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About the Institute
The Hunt Institute for Botanical Documentation, a research division of Carnegie Mellon University, specializes in the history of botany and all aspects of plant science and serves the international scientific community through research and documentation. To this end, the Institute acquires and maintains authoritative collections of books, plant images, manuscripts, portraits and data files, and provides publications and other modes of information service. The Institute meets the reference needs of botanists, biologists, historians, conservationists, librarians, bibliographers and the public at large, especially those concerned with any aspect of the North American flora.

Hunt Institute was dedicated in 1961 as the Rachel McMasters Miller Hunt Botanical Library, an international center for bibliographical research and service in the interests of botany and horticulture, as well as a center for the study of all aspects of the history of the plant sciences. By 1971 the Library's activities had so diversified that the name was changed to Hunt Institute for Botanical Documentation. Growth in collections and research projects led to the establishment of four programmatic departments: Archives, Art, Bibliography and the Library.

K 1979 K

JANUARY

S	M	T	W	T	F	S
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FEBRUARY

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MARCH

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APRIL

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MAY

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JUNE

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JULY

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AUGUST

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NOVEMBER

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Biological Sciences

April 27 – May 22. 1953

Lec. 1. ✓ 4-27 ✓ 7-23, 1953 12-8 ✓ 53
Introduction
- Protoplasm
- Life
- Origin of Plants & Animals
- Age of Earth. Man
- Atoms – size

The phyla – Plant – Animal
Differentiate Plants & Animals

Animal ← C H O N S P → Plant
? ? Virus, Bacteriophage, Rickettsiae

Lec. 2. 4-29 ✓ light trouble 7-24 ✓ 12-10 ✓
- Properties of Protoplasm
- Living vs Non-living
- Vitalism vs Mechanism
- Abiogenesis – Pasteur

Plant vs Animal cont'd.
"Recipe" for a living organism.

Lec. 3 5-1 ✓ 7-27 ✓ 12-12
- Plant vs Animal Cells –
- Survey of Algae } Blue Green – Green – Brown – Red Diatoms

characteristics of each gp.
economic uses

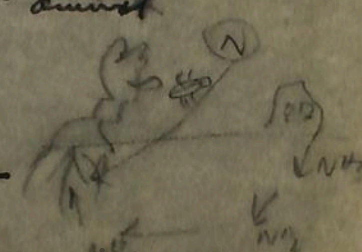
Lec. 4 5-4 ✓ 7-28
- Algae concluded } material shown: living green & blue-green algae.
  ✓ dried brown, red. diatomaceous earth (Berkfield filter)
- Fungi – "define" – groups:

Basidiox

Lec. 5 ✓ 5-6 7-29 } Condensation – chief characteristics of Phyla.
Fungi cont'd. } Phycos, Asco, Basidio, Deutero — examples.
Importance of fungi as a whole. Decay, antibiotics, Pathogens < plant, animal

Lec. 6. ✓ 5-8 (Lámpás) 7-30 53
Bacteria < Morphology, Physiology, Importance.
Photosynthesis – Demonstration – chlorophyll separation

Nitrogen Cycle.



Lec. 7 5-11 ✓ Photosynthesis } Pigment separation
chlorophyll } xanthophyll } Carotene } Petroleum Ether } Demonstrate
Equation
Significance of process.

Lec. 8 5-13 } Respiration < aerobic / anaerobic
Digestion (enzymes)
Transpiration < danger to plant / usefulness

Lec. 9 5-15 Fundamental Tissues } Meristem Parenchyma Epidermis Sclerenchyma — Vascular (xylem phloem (Tracheid Vessel
Root Structure

Lec. 10. 5-18. (heavy rain + 1/2 class absent) Stem
Leaf
Moss (begun)

Lec. 11 5-20 ✓ Moss / Fern — compare: } Thallophyta Bryophyta Pteridophyta

Lec. 12 5-22 ✓ Spermatophyta { Gymno < conifer flower structure — metagenesis
Origin < monocot / dicot

Review: Sum up

Sept.	Oct.	Nov.	Dec.	Jan.	
6	14	12	3	8	35
			[redacted]		14
			6		49

Zoology: 71% –

Botany: 29% +

Bio Sci Lecture Schedule 1953-54

Biological Sciences — Dec. 8 — Jan. 21, 1954

(14 sessions)

Lec. I. Dec. 8, 1953

ORIGINS } → CHONSPMg
PROTOPLASM
LIFE
ANIMALS ← – – → PLANTS
VIRUS BACTERIOPHAGE

ATOMS - MOLECULES } LIFE
EARTH 2 × 10⁹ YRS. } U/Pb .. BISHOP USHER 4004 B.C., etc.
MAN 10⁶ YRS } in EMPIRE STATE BLDG ANALOGY

② 10 — Introduction cont'd.
Living vs Non-living
Plant vs Animal } criteria

③ 12 — Algae } Blue-green, Green, Brown, Red — characteristics of each. Economic importance } Show living Blue-green & greens; Dried Brown, Red.

④ 15 — Diatoms — Lompoc, Cal. used as filters - abrasive - "fire brick" etc.
Bacteria } Morphology, physiology, N cycle — Parasites & Saprophytes

⑤ 17 — Fungi — Demonstration of larger Basidios

⑥ 19 — Photosynthesis } separation of pigments

Jan.

① 5 — Respiration } Aerobic, Anaerobic — Release of Energy, intracellular
Digestion } Enzymes — Specific, Catalyst, heat labile } metabolic activities

⑧ 7 — Fundamental Tissues } Meristem, Epidermis, Parenchyma, Sclerenchyma, Vascular
Root structure to illustrate

⑨ 9 — Stems

⑩ 12 — Brief review: Root, Stem — Vascular System; then Leaf

⑪ 14 — Bryophyta - 20,000
Pteridophyta, 5,000

⑭ 21 — Kodachromes

⑫ 16 — Spermatophyta - 200,000.

⑮ 25 – 27 } Final Exams

⑬ 19 — Spermatophyta cont'd; General Review

Biological Science

April 21 – May 22
1954
(M, W, F. 2-3 PM)

Lec. 1. – Introduction.
4-21. "Origins"
{ Organization
S → R
Physical properties: sol ⇄ gel
H_2O

2. – Protoplasm – characteristics (common denominator) } majority of class have never used a microscope.
4-23. Abiogenesis – "Redi's"
Vitalism vs. Mechanism } atoms → molecular → organic compds → Protoplasm (Life) → cells → tissues, organs, systems
3.
4-26 – Living vs. non-living } criteria Begin survey of Thallophyta — Algae < B-G, G, etc
Plants & animals
4.
4-28 – Plant vs Animal } as organism & cell
Survey of Algae begun: B-G, G.

5.
4-30 – algae completed

6. – Bacteria
5-3 completed by N cycle {metric System μ.

7. Bacteria – Fungi begun
5-5

8. MEET IN ~~[illegible]~~ GEOLOGY 115 TODAY ONLY.
5-7 FUNGI.

9. PHOTOSYNTHESIS
5-10.

10. RESPIRATION
5-12 DIGESTION
TRANSPIRATION

11. LEAF } EMPHASIZE
5-14 STEM } VASCULAR SYSTEM
ROOT

12. MOSS } METAGENESIS
5-17 FERN

13. FLOWER STRUCTURE – REPRESENTATIVE OF SPERMATOPHYTES.
5-19 ♂ ♀ GAMETOPHYTES
FERTILIZATION
SEED → FRUIT

14. SLIDES } ALGAE → SPERMATOPHYTA. } LSU CAMPUS (1 SLI.) {GYMNOSPERM, ANGIOSPERM}
5-21 FUNGI NEW ENG.
BRYOPHYTA FLA.
PTERIDOPHYTA PANAMA & CANAL.
B.A.

EXAM
5-21: 2-10 AM

July 19 1954

Biological Science - Botany Lectures

7:30 AM
Packer Aud.

July 19 - Introduction < CHONSP plant vs Animal

20 < Plants { Phyla cellular differences
Animals { Phyla

21 - Algae { B-G, G, B, R.

Algae { show specimens { B-G G B R

22 - Algae concluded. Bacteria ----> (class moved to Audubon 102 - large fan available)

23 - Fungi

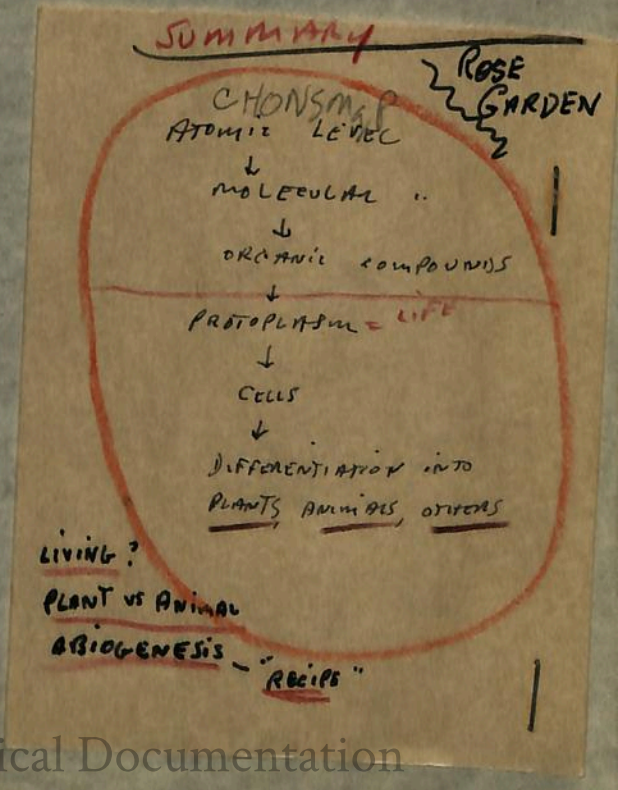
26 = Photosynthesis
Respiration

27 - Respiration - leaf structure & photosynthesis

28 = Stem Moss
Root

29 Figure Flower } metagenesis

30 Slides



Biological Science

Botany

Dec. 7, 1954
Jan. 21, 1955

Lecture (1) - Dec. 7-8

(a) Origins } Earth
Elements
Problems
Abiogenesis

(2) - Dec. 9-10

Review: C H O N S P Mg Ca
Protoplasm
Plants ↔ Animals
?

Vitalism vs Mechanism
Living vs Non-Living } how to "make" a living thing
Plant vs Animal

(3) - Dec. 11, 13

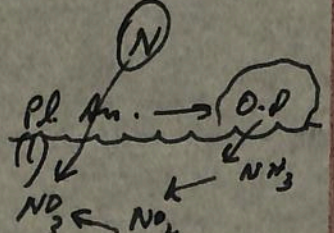
Plant Cell characteristics
Thallophyta
Algae } B-G
" Chlorella as Food } a world problem
Pigments } G B R D } Living & mounted specimens.
Agar.

(4) Dec. 14-15

Diatoms } chamberlain filter
uses for Diatomaceous Earth
Bacteria - Leeuwenhoek 1683
Pasteur
morphology physiology } important to man

(5) Dec. 16-17

Nitrogen Cycle



Bacteria & Fungi
Fungi = mycelium, spores
groups
characteristics
importance

(6) Dec. 18
Jan. 3 } Complete Fungi
and Bacilli } examples
Bacteria
Economic import.
Diseases
antibiotics

Photosynthesis ∴ E:
Equation
Pigment absorption &c.

(7) Jan. 4-5 Respiration } E relationships
aerobic
anaerobic
Relation to Photosynthesis
Digestion } Insoluble → soluble
Enzymes

(8) Jan. 6-7 - Tissues
Root Structure

(9) Jan. 8-10 - Root reviewed
Stem structure
function

(10) Jan. 11-12 - Review vascular system } root, stem
Leaf & photosynthesis
Structure

(11) Jan. 13-14 - Transpiration in relation to leaf structure
Bryophyta } Cycle

(12) Jan. 15, 17 - Review mon.
Pteridophyta
Outline Spermatophyta

(13) Jan. 18-19 - Review Fern
Spermatophyta
↓
Seed
Fruit

(14) Jan. 20-21 - Slides } Jan-21. Review 61M

Biological Science

Lecture Schedule 1955.
April - May

Lec. #

1. Introduction: Earth < Age, Evolution of Life, Man recent — Elements, molecules, Organic, Protoplasmic, Cellular → Plants & Animals, Viruses
April 20 WED.

Analogies: WBAZ Tower = geologic Time; Coin on top = man on Earth
Drop of H_2O. Expand to size of Earth, then atoms are the size of baseballs
Ancient Elements: air, Earth, Fire, H_2O.

2. 22 — Protoplasm. Living vs. Non-living. Criteria

3. 25 — Abiogenesis, Vitalism vs Mechanism } Plant vs Animal. Thallophyta; Algae: Blue-greens

4. 27 — complete Algae. Begin Bacteria

5. 29 — Bacteria completed — N cycle. Fungi begun

6. May 2 — Fungi completed. Photosynthesis begun

7. 4 — Photosynthesis completed. Respiration completed

F. 8. 6 — Digestion. Tissues

9. 9 — ROOT & STEM — VASCULAR SYSTEM

10. 11 — Review Root - Stem. Leaf - Complete structure & function } ie Photosynthesis

F. 11. 13 — Transpiration → Demonstration of vessels in Red Oak (Blow air H2O). Moss cycle begun " " observe of vessels in Pine. (Tracheids)

12. 16 — Moss, Fern } cycle. Sporophyte vs Gametophyte

13. 18 — Spermatophyta < Gymno, angio < monocot, Dicot etc. Flower, Fruit, Seed.

F. 14. 20 — Slides.

TH. — 26 — EXAM. 9 AM

Sci. at } George
hm }

et } Jackson
dm }

31.

BIOLOGICAL SCIENCE

December (22) — Lecture Schedule '54-'55

THIS Peabody 115

1 { TUES 7 < at-8, ct-10 } origin — ORIGIN OF EARTH, AGE 3 X 10^9, ELEMENTS EARTH, AIR, &c. 100 TODAY, LIFE, ABIOGENESIS, PASTEUR

MWF W. 8 < dm-11, hm-3 — P. 115 origin, Allen 108

2 { TH. 9 (Peabody 115) REVIEW
CHONS Pmg Ca → PROTOPLASM
PLANTS ... ANIMALS
INTERMEDIATES
10 (P. 115, Allen 108) VITALISM vs MECHANISM
F. PLANT vs ANIMAL

3 { S. 11 (all ag. inc.) COMPLETE PLANT CELL
THALLOPHYTA } NEG. CHARACTERS — ROOT - STEM - LEAF
ALGAE: B-G, G, B, R, D.
PIGMENTS { CHLOROPHYLL, CAROTENE, XANTHOPHYLL

3 { 13

4 { 14, 15
DIATOMS — LOMPOC, DIATOMACEOUS EARTH, FILTERS, INSULATORS &c.
BACTERIA
METRIC SYSTEM
MORPHOLOGY — SOLID MEDIA (agar)
PHYSIOLOGY — ANIMAL INOCULATION, SUGARS etc. } PATHOGENS OF MAN, ANIMALS, PLANTS

5 { 16, 17
N Cycle, Bacteria & Fungi } BENEFICIAL ASPECTS, IMPORTANCE TO ANIMAL & PLANT
Economic import. { Fungi — group characters } mycelium, spores
PHYCOS — POTATO BLIGHT (IRELAND)
ASCOS — YEAST - PENICILLIUM etc.
BASIDIOS — RUSTS - MUSHROOMS
IMPERFECTS — PATHOGENS - MAN

6 { 18
COMPLETE FUNGI
BASIDIO — RUSTS, MUSHROOM } SHOW SPORES, USE CALVATIA
IMPERFECTS
PHOTOSYNTHESIS — Pigment SEPARATION DEMONSTRATED

January (34)

6 { 3 (11, 3) AS FOR DEC. 18.

9 { 10 < AS ON 8th

12 { 17 AS FOR JAN. 15.

7 { 4, 5
RESPIRATION } ENERGY RELATIONS — AEROBIC, ANAEROBIC
PHOTOSYNTHESIS
DIGESTION } ENZYMES — PLANT & ANIMAL

10 { 11, 12
REVIEW VASCULAR SYSTEM OF ROOT, STEM
LEAF { PHOTOSYNTHESIS, STRUCTURE, EXTERNAL, INTERNAL

13 { 18, 19
Review BRYOPHYTA, PTERIDO —, SPERMATO —
FLOWER CYCLE → SEED, FRUIT

8 { 6, 7
FUNDAMENTAL TISSUES } COMPARE ANIMALS
FUNCTIONS { EPIDERMIS, MERISTEM, PARENCHYMA, VASCULAR } XYLEM < VESSEL, TRACHEID; PHLOEM
ROOT STRUCTURE

11 { 13, 14
TRANSPIRATION
BRYOPHYTA
MOSSES

14 { 20 Th., 21
SLIDES

9 { 8
Review root
STEM STRUCTURE, FUNCTION
TYPES, USES
STRESS VASCULAR SYSTEM & IMPORTANCE TO PLANT

12 { 15
REVIEW MOSS
PTERIDOPHYTA
FERN CYCLE
SPERMATOPHYTA
GYMNOSPERM - CONES
ANGIOSPERM - FLOWERS
MONOCOT
DICOT

15 (22) EXAM.
27 Th

JAN. 21. 6 pm
REVIEW
PORTER.

Biological Science 1 — Lecture Schedule — Spring 1956

Parker Auditorium

Lecture		
		April
2PM I	M. 30	— ORIGINS
		May
II	W. 2	— PLANT vs ANIMAL — NUMBERS LIVING vs NON-L. CELLS ABIOGENESIS
III	F. 4	— ALGAE
IV	M. 7	- ALGAE concl.
V	W. 9	- BACTERIA FUNGI
VI	F. 11	- Fungi concl. PHOTOSYNTHESIS BEGUN
VII	M. 14	- PHOTOSYNTH - RESPIRATION - ENZYMES
VIII	W. 16	- TISSUES }
IX	F. 18	- ROOT - STEM - LEAF } VASCULAR SYSTEM
X	M. 21	< METAGENETIS - TRANSPIRATION MOSS-FERN
XI	W. 23	— SPERMATOPHYTE < FLOWER FRUIT SEED
XII	F. 25	— 2 x 2

B.L.

Biological Science 1 — Lecture Schedule '55-'56

December (16)

I
- T. 13 — at 8 ✓ / ct 10 ✓ — INTRODUCTION (4 cot BC)
- W. 14 — bm 9 ✓ / hm 3 ✓

II
- Th. 15 — ✓ REVIEW & BEGIN ALGAE
- F. 16 — ✓ ✓ DEMONST.

III
- S. 17 — ALGAE ✓ B-G ✓ C B R
- M. 19 — ✓ DEMONST.

IV
- T. 20 — ✓ ✓ DIATOMS, BACTERIA, N-CYCLE DEMONST.
- W. 21 — ✓ ✓

January (32)

V
- T. 3 — FUNGI
- W. 4 — DEMONST. REVIEW N-CYCLE

VI
- Th. 5 — FUNGI - COMPLETED / PHOTOSYNTHESIS
- F. 6 — DEMONST. (CHLOR. SEPARATION)

VII
- S. 7 — PHOTOSYN. / RESPIRATION / DIGESTION
- M. 9

VIII
- T. 10 — TISSUES (ANALOGY WITH ANIMALS)
- W. 11 — ROOT STRUCTURE

IX
- Th. 12 — ROOT / STEM / LEAF
- F. 13 — "

X
- S. 14 — TRANSPIRATION / MOSS / FERN
- M. 16 — "

XI
- T. 17 — SPERMATOPHYTA / REVIEW / HETEROSPOROSIS
- W. 18

XII
- Th. 19 — SLIDES
- F. 20

FRIDAY 6 – 8:30 PM
REVIEW 375 ± ATTENDED.

OFFICE OF THE REGISTRAR

TO: Biological Science

SUBJECT: Classroom Assignment, 1st Semester, 1956-57 Jan. 7, 1957
assignment
DATE

This ~~will~~ confirm the ~~change~~ of classroom space for 1 final meeting
Jan. 22
release
Course Section

at 10:30-12:30 from ________ to Geology Aud., Parker Aud., Himes 111, Agro-Hort. 110

time days building room no. building room no.

bm B&I at, ct hm im DICK

Pigeron

DEN CIT GEORGE

________ Signature

Bio. Sci. — EXAMS

M. W. F. } 9 AM Sec. } JAN. 24 8 AM
bm } TUES.

M. W. F. } 8 AM Sec. } JAN. 27 1:30 PM
hm } FRI.

T. Th. S. } 8 AM Sec. } JAN. 23, 1:30 PM
at } MON.

T. Th. S. } 10 AM Sec. } JAN. 25 1:30 PM
ct } WED.

ALL IN AG. AUD.

SEPT. 1955

	M	T	W	Th	F	S
	9	8	9	8	9	8
mycology	10 3	10	10 3	10	3	10
Bta Sci.	2		2	6-10	2	

Bio. Sci. 1. Sec. at & ct : Dec. 13
Sec. bm & hm : Dec. 14
} ± 460 STUDENTS

{ bm - 128 hm - 109
at - 122 ct - 112 }

Biological Science

Dec. 11
12
begin

Sec. at ... 8 T Th S

ct ... 10 T Th S

bm ... 9 M W F

hm ... 3 M W F

im ... 4 M W F

521

Mycology

10 M W F

T Th

1-5 F

Dr. Lowry!
Dates to begin Biol. Sci. 1. → { B.S.1 bm, hm, im - Dec 12
B.S.1 at, ct - Dec 11

Numbers of students in sections

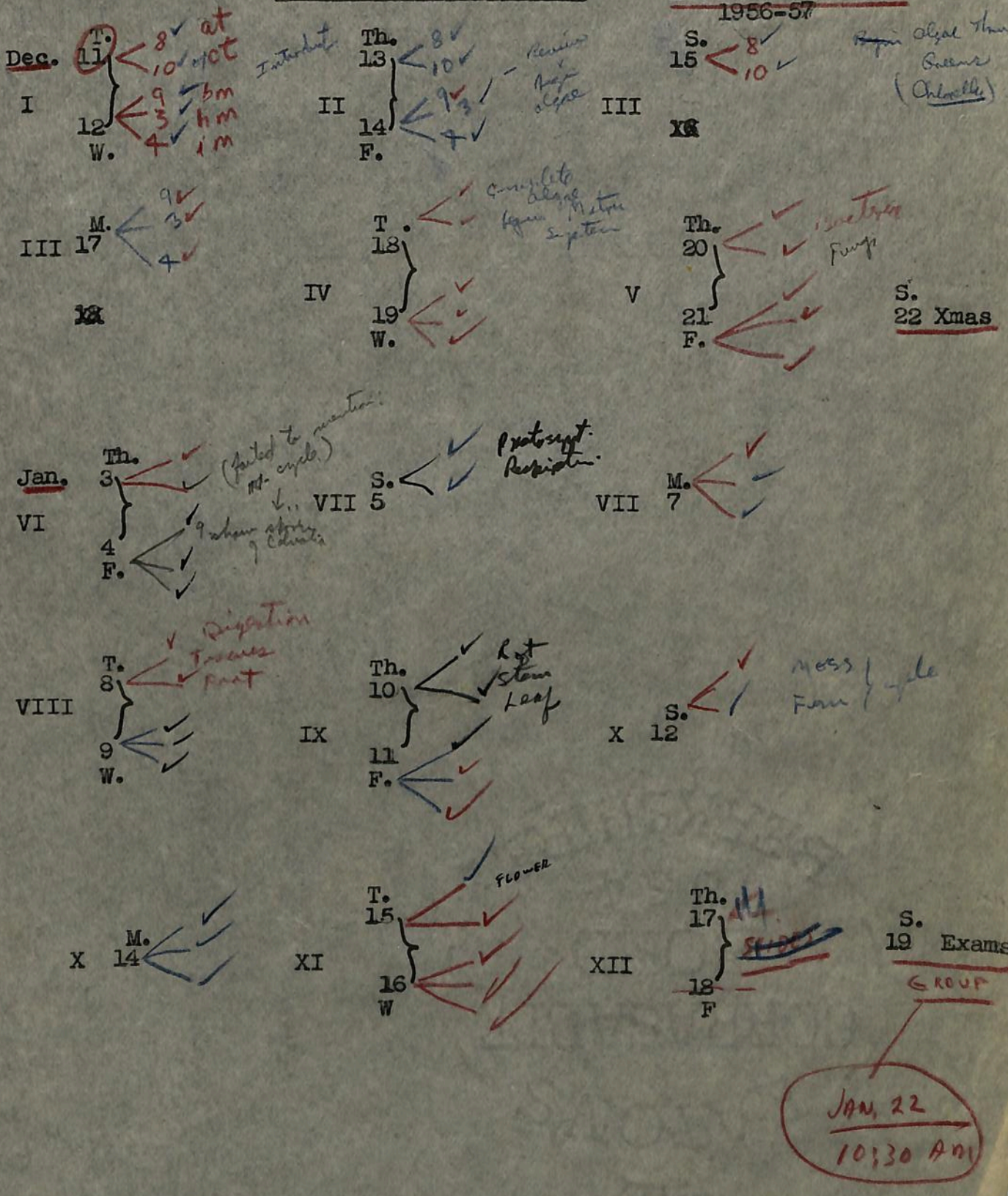
B.S. 1	bm	(Miss Pulling)	117
B.S. 1	hm	(Miss Pulling)	99
B.S. 1	ct	(Miss Pulling)	95
B.S. 1	at	(L. D. George)	114
B.S. 1	im	(L. D. George)	87

L. D. George

(512 STUDENTS)

Biological Science 1

Lecture schedule 1956-57



Biological Science 1

2-3 M.
4-5 W.
F.

APRIL 1957.

MAY - 22

Lecture Schedule

APRIL

F. 26 — INTRODUCTION

29

MAY

1 — ALGAE

3 — ALGAE CONCL.

6 — BACTERIA & FUNGI (PART)

8 — FUNGI COMPLETED N CYCLE

10 — 4-5 Y GEOLOGY A.O. PHOTOSYNTHESIS RESPIRATION

13 — TISSUES - ROOT - [redacted]

15 — REVIEW: ROOT - STEM

17 — LEAF - TRANSPIRATION MOSS CYCLE

20 — FERN - FLOWER CONCL.

22 — SLIDES

FINAL EXAM: MAY 30. 1 PM. (TH.)
(GROUP)

M	T	W	Th	F	S
9	8	9	8	9	8
10 myc.	10	10 myc.	10	3	10
3		3		4	
4		4		1-5 myc.	'57-58!
					1956-57

OFFICE OF THE REGISTRAR

TO: Biological Science Mr. Lowy

SUBJECT: Classroom Assignment, 2nd Semester, 1956-57 May 6, 1957
assignment DATE

This will confirm the ~~change~~ release of classroom space for 1 final meeting
May 30 Course Section

at 4-6pm from _____ to Parker Aud.
time days building room no. building room no.

Peg Crow
Signature

Sec. 1. 94.
Sec 5. 64.

Biological Science I

Lecture Schedule - 1958

April

I M. 21 < 2 origins / 4 "

II W. 23 < origins concl. / spont. gen. / vital vs mech. / plants vs animals

III F. 25 < plant – animal / algae begun

IV 28 < algae – diatoms

V 30 < Sect.

May

VI 2 < N cycle / fungi

VII 5 < Fungi – concl. / photosynth.

VIII 7 < Respiration / tissues begun

IX 9 < root / stem / leaf

X 12 < same + leaf / review & elaboration } vascular syst. / photostatic / guard cells

XI 14 < transpiration / vascular syst. / digestion } plant as a whole

XII 16 < moss / fern

XIII 19 < flower – part

XIV 21 < seed / fruit — complete metagen.

XV 23 < slides

Final exams begin: May 24.

Lecture Schedule
1957–58
(453 students)
5 sections

Biological Science 1

Dec. 10 — 8, 10

I Introduction: 11 — 9, 3, 4 } deleted: 2 finals? Exam.

II 12 — Recap. Plants vs Animals, Living vs Non-liv.
13

III 14 — three Green classes + metric system

III 16 — reproduction

IV 17 — Algae ↓ Diatoms
18

V 19 — Bacteria, N-cycle
20

VI 21 Sat. — 8, 10 — Fungi (part)

VI 23 — Xmas holiday begins noon 21 Sat.

Jan. 3 (F.)

VII

VII 4 — Fungi compl., Photosynthesis
6

VIII 7 — Respiration, Tissues
8

IX 9 — Root, Stem, Leaf
10

X 11 Sat. — Transpiration, Moss, Fern } Alternation of generations
13

(XI) 14 — Spermatophyta (Flower)

XI 15

XII 16 — Slides
17

Exams begin
Jan [redacted]

Final Group Exam

Wed. Jan. 22
10 AM

{ Parker — Sec. 2, 4
Geology — Sec. 1, 3
Nicholson 155 — Sec. 5 }

June 1958 to Peru
on Fulbright — 1 yr.

GENERAL BIOLOGY 2

LECTURE OUTLINE AND ASSIGNMENTS --- MWF

Spring Semester 1961

T = Textbook: General Biology by Kenoyer, Goddard, and Miller
W = The Science of Biology by Weisz.
M = The Biotic World and Man by Milne and Milne.
Note: W and M are on reserve in the library.

Jan. 30 Mon. Introduction to plant kingdom. Importance of plants.
Feb. 1 Wed. Photosynthesis. T: 331-333.
3 Fri. Photosynthesis. W: 241-264. M: 70-78.
6 Mon. Classification of plants. T: 334-338.
8 Wed. Fission plants. Blue-green algae. T: 339-341. Bacteria.
10 Fri. Bacteria. T: 341-345. Viruses. T: 345-348.
13 Mon. Bacteria. Carbon and nitrogen cycles. T: 351-354. Supplementary sheet.
15 Wed. Bacteria and disease. T: 354-363.
17 Fri. Green algae. T: 365-370. Diatoms. T: 370-371.
20 Mon. Brown algae and red algae. T: 371-375. Life cycles.
22 Wed. Economic importance of algae.
24 Fri. HOUR EXAMINATION.
27 Mon. Fungi. T: 378-387. Motion picture on fungi.
Mar. 1 Wed. Fungi. T: 387-395.
3 Fri. Fungi. Lichens.
6 Mon. Economic importance of the fungi. Plant diseases.
8 Wed. Bryophytes --- mosses and liverworts. T: 396-403.
10 Fri. Introduction to the tracheophytes. Plant tissues. T: 404-410. Supplementary sheets.
13 Mon. Early land plants and their evolution. M: 254-256. W: 676 692.
15 Wed. Clubmosses and horsetails. M: 252-256.
17 Fri. Subphylum Pteropsida. Ferns. T: 411-421.
20 Mon. Gymnosperms. T: 422-433.
22 Wed. Gymnosperm life cycle.
24 Fri. HOUR EXAMINATION.
27 Mon. Angiosperm roots. T: 434-439. M:235-239. W: 182-195.
29 Wed. Meristems in angiosperms. Primary and secondary growth. Vegetative propagation.

EASTER HOLIDAYS BEGIN THURSDAY NOON, MARCH 30

Apr. 5 Wed. Angiosperm stems. T: 439-446. Wood. Modifications of vegetative structures.
7 Fri. Angiosperm leaves. T:446-454. Transpiration.
10 Mon. Plant hormones. T: 333-334. Practical applications.
12 Wed. Reproduction in angiosperms. Flowers. T: 456-467.
14 Fri. Fertilization in angiosperms. Seed development. T: 467-47
17 Mon. Seedlings. Fruits. (Demonstrations.)
19 Wed. HOUR EXAMINATION.
21 Fri. Genetics. Carriers of heredity. M:306-339.
24 Mon. Genetics. Mendelian inheritance. T: 477-499.
26 Wed. Genetics. Sex and heredity. W: 609-632. W: 609-632. Mutation.
28 Fri. Genetics problems.
May 1 Mon. Genetics problems.
3 Wed. HOUR EXAMINATION.
5 Fri. Mechanism of evolution. W: 635-661. Supplementary sheets.
8 Mon. Evidence for evolution. T: 510-539.

10 Wed. Motion picture on evolution. — FOSSILS (SHELL OIL)
12 Fri. The course of evolution. W: 663-704.
15 Mon. Result of evolution. W: 705-762. Evolution of man. Origin of life. M: 454-461.
17 Wed. Ecology. Physical factors. T: 542-547.
19 Fri. Ecology. Biotic factors. T: 547-566.
22 Mon. Habitats. M: 369-405.
24 Wed. Conservation. T: 568-587.

45

23-T.H LAB. EXAM. 8-10 AM

42 lectures

1961-62

GENERAL BIOLOGY 2 - SECTION 2

Approximate Lecture Outline

Sept.	21Th.	Introductory remarks - Seating Assignments
	23S.	Background of Botany
	26T.	Historical Approach
	28Th.	Taxonomy
	30S.	Photosynthesis I
Oct.	3T.	Photosynthesis II
	5Th.	Photosynthesis III
	7S.	Respiration - ALGAE
	10T.	Algae I CONT'D.
	12Th.	Algae II
	14S.	Bacteria I
	*17T.	1st Hour Examination
	19Th.	Bacteria II
	21S.	Fungi I
	24T.	~~Motion Picture on Fungi~~
	26Th.	Fungi II
	28S.	Fungi III
	31T.	Metagenesis - Bryophytes
Nov.	2Th.	Tracheophytes - Tissues
	4Th.	Horsetails and Clubmosses
	*7T	2nd Hour Examination
	9Th.	Ferns
	11Th.	Phylogeny
	*14T.	Gymnosperms I
	16Th.	Gymnosperms II
	18Th.	Angiosperms - Root
	21T.	Angiosperms - Stem
		Thanksgiving Holidays begin Nov. 22, W. noon.
	28T.	Angiosperm - Leaf
	30Th.	Flower
Dec.	2S.	Fruits - Seeds - Seedlings
	5T	Hormones
	7Th.	Tropisms
	*9S.	3rd Hour Examination
	12T.	Genetics I
	*14Th.	Genetics II
	16S.	Genetics III
	19T.	Genetics IV — GENETICS — MONOHYBRIDS
		Christmas Holidays begin Dec. 20, W. noon
Jan.	4Th.	~~Evolution I~~ GENETICS & DIHYBRIDS — ANALYSIS — BACK CROSS
	6S.	Evolution II
	9T.	Motion Picture - Evolution
	11Th.	Evolution III
	13S.	Ecology I CLASS NOT HELD. (WEATHER)
	16T.	Ecology II
	18Th.	Conservation
		Final Examination begins Jan. 19

TEXTBOOK: General Biology, Rev. ed. 1961. Johnson, Laubengayer, DeLanney.

GENERAL BIOLOGY 2

LECTURE SECT. 1
8:30 - 9:30
M-F

1961
JUNE

12 - INTROD. ORIGINS BEGUN.

13 - CONT'D. { LIVING / ABIOGENESIS — VITALISM - MECHANISM

14 - CONT'D - PLANT VS ANIMAL LIVING VS NON-LIVING

15 - TAXONOMY — HISTORICAL ← ARISTOTLE - THEOPHRASTOS BRUNFELS - FUCHS - RAY LINNAEUS - DARWIN - D.C.

16 - CONT'D. D. SIGNATURES - TAXONOMY - NOMENCLATURE BINOMIALS.

19 - TAXON. END. PHOTOSYNTH. BEGIN "EQUATION"

20 - PHOTOSYNTH. ← LIGHT DARK REACTION CONT'D.

21 - PHOTO. CONT'D. { LIGHT ANALYSIS - IR - V; $C_6H_{12}O_6 \rightleftarrows C_{12}H_{22}O_{11} + H_2O$

22 - PHOTO. CONT'D. { SYNTHESES - ATP — ADP
RESPIRATION ← AEROBIC / ANAEROBIC } ENERGY

23 - PHOTO - RESPIR. CONCLUDED. { BEGIN "DEMONOLOGY"

26 - MYTHOLOGY - PROMETHEUS / DEMONOLOGY / ASTROLOGY { LEEUWENHOEK ANTECEDENTS OF MODERN SCIENCE. BACTERIOLOGY BEGUN

I 27 EXAM

28 - RETURN EXAMS go over { BACT. PETRI DISH AGAR STERILE TECHNIQUE

29 - BACTERIOLOGY { TECHNIQ. CONTIN — GRAM +, MOTILITY, CHO, PATH., PIGMENT, FLAGELLA. - DILUTION METHOD

30 - BACT: CONCL. N_2 CYCLE - MICHELI 1729.

JULY BEGIN FUNGI ← MYCELIUM SPORES } DEMOS. PUFFBALLS POLYPORES

3 HOLIDAY

4

5 - FUNGI CONT'D — { MYXOS { PLASMODIUM ETC. CYCLE

8 - FUNGI { PHYCO / ASCO / BASID.

7 FUNGI { ANTIBIOTICS - FLEMING / RUST - SMUT - AGARICUS } PLANT PATH. PROBLEMS NEW VARIETIES

10 - ALGAE { LICHENS / ISO - ANISO - OOGAMY } B-G C B R D } PIGMENTS

11 - ALGAE CONCL. USES

II 12 EXAM

13 - REVIEW EXAM - BEGIN BRYOPHYTES.

14 - METAGENESIS { BRYOPHYTA / SPOROPHYTE ⇅ GAMETOPHYTE

JULY

17 - OUTLINE TRACHEOPHYTA { PSILOPSIDA / LYCO → LIFE HIST. / PTERO - HOMOSPORY
COMPARE METAGENIC CYCLE

18 - SELAGINELLA / FILICINAE { HETEROSPORY — FERN CYCLE

19 { GYMNOSPERM / ANGIOSPERM } CYCLE

20 ← SEED DEV. DETAIL — FRUIT
BEGIN TISSUES (EPID.)

21

— TISSUES — EPI - MERI - PAREN - SCLER - VASCULAR
BEGIN ROOT

24 — ROOT - STEM — MONOCOT - DICOT

25 — LEAF { STOMATES ETC. TRANSPIRATION

26 EXAM.

27 - REVIEW ← { H_2O COHESION / CAPILLARITY } RISE OF SAP

28 — GENETICS — MEIOSIS / MITOSIS — MENDEL 1866 / MORGAN 1900 { TT x tt / Tt } CHROMOSOME / GENE / HOMOLOGOUS / HETERO — DOM. — RECESS. / HOMOLOGOUS F_1 F_2

AUG. 31 — MONO - DIHYBRID CROSS INCOMPLETE DOM.

AUG. 1 — SEX IN DROSOPHILA { DIHYBRID DETAIL

2 — SEX LINKAGE DROSOPH. { RED EYE ♂ x WH. ♀ / WH. ♀ x RED ♂
DNA MOLECULE TEMPLATE

3 — EVOLUTION ← DARWIN 1859 - BEAGLE 1831-5 / J. BORINGER 1726 / LAMARCK / NATURAL SELECTION

4 —

7 FINAL EXAM

8

9

10

GENERAL BIOLOGY 2

BOTANY LABORATORY OUTLINE
9:30 - 11:30 T & Th. Stubbs 122

JUNE

T. 13 - General orientation
Demonstrations: Algae -
Angiosperms (Manual 41-43)

15 - Complete survey of demonstrations
Field trip

20 - Use of the microscope (Manual 7-9)

22 - PHOTOSYNTHESIS

27 - Algae
QUIZ NO. 1

29 - Bacteria & Fungi

JULY

4 - Holiday

6 - Fungi completed

11 - Bryophyta
QUIZ NO. 2
Hepatics, Mosses

13 - Tracheophyta
Ferns, Lycopodium, Selaginella

18 - Equisetum, Gymnosperms

20 - Angisperms
Root, Stem, Leaf

25 - Angiosperms
Flower, Fruit, Seed

27 - Genetics
QUIZ 3

AUGUST

1 -

Th. 3 - Field trip

8 - Practical Exam.

VISIT MYC. HERB
PREPARE COUGH PLATE → BACTERIA FUNGI OBSERVED

MICROSCOPE ← SILK SLIDES NEWSPRINT

ELODEA
ONION
FREE HAND SECTIONS - HIBISCUS PETIOLE

OBSERVE COUGH PLATE & BACT. FUNG.

SEPARATE PIGM.
STARCH TEST
BENEDICT ..
ONION
APPLE
RADISH
GLUCOSE — SUCROSE — STARCH

CONT. F.H-SECT.

COMPLETE ALGAE
PROTOCOCCUS
DIATOMS
ALTERNARIA sl.

B-G { NOSTOC, OSCILLATORIA
G { PROTOCOCCUS
B- { SPIROGYRA
R- { DEMON.
Diatoms

LIVING & PRESERVED SHOWING CONJUGATION

Phyco
ASCO
BASIDIO

RHIZOPUS NIGRICANS (ZYGOSPORE)
PEZIZA COPRINUS
DEMOS. { POLYPORES
MONACEAE
LICHEN
MYXO.

POLYTRICHUM JUNIPERINUM
SPOROPHYTE & GAM.
ATRICHUM gam. ♂
MARCHANTIA
PALLAVICINIA
gam.

SELAGINELLA
EQUISETUM
MOSS ARCHEGONIUM
CYCLES

PINE OVULE
ALLIUM ROOT
CORN "
(ROOT HAIRS)
RANUNCULUS ROOT X-SECT.

YUCCA FL. FRUIT
GINGER FL SEED

CORN MONO-DIHYBRIDS & BACK CROSS
COUNTS

PRACTICAL

GENERAL BIOLOGY 2
BOTANY

SEPT. 1961 — JAN. 62

SEPT.

21 – INTRODUCTION – BEGIN ORIGINS
23 – " CONT'D. [ROLL CALL – SEATS ASSIGNED]
26 – LIVING – NON } ABIOGENESIS VITALISM – MECHANISM
28 – TAXONOMY – } PLANT – ANIMAL. HISTORY. THEOPHRASTUS HERBALS SIGNATURES RAY – LINNÉ MICHELI – DARWIN
30 – PHOTOSYNTHESIS } INTRO. EQUATION (REV.)

OCT.

3 – PHOTO { COMPLETE "ANALYSIS" OF BASIC EQUATION. PHOTOLYSIS CHO
5 – PHOTO – RESPIRATION
7 – PHOTO – RESP. – ALGAE
10 – ALGAE – B-G – G
12 – ALGAE – B – R – D
14 – BACTERIA – Begin ½ hr.
17 – BACTERIA – HISTORY – DISEASE – MYTHOLOGY
I (19) – EXAM.
21 – RETURN EXAM – BEGIN N_2 CYCLE
24 – BACTERIA CONCL. FUNGI BEGIN
26 – FUNGI < GEN. CHARACT. DEMOS < MYXO. PLASM RHIZOPUS
28 – FUNGI { MAJOR GROUPS BASIDIOM DEV. IMPORTANCE OF GROUPS IRISH FAMINE
31 – FUNGI { IMPORTANCE – PENICILLIN HISTORY

NOV.

2 – META GENESIS – MOSS
4 – " REVIEW → FERN } COMPARE
7 – " EQUISETUM – SELAGINELLA
9 – LYCOPODIUM
11 – TISSUES { MERISTEM ↓ REVIEW META GENESIS
14 – EXAM.
II 16 – REVIEW EXAM. } BEGIN GYMNOSPERMS
18 – GYMNOSPERMS { LIFE HIST. PINE
[THANKSGIVING 22ND]
21 – GYMNO – COMPLETED } ANGIOSPERM FLOWER & ♀ GAMETO – SEED – FRUIT
28 – ANGIOSPERM – COMPL. BEGIN ROOT } VASCULAR SYST.
30 – ROOT { LONG. & X-SECT – MONOCOT. DICOT.

DEC.

2 – STEM { MONOCOT DICOT X SECT
5 – LEAF { VASCULAR SYSTEM UNIFY – ROOT – STEM – LEAF GUARD CELL PHYSIOLOGY
7 – TRANSPIRATION $A = \frac{2T}{rdq}$
9 – COMPLETE VASCULAR SYSTEM HORMONES – (AUXINS) TROPISMS PHOTO – GEOTROPISMS { ASSN BLOCKS etc.
12 – REVI AUXINS. BEGIN MENDEL – INTRO.
III 14 – EXAM.
16 – REVIEW EXAM.
19 – MENDELISM – MONOHYBRID } BEGIN

JAN.

4 – DIHYBRIDS – BACKCROSS
6 – INCOM. DOM. } SEX IN DROSOPHILA DNA BEGIN
9 – DNA COMPL – EVOLUTION BEGIN
11 – DARWIN – BEAGLE 1831 – 1836 LAMARCK WEISSMAN
13 – CLASSES NOT HELD BECAUSE OF SEVERE FREEZE (UNIV. LAKE FROZEN!)
T. 16 – EVOLUTION CONCL. { EVIDENCES
18 – SLIDES

IV EXAM. JAN. 19 (F.) 1:30 PM

General Biology — Feb. 5, 1962

Botany

{2-3 Sec. 2; 4-5 Sec. 3}

FEB. 5 – Introduction & photosynthesis given by wheeler
7 –
9 – Hospitalized
12 –

14 – photosynthesis – recapitulation. Respiration – aerobic – anaerobic
16 – Classification – Theophrastus 400 BC; Ray; Linnaeus. Doctrine Signatures
19 – Abiogenesis – vitalism, mechanism. Life, Protoplasm. Living – non-living. Fermentation & new elements.
21 – Plant vs Animal – Classification. Chlorophyll, Meristem, Cellulose. Bryophyta, Spermato-
23 – Algae – characters, sexual reprod. Demonstrations, Pigments
26 – complete Algae & Ulva
28 – Bacteria – begin – Leeuwenhoek 1683 – morphology – physiology, N_2 cycle

MARCH 2 F. EXAM. I

5 – Review Exam – Bact. cont'd.
7 – Bacteriology – concl. Historical survey. Demonology, Pandora etc.
9 – Bact. – complete – Begin Fungi. Basket w. ella
12 – Fungi – Phyco, Asco – Sexual Reproduction
14 – Film on Fungi & Basidios
16 – Move to Geology Aud. for remainder of semester. Economic importance – Phyco – potato, Asco – yeast, Basidio – Rust
Millardet & Bordeaux mix. – 19 – METAGENESIS – Moss Cycle. ANTIBIOTICS Fleming 1929
21 – Moss & Fern – compare – Cytology
23 – METAgenesis (generalized). Review: Psilopsida, Lycopsida, Sphenopsida, Pteropsida – Tracheophyta
26 – Lycopodium, Selaginella, Equisetum – Life cycle
28 – RM. 227 HILL – EXAM NO II 2 PM – DODSON – 4 PM

30 – Tissues – epidermis, vascular – xylem, phloem

Feb. — Lab.

5 – General survey plant kingdom
12 – Photosynthesis
19 – Algae
26 – Bacteria – Fungi – Agar plates – Rhizopus, hay infusion

March

5 – No lab – (Mardi Gras)
12 – Fungi – Ascos – Chaetothecium, Peziza sut.; Basidio – Coprinus sects; Lichen – Ramalina
19 – Bryophytes – Ditrichum, Dumon, Marchantia
26 – Fern – Lycopodium – Selaginella

April

2 – Gymnosperm – Pine life cycle, cycad
9 – Root – Stem – Monocot Ranunc., Dicot Zea
16 – Stem – Leaf – Slides – Tilia, Sedum, Salix, magnolia
23 – Easter
30 – Flowers ♂, ♀ gametophytes, Auxins

May

7 – Fruits – Seeds – Cotton seedlings, Bean, Corn

APRIL

2 – Exams returned & Review

4 – Gymnosperms < Pine cycle

6 – Angiosperm – Flower cycle

9 – SEED formation – Double fertilization

11 – Root structure begin (Fruit)

13 – Root / Stem – Monocot – Dicot } micro detail

16 – Leaf < Monocot – Dicot – Vascular Tissue / Stomate mechanism

(227 Hill Sec 2) 18 – Exam No. III

20 – } EASTER
23 – }

25 – Transpiration { Root pressure / Capillarity $H = \frac{2T}{rdg}$ / H_2O Cohesion (Papers returned)
Mineral absorption

27 – Auxins begin – Tropisms

30 < TURGOR MOVEMENTS / MITOSIS – meiosis

MAY

2 – Mendelian Inheritance – Dom. & Recess. Homo vs Heterozygous

(Sec 2 to allow 150) 4 – Monohybrid – Incomplete F_1 F_2 Monohybrids
Back Cross Dominance

7 – Dihybrids 9:3:3:1 worked out

9 < Sex in Drosophila ♀ ♂ / Crossover – DNA – RNA

11 – Exam. No. IV

14 – Begin Evolution – (Return exams)

16 – Evolution cont'd < Fossils < Impression / Petrifaction / Amber; Early Theories / Pre-Darwin (Lamarck / Lyell / Weismann)

18 – Voyage of Beagle 1831–36 Darwin's Theory

21 – Film EVOLUTION (Courtesy Shell Products) FOSSILS ±25 min.

23 – Evolution cont'd – Eras – Periods
Excerpts from Huxley "a piece of chalk"

25 – Readings – Darwin

28 –

May

14 – Genetics – corn: 3:1 / 9:3:3:1 counts (PTC)

✓ 21 – Practical

JUNE 1 – Fri. 10:30–12:30 – FINAL EXAM
DOBSON – Sec. 2 } GROUP EXAM.
STUBBS 114 – Sec. 3 }

GENERAL BIOLOGY 2
LECTURE OUTLINE AND ASSIGNMENTS --- SECTION 1
Spring Semester, 1962

Textbook: GENERAL BIOLOGY, Revised, by Johnson, Laubengayer, DeLanney

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Feb. 5 M Introductory remarks.. Seating Assignments.

7 W Importance of plants. Photosynthesis pp. 97-105.

9 F Photosynthesis. Supplementary sheets.

12 M Photosynthesis.

14 W Respiration. pp. 106-107-56-58.

16 F Classification of plants. pp. 312-317

19 M Blue - green algae. pp. 321-323.

21 W Green algae. Life cycles. pp. 324-330.

23 F ~~Meiosis.~~ pp. 321-326.

23 F Diatoms. pp. 330-331. Red and brown algae. Economic importance of the algae. pp. 331-336.

26 M ~~HOUR EXAMINATION.~~

28 W Viruses. pp. 19-20. Bacteria. pp. 336-342.

EXAM No 1 Mar. 2 F Bacteria. Carbon and nitrogen cycles. pp. 342-344.

5 M Bacteria and disease. pp. 344-347. — RETURN EXAM.

7 W Introduction to fungi. Slime molds and Phycomycetes. pp. 347-350.

9 F Ascomycetes and Basidiomycetes. pp. 350-359. Lichens.

12 M Motion picture on fungi. Economic importance of fungi. Plant diseases.

14 W Metogenesis. Bryophytes. pp. 360-365.

16 F ~~HOUR EXAMINATION.~~

19 M Introduction to vascular plants - Plant tissues. pp. 366-375.

21 W Early land plants. Clubmosses and horsetails. Life cycles. 366-375.

23 F Subdivision Pteropsida. Ferns. pp. 375-380.

26 M Gymnosperms (cycads and conifers). pp. 381-390.

EXAM No 2 28 W ~~HOUR EXAMINATION~~

Mar. 30 F Structure of flowering plants. Meristems. Leaves. pp. 52-54.

Apr. 2 M Angiosperm stems. pp. 79-90.

4 W Angiosperm roots. pp. 90-95.

6 F Reproduction in angiosperm plants. pp. 391-397.

9 M Flowers, fruits, seeds, seedlings. pp. 398-404.

11 W Water and mineral requirements in plants. pp. 107-116.

13 F Growth and growth responses in plants. pp. 116-123.

16 M Plant phylogeny. pp. 406-412.

18 W HOUR EXAMINATION.

EASTER HOLIDAYS BEGIN NOON, THURSDAY, APRIL 19

25 W Genetics. Mendelian inheritance. pp. 517-520.

27 F Physical basis of heredity. pp. 521-528.

30 M Genetics. Sex and heredity. pp. 529-542. Genetics problems.

May 2 W Genetics. Gene action and nature of genetic material pp. 543-552.

4 F Genetics and agriculture. Eugenics: Genetics problems. pp. 552-559.

7 M Genetics problems.

9 W Genetics problems.

11 F HOUR EXAMINATION.

14 M Evolution. Evidences for theory of evolution. pp. 560-590.

16 W Evolution. Mechanism of evolution. pp. 592-609.

18 F Evolution. The origin of life. Supplementary sheets. pp. 607-609.

21 M Ecology. Physical factors. pp. 611-616.

23 W Ecology. Biotic factors. pp. 616-629.

25 F Ecology and conservation.

FINAL EXAM — 1 JUNE Fri 10-12 < DOBSON (Sec. 2)
STUBBS 114 (Sec. 3)

HALL 227

GENERAL BIOLOGY – LECTURE MWF

FEB.–JUNE 1963

FEB 4 – SEATING
INTRODUCTION
EARTH – LIFE – MAN L/P B

6 – CONT'D. ANIMISM / VITALISM } LIFE – NON-LIFE
ABIOGENESIS
PLANT – ANIMAL
ELEMENTS

8 – PHOTOSYNTHESIS
BASIC EQUASION – ANALYSIS

11 – PHOTOSYN. CONCL; RESPIRATION

13 } Taken by Dr. Logan –
15 } out because of Staph. aureus

18 – TAXONOMY – { INTERNAT. CODE BOT. NOM.
BINOMIAL SYSTEM
LINNE' 1753
DOCTRINE OF SIGNATURES
TROPICAL BOTANY etc.

20 – BACTERIA < MORPH. – PHYSIOL.
LEEUWENHOEK 1683 – PATH.
PASTEUR 1865

✓22 – BACTERIA + DISEASE } PANDORA – GREEKS
BEGIN ALGAE } HUMOURS
ASTROLOGY
DEMONOLOGY

25 – EXAM No 1

27 – ~~RETUR~~ BG, GR. ALGAE

MARCH 1 – RETURN EXAM...

4 – ALGAE < SARGASSO SEA ETC.
CORAL ISL.
DIATOMS

6 – BEGIN FUNGI N CYCLE < BACT. / FUNG.
$NH_3 \rightarrow NO_2 \rightarrow NO_3$

8 – FUNGI CONT'D. – PHYCOS to CHARACTERS.
MILLARDET 1885
IRELAND 1845

11 –

13 – EXAM No 2

15 –

18 –
20 – } DR. WHEELER TOOK THESE
22 – } CLASSES. BACK SPRAINED
"SOMA" COMPOUND OK

25 – RETURN TEST

27 – MOSS CYCLE { COMPARE ALGAE BRYOPHYTA
AQUATIC vs TERRESTRIAL

29 – METAGENESIS CONCL. FERN –
(MOSS MODEL) BEGIN TRACHEOPHYTA

APRIL 1 – ANGIOSPERM CYCLE
BEGIN ♂, ♀ GAMETOPHYTE

3 – COMPLETE FERTILIZATION < EMBRYO / ENDOSPERM
SEED FORMATION

5 – SEED → FRUIT
BEGIN VASCULAR SYSTEM < XYLEM / PHLOEM
TISSUES – MERISTEM ETC.

8 – ROOT { MONOCOT / DI – TISSUES ETC.

10 – EXAM No. 3
EASTER (11–16th)

17 – EXAMS RETURNED – CONTINUE STEMS
MONO – DICOT

19 – STEM – GIRDLING
GENETICS FILM PART 1 30 MIN

22 – FILM Pt. 2. – STOMATE MECHANISM

24 – TRANSPIRATION – PHYTOHORMONES

26 – MITOSIS – MEIOSIS { MENDEL 1866
(PISUM SATIVUM)
INTRO

29 – MONOHYBRID CROSS TT × tt
↓ Tt
3:1
1:2:1

MAY 1 – DIHYBRID – INCOMPLETE DOM.
– X^n
INTRODUCE DROSOPHILA

3 – SEX CHROM. DROSOPHILA – ETC.
CROSSING OVER

M. 6 – EXAM No. 4

8 – EXAM RETURNED } DNA S-A:T-S; P
S-G:C-S
"ALL TIGERS GOOD CATS"

10 FILM EVOLUTION – FOSSIL STORY (SHELL) 25 MIN.
DNA

MAY 13 – GENE – RNA
INTROD. EVOLUTION — FOSSILS. EARLY IDEAS. PRE-DARWIN BERINGER

15 – HOMO DILUVII TESTIS 1726 – SCHLEUCHZER (NOAH)
DARWIN'S BACKGROUND – CAMBRIDGE
1831–36 BEAGLE – GALAPAGOS ARCHIPEL.
LYELL – HENSLOW – WALLACE – HUXLEY

17 – EVOLUTION CONT'D. LAMARCK'S CONTRIB. ACQUIRED CHARACTERS
OUTLINE ERAS – TIME SCALE { FOOT BINDING, ORANGS, ETC. RAT TAILS }
LINNAEUS : FIXITY OF SPP.

20 – DARWIN ON GALAPAGOS
EVOLUTION – CONT'D. — OUTLINE
POINTS OF 'NATURAL SELECTION'

22 – SLIDES

~~24 – SLIDES~~ ?

FINAL EXAM: MAY 30 Th. 1:30 – 3:30

GENERAL BIOLOGY 2
LECTURE OUTLINE AND ASSIGNMENTS
Spring, 1963-64

MWF SCHEDULE

Textbook: GENERAL BIOLOGY, Revised, by Johnson, Laubengayer, DeLanney

Feb. 3 - Seating assignments. Lesson assignments explained. Introductory remarks: Importance of plants.

5 - Photosynthesis. pp. 97-105.

7 - Chemistry of photosynthesis.

10 - Taxonomy in the plant kingdom. pp. 312-317.

12 - Blue-green algae. pp. 321-323. Green algae. p. 324-330.

14 - Life cycles in algae. Review of meiosis. Study diagrams on p. 524.

17 - Diatoms. Red and brown algae. Economic importance of algae. pp. 330-336.

19 - FIRST HOUR-LONG EXAMINATION

21 - Bacteria. pp. 336-344.

24 - Carbon and nitrogen cycles. Bacteria and disease. pp. 345-347. Abiogenesis.

26 - Rickettsias and viruses. pp. 344-345; 19-20; 546.

28 - Fungi: Myxomycetes. Phycomycetes. pp. 347-350.

March 2 - Fungi: Ascomycetes, Basidiomycetes. Lichens. pp. 350-359.

4 - Economic importance of fungi. Plant diseases.

6 - Liverworts and mosses. pp. 360-365. Plant life cycles. FILM

9 - SECOND HOUR-LONG EXAMINATION

11 - Tracheophytes. pp. 366-380. Tissues in vascular plants. pp. 52-55. FERN

13 - Gymnosperm plants. pp. 381-390. Pine life cycle.

16 - Angiosperm plants. Meristems. pp. 71-72. Study diagram p. 72. Angiosperm leaves. pp. 72-79.

18 - Angiosperm stems. pp. 79-90.

20 - Angiosperm roots. pp. 90-95.

23 - Transpiration. Mineral nutrition. Movement of materials in plants. pp. 107-116.

March 25 - Reproduction in angiosperm plants. pp. 391-397.

EASTER RECESS

April 1 - Fruits. Seeds. Seedlings. pp. 397-404.

3 - Growth responses. pp. 116-123. Practical applications.

6 - THIRD HOUR-LONG EXAMINATION } BILORI - DR. WHEELER TAKES OVER ON GROWTH SUBSTANCES

8 - Introduction to heredity. Motion picture: Thread of Life.

10 - Mendel's work. pp. 517-520. The physical basis of heredity. pp. 521-528.

13 - Heredity (continued). pp. 528-542. Genetics problems.

15 - Gene action and the nature of the genetic material. pp. 543-552. Genetics problems.

17 - Mutations. Genetics in agriculture. Human inheritance, pp. 552-559.

20 - Genetics problems. p. 559.

~~22 - FOURTH HOUR-LONG EXAMINATION.~~ NO EXAM HERE } COMBINED WITH FINAL

24 - Evolution.

27 - Evidence of evolution, I. pp. 560-571.

29 - Evidence of evolution, II. pp. 572-586.

CONVOCATION NO CLASS

May 1 - Evolution of man. pp. 586-591.

4 - The mechanism of evolution. pp. 592-607. } DNA

6 - The origin of life. pp. 507-609. Supplemental sheets.

8 - Physical factors in ecology. pp. 611-616. } FOSSIL STORY DNA

11 - Physical factors in ecology (Cont.) } DNA CORREL.

13 - Biotic factors in ecology. pp. 616-625.

15 - Biotic factors in ecology (Cont.)

18 - Review — SLIDES — KNAPP HALL — CHANGED

FINAL EXAMINATION 25 10:30 — 12:30

GENERAL BIOLOGY - LECTURE

AG. ADMIN 255
MWF 10
FEB. 3 - MAY 20
1964

FEB. 3

BEAMING - INTRODUCTORY ORIENTATION food etc. 5 x 10⁹, 2.5 x 10⁹, 1 x 10⁶ — 1/16

5 - EARTH, PLANETS, ABIOGENESIS, PASTEUR 1865 VITALISM - MECHANISM - PROTOPLASM - LIGHT YEAR etc.

7 - HOOKE, LEEUWENHOEK - BROWN 1665 MICROSCOPY 1831

SCHLEIDEN 1838 - PLANT CELLS, SCHWANN - 1839 - ANIMAL CELLS } CELL THEORY

10 - CRITERIA - CHLOROPHYLL, CELLULOSE, MERISTEM — BEGIN TAXONOMY — 10^6 spp vs 300,000 sp

12 - TAXONOMY, BRUNFELS, FUCHS, IDEAS, DOCTRINE OF SIGNATURES, LINNÉ - 1753 HISTORICAL

14 - BEGIN PHOTOSYNTHESIS EQUATION ANALYSIS - GEN. PHOTOSYNTH. CONT'D.

17 - GEN. EQUATION - SYNTHESIS ⇌ $C_{12}H_{22}O_{11} + H_2O$, BEGIN RESPIRATION, PHOTOSYNT. ⇌ $(C_6H_{10}O_5)_x + H_2O$

19 - STAGES, PHOTOLYSIS → CO_2 FIXATION, TPN; RESPIRATION ← AEROBIC, GLYCOLYSIS AN—; COMPLETE TPN & PHOTOSYN. vs RESPIRATION, ATP-ADP; BEGIN ALGAE - N^2 CYCLE

21 - EXAM No. 1

24 - RETURN EXAM

26 - BACTERIA — MYTHOLOGY ← PROMETHEUS, PANDORA; ANIMISM - DEMONS; ASTROLOGY TO LEEUWENH. 1683; BEGIN MORPHOLOGY

28 - BACTERIA - CRITERIA - KOCH'S POSTULATES; BEGIN ~~KLAVS~~ PASTEUR 1882

MARCH 2

4 - VIRUS - RICKETTSIAE - ALGAE (~~Begin~~) CYANOPHYTA

6 - FILM } LIFE OF MOLD + 20 MIN. INTRO. TO FUNGI — POLYPORES, PUFFBALLS

9 - COMPLETE ALGAE - BEGIN FUNGI

11 - FUNGI - PHYCOS ← ~~OOMYCETES~~ 27 SP.

13 - FUNGI - ASCO - BASIDIO - DEUTERO. LICHENS

EXAM No 2 — 16 -

MARCH

18 RETURN EXAM

20 - BRYOPHYTA - CYCLE } COMPARE VASCULAR PLANTS

23 - METAGENESIS (GEN.) FERN

25 - REVIEW METAGENESIS: LYCOPODIUM w. MYCORRHIZA; PSILOPSIDA - LYCOP. - SPHENO - PTEROP. -

27 - EASTER RECESS.

30

APRIL

1 - ANGIOSPERMS - REVIEW METAGENESIS { MOSS, FERN, PINE

3 - COMPLETE ANGIOS. ← SEED, FRUIT; CONTRAST - GYMNO, ANGIO

6 - DR. WHEELER

8 - TISSUES - VASCULAR ← TRACHEIDS, VESSLE; GIRDLES { H_2O, SUGAR etc. ⇅ PHLOEM

10 - ROOT - VASCULAR SYSTEM - etc.

13 - EXAM No. 3

15 - RETURN EXAM - STEMS { MONO, DICOT

17 - FILM - "THREAD OF LIFE" } 50 MIN. 2 REELS

20 - ROOT - STEM - LEAF - STOMATE MECHANISM

22 - $h = \frac{2T}{rdg}$ - CAPILLARITY etc. USES CINCHONA COCAINE

24 - ~~Begin~~ MENDEL - MITOSIS, MEIOSIS 1865-6, DARWIN etc.

27 - ~~MENDEL~~ ~~BEGIN~~ MONOHYBRID

29 - CONVOCATION NO CLASS

MAY 1 - MENDEL - MONOHYBRID - BACKCROSS; PEACE CORPS Rep. - PRUE INGEMAR

MAY 4 – DIHYBRID — GAMETES 9:3:3:1

BEGIN DROSOPHILA (1906 – CASTLE)

6 – SEX IN DROSOPHILA } PTC TESTED IN CLASS ± 3:1 CURL TONGUE

BEGIN DNA

8 – FILM — FOSSILS + DNA

J. BERINGER – LITHOGRAPHIN 1726

11 – DNA CONCLUDED — GENETIC CODE

ORIGIN OF LIFE 1 ENZYME 1 GENE

BEAGLE 1831-36

13 – EVOLUTION – DARWIN – LAMARCK

FOSSILS – PETRIFACTIONS – CASTS – AMBER

15 – READINGS FROM BEAGLE VOYAGE

スライド!

18 – SLIDES — KNAPP HALL AUDIT.

~~20~~ – CLASSES END 19th.

~~22~~ –

25 – 10:30 – 12:30 } FINAL EXAM

BIOLOGY Test I

Archbishop of Usher said that the World was formed in 4004 BC October 26 at 9 a.m.
The Earth formed 5 billion years ago. 2 1/2 billion years ago life began. Man 1 million years ago. Empire State building and a quarter on top
Light travels 186,000 miles/second. Alpha Centauri is the nearest star, 4 lt yrs.
Abiogenesis -- life arises from dead stuff. Spontaneous generation. Aristotilian two bricks.
Galileo pioneered in optics which led to microscope in 1610.
Robert Hook in 1665.
Louis Pasteur finally shot down spontenecus generation in 1865. Substituted the idea that living things must come from other living things. But where did the living ancestors come from?
Life is wrapped up in Protoplasm. This is an approach to the life problem.
Vitalism in living things -- what makes it unique?
two schools -- 1. Vitalists. 2. Mechanists. Vitalists say there is some vital force in living things which goves it life. It can't be found; unknowable.
Mechanists say living organism is knowable. Study chemical and physical properties.
But before life, what? Must have come from nonliving matter, spontaneous generation. Abiogenesis.
Watch analogy -- Organization changed, not the elements of the watch. Same thingg with the cell.
Cell most important unit. Not simple.
Knowlege of cell goes back to the 17th century. Robert Hooke 1665 worked with compound microscope. In 1665 wrote Micrographia. Looked at cork, among other things.
Lowenhook made his own microscopes. He saw bacteria and many other things.
Late 1670's and '80's. Royal Society of London came to see his observations.
Robert Brown 1831 discovered the nucleus of the cell. Worked with living cells.
Schlieden (plant) and Schwann (animal) 1838 and 1839 cell theory. All animals and plants made of cell. All cells come from preexisting cells.

How to distinguish between plant and animal cell-- 1. Chlorophyll -- plant. 2. Rigid cell wall, cellulose -- plant. 3. Plants can growx almost indefinitely as long as environment lets it. Meristem.

Taxonomy -- one million different kinds of animals. 300,000 plants.
For taxonomy go back to Greeks.
Agriculture precedes great civilizations. Egyptian papyrus.
Theophrastus -- plants, Aristotle's student. Father of Botany.
Otto Brumfels in 1535 and Fuchs in 1550 compiles a large body of knowledge about plants of Europe for medicinal value.
Method used for identifying plants. Described as minutely as possible all aspects -- took pages.
Looked at plants as to their uses.
Doctrine of Signatures -- heart shaped leaf good for the heart.

Linneaus 1753 Binomial system of nomenclature. Species Plantarum. Thought creator created all species and they are unchangeable. Predecessor John Ray in England.
1859 Origin of Species.
Species are mutable and dependent upon environment.

PHOTOSYNTHESIS -- Photo-light; synthesis-building something up out of ingredients.
Building up in presence of light -- results in tremendous reservoir of energy.
glucose -- get it from plants.
(See formula)
.03 percent of the atmosphere is carbondioxide. Gase comes into leaf through a stomate.
Chlorophyll made up of $C_{55}H_{72}O_5N_4Mg$

Water--hair roots.
Hemoglobin--CHONSFe
Two pigments with chlorophyll, carotine $C_{40}H_{56}$ and Xanthophyll $C_{40}H_{56}O_2$ -- don't know their roles.

Light -- Red, orange, yellow, green, blue and violet.
Blue and Red ends of visible spectrum more efficient than the others.
Wave length of light is plus or minus 400 mili-microns.
Micron is one millionith part of a meter. Mili-micron is one thousandth of a micron. (see book). Angstrom.
Invivo Process -- Living response
Intvitro Process -- takes place in testtube.
Photosymthesis has never been duplicated completely in vitro.
Hexose Sugar $C_6H_2O_6$ -- Glucose molecule -- full of energy.
Once Glucose synthesized, other more complex items made. -- carbohydrates, fats, proteins. Triose sugar -- three carbons and three oxybens.
Imperical Formula -- $C_6H_{12}O_6$ --- $C_{12}H_{22}O_{11}$ plus water when enzymes help out.

Structural formula would show difference.
Temperature and enzymes control the direction in which the reaction will go.
there are other factors also.
$C_6H_{12}O_5$ with enzymes gives $C_6H_{10}O_5$ plus water
(Glucose) (Starch)
Reaction to the right is syntheis -- get single complex ingredient. Reaction to the left called hydrolysis -- involves a dehydration (getting rid of watter)
Any six carbon sugar is a monosaccharide. 12 carbon sugar is disschar ride.
Poly saccharide has six carbons but they are in a long chain. (starch)

How is reservoir of energy used by individual cells? Respiration. Read the syntheis reaction in reverse and omit light and chlorophyll. Respiration is the way or ways in which living cells utilize energy. Burn glucose in the presence of Oxygen.
$6CO_2$ plus 12 H_2O plus L plus Chl gives $C_6H_{12}O_6$ plus 6 O_2 plus 6 H_2O
Aerobic respiration -- in oxygen
Anaerobic -- w/O oxygen. Many bacteria, some algae and fungi.
Most important thing about respiration is the release of energy.
Steps in the above equqtion -- 1. Breakdown of water $2H_2O$ in the presence of chlorophyll and light give 2 H_2 and O_2. 2. $2H_2$ plus CO_2 give CH_2O (carbohydrate) plus H_2O. Hydrogen won't normally unite with carbon, but in the first part Hydrogen combines with hydrogen acceptor TPN to form $TPNH_2$. This can combine with CO_2. This is called the Carbon Dioxide fixation process.
3. $2(CH_2O)_3$ gives $C_6H_{12}O_6$.
Metabolism tests -- rate at which you burn up energy.
675 kg/cal per glucose molecule.
Anerobic takes place in presence of certain enzymes. $C_6H_{12}O_6$ in the presence of the enzymes gives $2C_2H_5OH$ plus H_2O plus energy. 25 kg/cal
Aerobic is more efficient because 675 kg/cal produced 27 times more efficient
In some organisms both can be going on.
Glycolysis -- breaking down of glucose molecule.
Glucose plus O_2 gives carbon dioxide and water. Phosporus is the key as to how much energy is released in the cell.

Steps in glycolosis -- 1. Glucose plus ATP (Adenocine Triphosphate) forms a glucose phosphate. 2. Pyruvic acid gives acetic or lactic acid which gives CO$_2$ and water.
When the phosphorus breaks off ADP formed (see notebook)
Review of idea behind photosyntheis and respiration. Photosynthesis means that a tremendous reservoir of energy is prepared for use. Glucose molecule is produced. In this energy resides.
Conversion of Glucose to energy is respiration. Energy released and made useable to living organism.
(See diagram in notebook)
When the crebs cycle stops, the plant is dead. When phosphorus combines with glucose it is called phosphoriolation. Final product in energy.

Thallophytes -- Thallo means sheet of cells and phytes means plants. Originally bacteria fungi, and algae, Why all together? One negative characteristic -- no roots, stems or leaves.
Algae has chlorophyll. Is part of world that gives us energy. Autophytic -- can make its own food if it has chlorophyll. Bacteria and Fungi can't make own food. Parasites or saphophytes. Latter gets nutriment from decaying debree.
Nitrogen must be transformed into another form to be used.
(See diagram)
Some organisms can take N2 directly. Some blue green algae. Some bacteria nd fungi also. Nitrogen fixing bacteria, fungi and algae.
Practically all algae have Chlorophyll. 15-20 thousand kinds. Most of them are aquatic and most are in ocean.
Ecology is the relationship of a plant to its environment.
Classify according to pigment.
Blue green most primitive because of organization of the cell. No particular nucleus in cell. Scattered in cell. Similar to what is found in Bacteria.
This is a meetin g point. Also unicellular algae and bacteria. Internal organization of the cell is similar. There is bacteraal chlorophyll, but it is not photosynthetic.
Great majority of rest is multicellular. ~~XXXXXXXXXXXX~~ Agar comes in red algae used as a substance upon which microrganisms are grown.

* *

Practically all algae have Chlorophyl, 15 to 20 thousand kinds most aquatic and most in the ocean.

Bacteria: play part in the Nitrogen cycle. Saprophytic bacteria and fungi make substrates available to plants and animals.
Discovered by Leewenhoek in 1683.
Majority of bacteria are saprophytes
Greek theory of disease -- blood, phlem, yellow bile and black bile; all had to be in balance.
Middle ages-- animistic idea--demons.
Pathogenic bacteria
1. Coccus -- hooked in chain -- streptococcus
2. Tubular Bacillus -- T. B.
3. Spiroheet for syphillus (Treponema Pallidum)
4. Pneumonia (bacterial)
5. Cholera -- waterborne disease
6. Plague -- bubonic and pneumonic
7. dyptheria
8. Menimgitis -- caused by a caccus
9. Tetanus
10. Leprosy--caused by a bacillus

GENERAL BIOLOGY LECTURE

FEB. 1 – MAY 19, 1965

MWF 3 AG. AD. 255

FEB. 1
INTRODUCTION — Seating; Exams – Assignments

3 – ORIENTATION — Recommend Rachel Carson; Cosmos; Universe – Distances etc.; Birthdays 4004 BC; Planets

5 – VITALISM – MECHANISM; MATTER – PROTOPLASM; ABIOGENESIS

8 – PLANT vs ANIMAL vs FUNGUS — CRITERIA; TAXONOMY – DOCT. SIGNATURES; CELL THEORY 1838-9

10 – INTRO. TO Linne 1753 – Binom.; Fixity of spp. vs Darwin 1859; Abiogenesis Pasteur 1865 –
PHOTOSYNTHESIS – EQUATION – ANALYSIS; 10^{11} TONS C PART.

12 – PHOTO. CONT'D – GLUCOSE + FRUCTOSE ⇄ SUCROSE + H_2O
$(C_6H_{12}O_6)_x$ ⇄ $(C_6H_{10}O_5)_x$ + H_2O
ENERGY RESERVOIR – STARCH

15 – PHOTO → RESPIRATION – BEGIN; PHOTOLYSIS – CO_2 FIXATION TPN

17 – PHOTO – RESPIRATION CONCL. ATP ⇄ ADP; PHOSPHORYLATION – GLYCOLYSIS (E)
BEGIN ALGAE

19 – ALGAE – B-G. GR. BR. (USES) – MAN – H2O

22 – ALGAE COMPL. — USES – BROWNS – ALGIN; REDS – CORAL, FILTERS, AGAR; N^2 CYCLE $NH_3 \rightarrow NO_2 \rightarrow NO_3$

24 – EXAM No 1

26 – BACTERIA – BEGIN — LEUWENHOEK 1683; MORPHOLOGY

MARCH 1 – EXAM RETURNED

3 – BACTERIOLOGY — MYTHOLOGY: PROMETHEUS, PANDORA; DEMONOLOGY; ASTROLOGY; STERILE TECHNIQUE; Pam.

5 – MISSED!

8 – BACTERIA COMPL. — IMMUNITY – ACTIVE / PASSIVE; SMALLPOX, POLIO 1) ATTENUATED CULT.; TYPHOID 2) KILLED; DIPHTH. 3) ANTITOXINS; LADY MAY 1717
BEGIN FUNGI

10 – FUNGI CONT'D – GROUPS < MYXO – PLASMOD.; PHYCO – MYCELIUM; BASIDIO – TYPES
ASSIMILATIVE PHASE (PLASMODIUM vs. MYCELIUM)

12 – FUNGI — REPRODUCTION — PHYCOS – OOMY., ZYGOMY.

15 – FUNGI CONT'D. ASCOS – ASCUS; BASIDIOS – BASIDIUM; HOMO – FORMATION

17 – FUNGI – ECONOMIC IMP. — PHYTOPHTHORA; MILLARDET – BORDEAUX MIXT.; RUSTS – SMUTS –

19 – FUNGI COMP. — FLEMING 1929; HALLUCINOGENIC MUSH.; LICHENS
BEGIN METAGENESIS.

22 – EXAM No 2

24 – METAGENESIS – GEN.

26 – MOSS – FERN CYCLES

29 – WASHINGTON DC CONSULTATION – STATE DEPT. FOR BRASIL.

31 – DR. LOGAN TAKES OVER

APRIL 2 –

5 – RETURN EXAM

7 – TISSUES < XYLEM, PHLOEM } VASCULAR SYSTEM H_2O ↑ FOOD ↓

9 – V.P. HUMPHREY ON CAMPUS; CLASSES DISMISSED 1–4 PM

12 – ANGIOSPERM CYCLE – FLOWER → SEED

14 – EXAM No 3

16 – EASTER RECESS

19

21 – RETURN EXAM — BEGIN ROOT

LECTURE

APRIL 23 – ROOT & STEM x-SECT. VASCULAR SYSTEM < XYLEM / PHLOEM

26 – FILM Pt 1 – THREAD OF LIFE (DR. BAXTER)
+ LEAF ANAT < MONOCOT / DICOT

28 – Film Pt 2 – DNA – MUTATIONS "GENE" SEX CHROM. (XX) (XY)

30 – COMPLETE LEAF – STOMATES BEGIN MENDEL [PEACE CORPS TALK]

MAY 3 – MONOHYBRIDS < DOM. VS REC. HOMO VS HETERO BACK CROSSES
3:1 – PHENO. 1:1 VS 1:0
1:2:1 – GENO.

5 – DIHYBRID – BLENDING – 9:3>3:1
GAMETES

7 – BEGIN DNA P-S-A-T-S / S-G-C-S>P

10 – DNA – RNA – ENZYMES – NUCLEOSOMES

12 – BEGIN DARWIN & EVOLUTION
1831 – BEAGLE
1859 – ORIGIN
1726 – BERINGER "LITHOGRAPHIA"

14 – EVOLUTION – ERAS
DARWIN'S THEORY

17 – SLIDES

19 – EXAMS BEGIN (18TH)
T.

21 – MAY 25 (R.) ~~8 10 AM~~ 4 – 6 PM

SENIORS: EXAM 8 AM

BIOLOGY 1002

16-I-1978

MWF 102 Wms. 11:30
215 STUDENTS

250 x 10⁹ stars — 100 x 10³ LY

3992 – KEPLER – d. 1630
3123 – MAYA
4004 – USSHER 1654

16-I INTRODUCTION
TEXTBOOK – CURTIS
EXAM DATES – FEB 8, MAR 1, APR 5

18 – CONT'D. PTOLEMY – 130 A.D. ± 5 x 10⁹ yrs
VOYAGER I, II — COPERNICUS – 1543 ± 4 x 10⁹ yrs
LAUNCHED 1977 — GALILEO – 1642
NEWTON
EINSTEIN – d. 1955 ± 2 x 10⁶ yrs H. SAPIENS
"ETERNITY"
ARISTOTLE – BEGIN → END

20 – MATTER – Big Bang (20 x 10⁹ yrs)
ATOMS – MOLECULES – (micro, macro – DNA)
4 x 10⁹ yrs – LIFE
ABIOGENESIS – REDI – SPALLANZANI – PASTEUR
ARGUMENT FROM 1st CAUSE INVALID — 1668 – 1768 – 1864

23 – MECHANISM – VITALISM
"ELAN VITAL" "CONTROL" IN EXPERIMENT
C H O N S P
CH₄ NH₃ H₂O H₂ – MILLER'S EXP. (1953)
(GLYCINE) – AMINO ACIDS

25 – DNA – P < S – A:T – S > P ; S – G:C – S
WATSON – CRICK
SELF REPLICATING — PAULING
GENETIC CODE

27 – SUMMARY – OPARIN – MILLER
WATCH ANALOGY
CARLYLE – "WHENCE O HEAVEN ......"
WORDSWORTH – "NOT IN ENTIRE FORGETFULNESS"
CALVIN – LIFE – "... logical consequence ..."
"HOT, DILUTE SOUP"

30 – BROWN – 1831) NUCLEUS — R. HOOKE – 1665 – CELL
SCHLEIDEN – 1838
SCHWANN – 1839) CELL THEORY
(VIRUS) LIVING VS NON-LIVING — (S → R etc. GROWTH)
PLANT VS ANIMAL — CHLOROPHYLL, CELLULOSE, MERISTEM
COMPLEXITY OF CELL

1-II – 5-KINGDOM SYSTEM
$C_{55}H_{72}O_5N_4Mg$ — MONERA, PROTISTA — PLANT, ANIMAL, FUNGUS — PHOTOSYNTH., ABSORPTION, INGESTION
BEGIN PHOTOSYNTHESIS
BIOLUMINESCENCE dinaflagellates

3 – PHOTOSYNTH. CONT'D.
LIGHT I PHOTOLYSIS
DARK II CO_2 FIXATION
ANALYSIS OF EQUATION – COMPARE RESPIRATION
NH_2CH_2COOH — Amino group, carboxyl group
LIGHT 7600 Å → 4500 Å

6 – MARDI GRAS HOLIDAY

8 – EXAM No 1

10 – AEROBIC VS ANAEROBIC RESPIR. (E)
$C_6H_{12}O_6 \xrightarrow{enz.} C_6H_{10}O_5 + H_2O$
$C_6H_{12}O_6 \xrightarrow{yeast} C_2H_5OH + CO_2$ ↑ + 25 K cal. vs. 673 cal
MONO – DI – POLYSACCH.

13-II – ADP ⇄ ATP — GLUCOSE + ATP
GLYCOLYSIS, PHOSPHORYLATION — "energy engine" C_6 — GLUC. + ADP → PYRUVIC ACID, ACETYL "
C_3 C_2 C_1 CO_2 + H_2O
PAPERS RETURNED

19-I – Snow

15 – FUNGI — SZENT-GYÖRGYI
NUMBERS OF ORGANISMS — ATP MUSCLE
± 10⁶ INSECTS ± 1.25 x 10⁶ ANIMALS
± 500,000 PLANTS — POISONOUS VS EDIBLE
± 250,000 FUNGI ± 5,000 Bacteria
INTRODUCTION TO ETHNOMYCOLOGY

17 – N_2 → NO_2 – NH_3 → NO_3 CYCLE
RHIZOBIUM — LEGUMES – NODULES
SAPROPHYTE – SAPROZOITE – PARASITE
PATHOGEN
IRISH FAMINE 1846–48 } Phytophthora infestans
GRAPE } PLASMOPARA VITICOLA

20 – FUNGI – PLANTS – ANIMALS
CELLULOSE – CHITIN – GLYCOGEN
LIFE CYCLE – SPORE – GERM TUBE – HYPHA (E)
MILLARDET 1885 — MYCELIUM – Fr. body – SPORE

22 – FUNGI CONT'D – MYXOMYCOTA – MITH. PROTOZ.
EUMYCOTA
EVOLUTION H_2O → LAND — OOMYCETES, ZYGO, ASCO
ADAPTATIONS (CACTI – MAN IN DESERT) — ♂ ♀ SYMBOLS

24 – OOMYCETES, ZYGOMYCETES — ISOGAMY, HETEROGAMY, OOGAMY — RHIZOPUS
MONOECIOUS
DI –
PARTHENOGENESIS
HERMAPHRODITE

27 – REVIEW – PHYCOS { ZYGO –, OO – — ASCO, BASIDIO, STAGES, MYCELIAL DIFF.
CYTTARIA — DARWIN — N → 2N → N
TRUFFLES — P. ROQUEFORTI

1-III – EXAM No 2

3 – BEGIN DEMONOLOGY – MYTHOLOGY
PANDORA – PROMETHEUS
PHLEGM, BLOOD – BILE etc.
ASTROLOGY — EXAM RETURNED
Agaricus bisporus
Amanita fusca
Amanita virosa

6 – ARCHIMEDES EUREKA! — KOCH'S POST. 1882
PASTEUR – 1865 – GERM THEORY
JENNER – 1796–8 – SMALLPOX / COWPOX
1847 – SEMMELWEISS – CHILDBED

8 – BACTERIOLOGICAL TECHNIQUE – AUTOCLAVE, PETRI DISH, PURE CULTURE, STERILE FLAME etc.
(20)
CHAMBERLAND FILTER
FILTERABLE VIRUS AGAR
MYCOBACTERIUM tb.
M. leprae – LEPROSARIUM CARVILLE – ARMADILLO
DIPLOCOCCUS PNEUMONIAE
NEISSERIA GONORRHEA
KOCH'S POSTULATES
TREPONEMA PALLIDUM

10 – MORE PATHOGENS
MALARIA – YELL. FEVER – PANAMA
CORYNEBACT. DIPHTH. BOTULISM
CLOSTRIDIUM TETANI
PASTEURELLA PESTIS – DEFOE – JOURNAL
POLIO
♀ ANOPHELES & AEDES VECTORS
LISTER(INE)
PLASMODIUM VIVAX
SALK – 1955 POLIO

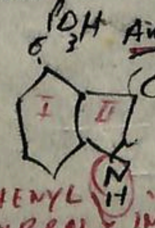
13 – SOCIOBIOLOGY – E. WILSON
RECOMBINANT DNA – NY TIMES ARTICLE
LEGISLATION
♂ ♀ PINE CONES (Pollen)
FROM MAGIC → SCIENCE
ANTIGEN – ANTIBODY REACTION
IMMUNOLOGY
SALK VACCINE 1955
SABIN " (LIVE 1960 VIRUS – ORAL)
BEGIN RABIES 1885

d. 1945 – Nazi occupation Paris
15 – JOE MEISTER – PASTEUR – RABIES – 1885
"PRIMITIVE" MAN MEDICINE || HUNTERS – PLANT GATHERERS
CULTIVATION – CIVILIZATION
NICOTIANA RUSTICA – PICIETL – TOBACCO
CULTURE TRAITS → VALUES.
— CONT'D. —

17 – RIVEA CORYMBOSA – OLOLIUHQUI
IPOMOEA VIOLACEA
CANNABIS SATIVA – MARIJUANA (h)
LOPHOPHORA WILLIAMSII – PEYOTL(E)
(LEPRECHAN – ST. PATRICK'S DAY)

20 – 22 – 24 – 27 } EASTER RECESS

29 – CONT'D – PSILOCYBE MEXICANA – OAXACA
SH.
TEONANACATL
SOMA
CORTES – 1519
PIZARRO – 1532
AMANITA MUSCARIA
MUSHROOM CEREMONY – CATHOLIC MASS



PSILOCYBIN
I: PHENYL
II: PYRROL } INDOLE NUCLEUS

31 – P. mexicana & spp. – TEONAN.
A. muscaria – "SOMA" – FLY AGARIC
REVIEW
Kod. slides

3 – IV – A. muscaria = KAKULJA – Quiche etc.
CURRENT ETHNOMYCOL. RES.
MONERA – B-G. ALGAE • BACTERIA. – PROKARYOTE
PROTISTA
PLANTS – ANIM. FUNGI
GREEN – BR. – RED
MANNA – (MAN HU)
BIBLICAL REF.

5 – IV – EXAM No 3

7 – CYANOPHYTA, BACTERIA } MONERA
CHRYSOPHYTA
PYRRO
EUGLENOPHY } UNICELLULAR
CHLOR, PHAEO, RHODO } MCELL
PLANKTON – PHYTO, ZOO
PANGAEA ← LAURASIA, GONDWANA
ECOLOGY – ARGO MERCHANT
6 × 10⁶ gals. OIL SPILL 1976
NANTUCKET (COUSTEAU)
FORAMINIFERA
± 250 × 10⁶ yrs, 150
CONTINENTAL DRIFT

10 – REVIEW ALGAE
CHRYSOPHYTA – DIATOMS & TNT – NOBEL
PYRRO – BIOLUMINESCENCE
DINOFLAGELLATES
PHYCOCYANIN
ERYTHRIN
FUCOXANTHIN
CHLOROPH., CAROTENE, XANTHOPHYLL
UNICELLULAR VS MULTI –

12 – CHLORO – CHLORELLA – FOOD / POPULATION
PHAEO – KELPS – KOMBU – SARGASSO SEA
KELPMEAL – ALGIN
RHODO – CARRAGEENIN – AGAR
CORAL – LITHOTHAMNION
K
IRISH MOSS

14 – LICHENS ← PHYCOBIONT, MYCO
(30)
ASCOLICHENS
BASIDIO –
SO₂ – CO SENSITIVITY
SLOW GROWTH
DOCTRINE SIGNATURES
FRUTICOSE
FOLIOSE
CRUSTOSE

17 – LICHENS – CONCL.
BEGIN BRYOPHYTA
MOSS – HEPATIC
SPOROPHYTE VS GAMETOPHYTE
USNEA – BURNS
HARRIS TWEED
REINDEER MOSS
PERFUMES

19 – METAGENESIS
BRYOPHYTA – MEIOSIS
SPOROPHYTE → GAMETOPHYTE
2N → N
EVOLUTIONARY TRENDS + H_2O → LAND
ADAPTATION VS DRYING
1ST LAND PLANTS
GAMETANGIA ♂ ♀

21 – REVIEW METAGENESIS
H_2O → LAND
ARCHEGON. ANTHERID.
XYLEM – WOOD
PHLOEM – BARK
N 2N 2N
BRYOPHYTA
TRACHEOPHYTA
LYCOPSIDA – CLUB MOSSES
SPHENOPSIDA – HORSETAILS
PTEROPSIDA – FERNS
GEOLOGY – SILURIAN – LAND PLANTS etc.

24-IV-MET — GENESIS — FERN SORUS

SPOROPH → GAMETO (PROTHALLIUM)
2N N

4y EVOLUTIONARY TRENDS etc (TREE FERNS)
SPOROPH → LARGER
GAMETO " → SMALLER (MICRO) CONDUCTING TISSUE

[TONGUE CURL 3:1]

26 — GYMNOSPERM
CYCADS — FLAGELLATED ♂ GAMETE
CONIFERS — WIND-BLOWN "
ANGIOSPERM ♂ ♀ GAMETOPHYTE
FLOWER POLLEN OVULE
DOUBLE FERTILIZATION in (ZYGOTE, ENDOSP. 3N)

28 — BERINGER'S FOLLY — LITHOGR. WURZB. } 1726
SCHEUCHZER — HOMO DILUVII TESTIS }
GYMNO VS ANGIOSPERM
MONOCOT } SEEDS USES etc
DICOT }
BEGIN CELL
BROWN - 1831 - NUCLEUS
WALDEYER 1888 - CHROMOSOME
CELL ÷ MITOSIS, MEIOSIS

1-V — MITOSIS vs MEIOSIS
BEGIN MENDEL (1865) [NÄGELI etc.]
DARWIN

3 — (38) SEX DETERMINATION: XX vs XY
MENDEL'S MONOHYBRID X TT x tt
BACKCROSS

— EVALUATION FORMS —

8-V — FINAL EXAM

BIOLOGY 100 Z

24-VIII-1979
MWF 102 WMS.
11:30

24-VIII Introduction: Curtis etc. Exam dates 19-IX, 10-X, 7-XI
Origins – via GALACTEA, 1,000,000 L.Y.
PTOLEMY – GEOCENTRIC vs COPERNICUS – HELIOCENTRIC

ARISTOTLE – 322 BC
PTOLEMY – 5125 AD
COPERNICUS – 1543
GALILEO – 1642 d.
NEWTON – 1727
EINSTEIN – 1955 $E = mc^2$

27- CONT'D. Pioneer 11 → Saturn, now approaching
1 light year
8 lm Sun → Earth

29- CONT'D. GRAVITATION: $F = \frac{G m_1 m_2}{d^2}$
4004 BC – USHER
3992 – KEPLER
3113 – MAYA
BIG BANG – ± 20 × 10⁹ yrs
± 4 × 10⁹ yrs – EARTH
± 3.5 × 10⁹ yrs (ca. LIFE) – HOMO ± 3 × 10⁶
POPE ON NEWTON

31- CONT'D. ATOMIC THEORY – ARISTOTLE – E, A, F, W.
QUARKS – QUASARS
DEMOCRITUS 340 BC
DALTON – 1809
63 el. ← MENDELEEV – 1869
92 elements +
ABIOGENESIS
Petri dish demo.

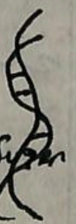
3-IX LABOR DAY HOLIDAY

5- Remarks on Pioneer 11 → Saturn
SPONTAN. GEN. CONTROVERSY
REDI – 1668 – maggots etc.
LEEUWENHOEK – 1683 etc.
SPALLANZANI – 1765 – boil flasks
ELAN VITAL
VITALISM – MECHANISM

7- PASTEUR – 1864
OPARIN – 1936 → CHEM. EVOLUTION
MILLER – 1953 → AMINO ACID
water analogy etc.

M.

10- Begin DNA – DOUBLE HELIX
1953 – WATSON/CRICK
Early evolution of Earth etc.
PURINE: AD., GU. / PYRIMIDINE: THY., CYTOS.
H_2 bond
5-CARBON SUGAR
PHOSPHOROUS



12- DNA (CONT'D.)
BROWN – 1831 – REPLICATION METHOD [zipper analogy etc.]
DARWIN – 1859.
20 AMINO ACIDS
ΦX174 BACTERIOPHAGE 5375 BASES
SANGER 1977
NH_2 CH_2 COOH
H_2N – C(R)(H) – C(=O)OH
AMINO
CARBOXYL
GLYCINE – H_2
ALANINE – CH_3

14- DNA CONT'D.
RIBOSOMES → amino acids
ENDOPLASMIC RETIC. → PROTEINS
MITOCHONDRIA – ATP
ENZYMES
(organelles)
METABOLISM
CALVIN on "LIFE"
"LOGICAL CONSEQUENCE..."
CHEMICAL – "WHENCE...?"
(applause)!
"balanced view"

17- Begin PHOTOSYNTHESIS
ANA- / CATA- ; S → R reproduction
$6CO_2 + 12H_2O \xrightarrow{Chl.} C_6H_{12}O_6 + 6O_2 + 6H_2O$
(RESPIRATION suggested)
$C_6H_{12}O_6 + C_6H_{12}O_6 \xrightarrow{ENZ.} C_{12}H_{22}O_{11} + H_2O$ POLYSACCH.

EXAM 1 19-IX (40 min)
PHOTOSYNTHESIS
5-KINGDOM SYSTEM – MONERA, PROTISTA, PL., AN., FUNGI
PROKARYOTES / EU.
PLANT/ANIMAL CRITERIA – CHLOR., CELLULOSE, MERISTEM

21-IX PHOTOSYNTH. CONT.
I – PHOTOLYSIS
II – CO_2 FIXATION – CALVIN CYCLE, DARK REACTION
ADP ⇄ ATP [Demo. w. 3 students) applause
(energy wheel)

24- RESPIRATION CONT.
AEROBIC vs ANAEROBIC
PAPERS RETURNED EXAM 1
$C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$
$C_6H_{12}O_6 \rightarrow 2C_2H_5OH + 2CO_2$
25 kg cal vs 686 kg/cal for aerobic

26- FOSSIL HISTORY – DA VINCI d. 1519
BERINGER, SCHEUCHZER (1726) – LITH. WÜRZB., HOMO DIL. TEST.
PANGAEA – LAURASIA – N. AMER., ASIA
GONDWANA – AFRICA, AUSTRALIA etc.

28- Begin ALGAE
MONERA ← B-G – CYANOPHYTA
PROTISTA – BACIL., CHRYS-, PYRRO-, CHLORO-, PHAEO-, RHODO-
MONERA, NOSTOC
PIGMENTS: CHLOROPHYLL, XANTHO-, CAROTENE (PHYCOCYANIN, ERYTHRIN)
BLUE-GR. – TRICHODESMIUM [RED SEA]
Begin DIATOMS – complex etc.

1-X – ALGAE CONT'D. } gen. ac. characters
SILICON – DIATOMS – DIATOMACEOUS EARTH FILTERS in BACTERIOLOGY
DINOFLAGELLATES – RED TIDES, BIOLUMINESCENCE
CHLORO → fresh H₂O
EVOLUTIONARY trends
H_2O → LAND
simple → complex

3-X – CONT'D. DYNAMITE – NOBEL 1866 } DIATOMACEOUS EARTH
CHLOROPHYTA – SEX. REPROD. PATTERNS
CHLORELLA – ISO, ANISO – OOGAMY
KWASHIORKOR – PROTEIN DEF.
PHAEOPHYTA – KELP – size
GAMETES (N) → HETERO – ZYGOTE (2N) etc.
SYMBOLS: ♂ ♀ MARS, VENUS etc.

5-X – cont'd. Begin FUNGI
PHAEOPHYTA – SARGASSO SEA, COLD H₂O, SIZE, FUCOXANTHIN
RHODO – PHYCOERYTHRIN
MYCELIUM, HYPHAE – NO CHLOROPHYLL, NO ROOT, STEM
AGAR
LAMINARIA
CHONDROPHYLLIN CARRAGEENIN
CORAL REEFS – TAHITI
CORAL ($CaCO_3$) etc.

8-X cont'd.
PL.– AN. FUNG. – N_2 cycle → NH_3 ...

EXAM. 2

10-X Fungi cont'd.
- OOMYCETES — sex. reprod. → oogonium/antherid. oospore (2n)
- ZYGO — zygospore
- ASCO —
- DEUTERO —
- BASIDIO —

Phytophthora infestans
+ Late Blight Potato
1845-50 IRISH FAMINE etc.

12-X – Fungi cont'd. PLASMOPARA VITICOLA
MILLARDET — 1882
BORDEAUX MIXTURE
$CuSO_4$ + Lime

FLEMING 1929

Asco — Ascus formation
Basidio — Basidium ..
— meiosis / mitosis → (N) spores

15- cont'd. CYTTARIA → DARWIN etc. TIERRA DEL FUEGO
ASCOS — TRICHOPHYTON spp. A's foot
TRUFFLES etc. hypogeic
bread wine etc. — YEAST etc.
NEUROSPORA — genetic tool
DEUTERO — ASEX.
PENICILLIUM — FLEMING 1929 etc.
REVIEW ASCO — BASIDIO
EXO — ENDO SPORES

17- BASIDIOS
RUST — WHEAT — BARBERRY
SMUT — CORN
ASPERGILLUS → SHOYU SOY SAUCE
RHIZOPUS → TEMPEH
POLYPORES
AGARICACEAE
PUFFBALLS DEMO.
BREAD MOLD "EXPERIMENT"

19- Agaricus bisporus — commercial etc.
CANTHARELLUS CIBARIUS
AMANITA VERNA
{ MYCOPHOBIST, MYCOPHILE, MYCOPHAGE }
CULTURAL DIFF. → FOOD HABITS
RUSTS / WHEAT (var. nov.) etc.

22- POISONOUS vs EDIBLE — myths (silver coin) etc.
Amanita caesarea
HOUSE OF USHER (SERPULA LACRYMANS / DRY ROT) — POE —
CLITOCYBE ILLUDENS — LUMINESCENT
ALICE & HALLUCINOGENIC MUSHROOMS

24- Intro. to Economic Botany — useful to man
Empirical knowledge of plants, animals etc.
→ civilizations → CULTIVATED PLANTS
MYTHOLOGY — FAIRY RING
INDIGENOUS AMER. PLANTS
CORN — ZEA
BEANS —
SQUASH —
COCOA —
POTATO —

26- ethnobotany vs Economic bot
ZEA
PHASEOLUS
CUCURBITA
THEOBROMA
SOLANUM etc.
NICOTIANA RUSTICA
LOPHOPHORA WILLIAMSII
PSILOCYBE MEXICANA
... = RELIGION & MYTH.

29- Ethnobotany cont'd. mycology (28) lec.
+ TRICHOCEREUS pachanoi — Peru etc.
Psilocybe mexicana = TEONANÁCATL
Personal narrative — "MASS" etc.
CANNABIS SATIVA → COPTIC CHURCH
"MARIJUANA" USE / ABUSE etc.

31- cont'd. AMANITA MUSCARIA — SOMA
PANAEOLUS, STROPHARIA etc.
CODEX MADRID shown

2-XI — ETHNOBOTANY / MYCOLOGY SLIDES (59)

5-XI — REVIEW — + MISKWEDO (OJIBWAY) = A. muscaria.
CODEX MADRID
CLAVICEPS PURPUREA — Ergot of RYE
ELEUSINE MYSTERIES
ST. ANTHONY'S FIRE

EXAM 3

7-XI – Begin Mythology of Disease etc.
I. PROMETHEUS → PANDORA
GR. PANTHEON
II BABYLONIA — DEMONOLOGY
III CHRISTIAN EXORCISM

9-XI — HIPPOCRATES ± 450 BC — OATH etc.; Blood, Phlegm etc.
ASTROLOGY — SHAKESPEARE
SYMBOLISM — Yin: DARK, NEG.; YANG: LIGHT POS.
PASTEUR — 1885 — GERM THEORY
LEEUWENHOEK — 1683

12 — PAPERS RETURNED.
MYCOBACTERIUM
M. LEPRAE
T. PALLIDUM
N. GONORRHEA
P. PESTIS
TYPHOID
JENNER 1798
LADY MARY — D 1765

14-XI — JENNER cont. 1798 — Smallpox vaccine
SEMMELWEISS — "childbed fever" 1847
LISTER — 1867
PASTEUR — 1881 — ANTHRAX; 1885 — RABIES

16- BEIJERINCK — 1898 — TMV
"IN VITRO" "IN VIVO"
KOCH — 1876 — ANTHRAX
1881 — CHOLERA
1882 — TB → POSTULATES
SALK Vaccine vs Polio — 1950 — DEAD
SABIN .. .. — 1960 — LIVE
ARCHIMEDES — 3rd Cen. BC "EUREKA!"
ANTIGEN — ANTIBODY REACTION (PROTEIN)

19-XI-'79 - 1898 - SP.-AMER.-WAR

TMV → YELLOW FEVER

AEDES LAZEAR - 1900

CUBA ← VIRUS ← REED - 1901

GORGAS - 1904

MALARIA - LAVERAN - 1880

PLASMODIUM in Man-

ROSS - 1897 - in Anopheles

21-XI - complete above

1905 yellow fever epidemic in N.O.

NO vaccine vs malaria

Begin Lichens - SO_2, Co

Sensitivity

alga + fungus | foliose

resistant to drought | fruticose

cold. | crustose

THANKSGIVING HOLIDAY 22-25-XI

26-XI - LICHENS concl.

MYCOBIONT { ASCOLICHEN

PHYCO — BASIDIO —

LITMUS BEGIN BRYOPHYTA

REINDEER MOSS { MOSS

LIVERWORT

28 - BRYOPHYTA - MOSS - SPHAGNUM

LIVERWORT

TRACHEOPHYTA ← XYLEM | VASCULAR

Begin Life Cycle PHLOEM | SYSTEM

FUNCTIONS

DEAD CELLS etc.

30 - MOSS - complete

Begin FERN

GAMETOPHYTE / SPOROPHYTE

etc. etc.

ARCHEGONIUM ANTHERIDIUM

EGG → ZYGOTE → EMBRYO - SPOROPH.

N 2N →

2 - COMPARE: SPOROPHYTE ♂

GAMETE < ♀

MOSS - FERN - ANGIOSPERM

EVOLUTIONARY TRENDS etc.

FLOWER STRUCTURE

5 - COMPLETE - ANGIOSPERMS

SEED → FRUIT MONO- DI- | oecious

EVOLUTIONARY TRENDS

FIN

44 lectures

BIOLOGY 1002

16-I-1979.

T.Th. 102 Wms. 10:30

16-I Introduction — H. Curtis – "assignments" 4 exams
"Biology" defined — Ptolemy 150 A.D.; Copernicus – 1543; Galileo, Newton > 1642 — Ussher 4004 BC; Kepler 3992 BC; Maya 3113 BC
20 × 10⁹ yrs "Big Bang"
Milky Way ± 100 × 10³ light yrs diam.
Geocentric vs heliocentric
students an "intellectual elite" — Aristotle's Beginning in Dur End
Aztec, Maya, Inca, Greek
Pope on Newton: "Nature & Nature's Laws" etc.
Mention Arabs and zero || Arno Penzias radiation Big B.
"In the beginning..."

18-I Galaxy – Milky Way – 100 × 10³ LY
"Birthdays" – ± 5 × 10⁹ yrs; ± 4 × 10⁹ yrs "Life"; ± 2 × 10⁶ yrs. Homo sapiens
Abiogenesis: Redi 1668; Spallanzani 1768 — mechanism vs vitalism; Pasteur 1864 flask
"brick recipe"
Leeuwenhoek 1683 – Bacteria, simple microscopes etc. Protozoa, Bacteria etc.
Long boiling destroyed "vital principle"!
Cell: Brown – 1831; Schleiden – Schwann 1838, 1839

23 – Origins cont'd – Pauling – Watson & Crick 1953 DNA
Nucleotide bases & sugar, PO_3 — Bunsen 1857, Petri 1877
A:T–S, G:C–S > PO_3 etc.
3.4 Å bet. steps; 20 Å wide; 34 Å for repeats — Miller – 1953, Oparin – 1935
Abiogenesis

25 – (Democritus (400 BC); Dalton (1803) "Atom" — Carlyle, Wordsworth
Einstein – $E = mc^2$
Newton – $F = G\frac{m_1 m_2}{d^2}$
DNA: purine, pyrimidine, codon, 3 nucleotides in code; RNA – single strand
Voyager – Jupiter 1 & 2 (± 480 × 10⁶ mi from Sun); Pluto 2.3 × 10⁹ mi.
Prokaryotes – Bacteria & B-G Algae
Eu" – Protista, Plant – Animal – Fungus
5-Kingdom System — "Life" def. Calvin
Amino acids → Proteins
Wöhler – 1828 – $C{=}O{-}(NH_2)_2$

29 – light match — Scheele – 1771; Priestly – 1774 – O_2 & combustion etc.; Lavoisier – 1779 – O_2 + N_2 end of Phlogiston Theory
5 Kingdoms: Monera – Bact & B-G; Protista – Diatoms – Desmids, Protozoa etc.; Plants; Animals; Fungi — Linné – "Lapides etc." fixity of sp.
Begin Photosynthesis
$6CO_2 + 12H_2O + L. + Chl. \rightarrow C_6H_{12}O_6 + 6H_2O + 6O_2\uparrow$
Analysis of equation CO_2, H_2O, Light

1-II Photosynthesis analysis cont'd. O_2 from H_2O (tagged O^{18}) etc.
Respiration begin – use of energy source etc.
Chloroplasts – Thylakoids – grana
Chlor. α + β; Carotene; Xanthophyll } separation
Stress significance of process.

5-II – Photosynth vs Respiration — Aerobic → $CO_2 + H_2O$ 686 kcal; An → $C_2H_5OH + CO_2$ 25 kcal
ATP ⇌ ADP, energy-rich ~P
Energy release — Mono, Di, Poly } saccharides C_6 hexose, C_{12} — starch
Amer. Sci 67(1): 57–67. 1979. Michael Smith on nucleotide sequencing in ΦX174 bacterial virus – E. coli
Cellulose, meristem — Plant / Animal / Fungus criteria — Photo-, Oxidative } phosphorylation

7 – Exam No 1

8 – Plant – Animal – Fungus | criteria compared: cellulose, glycogen, mycelium
N_2 cycle → NH_3 → NO_2 → NO_3 — Ammonification, Nitrification, N fixation
Rel. numbers of organisms: ± 500,000 pl.; ± 10⁶ anim.; ± 50,000 fungi
Plasmopara v. Millardet 1882 — $CuSO_4$ + lime, Bordeaux mix
Yeast & fermentation, bread, wine — $C_2H_5OH + CO_2\uparrow$

13 – Fungi – Mycota: Oomycetes — Aquatic — Haploid, Diploid, Somatic, Egg – sperm
4/4 Irish Famine 1848; Phytophthora — 2490, Asco, Basidio — Imp.
Fairy rings
Poe – Usher – Dry rot – Merulius
"Forests" – luminescent fungi; [Light sin heat]
Alice & hallucinogenic mushroom
[Exam returned]

15 – (10th) Fungi cont'd – Zygo – Rhizopus; Asco – Yeast; Basid – Mushrooms, Rusts, Smuts; Imperf. – Penicillium
Aquatic → Terrestrial; "Darwin & Cyttaria"
Lower vs "higher" fungi
Ascus – Basidium; Exo – endospores

20 – Isogamy, Heterogamy — Poisonous vs edible
Begin — Demonology, Prometheus, Pandora — Leeuwenhoek 1683 Bacteria
Mythology — Socrates & conium m.
Diseases: T.B., Leprosy, Syphilis, Gonorrhea, Plague, Diphtheria, Pneumonia, Anthrax
"Plagues" of man

22-II Yin-Yang / Humors
Lit / Dark Light
Jenner v Small pox Vaccination

Pasteur 1865 - Germ Theory
1881 Anthrax vaccine
1885 - Rabies

Semmelweiss - 1847 - "Childbed Fever"
Immunity concept
Salk - 1955 / Sabin - 1960 } Polio

27 - Mardi Gras Holiday

1-III Poisonous mushrooms
A. bisporus
Amanita caesarea
Fleming 1929
Bacterial diseases - M. tb, M. leprae, F. pallidum, P. pestis, N. gonorrhea
Shoyu / Tempeh
Blue cheese, truffles etc.

Beijerinck 1898 TMV

6-III Virus vs Bacterial diseases
Stanley - 1935
Yellow fever - virus
Aedes
Malaria - plasmodium
♀ Anopheles
Archimedes "Eureka!"
Koch's Postulates
Chamberland Pasteur filter
Cinchona (Jesuit's Bark)

7- EXAM N°2

8- Ethnobotany / myco.
Corn - Zea
Beans - Phaseolus
Squash - Cucurbita
Chili - Capsicum
A. muscaria, Psilocybe, Lophophora w., Datura < Soma, Thunderbolt
Magic - Religious etc
Hunters - cultivation of plants & civilizations
Personal exp. Amazonas, Guatemala, Oaxaca

13 - cont'd.
Cortés - 1519
Pizarro - 1532
Suppression of native religions etc.
Sacred use of hallucinogens - [The Mass]
Morning glory - Ipomoea - Rivea corymbosa
- Lophophora
Psilocybe spp. Teonanacatl
Amanita muscaria
Codices [Madrid shown]
56 slides - Native Amer. Church
De Lauda, Sahagun, mushroom stones [shown]
Papers returned

15- 1st ½ hr. student evaluation forms
Review hallucinogens - Trichocereus pachanoi "San Pedro" "whistling"
Cultural importance
Marijuana - Cannabis sativa (Asia)
I. Phenyl / II. Pyrrol / β-Indole nucleus (CHON)

20-III Phycology
Monera - Cyanophyta
Protista - Chrysophyta - Diatoms
Pyrrophyta
Chloro-, Phaeo-, Rhodo-
Phycocyanin, Phycoerythrin
Precambrian record
Aquatic vs terrestrial
Manna etc
Hot springs ±85°C ±185°F
Travertine
Phyto / Zoo- plankton
100th Einstein - Fossil algae pre-cambrian

22- Fossils
Beringer, Scheuchzer 1726
Lithographiae W.
Homo diluvii T.
1731 - Copper bible
Nobel 1866 & dynamite - TNT etc.
Chrysophyta - Diatoms | D. earth - uses
Pyrro - Dinoflag. - Red tides - Fish kills, toxins, bioluminescence
Nobel prizes 1901 →
Roentgen X-rays

27- Complete review of algae
Chlorella - Food
Sargasso Sea
K, I - Fertilizer
Seaweeds: Agar - Demo. Br. Al. Demo
Lithothamnion - coral reefs, islands
Coelenterate (Anthozoa) + red algae
Carrageenin
Pangaea < Laurasia / Gondwana
Continental drift

28 - EXAM N°3

29- Lichens
Evolutionary trends - Evol. arrow - H_2O → land, simple →
Alga - fungus - survivors
SO_2 - CO sensitivity } 100ppm SO_2 → inhibition
Desiccation -70°C ↔ +70°C C. rangiferina - Reindeer moss
Rock - soil formers
±2% photosynth. level of higher plants
Doctr. of signatures
Schwendener 1867
Lobaria pulmonaria - pneumonia
Lichen caninum - rabies

3-IV Review lichens } myco - phycobiont
Ascolichens - basidio
Apothec. - perithec.
Usnea - antibiotic vs burns
Litmus
Begin Bryophyta < mosses, hepatics } doct. signat.
General characters
Non-vascular → small
Evolutionary sig.

5- Moss cycle complete
Sporophyte, gametophyte
Calyptra (N)
Autophytic gametoph.
Parasitic sporophyte
Evolutionary trends
vs desiccation
Sporophyte 2N → Gametophyte N
Archegonia ♀, Antheridia ♂ (N), Zygote, Embryo (2N)
Differentiation

9-16-IV Spring Break (2 classes missed)

17- Algae, Bryophyta, Lycophyta, Spheno, Ptero, Fern, Gymno, Angiosp.
Embryophyta, Tracheophyta
Sporophyte > gametophyte
Evolution - vascular tissue, xylem, phloem
Equisetum
Lycopodium
Osmunda
Quercus virginiana

Margin notes: 23-III Begin spring; 26-III Begin, Pres. Carter, New trend; Chastise class; 14-III Einstein 100 yrs; 6-IV Spring break; 17- Lecture

19 – IV – METAGENESIS

MONOECIOUS ✓

DI —

73 BRYOPHYTA

↓

GYMNOSP < CYCADS – LARGE fl. sperm

CONIFERS – PINES etc.

ANGIOSPERMS

evolutionary patterns

sex. reproduction

FERN LIFE CYCLE

↓

SEED

24 – REVIEW GAMETOPHYTE

SPOROPHYTE

ANGIOSPERM — ♂, ♀ GAMETOPHYTE

(POLLINATION – FERTILIZATION) { POLLEN GRAIN

OVULE

↓ SEED.

FRUIT

26 – GYMNO – TRACHEID

ANGIO – + TRACHEA

SEED COTYLEDON(S)

MONOCOT } LEAF VENATION

DICOT

HOOKE – 1665

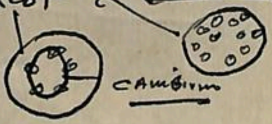
MENDEL – 1865

BROWN – 1831

FLEMING – 1882

BOVERI – 1892

WALDEYER – 1888



CAMBIUM

– OVER –

1-V-'79 (last lecture)

FJ

MITOSIS

MEIOSIS

MENDELIAN GENETICS

MONOHYBRID CROSS

FIN

Biology 1002 (1980)

14-II-1980

MWF 103 WMS.

7:30 · Sec 1 + Sec. 4

{Sec 1 ± 13, Sec 4 ± 2?}

14-I

Introductions Curtis – Exams < 500 pts., 4

Gen. orientation + course content.

Begin: ; 100 x 10⁹ ly.

16 – Origins – 4004 BC – Usher; 3113 BC – Maya; 3992 BC – Kepler (1630 d.)

Big Bang ± 20 x 10^9 yrs.

322 BC Aristotle – Begin – Middle Ages.

125 AD Ptolemy – Geocentric

1543 – Copernicus – Heliocentric

1630 – Kepler – Elliptical rev.

1727 – Newton – Gravitation – Pope's epitaph "Nature & N's laws"

– Galileo – 1642 b.

(Matter? Eternity..)

18 – ± 5 x 10^9 yrs – Earth; ± 4 x 10^9 yrs – Life; ± 3 x 10^6 yrs – Man

Einstein – $E = mc^2$; Newton – $F = \frac{m_1 m_2}{d^2}$

Dalton – 1808; Demokritus – 400 BC; Mendeleev – 1869; Atomic theory <

21 – Atom – Proton, electron; Molecule – Quark, Quasar

Earth, air, fire, water.

Abiogenesis – Spon. gen.; Ancient beliefs; Redi – 1668 – Alien; Spallanzani 1768; Leeuwenhoek – Bacteria 1683

Begin Pasteur

23 – Pasteur – 1864; Oparin – 1936; Miller – 1953; "Elan vital"

Mechanism vs Vitalism; Carnegie ... ? ... "whence ..."; Calvin: "Life ..."

Amino acid – Glycine $NH_2 \cdot CH_2 \cdot COOH$

25 – CHONSP ... Micro & macromolecules; Amino acids; Proteins ... etc.; DNA; Life; Cell

Hooke – 1665; Brown – 1831; Schleiden – 1838; Schwann – 1839; Virchow – 1858

Von Mohl – 1846 "Protoplasm"; Plant, Animal, Fungus etc.

Flemming – 1882 "Mitosis"; Waldeyer – 1888 "Chromosome"

28 – Plant – Animal – Fungus

Cell structure – Differences; Physiological

Cellulose wall; Meristem; Chlorophyll; examples (supermarket etc.)

wall, membrane, mid. lamella, nucleus

Photosynthesis, Ingestion, Absorption

centriole (animals)

Cell – tissue – organ / system – organism

autotroph – heterotroph; chloroplast

30 – Cytology – Ribosome – Amino acids; Endoplasmic retic. – Proteins; Mitochondria – ATP; Golgi – Glycoproteins; Vacuoles – lipid

Begin DNA – 1953; Watson – Crick – Wilkins

1-II – DNA – Base pairs (H_2 bond); 5-C sugar; PO_4; Recombinant DNA; ΦX174 bacteriophage

P < S – A:T; S – G:C etc.

4-II – DNA – RNA; Amino acids; Replication; Protein; Codon triplet

R: $H_2N-C-COOH$ (H); Amino, Carboxyl; (Glycine, Alanine etc.)

Begin Photosynthesis

.03% CO_2; 21% O_2; 78% N_2

$6CO_2 + 12H_2O \xrightarrow[Chl.]{L.E.} C_6H_{12}O_6 + 6O_2 + 6H_2O$

$Å = 10^{-10}$ m.

6 – Cont'd – analysis thru Light ... ROYGBV ... ±8000Å, ±4000Å

$CO_2 + H_2O$ enter plant, etc. Chlor. a – CHONMg 55 254

EXAM I

8 – Review: + $C_6H_{12}O_6 + C_6H_{12}O_6 \rightarrow C_{12}H_{22}O_{11} + H_2O$

$[C_6H_{12}O_6]_x \rightarrow [C_6H_{10}O_5]_x + H_2O$

Glucose/Fructose; 6-carbon sugar; Monosaccharide; Di-; Poly-

(Isotope, Isomere)

11 – Cont'd. Intermediate reactions

I Photolysis –

II Calvin (Dark reactions) CO_2 fixation

a. $H_2 + NADP \rightarrow NADP \cdot H_2$

b. $NADP \cdot H_2 + CO_2 \rightarrow C_3H_6O_3 \cdot P$

c. $C_3H_6O_3 + C_3H_6O_3 \rightarrow C_6H_{12}O_6$

EXAM RETURNED

13 – Aerobic vs Anaerobic resp. etc.

Glycolysis { $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$ + E

$C_6H_{12}O_6 \xrightarrow[Zymase]{Yeast} 2CO_2 + 2C_2H_5OH$ etc. ±25 kg/cal

ADP, A-P-P~P; – Photophosphorylation

Fermentation

Glucose – Phosphate; Pyruvic acid 3-C; Acetic " 2-C; CO_2 1-C

15 – Geological history

Pangaea < Laurasia ('N. Amer. Asia); Gondwana (S. Amer. – Australia, Africa –)

Continental drift ± 200 x 10^6 yrs

Fossils – Scheuchzer – Homo diluvii testis 1726

(1519 – Leonardo; Beringer – Lithographia Wirceburgensis

MARDI GRAS HOLIDAY 18-19-II

20 – Fossil record concl. (significance)

Monera –; Protista – } Characteristics – Chlorophyll a, b; Carotene; Xanthophyll; Phycocyanin – BG; Phycoerythrin; Nuclear organiz.; N_2 fixation

(Monera)

22 – Protozoa; Euglenophyta; Chrysophyta; Pyrrophyta } Protista etc.

– Diatoms } Petri model etc. –

Silicon. D. earth → Lompoc uses: filters, fire brick, dynamite

Fucoxanthin; Nobel 1866

– CHRYSOPHYTA – Diatoms

25-II – PYRRO – DINOFLAGELLATES
BIOLUMINESCENCE
NOCTILUCA
CHLORO –
PHAEO – Fucoxanthin FLAGELLA
RHODO – Phyco-erythrin FOOD CHAINS
microscopic → whales
PHYTOPLANKTON
ZOO

27 – PLANTAE
CHLOROPHYTA – Isogamy N, 2N etc.
ANISOGAMY } HETERO-g.
OOGAMY
KWASHIORKOR (GHANA) PROTEIN DEF.
Symbols ♂ ♀ etc.

29 – PHAEOPHYTA – KELPS
K, I – Fertilizers | FOOD
SARGASSO SEA (Columbus) – ALGIN – uses – stabilizers, emulsifiers, cosmetics
RHODO – AGAR

3-III – (CARRAGEENIN { CHONDRUS CRISPUS – IRISH MOSS
CORAL – GREAT BARRIER REEF, TAHITI
Begin FUNGI –

5 – FUNGI CONT'D. – OOMYCETES, ZYGO –, etc.
MYCELIUM (HYPHAE)
Phytophthora infestans
IRISH FAMINE 1848

(EXAM 2)

7 – ZYGOMYCETES – BREAD MOLD
2N zygospore
RHIZOPUS
PLASMOPARA V.T. DOWNY MILDEW GRAPES etc.
MILLARDET 1882 BORDEAUX MIX.

10 – ASCOMYCETES – SPORE → MYCELIUM
SEPTATE MYCELIUM (N+N) → DIKARYON → ASCUS
MORCHELLA (MOREL)
YEAST – SACCHAROMYCES – BREAD, WINE etc.
MEIOSIS, MITOSIS, DIKARYON

12 – BASIDIOMYCETES
LIFE CYCLE → Basidium etc.
A. campestris
AGARICUS bisporus
LENTINUS edodes – SHIITAKE – SPORE Prints
Auricularia sp. "wood ear"
DEMOS – CALYPTRA SPORES
mycophile, mycophobe

14 – CANTHARELLUS cibarius
AMANITA VIROSA
A. MUSCARIA.
TRUFFLES
A. caesarea
Edible vs Poisonous
Hallucinogenic
CRITERIA
MYTHS (Ag coin)
(AMANITA)

17 – BASIDIOS – RUST – PUCCINIA graminis
SMUT – USTILAGO MAYDIS
Edible vs Poisonous etc.
FAIRY RINGS – LUMINESCENT – Clitocybe illudens
DRY ROTS – POE'S HOUSE OF USHER
ANTIDOTES: THIOCTIC ACID
RABBIT STOM. + Brains etc.
CHLOROPHYLLUM molybdites

19 – DEUTERO – PENICILLIUM notatum
1929 – FLEMING
ANTIBIOTICS
ASPERGILLUS spp. (origin of name)
P. roqueforti
P. camemberti
SHOYU – SOY SAUCE
MISO – ASPERGILLUS sp.
TEMPEH – RHIZOPUS
SOYBEAN BASE
FUSARIUM sp.
ALTERNARIA sp.
PLANT PATHOGENS COTTON, RICE
TRICHOPHYTON sp. ATHLETE'S FOOT

21 – ETHNOBOTANY (ETHNO MYCOLOGY } ECONOMIC BOTANY
MANS EARLY HISTORY – HUNTING etc. TRIAL & ERROR
CULTIVATION of PLANTS
SAVAGERY, BARBARISM, CIVILIZATION
ZEA MAYS – CORN GOD
PHASEOLUS spp. –
CUCURBITA sp. – THEOBROMA –
SOLANUM – MANIHOT –
LYCOPERSICUM
AMERICAN – AZTEC, MAYA, INCA

24 – ISIS – EGYPT, DEMETER – GREECE; CERES – ROME; QUETZALCOATL – MEXICO
PLANT POWER
SHAMANISM
CURANDERO(A) – PICIETL – NICOTIANA – TOBACCO
tabacum
HALLUCINOGENS etc. – OLOLIUHQUI – IPOMOEA VIOLACEA – MORNING GLORY (LSD)
uses: HUICHOL – NATIVE AM. CHURCH

26 – PEYOTL – Lophophora w. – cactus
CORTEZ 1519 PIZARRO 1533
SOMA – A. muscaria – fly agaric
(Psychotomimetic, Psychotropic etc., HALLUCINATION) magico-religious ceremonies

28 – Soma – cont'd → INDIA → SIBERIA
KAHULJA – THUNDERBOLT
MISKWEDO – MAYA COMTE.
PIPOL VON QUICHE
TEONANACATL = Psilocybe mexicana

(SPRING BREAK)

9-IV – Hallucinogens cont.
TEONANACATL = Psilocybe mexicana
OAXACA EXP.
Summary of Ethnobotany

(EXAM 3)

11- PSILOCYBE
STROPHARIA
PANAEOLUS
CONOCYBE
spp.

1) ALKALOIDS
CHON
2) INDOLES
A-Phenol
B-Pyrrol etc.

Begin Gr. Mythology
DISEASE

14- GR. MYTHOLOGY – PROMETHEUS
PANDORA
– BABYLONIA – DEMONOLOGY
EXORCISM
– ASTROLOGY – SHAKESPEARE

16- HIPPOCRATES – HUMORS
BLOOD – PHLEGM –
Y. B. BILE
YIN / YANG

LEEUWENHOEK 1683 —
JENNER – 1798 – 1802
MILKMAIDS – VACCINATION
ANTIGEN / ANTIBODY

18- SEMMELWEISS – 1847
LISTER – 1867
PASTEUR – 1864–1865 – GERM THEORY
ANTHRAX – 1881
RABIES – 1885

21- J. MEISER – N 8219
KOCH'S POSTULATES
BACTERIAL — VIRAL DISEASES
PAST. PESTIS
T. PALLIDUM
N. GONORR.
M. TB
M. LEPRAE – CARVILLE LA
COLDS
Y. FEVER
POLIO – SALK 55
SM. POX – SABIN 60

13- VIRUSES — BEIJERINCK 1898
TMV
STANLEY – 1935
YELL. FEVER
1900 REED – LAZEAR
GORGAS
AËDES
MALARIA
LAVERAN – 1880
PLASMODIUM IN MAN
ROSS – 1897
♀ ANOPHELES

25- ALGAE – 40
BRYOPHYTA – Embryophyta
LYCOPHYTA
SPHENOPHYTA
FERNS
GYMNOSPERMS
ANGIO –
TRACHEOPHYTA
XYLEM
PHLOEM
LAND etc.
– phytina

28- BRYOPHYTA – LIFE CYCLE
SPOROPHYTE / GAMETO –
GAMETANGIA → GAMETES
ZYGOTE – EMBRYO – SPORO
SPORE etc.
PROTONEMA etc.

30- METAGENESIS
MOSS vs FERN – Compare
GAMETOPHYTE → SPOROPHYTE
MONOECIOUS vs DI etc.
♂♀ gametophytes etc.

2 – V – SEED
ANGIOSPERMS
DOUBLE FERT.
19/20
FIN DE COMEDIA

LA DERNIER CLASSE!

FINAL EXAM
±½ REVIEW etc.

Biology 1002

14-I-1980
MWF - 102 WMS.
11:30 Sec. 4

14-I
Introd. - Textbook - Exams < 4-500 / NO MAKEUP
"Biology" — Course Content.
Begin: VIA LACTEA etc.
GALAXY ±250 x 10^9 STARS
16- Origins } see blue sheet on
4 f. Dimensions of sun, earth, jupiter etc
"Infinity" Light year
VOYAGER I, II ±8 Light minutes SUN → EARTH
Give 3 dates.!!
18- ibid
21- ibid
23- ibid.
25- ibid
4 f.
28- ibid
30- ibid
4 f.
1-II - ibid ✓ A ONLY with T
G - " C
4- ibid
4 f.
6- ibid
8- ibid
11- ibid
13- ibid
15- ibid (Pre-Mardi Gras)
20- ibid.
4 f.
22- ibid
4 f.
25- ibid
27- ibid
29- ibid.
(digression on noise)
3-III - ibid.
4 f.
5- ibid.
4 f.
7- ibid.

12-III
ibid.
14-
ibid.
4 f.
17- ibid.
19- ibid
4 f.
21- ibid
24- ibid
26- ibid
4 f. Peyote Demo.
28- ibid
4 f.
9-IV ibid.
4 f.! Coleridge (KUBLA KHAN)
applause
11-IV ibid
14-IV - ibid
16- ibid
4 f.
18- ibid.
21- "
23- "
25- "
28- "
30- "
2-V "
FIN