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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.

July 9, 1958

The following were my activities at Allegheny:

Tuesday, A. M. (one hour) Introduction to work

How to study plants without a microscope

1. Inspect a grass plant--why is it good for lawns and for grazing animals?
2. A Method in morphology

Tuesday P. M. 1-4:30

Christmas tree farm--already outlined.

Wednesday A. M. (one hour)

The horse-chestnut--an example of techniques to study morphology, anatomy, growth. You may remember Andy's technique which I followed closely.

Wednesday P. M. (one hour)

General lecture--orchids

Thursday A.M. (one hour)

How to use a greenhouse

Thursday P.M. 1-4:30

1. Discussion of research with Manihot
2. Techniques in a bacteriology lab to study bacteria

Friday A.M. (one hour)

How to learn, in a practical way, the differences between species. Used local species of Acer to show importance of reproductive structures and vegetative characters.

Orchid slides, ordered according to Schlechter  
Nos. in ( ) are slide nos.

- Group
2. Habenariinae  
 1 — 12-Stenoglottis fimbriata (19)  
 2 — " longifolia (20)
26. Coelogyninae  
 3 — 154-Coelogyne Parishii (44)
28. Fleurothallidinae  
 4 — 178-Fleurothallis (43)  
 5 — " Turiamo #15 (65)
30. Laeliinae  
 6 — 197-Epidendrum Dellense (63)  
 7 — " hanbur ((57)  
 8 — " secundum (54)  
 9 — " anceps (46)  
 10 — " rhynchophorum (12)  
 11 — " patens (10)  
 12 — " candolei (8)  
 13 — " atropurpureum (6)  
 14 — " ciliare (28)  
 15 — " replicatum (36)  
 16 — " stamfordianum (33)  
 17 — " radiatum (35)  
 18 — " parkinsonianum var. falcatum (66)
- 19 — 208. Cattleya bruges x invicta (21)  
 20 — " Guatemalense (4)  
 21 — " intermedia alba (50)(51)  
 22 — " aurantiaca (42)  
 23 — " skinneri (55)  
 24 — " forbesii (58)
- 25 — 210. Schomburgkia undulata (30)  
 26 — " sp. (38)  
 27 — " tibicinis (9)  
 # ~~XXXXXXXXXXXX~~
- 28 — 214. Meiracyllium trinasutum (14)
32. Dendrobiinae  
 29 — 223. Dendrobium superbum Dearei (31)  
 30 — 225-Eria rosea(45)
35. Polystachinae  
 248. Anselia africana (15)  
 249. Neobenthamia gracilis (16)  
 250. Polystachya luteola (48)
38. Bulbophyllinae  
 275. Chysis bractescens (3)

Group

46. Catasetinae  
313 Catasetum (11)
47. Gongorinae  
332 Gongora truncata (62)
48. Lycastinae  
337 Eifrenaria Harrisoniae (7)  
336 Lycaste cruenta (32)
49. Zygopetalinae  
345 Zygopetalum mackay (24)  
" "Crestwood" (2)
51. Maxillarinae  
361 Maxillaria picta (56)  
" "variabilis (40)  
363 Ornithidium densum (41)
58. Oncidiinae  
396 Odontoglossum grande (53)  
" pulchellum (37)  
" bicktoniense (1)  
" " (26)
- 397 Miltonia "Princess" (13)  
" " (5)
- 403 Oncidium leucochilum (27)  
" ampliatus majus (49)  
" sphacelatum (39)  
" tigrinum splendidum (29)
- 65 Sarcantinae  
432 Phalaenopsis leddemanniana (52)  
" nannii (59)
- ~~441 Miltonia bicolor (51)~~
- 465 Sardenthus rostratus (60)
- 479 Cyrtorchis Sedeni (22)
- 488 Angreecum eburneum (23)  
" eichlerianum (25)

Intergeneric hybrids

- Epiphronitis (Epidendrum x Sophronitis) E. veitchii (34)
- Epicattleya orpetii (Epidendrum x Cattleya) (47)

ORCHIDS

- |  |   |
|--|---|
| X 1. <i>Odontoglossum</i> Bictoniense                  | X 29. <i>Oncidium</i> <del>trigrinum</del> splendidum |
| X 2. <i>Zygopetalum</i> "Crestwood"                    | X 30. <i>Schomburgkia</i> undulata                    |
| X 3. <i>Chysis</i> <sup>br</sup> bractescens           | X 31. <i>D<sup>ex</sup>Superbum</i> Dearei            |
| X 4. <i>Cattleya</i> Guatemalense                      | X 32. <i>Lycaste</i> cruenta                          |
| X 5. <i>Miltonia</i> "Princess"                        | X 33. <i>Epidendrum</i> stamfordianum                 |
| X 6. <i>Epidendrum</i> Atropupureum                    | X 34. <i>Epiphronitis</i> Veitchii                    |
| X 7. <i>Bifrenaria</i> Harrisoniae                     | X 35. <i>Epidendrum</i> radiatum                      |
| X 8. <i>Epidendrum</i> Candollei                       | X 36. <i>Epidendrum</i> replicatum                    |
| X 9. <i>Schomburgkia</i> tibicinis                     | X 37. <i>Odontoglossum</i> pulchellum                 |
| X 10. <i>Epidendrum</i> patens                         | X 38. <i>Schomburgkia</i>                             |
| X 11. <i>Catasetum</i>                                 | X 39. <i>Oncidium</i> sphacelatum                     |
| X 12. <i>Epidendrum</i> rhynchophorum                  | X 40. <i>Maxillaria</i> variabilis                    |
| X 13. <i>Miltonia</i> "Princess"                       | X 41. <i>Ornithidium</i> densum                       |
| X 14. <i>Meiracyllium</i> trinasutum                   | X 42. <i>Cattleya</i> aurantiaca                      |
| X 15. <i>Anselia</i> africana                          | X 43. <i>Pleurothallis</i>                            |
| X 16. <i>Neobenthamia</i> gracilis                     | X 44. <i>Coelogyne</i> Parishii                       |
| ? 17. <i>Veratrifolium</i> D. Lester                   | X 45. <i>Eria</i> rosea                               |
| ? 18. <i>Gouldi</i> D.                                 | X 46. <i>Epidendrum</i> anceps                        |
| X 19. <i>Stenoglottis</i> fimbriata                    | X 47. <i>Epicattleya</i> Orpetii                      |
| X 20. <i>Stenoglottis</i> longifolia                   | X 48. <i>Polystachya</i> luteola                      |
| X 21. <i>C. Remy</i> Chollett-X-C. Bruges-XLC--Invicta | X 49. <i>Oncidium</i> ampliatum majus                 |
| X 22. <i>Cyrtorchis</i> Sedeni                         | X 50. <i>Cattleya</i> intermedia alba                 |
| X 23. <i>Angraecum</i> eburneum                        | X 51. <i>Vanda</i> tricolor Dodgsoni                  |
| X 24. <i>Zygopetalum</i> mackay                        | X 52. <i>Phalaenopsis</i> leddemanniana               |
| X 25. <i>Angraecum</i> eichlerianum                    | X 53. <i>Odontoglossum</i> grande                     |
| X 26. <i>Odontoglossum</i> bictuniense                 | X 54. <i>Epidendrum</i> secundum                      |
| X 27. <i>Oncidium</i> leucochilum                      | X 55. <i>C<sup>attleya</sup> skinneri</i>             |
| X 28. <i>Epidendrum</i> ciliare                        | X 56. <i>Maxillaria</i> picta                         |

- X 57. Epidendrum Hanbur  
 X 58. <sup>attleya</sup> C~~A~~forbesii  
 X 59. Phalaenopsis nannii  
 X 60. Sardanthus rostratus  
 61.  
 X 62. Gongora ~~T~~unicata  
 X 63. Epidendrum Dellense  
 ? 64. <sup>?Epi</sup>Dendrum-Parmeri <sup>A</sup>Albiflora  
 X 65. Turiamo #15 ~~Platroc~~ <sup>Thallis</sup>  
 X 66. Epidendrum Parkisoniaum-var.-Falcatum

## Algebra

1. Botany + advances
2. Cassava Wednesday evening.
3. Bacteriology

### 1. Modern study of Botany

#### A. Emphasis on fundamentals of plants useful to man

##### How to study?

1. Take a look at a lawn - growth pattern that makes it useful - how to keep a lawn healthy - greenkeeper at golf course - use of fertilizers - why use them? why certain ones - what conc.
2. Why isn't a broad-leaved plant good for lawns - erect growth, no spread - difference between various kinds of stems - rhizomatous vs erect adventitious roots
3. What makes dandelion such a toughweed to kill - tap root - dig one out -
4. Why know names of plants - example - grass - to differentiate kinds to be used - just grass gets you nowhere -
5. Good exercise - make a field trip to local druggist - or individual assignment to keep one druggist from getting overloaded. What plants used in patent medicine prescriptions?
7. Go to herbarium etc - catalog things of plants

How would you study botany in  
this room without any more materials  
than are here at the moment?

7. (cont) these - rope - varnishes, handles  
on tools - fishing lines, corks, floor wax -  
where

2. All these introduce one phase or another of botany
  1. Drugs, varnishes, wax, food plants - ~~plants~~ fertilizers  
introduce physiology
  2. Woods used for various purposes introduce anatomy
  3. Where certain plants grow, show they happened to  
fit certain areas - why wheat + corn best in Northern  
plains? - why hardwoods in the east - softwoods  
in SE + West. - ecology - where do food plants <sup>come</sup> from?
  4. Why does hybrid corn ~~for~~ produce more?  
" are certain food plants better - introduce  
genetics.
3. What are seeds used for.  
Go to a grocery store for this - oats, rice, corn, wheat,  
beans, flower seeds  
Spices - what from?
4. Beauty - go to a cemetery - best place to see  
how big plants will get, their shapes, sizes,  
colours.
3. Agriculture + land utilization -  
Importance to feed a growing population -  
show rate of growth of population, project  
for 10, 50, 100 years - how many more mouths  
to feed? How to do it?  
Importance of plants for special purposes -

Wreaths, corsages, sweet trees, mistletoe, holly,  
house plants - how many have no plants  
in the house - pipes, bowls, spoons,  
matches,

Field trip: on ride out:

1. Take a look at kinds of utilization between  
here + farms - How many different types of crops  
e.g. hay, grain crops, vegetables, pastures, etc.  
Maples make sugar - and lumber <sup>had all original</sup>
2. How would you characterize the <sup>vegetation</sup>  
of this sector of Crawford Co.?  
Forest? Grassland? mixed?
3. For planning "land" utilization here, what  
would be your recommendations? - Answer  
this question at the end.
4. Now - the x-mas trees
  - a. Mostly Scotch Pine - some red, some  
spruce - How many "kinds" here
  - b. What can you tell from observation?
  - c. " " " " will yield top prices?
  - d. " " " " need ~~to~~ pruning?
  - e. " " " " " culling?
  - f. Would you say that this is one species?
5. The natural area.

Soils?  
Past history  
Ground cover

Stress inter disciplinary nature  
of this work.

No use of words "unaccepted", "non-accepted",  
"Adansonian", "phenons",  
Seminar - U. Mass 3/8

1. Reason for interest in computers.  
Intuitively want some way to <sup>bolster</sup> ~~understand~~ our  
decisions - what do you mean by species?  
Massif data retrieval system -  
Correlations done simultaneously.
2. Diff. between ident & classif.  
Many never get it straight that the  
classification precedes identification -  
ident merely one result or ~~but~~ that  
possible from classif.  
Classification - traditionally hierarchical,  
with nested boxes - no overlap between  
taxa, no reason why shouldn't be.  
~~Such~~ Classification should not be considered  
as a static - ~~a~~ new information, or  
new concepts have a way of modifying  
our species levels - and this causes  
considerable confusion for many because  
of necessary name changes following the  
rules of nomenclature.
3. These ~~changes have to~~ activities demand  
that we look at the taxonomic process of  
classification (systematics is a preferable  
word), with the idea of finding ways  
to improve our methods.  
We call it the dynamics of taxonomy.

3 cont)

and the actual methodology taxinetics, insisting that it be ~~not~~ considered as ~~one~~ but one aspect of taxonomy, rather than referring to numerical taxonomy, which has overtones not pleasing to us or to others -

4. What are we working on? A flow chart to show the process -

5. Some of the processes for models -

Should refer to work by two ~~substantive~~ most active workers - Sokol + Sneath, both of whom employ statistical procedures. Inasmuch as stat. proc. require an assumption of randomness, and distances away from a "norm", we find this to be an intolerable requirement on a procedure which must refer to the actual plant material which is, under no circumstance, random.

Week 3  
Lecture 1.  
The Taxonomic Approach  
Modern Concepts of Taxonomy

- I. Historical
  - A. Pre-Darwinian concepts
    - i. the genus as the natural group
    - ii. the species as a fixed entity
  - B. Darwin's influence on Taxonomic theory
    - i. the species as the natural unit
    - ii. the genus as a concept
- II. Modern modifications
  - A. The population concept
    - i. the "type" and its connotations
    - ii. the influence of ecological studies--the ecotype
  - B. The species as a philosophic concept
    - i. the danger of definition (actually describing, not defining).
  - C. The cultivated species
    - i. "Artificial" modifications
    - ii. Lack of geographic definitions and derived difficulties
- III. Methods of analysis of populations
  - A. Morphological basis
    - i. The plant as an expression of gene action and environmental modification.
    - ii. The difficulties of taxonomic decision.
    - iii. Modifications of sexual behavior and their influence on taxonomic work.

Week 3, Lecture 1 (continued)

III. Methods of analysis of populations (continued)

B. Techniques for analysis

i. Population studies

a. Field samples

b. Herbarium specimens

ii. Semi-statistical procedures

a. Scatter diagrams and pictographs

## LECTURE 2

Manihot esculenta (cassava, manioc, or tapioca), a problem in cultivated plant taxonomy.

Description of plants and products

1. Importance of M. esculenta
  - A. Numbers of people
  - B. Areas of cultivation--all warm tropics at low elevation
  - C. Products of plant (carbohydrate and protein)
2. Botanical problems
  - A. Classification of cultivars
  - B. Geography and origin
  - C. One- or two-species hybrid complex
3. Methods of study
  - A. Field sampling
  - B. Collection and preparation of herbarium specimens
  - C. Chemical analyses--comparative biochemistry
  - D. Ethnological data
4. Products of study=
  - A. Understanding of evolution under man's care
  - B. Broad "pattern analysis" of cultivars to aid in further agricultural work, including plant breeding, selection for special purposes, etc.

LECTURE 3

THE ORCHID FAMILY

1. Basis for this talk--Garden collections and photographs
2. What are orchids?
  - A. Botanicals versus horticulturals.  
Ornithidiums and Cattleyas
  - B. Description of the flower.
    - i. Unique structure--the column and its origin.
    - ii. The other flower structures--labellum, petals & sepals.
  - C. Their relationships.
    - i. Monocotyledons, Angiospermae.
    - ii. Highest evolution in Monocots--perhaps evolved from Liliaceae.
3. Biological problems of interest.
  - A. Methods of pollination--insect relationships.
  - B. Resupination, how and why.
  - C. Distribution--world-wide, from Arctic to tropics.
    - i. terrestrial
    - ii. epiphytic
    - iii. very localized
  - D. Seed-fungus relationship.
  - E. Numbers--496 Genera, 15- 20,000 species, countless varieties.
  - F. Plant forms--herbs and shrubs, a few vines, no woody species.
  - G. Uses--aside from the vanilla orchid, a few in folk-medicine, none have commercial significance. Their decorative uses have caused the wide-spread interest.
4. Kinds--arranged here according to system of German botanist Schlechter, in 1915.
  - A. Evolution--primitive, intermediate and highly developed.
  - B. Difficult to see the relationships here.

5. Intergeneric hybrids.

- A. In nature, orchids strictly pollinated by their own kind.
- B. In cultivation, some are easily crossed. Some hybrids from as many as four different generic parents.
- C. Some crosses among orchids are made between plants as widely separated as roses are from apple trees.

6. Cultivation--can be done, if certain conditions are met.

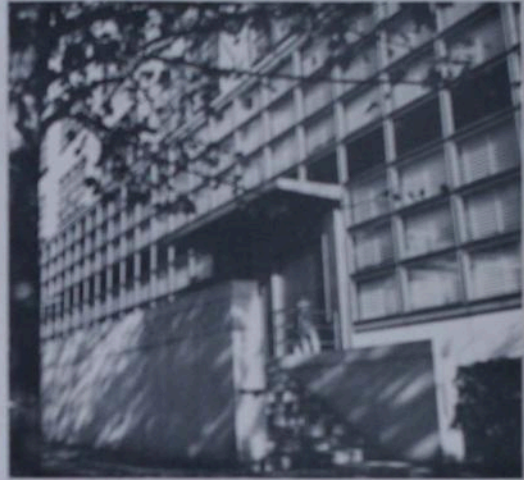
- A. Media for the epiphytes: fir bark or osmunda rhizomes.
- B. High atmospheric humidity much more important than watering of roots.
- C. Many different "how to" books. -- Don't be taken in by the statement "There is no difficulty in raising orchids". This may be so for certain ones, but not for all.

## Orchid Slide Numbers for Talk

1. *Cattleya bruges* x *invicta* habit
2. " " " closeup
- Ornithidium *densum* habit
- " " " closeup
3. Drawing of essential parts of an orchid from Ames
4. *Stenoglottis fimbriata* habit
5. " " " closeup
6. " *longifolia* habit
7. " " " closeup
8. *Coelogyne parishii* habit
9. " " " closeup
10. *Pleurothallis* (Turiamo #15) habit
11. *Epidendrum hanbur* habit
12. " " " closeup
13. " *dellense* habit
14. " " " closeup
15. *Cattleya forbesii* habit
16. " " " closeup
17. " *skinneri* habit
18. " " " closeup
19. *Schomburgkia undulata* habit
20. " " " closeup
21. *Meiracyllium trinasutum* habit
22. *Dendrobium superbum dearei* habit
23. " " " " closeup
24. *Anselia africana* habit
25. *Chysis bractescens* closeup
26. *Catasetum* sp. habit
27. *Gongora truncata* habit
28. " " " closeup
29. *Lycaste cruenta* habit
30. *Zygopetalum mackay* habit
31. " " " closeup
32. *Maxillaria picta* habit
33. " " " closeup
34. *Odontoglossum grande* habit
35. " " " closeup
36. " *bictoniense* closeup
37. *Miltonia* "princess" closeup
38. *Oncidium ampliatum majus* habit
39. " " " " closeup
40. *Phalaenopsis leddemanniana* habit
41. " " " " closeup
42. *Sardanthus rostratus* habit
43. " " " " closeup
44. *Vanda tricolor dodgsoni* closeup
45. *Epiphronitis* (*Epidendrum* x *Sophronitis*) *E. veitchii* habit
46. " " " " closeup

Note relationship in  
Oncidiinae

Summer Institute  
*for*  
High School Teachers  
*of*  
BIOLOGY



A National Science Foundation Institute at  
Hunter College of the City of New York

June 29 to August 7, 1959

*This is the first of pages of our application,  
mailed yesterday to N.Y.C. University, I think.*

SUMMER INSTITUTE OF BIOLOGY FOR HIGH SCHOOL TEACHERS

HUNTER COLLEGE OF THE CITY OF NEW YORK

1. Science areas to be covered: Biology
2. Duration: July 7 through August 14, 1959.
3. Major objectives: To enrich the background of teachers of Biology and to make them more fully aware of the importance and scope of the subject.

This proposal is made in the conviction that the New York City area offers special advantages to the student of Biology, in its great collections of living plants and animals, in its incomparable Museum of Natural History, in its several universities and many biological research institutes with their active staff members. Hunter College is centrally located in Manhattan and its Department of Biological sciences has long established cooperative relations with these institutions. The proposed curriculum reflects their interest as well as our own. A six-week program has been planned in broad outline, with some effort to integrate the subject matter. Basic concepts as well as recent advances will be presented in lectures, laboratory exercises and field work. We are fortunate in being able to present a very distinguished staff.

4. The Six-week Program as planned.

Week 1. Plant Ecology (terrestrial)

Dr. Murray F. Buell  
Rutgers University

*July 7-10*  
Animal Ecology (vertebrate)

Dr. Paul G. Pearson  
Rutgers University

Morning lectures; afternoon studies at the American Museum of Natural History; one full day in Mettler's Woods, N.J.

Week 2. Botany as applied to Horticulture

Dr. George S. Avery, Jr.  
Director, Brooklyn  
Botanic Garden

*13-17*  
The Improvement of Plants Through Breeding,  
Selection and Colchicine Treatment.

Dr. Clyde Chandler  
Boyce Thompson Institute  
for Plant Research

Lectures in the morning; laboratory exercises in the afternoon; one day at Brooklyn Botanic Garden; one day at Boyce Thompson Institute for Plant Research.

Week 3. The Taxonomic Approach:  
Useful Plants

Dr. David Rogers  
New York Botanical Garden

*July 20-24*  
Insects of Economic Importance

Dr. Louis S. Marks  
Fordham University

Morning lectures; afternoon laboratory; one full day at New York Botanical Garden.

## Week 4. The Cytological Role in Development

Dr. Charles A. Berger  
Fordham UniversityThe Functions of the various Components  
of the Cell.Dr. Daniel Ludwig  
Fordham UniversityMorning Lectures; laboratory exercises in the afternoon.  
Field Trip to the Audubon Nature Center in Connecticut.

## Week 5. Marine Ecology

The week will begin with lectures and instruction at Hunter College. Then, working in small groups, each student will have one morning or afternoon on the ocean, collecting under the direction of Dr. Perlmutter; one morning or afternoon studying shore life with other instructors. There will be laboratory studies of collected material and directed studies of material in the Aquarium and at the American Museum of Natural History.

Dr. R. F. Nigrelli  
Dr. Carleton Ray  
Dr. Sophie Jakowska  
all of the New York Aquarium  
and  
Dr. Alfred Perlmutter  
Dr. Erwin Alpert  
both of  
N.Y. State Conservation

Week 6. Living Plant Materials, their Sources,  
Preparation and Maintenance.Dr. Harold G. Bold  
University of Texasstudies of Living Animals at the New York  
Zoological ParkStaff members to be  
named later.5. Facilities for Formal Instruction

Hunter College has many fine lecture rooms, well equipped laboratories, a good library, a greenhouse, a small herbarium, a long tradition in Biology. Its Faculty Dining Room will be open to the Summer Institute for a cafeteria lunch, thus affording an opportunity for staff and students to eat together once a day.

6. Facilities for Housing and Eating

Housing for participants and their families, exclusive of children, will be at the Cornell University Medical College Residence, Clin Hall, at 445 East 69th Street, a ten minute walk from Hunter College. The cost will be two dollars per person per day. The residence is a new building, not far from the East River. It has a sun deck, a music room, a television room and laundromat facilities.

There are many restaurants in the neighborhood between this residence and Hunter College.

Mathews - Textile Fibers 5<sup>th</sup> Ed. Ch 1, 11

See exhibits

Plants that protect us -

1. A broad coverage to include  
Shelter, clothing, and other protection -  
i. e. various uses of paper -

2. Source -

The unique construction of the  
plant cell-wall (primary + secondary) cellulose + lignin -

Tree divided into two tissue systems  
xylem + phloem, or roughly wood + bark  
xylem - wood for trees, but in the case of  
herbaceous plants, not sufficient

The most important fiber-cotton - not  
from xylem or phloem - but from  
hairs on the seed of the cotton fruit -  
composition - largely cellulose -

3. What is cellulose? - a complex sugar  
molecule, organized in a long chain -  
Polymers

4. Wood + its uses -

Lumber + construction - in temperate regions  
mostly conifers - in tropics hardwoods

Plywood + veneers - the value of these

stretch the supply - less warping

smelling, coarsening -

Laminated construction for beams +  
heavy supports -

RR ties - oak -

~~Ramps~~ - wild garlic?

~~St rest~~ ~~weaker~~

Paper pulp - two process - sulfite (acid) and sulfate (base) -

Qualities of paper - dependent on type of fiber, and method of mfg.

Essentially, paper is a protective device - for cleanliness of food, for insulation, roofing, and the written word would be a sad story w/o it.

Modified cellulose - rayons, acetate.

Clothing and other ~~several~~ uses of vegetable fibers -

natural fibers  
More than any other plants  
1000 yield some fiber

Cotton is king - Kapok - silk cotton tree  
Jute + ramie - rough fibers, but ramie called the vegetable silk -

Hemp, sisal and abaca -

Linen - losing ground, but still a valuable

Soft fibers - temperate zone - used for fine textiles, thread

Hard " = tropics " " Coarse textiles +

Tapa cloth Cordage.

Baskets

THE NEW YORK BOTANICAL GARDEN

Bronx Park, New York 58, N.Y.

IN-SERVICE COURSE FOR TEACHERS -- D 257 -- ELEMENTARY PLANT STUDY

PART I - ECONOMIC PLANTS

Thirty-hour course of 15 sessions on WEDNESDAYS - Beginning September 27, 1961  
Class meets at 3:45 p.m.

IN CHARGE: Mr. H. W. Swift, Assistant Curator of Education and Mrs. Lillian Weber, Instructor in the Educational Department.

INSTRUCTORS:

Dr. Ernest Guenther	-Vice President and Technical Director Fritzsche Brothers, Inc.
Miss Elizabeth C. Hall *	-Sarah Gildersleeve Fife Research Librarian
Dr. Annette Hervey *	-Senior Research Associate
Dr. Bassett Maguire *	-Head Curator, Nathaniel Lord Britton Distinguished Senior Curator and Coordinator of Tropical Botany
Dr. David J. Rogers *	-Curator of Economic Botany
Mr. Howard W. Swift *	-Assistant Curator of Education
* Staff, The New York Botanical Garden.	

FALL SCHEDULE - 1961

ECONOMIC PLANTS

Sept. 27	(Registration) The Basic Motivations in Man's History (Drugs, Painkillers and Pleasure-producing Plants)	Dr. Rogers
Oct. 4	Satisfying Man's Esthetic Senses (Spices, Laquers, Arcmas, Perfumes from Plants)	Dr. Rogers
Oct. 11	Protection: A Fundamental Endeavor of Man (Fibers and Lumbers)	Dr. Rogers
Oct. 18	The Fight Against Hunger (Basic Food Plants)	Dr. Rogers
Oct. 25	Used Today - Obsolete Tomorrow (Plants Long Known May Have Uses in Our Highly Industrialized Society)	Dr. Rogers
Nov. 1	Crystals of Energy (Sugar Information Service) N. Y. Dept. of Commerce The Chocolate Tree	Nestlé's
Nov. 8	The Importance of Microorganisms, Including Laboratory Demonstration. Part I	Dr. Hervey
Nov. 15	The Importance of Microorganisms, Including Laboratory Demonstration. Part II	Dr. Hervey
Nov. 22	Economic Plants in the Conservatory Visit to the Greenhouse	Mr. Swift
Nov. 29.	Wheat--From Field to Market (Santa Fe Rwy.) Great Story of Corn	N. Y. Dept. of Commerce Cornell University
Dec. 6	The Use of Plants by Primitive American People	Dr. Maguire
Dec. 13	Available References on Economic Plants	Miss Hall
Dec. 20	American Farmer (Ford Motor Co.) Apples--From Seedlings to Market } Green Gold of the Salinas Valley }	N. Y. Dept. of Commerce Indiana University Bloomington, Ind.
Dec. 27	NO CLASS	
Jan. 3	Gift of Ts'ai Lun - Paper (Hammermill) Cotton--Nature's Wonder Fiber (Nat'l. Cotton Council)	N.Y. Dept. of Commerce "
Jan. 10	Essential Oils of South America	Dr. Guenther

NOTE: A fee of \$5.00 will be charged by The New York Botanical Garden  
Schedule of lectures subject to change

## Basic food plants-

### 1. What are our interests:

Kind of plants used

take a good American meal as an example - Steak dinner - start with an appetizer, then the <sup>potatoes</sup> soup, <sup>w/c</sup> entree, <sup>veg. rolls</sup> vegetables, <sup>potatoes</sup> drink, desert - ~~with ice~~

What is provided - basically

Carbohydrates, proteins, fats.

Most food plants provide some of each  
" " " " 1 predominant

Carbohydrate (Cereals) → carbohydrates

Sugars, starches,

> side products - oils, proteins

Types of cereals -

1. wheat - *Triticum aestivum* - many spp.

2. Rice - *Oryza sativa* - et al.

3. Corn - *Zea mays*

4. Barley, Rye, Oats, Sorghum.

Millets - several minor

5. Buckwheat -

Other grasses of imp. - Sugar cane, bamboo, forage

## Carbohydrate

- Potatoes -
- Yams
- Manihot - common names
- Taro
- Bananas -

## Protein plants - Legumes -

1. Beans - new world
2. Peas - old world
3. Others - coconut, various other seeds.
4. Soybean - versatile plants from orient - multiple uses - ~~so~~

## Oils - sources -

- Many legumes -
- Others - Sesame -
- Corn, cotton, flax,
- Olive -

## Food accessories -

1. Vitamins  
Rich sources are various fruits
2. Flavoring - many parts of many plants used - cinnamon - bark, allspice - young fl. buds, ginger - stems  
Sage - leaves, nutmegs - fruit,

your most desired manner  
What is it

Food - an appetitif!

A Beefsteak - with mushrooms and potatoes,  
a salad of lettuce, onions, cress, radish,  
tomatoes, seasoned w/ vegetable oil, vinegar,  
peppers, paprika, the bowl rubbed with  
a garlic clove -

Rolls - of wheat flour, perhaps with poppy  
seeds - butter (or perhaps - margarine from  
cotton seed oil)

Coffee - sugar,  
Liquor

Table decorations - fruits - apples, oranges,  
pineapple, etc. grapes

What are you eating, mostly  
Vegetable sources

If a martini - alcohol (from distilled fermentation)  
the flavor of the gin from Juniper, and a dry Vermouth  
the fermentation of a particular grape, with a specific  
variety of wine yeast -

The soup - will be flavored with vegetable  
material, no matter the <sup>kind</sup> of soup -

The entree - only a step away from  
vegetable products - corn, wheat, pressed soy  
bean cake, vitamins, minerals, from such  
a wide variety of vegetables you can not  
name them -

Mushrooms - a plant of fascination - other

no chlorophyll-

The potatoes - varieties, origin -

The salad - lettuce from the near east,  
tomatoes from S. Am., the onion, garlic, radishes  
from the Mediterranean, the spices from  
India and S. America -

The rolls - wheat, yeast, shortening (vegetable  
fat) - the rye seeds from Asia minor -

A fruit - oranges, coconuts, apples, or  
an exotic fruit - pineapple, or mango,  
or grapes, etc -

Coffee - tea or chocolate,

Liquors -

Food plants generally -

With very few exceptions, food plants ant. date  
history -

Why? -

Where are food plants from?

Generally, centers of origin of man himself  
E. Meditern., NE Africa, SE Asia, W. S. Am.

Specifically very difficult to decide - ex.

Corn -

Most important crops - cereal - at least one  
for every center of origin - why - capacity

Nature of food material -

to yield, capacity of  
storage, "  
varied food content -  
carb., fat, protein,  
fiber.

Mr Swift:

For my part of the course for teachers, the lectures will have the following titles, and the lectures will, in one place or another, discuss most of the topics which you suggested. However, the title will not disclose the exact nature of the talk, for the title is to be one of the "teasers" of the lecture.

1. The basic motivations in man's history. Oct. 8  
(Drugs, pain killers and pleasure producing plants)
2. Satisfying man's esthetic senses. Oct. 15  
(Spices, lacquer, aromas, perfumes from plants)
3. Protection: a fundamental endeavor of man. Oct. 22.  
Fibers + lumber
4. The fight against hunger---. Oct. 29  
The basic food plants
5. Used today, obsolete tomorrow? Nov. 5.

Plants long known may have new uses in our highly industrialized society. House plants, rubber, paper, plastics, movie film  
D.J. Rogers  
(resolubion succulents plants)

1. Sir J. C. Frazer - The Golden Bough
2. The Story of Spices by John W. Parry
- 3.

Oct. 29

Mad. in  
direction

(1) Tropical fruits (Film Strip, Rudolf Schick,  
700 Riverside Dr., N.Y. 5.

(2) Story of bananas - (Motion Pict., Pan  
American Union, Washington 6 -

Association  
Pdm

(3) Also try United Fruit Co. for free  
film here in N.Y.

#

(4) Grain that built a Hemisphere (Motion  
Picture, Institute of Inter-American Affairs,  
499 Penna. Av., N.W., Washington 25, D.C.

Corn products Refining Co.

Eastern Div. Sales, 350 5th Ave

LAkuna 4-4695

M. Swift - try to find illustrations  
(4x5 or 2x2 Kodachrome) of the following:

1. Aconite (*Aconitum napellus*) - root, or aboveground
2. Colchicum - (*C. autumnale*) - root, if possible,
3. Ginseng (*Panax sp.*) - root.
4. Licorice (*Glycyrrhiza glabra*) root, or aboveground
5. Podophyllum -
6. Curare - (*Strychnos*, *Chondodendron*, *Abuta*, *loculus*)  
plants
7. Quinine (*Cinchona sp.*)
8. Belladonna (*Atropa belladonna*) leaves + fls.
9. Digitalis
10. Opium - (*Papaver somniferum*)
11. Strophanthus.
12. Rauwolfia *seppifolia*
13. Pyrethrum (*Chrysanthemum cinerariaefolium*)
14. Rotenone - (*Lonchocarpus*)
15. Red squirrel (*Urginea maritima*)
17. Tobacco - any you can locate.
18. Cannabis sativa
19. Peyote (*Lophophora Williamsii*)

The following films, if still possible -

Oct. 22<sup>(1)</sup> - European Timber Trees (Film strip, from  
Filmotte Co., 635 Riverside Dr. -

(2) Any fiber films (or paper) available in  
NY

(3) Story of Wood in the Northeast - State U. College of Forestry

~~Why did man make history~~

Drugs

Fibers

Beverages

Grains

Fruits

Spices

Sumner

Waxes

1. ~~What~~ The basic motivations of man's exploration in drugs + spices

2.

Ed Mus Nat. Hist Leaflets in Botany  
The lectures will have the full title, and in what one place or another, will discuss those topics which you suggested to me - however, the title will not disclose the exact nature of the talk, ~~that is to~~ <sup>for the title</sup> be one of the "teasers" of the lecture.

1. The basic motivations in man's history.
2. Satisfying man's esthetic senses.
3. Protection - a fundamental endeavor of man.

4. The fight against hunger -
5. <sup>used</sup> ~~modern~~ today, obsolete tomorrow?

LECTURE TO TEACHERS: THE BASIC MOTIVATIONS IN MAN'S HISTORY

I. Introduction

- A. What human endeavor does not require plant material?
- B. Plants and man
  - 1. Basic relations--oxygen, decay, and recycling of basic chemical substances
  - 2. Basic food of all living things
  - 3. Esthetic value of plants
- C. Differences between needs and motivations for greater endeavor
  - 1. Recognized requirements of food, clothing, shelter-- mostly available in all regions
  - 2. Frankincens and myrrh are mostly valuable as perfumes and incense
  - 3. Beyond these, the other pressing needs: to heal to cure, to alleviate pain, to attract or repel

II. Drug plants: examine your druggist's shelves, a wonderful experience

- A. Difficult to separate boundaries between drugs and some spices and condiment plants. Ex. pepper--high vitamin content.
- B. Kinds of activities: remedies, relief, stimulants, depressants, palliatives, emetics, cathartics, expectorants, febrifuges (fever producers), tonics, etc. etc.
- C. Kinds of plants
  - 1. Most of plant kingdom provide some bacterial and fungal antibiotics, vitamins, hallucinating compounds
  - 2. Brown algae--agar and related swelling compounds
  - 3. Ferns?
  - 4. Pines and related--gums, resins, essential oils, ephedrine, pine tar (cough medicine)
  - 5. Flowering plants--extracts and plant parts

III. What has been some of the real background of motivation? What caused expeditions to unknown parts of the globe?

Marco Polo to China

The Opium Wars

Spice Trade--Columbus' adventures

Tobacco and the Slave Trade

Quinine--the cure for the old world disease, malaria; discovery is really not too well documented--Marquessa de Cinchona--Hair raising exploits of botanical collectors to smuggle plants from Peru and Ecuador

SLIDES 3 x 4

- |                |  |
|----------------|--|
| Slide No. 4773 | 1. Digitalis--foxglove--leaves used in treatment of heart disorders.   |
| 230            | 2. Cinchona--quinine--bark--although substitutes now better, new uses for the alkaloid   |
| 6043           | 3. Ginseng--no real value known, but still a big item to China   |
| 639            | 4. Colchicum autumnale--colchicine in rheumatism and gout--also used as a tool for geneticists to modify behavior of genetic materials |
| 4204           | 5. Papaver somniferum--opium poppy--2 alkaloids--morphine and heroin, and others   |

SLIDES 2 x 2

- |          |  |
|----------|--|
| 2 slides | 1. Podophyllum--May apple--emetic and cathartic, also called Mandrake  |
| 2 slides | 2. Datura stramonium--Jurison weed--alkaloids hyoscyamine, atropine, scopolamine--relaxes muscles--used as a narcot. |
| 1 slide  | 3. Castor bean--Ricinus communis--castor oil   |

REFERENCES

- Cargoes and Harvest--D. C. Peattie  
Economic Botany--A. F. Hill, Chapters 11 and 12  
White Water and Black Magic--T. C. Gill  
Flight from Reality--Norman Taylor

Lect. to Teachers - Dec. 10, 1958

New Plants, and new uses for plants for man

1. In past lectures emphasis on plants pre-dating history
2. Today, emphasis on items which have developed within last century.
3. Wood pulp as a source of paper
  - a. Long use of paper - felted sheet of indiv. sep. <sup>microscopic</sup> plant cells
  - b. Materials early used
    1. Papyrus in Egypt 2000 B.C.
    2. Linen rags + other suitable natural materials - even mummy wrappings.
    - c. Scarcity of these caused search for new raw materials -
      1. Straw fiber used 1828 - Woodville, Pa.
      2. Other plant materials tried - corn stalks  
Sea grass, esparto grass, okra,  
dried stems of sugar cane (bagasse)
      3. These not in sufficient supply
      4. Wood pulp first used successfully in Germany in 1840.
      5. In US earliest was in 1798 in Vermont, another in Pa. in 1830
      6. These are historical interest and 1st real use of wood as paper pulp came when chemical processing, following chipping came in 1852  
Using non-resinous woods - poplar + beech  
Soon found that spruce was the best

because of longer fibers.  
Many species used - hickory, birch,  
poplar, and other so-called hardwoods.  
Most successful, however are the soft-woods,  
from coniferous - because of longer fibers.

Today - fully 38% from southern  
yellow pines - had to <sup>find process to get</sup> ~~overcome~~ <sup>rid of</sup>  
resin content - now accomplished by  
chemical methods - the sulphate

Total consumption of all woods for pulp  
in 1955 was 33,332,000 cords, and  
in 1954 29,100,000 cords, a jump of  
4 1/2 million cords, at this rate a yearly  
increment would make present usage about  
50,000,000 cords -

Can we continue to increase our production  
to meet this growing needs?

### Penicillin -

Origin - Al. Fleming 1928  
Stimulus to produce - WWII  
Present importance

### Rauwolfia -

Origin - Indian folk medicine  
1931 - noticed action  
1954 - first big use as tranquilizer

Japocares -  
See exhibit on 1st fl -

# Get out Pirie's publications

1. Today's industrial civilization still rests on large masses of plants, but many modifications:
  - A. Plastics, and various light metals increasing usage in places where wood once used.
  - B. Raw materials from plants now have to be chemically changed -
    1. Algeenine + Carageenine from algae for ice cream.
    2. Castor oil - former violent purgative now little used, but provides excel. lubricant for jet engines - Fractionated castor oil used in countless ways - particularly perfumes -
    3. Amylose starch from corn - new varieties producing high amylose for industrial purposes.
    4. Secondary food products by modification of raw materials - Pirie's work -  
Extract high of protein from foliage - leaf protein "in the raw" poor because of large quantities of non-digestible fibers - cellulose -  
Procedure to extract is chemical + physical -
    5. Sweden - WW II - microbiological conversion of wood for various uses