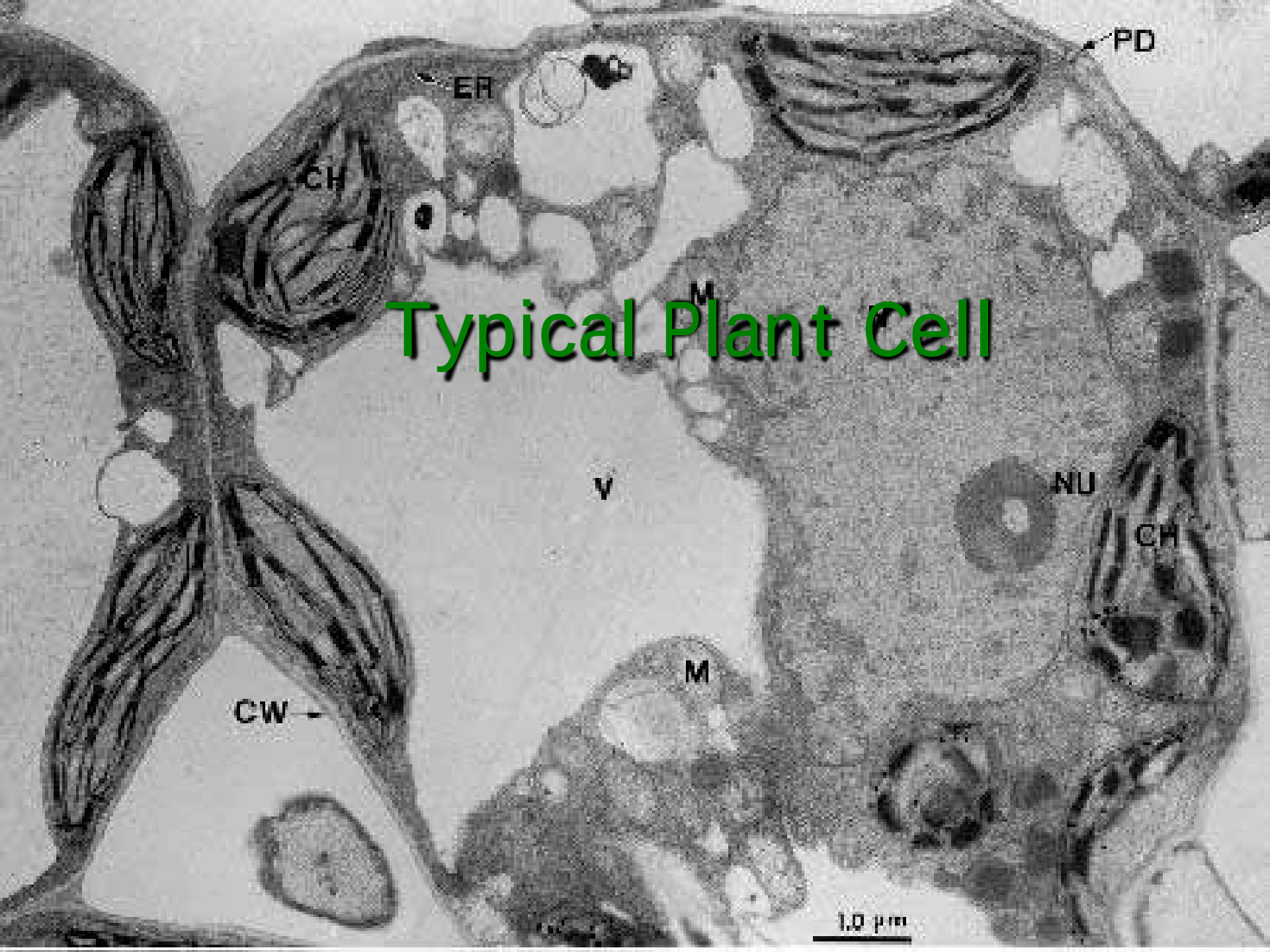
Cells – Animal and Plant



Also: Fungi & Bacteria

A typical human cell





Typical Plant Cell

Scanning Electron Microscopy

Cosmos pollen on stigma





Penicillin

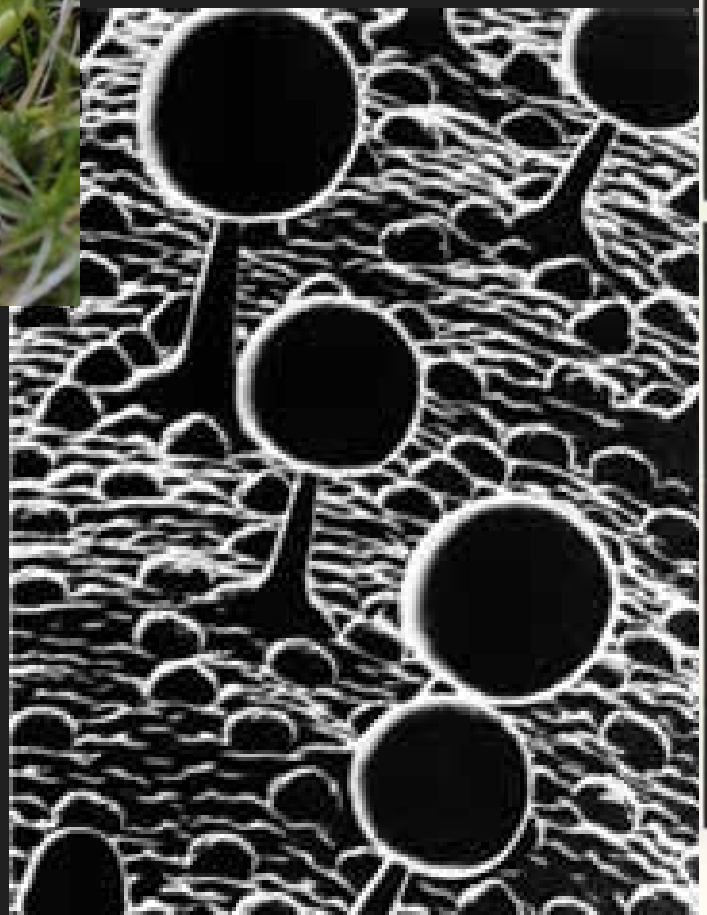


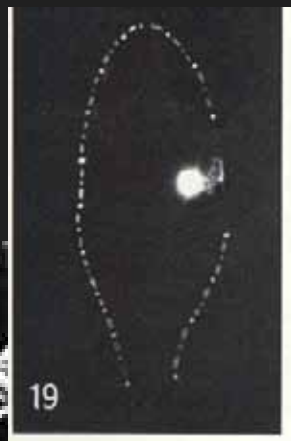
Y Heslop-Harrison / SC Hyman NS Allcock

SEM and Cytochemistry



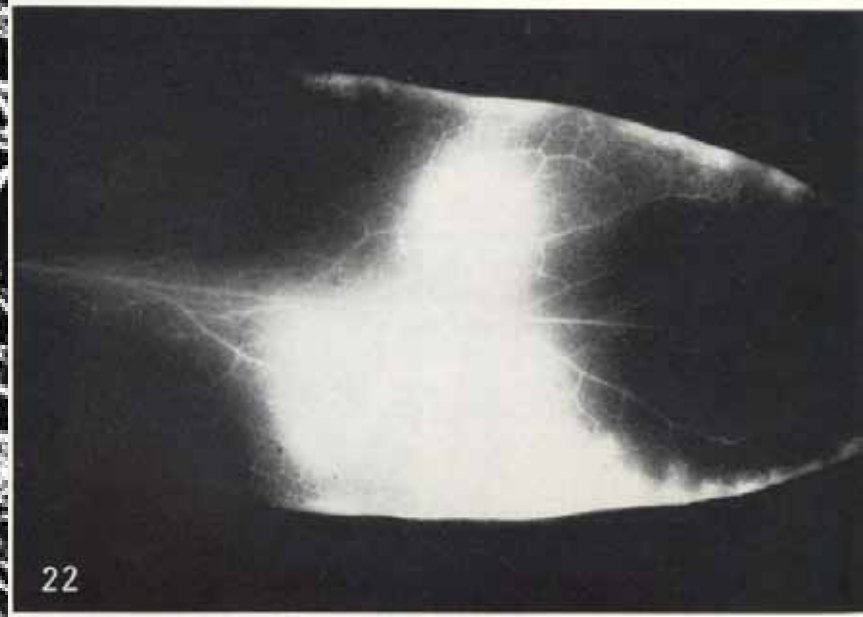
Carnivorous plant
Pinguicula
digestion and uptake





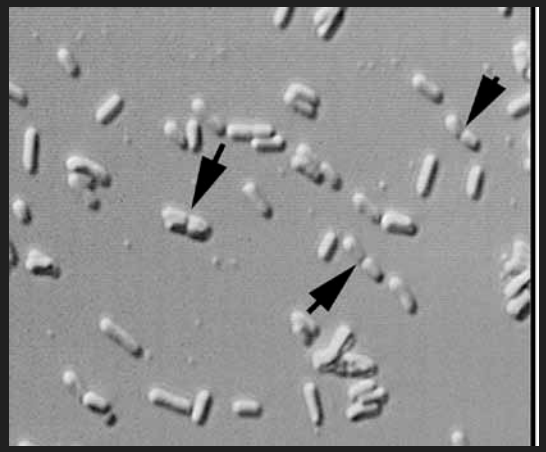




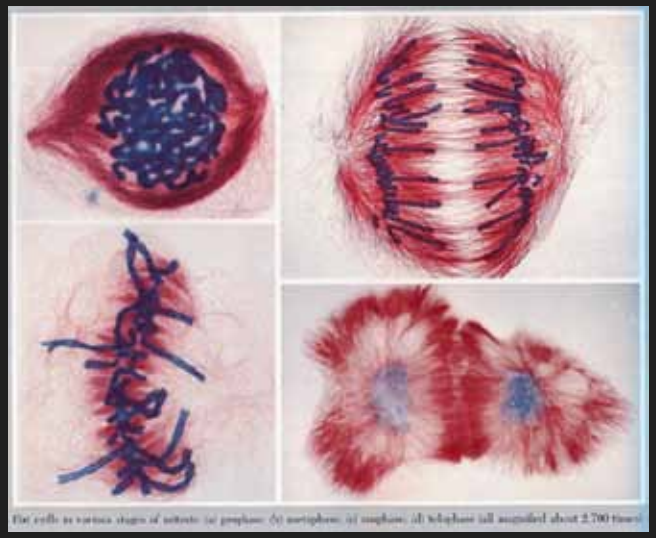


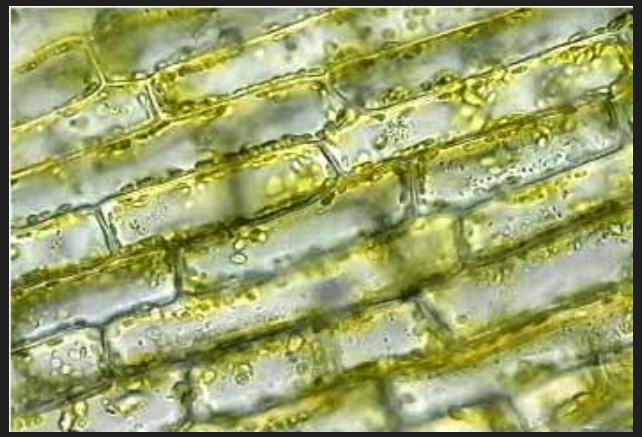
Figs. 19–21. Macroautoradiographs of leaves of *P. grandiflora* excised 2, 4 and 8 hr after feeding with ^{14}C-labelled protein. A needle-point load of protein was placed to the right of the midrib in each case, except that in the leaf of Fig. 21

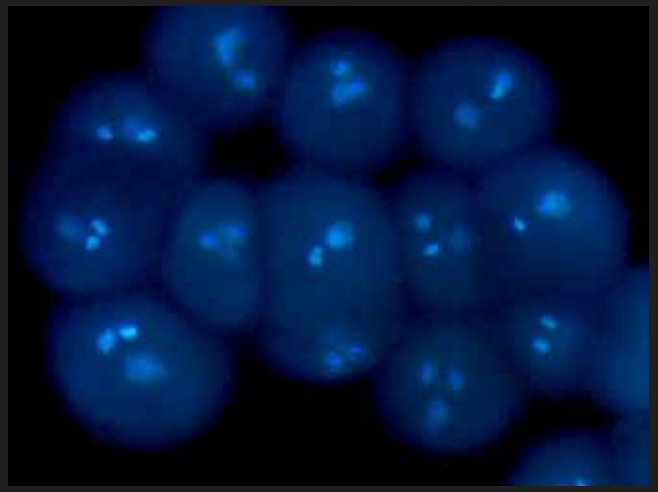
Light Microscopy



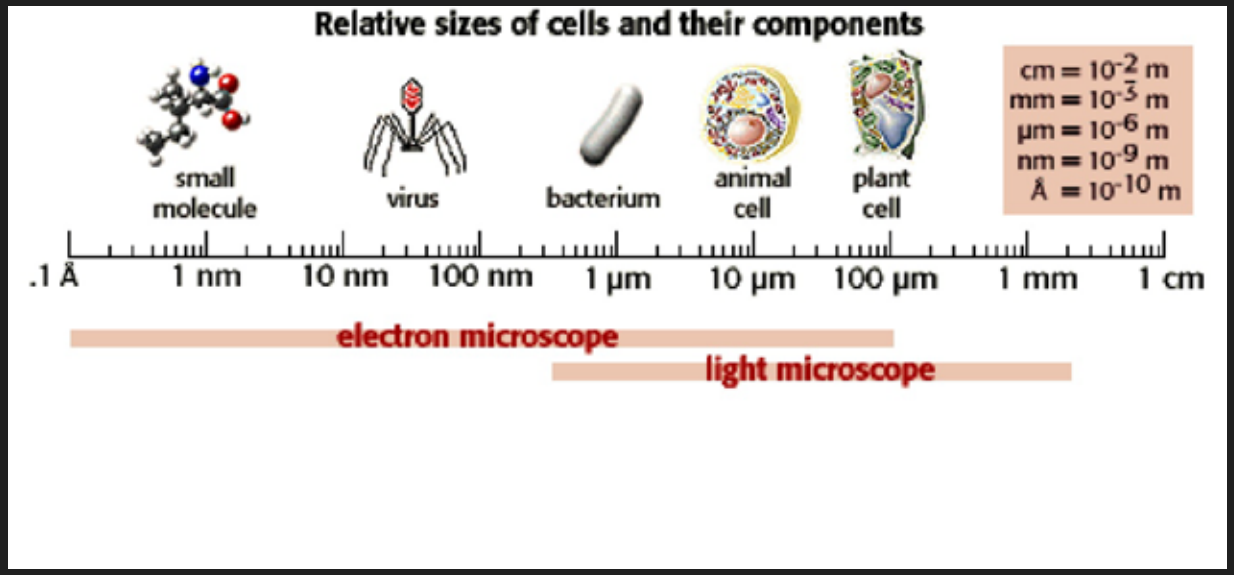








Relative sizes



From http://pc65.frontier.osrhe.edu/hs/science/bcell1.htm

BS1003 Cell and Developmental Biology (BS1003)
Announcements
Course Information
Contacts
Course Documents
Assignments
Exam information
Communication
Google+
Groups
Tools

COURSE MANAGEMENT
Control Panel
Course Tools
Course Links
Evaluation
Users and Groups
Customisation

Announcements

Create Announcement

Groups

DO YOU KNOW WHICH PRACTICAL AND TUTORIAL GRO[illegible] ARE IN?

CHECK THE LISTS UNDER COURSE INFORM[illegible]TIO[illegible].

UNLESS YOU HAVE AN ACCEPTABLE [illegible]ON,

YOU WILL NOT BE ABLE TO [illegible]NG GRO[illegible]

PLEASE SEE PENNY BUTLER IN ADRIAN 329 IF YO[illegible]VE [illegible] PROBLEMS WITH GROUPINGS.

Each student will h[illegible]e THREE tutorials,

on[illegible]n ea[illegible]ve[illegible] beginning:

17 th [illegible]er, [illegible]th [illegible]ber and 31st Octoberr 2011.

The[illegible]a[illegible]e[illegible]ed. Attendance is compulsory.

PLEASE COL[illegible]CT A MODULE HANDBOOK FROM ROOM 329A ADRIAN BUILDING.

Blackboard

Access to lecture notes

Blackboard

http://www.le.ac.uk/

“Blackboard”

Login with central filing system account name/pw

BS1003

What is Cell and Developmental Biology all about?

- **Cell functions**
  - Grow
  - Divide
  - Synthesize molecules
  - Use energy
  - Generate energy
  - Interact with neighboring cells
  - Respond to environment

- **Cell structures**

  what are the different cell types, organelles
- **Molecules**

  what type of molecules make up a cell and what are their roles in cellular processes ?
- **Cell interactions**

  how do cells interact with one another ?

  how do cells communicate ?
- **The Genome and Genomics**

  what type of genes are present in cells ?

  how are they regulated ?

  how are they organized ?

Learning at Leicester

- Lectures
- Tutorials
- Practical classes
- Assessment

Bringing together evidence
Problem Solving
Common approach in research and study

- What you can see
- What you can read
  - multiple sources
  - are these up-to-date?
- How do you collect data?
- How do you analyze data?

Robert Weinberg – MIT

MIT 7.012 Introduction to Biology YouTube

- "Perhaps the biggest goal of this course … is not that you learn the names of all the organelles and cells but that you learn how to think in a scientific and rational way. … be able to think logically about scientific problems."

Where do you learn about Cell Biology ?

- Lectures, practicals, tutorials …
- Textbooks
- Magazines, newspapers
- Journals
- Internet
- Social Media
- Talking
- Thinking

- We are flooded with information
- Information is not hard to find - we are drowning in it

- One challenge is filtering all that information: what is important and what is not important
- Another challenge is using all that information

- Some types of virtual learning methods are as effective as live teaching, perhaps even more effective. [**Open educational resources]** will not easily replace a lab practical or social training. It may be more useful for acquiring knowledge than skills or attitudes.

Anka Mulder President of the OpenCourseWare Consortium

Learning at Leicester

- Lectures
  - Team taught
  - By researchers at the forefront of their field

Learning at Leicester

- Tutorials
  - Small groups (8-10)
  - Highly interactive
  - Discussions and presentations
  - Essay

Tutorials

- You are assigned to ONE of the BS-1003 tutorial groups
- You stay in this group for 3 sessions
- You MUST find out which tutorial group you are in, the time at which that group has its tutorial, and the location for the tutorial (Blackboard)
- The tutorials start in WEEK 3 (from 17 Oct).

Textbooks

- No particular one is 'essential' but you need one!
  - Each has its own strengths/ weaknesses
    - some for all users: dated, unillustrated or only 'artistic' illustrations, inaccurate, ...
    - others for you: medical, biochemical, genetical ...
- How to choose?
  - Look at several
  - Think of a question and see if the book answers it
  - Does the style make you want to read more?
- Study skills

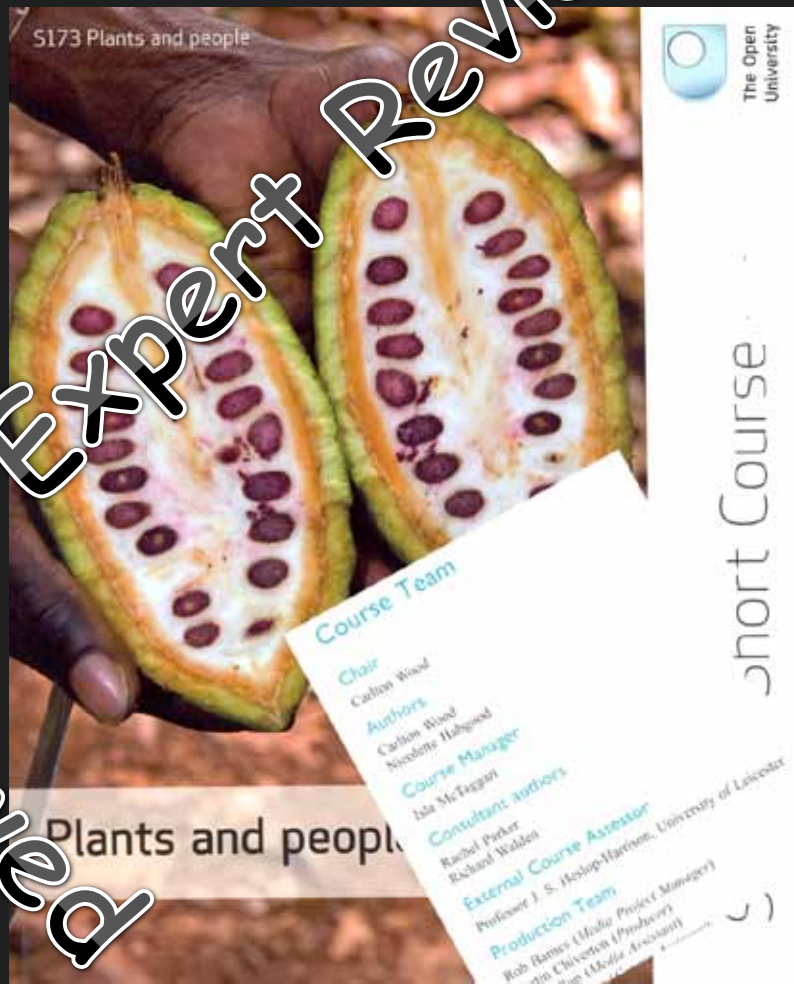
Brooker et al. OR Campbell et al.

Internet Resources: Reference

- Associated with textbooks
  - www.brookerbiology.com
  - www.campbellbiology.com
- Lab websites
  - www.molcyt.com
- Wikipedia
- YouTube

Maybe Unreviewed

Expert Reviewed



How Twitter will revolutionise academic research and teaching

Social media is becoming increasingly important in teaching and research work but tutors must remember, it's a conversation not a lecture, says **Ernesto Priego**

Tweet 442

Recommend 131

reddit this

Comments (0)

Ernesto Priego



Higher Education Network

Technology · Research · Teaching · Academics · Social media



How iTunes is helping the University of London reach a global audience
Prof Roger Kain

Location: S:\

Pathh1 Pat Heslop-Harrison
How Twitter will revolutionise academic research and teaching gu.com/p/3xy6q/tw via @guardian
Sep 29, 1:10 AM via Tweet Button

Social Media Resources

- Google+
- Blogs
- Facebook
- Twitter

My Google+ name is Pat Heslop-Harrison

I plan to use Google+ including the keyword BS1003 for this course

See links on Google+ to some nice YouTube videos of cell division and dances!

My twitter name is pathh1

TweetDeck v0.38.1

All Friends

11 Most Threatened Sea Turtle Species Identified sns.mx/Tng0y4

5955

• aScienceWorld, [+] Tue 04 Oct 17:49 via SNS Analytics

Secrets of the human genome disclosed: Secrets of the human genome disclosedNature News , 04102011 doi: 10.1038... bit.ly/oMnEYd

248494

• NatureNews, [+] Tue 04 Oct 17:35 via twitterfeed

USDA Blog: Managing Risk: Key to Climate Change Adaptation for Resource Managers (Part One) ow.ly/1eYyCk

45300

• USDA, [+] Tue 04 Oct 17:31 via HootSuite

A 10-year Plan for Plant Science Begins to Take Shape danforthcenter.org/wordpress/?p=7... - @DanforthCenter

345

Search: annbot

Plant bloggers might be interested in Blog Action Day. This year's topic is food. http://t.co/htE8lb0V I'm looking to see what we can do /AS

RT @annbot: Another look at science graduates: how many go into science | @scoopit http://t.co/MFTOV1bh

• PlantEncyclpdia, [+] Mon 03 Oct 22:54 via Scoop.it

RT @annbot: Toxic garden plants: How to Grow a Beautiful But Deadly Garden | @scoopit http://t.co/eSoFHq1j

• NatureExchange, [+] Fri 30 Sep 13:43 via Scoop.it

Secrets of artificial leaf revealed | @scoopit http://t.co/FHckCNn7

• OxfordJournals, [+] Fri 30 Sep 15:56 via TweetDeck

Search: pathh1



Innate and Adaptive Immunology: illustrated explanation of 2011 Nobel Prize winning work http://t.co/YEbNnvBs

• Pathh1, [+] Tue 04 Oct 16:48 via Tweet Button



Global trend too: don't expect 50% Africa and 30% Asia as farmers. RT @CarolineFW: Young ppl value their social lives need to adapt #fwconf

• Pathh1, [+] Mon 03 Oct 20:06 via TweetDeck



Rice breeding brings billions to SE Asia: http://t.co/3wQVfkWc via @AddThis

• Pathh1, [+] Thu 29 Sep 12:43 via Tweet Button



FOOD: the topic for Blog Action Day 2011, a global discussion about Food. I'll have something on AoBBlog.com http://t.co/3VhV0dP5 #Bad11

Learning at Leicester

- Practical classes
  - "Real" laboratory environment
    REAL experiments
  - Work in groups (2 or 3) – scientific interaction
  - Answers written individually
  - Highly interactive
  - Presentation of data

Learning at Leicester

- Practical classes
- Practical answer sheets
  - Discuss with your demonstrator (PhD student/post-doc who works with group of c. 16 students)
  - Aim of questions is to help you learn
  - The aim is NOT assessment /discrimination in 1st year
  - You should be getting close to full marks if not find out where you went wrong



BSI003

Practical Class

Light in plant development

Friday Practical

- Find out your group
- Bring your module handbook
- Read your module handbook
- Look at YouTube video – search BS1003









Where do you learn about Cell Biology ?

- Talking
- Discussions
- Your own study and reading
- THINKING !! ASKING QUESTIONS??

- Blackboard
- Lab coats on Friday for the practical Lectures: Bennett Link

Cell and Developmental Biology Module BS1003

Cell and Developmental Biology

1.Introduction

2.Animal CDB

3.Plant CDB

Dr Alex Patel

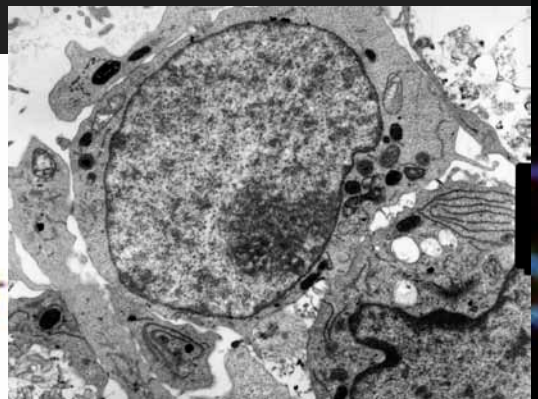
@le.ac.uk

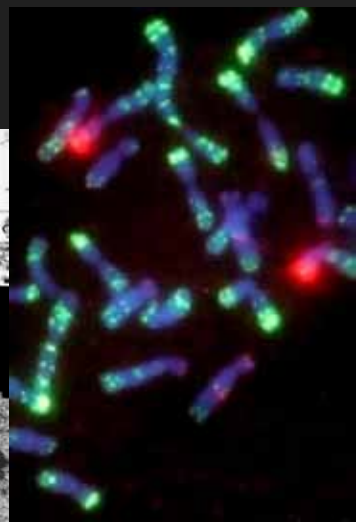


Prof Pat Heslop-Harrison

phh4@le.ac.uk

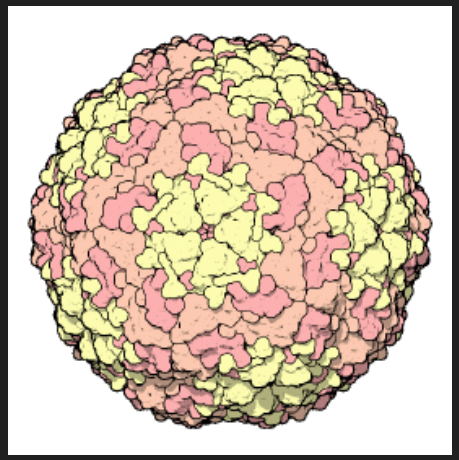


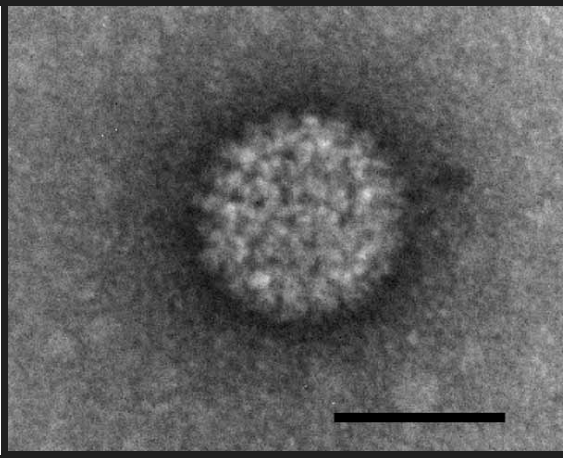


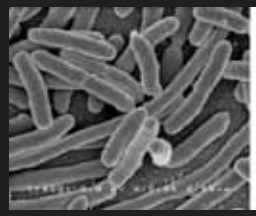


PHH: My use of Powerpoint Slides

- In general, I will talk about slides with illustrations
- Slides with only bullet points
  - Review what I have said
  - Remind ME if I have got away from the points I want to make
  - Help YOU with notes
- Lectures are not passive like following textbook pages – I try to interact!













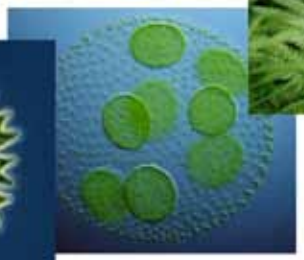


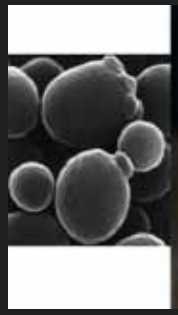


















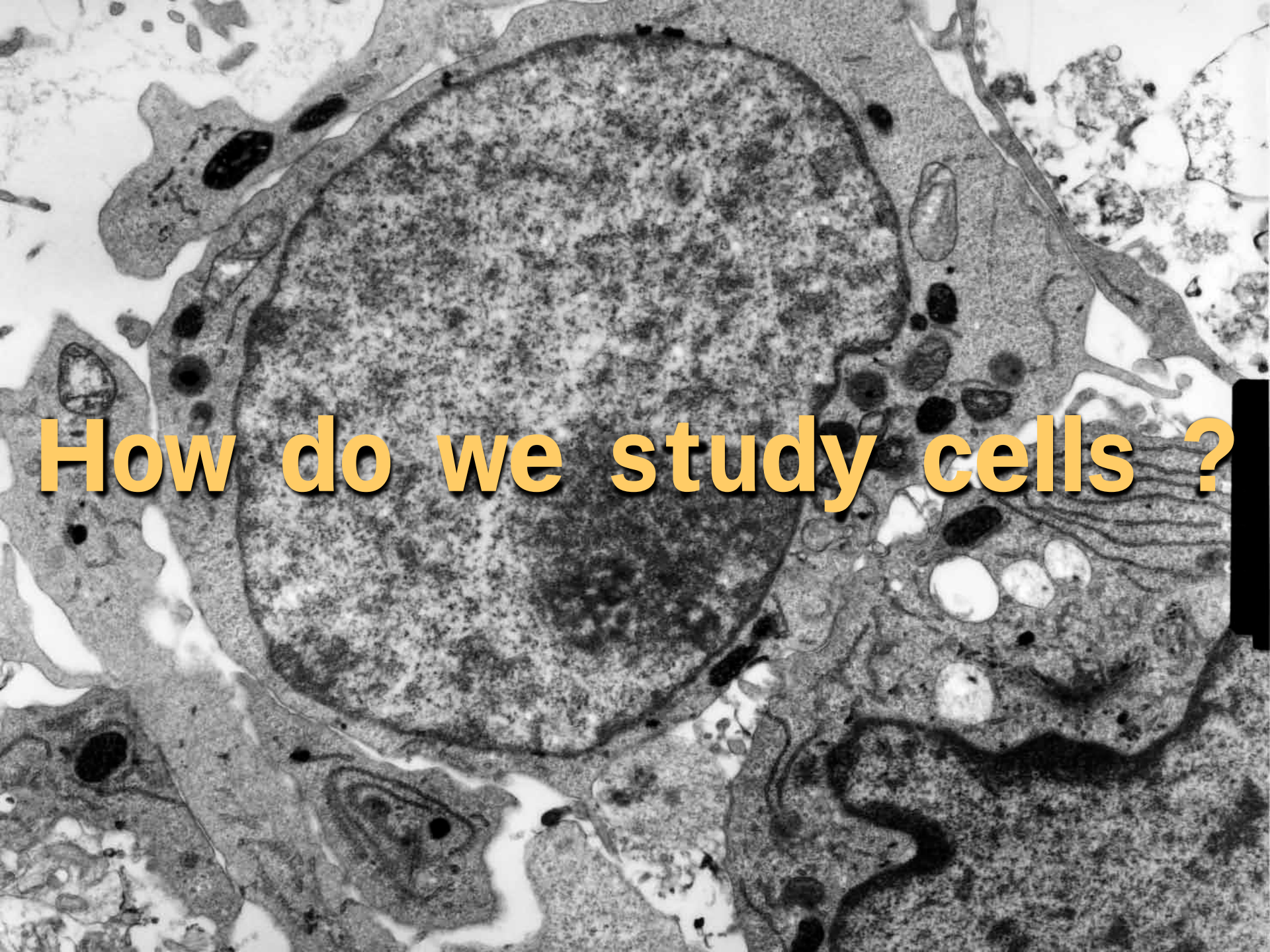




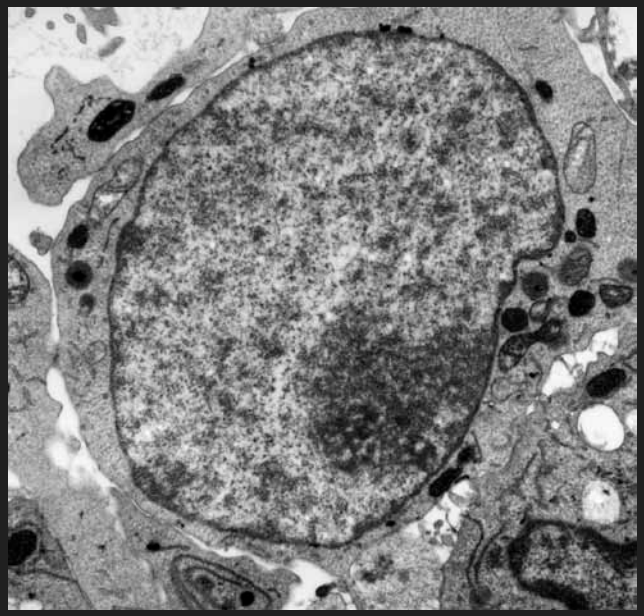
Chemical composition of a cell

Water	70%
Ions	1%
Sugars	1%
Fatty acids	1%
Amino acids	0.4%
Nucleotides	0.4%
Other small molecules	0.2%
Macromolecules	26%

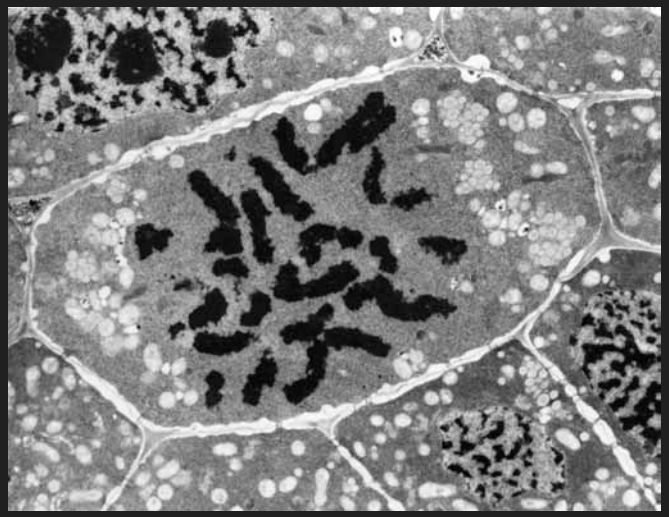
Bacterial cell; From Alberts et al. p.43

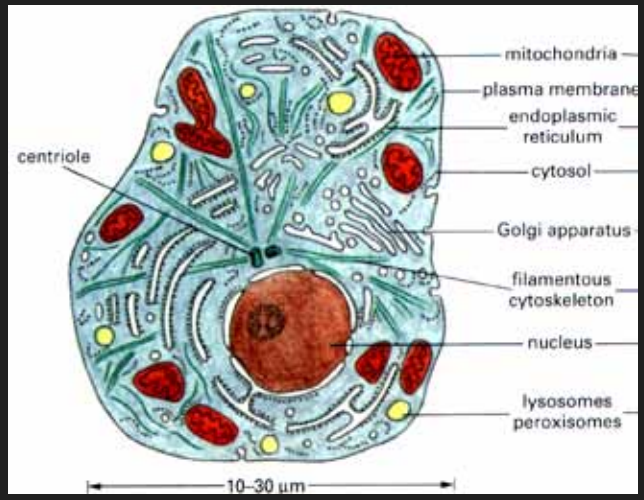

How do we study cells ?

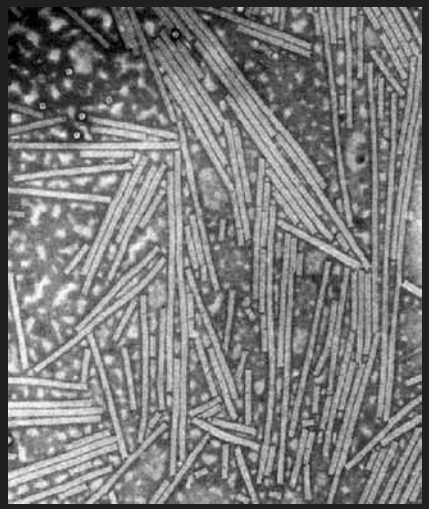
Transmission Electron Microscopy



Dividing cell







Plant virus

Assessment

Hints:

- Look at what is needed at each mark/degree class
- Attending lectures and “cramming” is not enough
- Look at the feedback you get carefully
- Reading outside the lectures
- Self-driven
- Following courses build on previous
- CURIOSITY and THINKING