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**A Study of Three Hundred Seventy-five Plants in
Northeast Virginia That Are Available for the
Teaching of Science in the High School**

by

Sue Adeline Florance

Submitted in Partial Fulfillment
of the Requirements
of the
College of William and Mary
for the Degree of
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1934

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Chapter I

The Problem

The present tendency in regard to the teaching of science in Virginia is to put a science program in the elementary school as well as in the high school. The new state course of study in Virginia proposes to substitute for the present subject offering of two, three, or four years of science, known as general science, biology, chemistry, and physics, a four-year science program integrated, as far as possible, with the fields of social studies, English, and mathematics. This new science program is to be based upon a selection of scientific principles and facts necessary to help the child understand his environment, is to be called, "Science for Four Years of High School", and is to draw upon the fields of chemistry, physics, zoology, botany, astronomy, agriculture, physiology, hygiene, home economics, and geology. Hence this thesis is based upon the acceptance of this point of view.

In view of the fact that green plants are the source of food and oxygen for man and animals, and all animal life depends upon plants, should one not stress this teaching in order that our boys and girls may have the opportunity of deepening their interests in science and of appreciating more fully the importance of green plants?

Besides supplying us with food and oxygen, plants

furnish us with fuel, clothing, shelter, and other necessities of life. Coal, oil, and wood, the chief fuels of modern civilization, have originated either directly or indirectly from and through activities of plants. The textiles are all either direct plant products, or come from animals which feed upon plants.

The great variety of natural vegetation, flowers, trees and plants of various kinds, have an important place in the aesthetic life of man, and he gets much wholesome satisfaction from these because he realizes how they fit in with the general scheme of things on this planet, their connection with soil, and climate, with insects, birds, and beasts, and with man himself.

Careful observations will unfold many secrets of the plants and it is the writer's earnest desire that the pupils learn to be more observant and more appreciative of his surroundings. Most pupils will be more interested in plants, and will learn much more about them if they are encouraged to study them in their native habitats. The observation and study may become a hobby with some and may provide them with an excellent way of spending leisure time. Do we not enjoy the country more when we are familiar with some of the plants and have them for our friends? Is it not satisfying to be able to call a plant by name when we see it?

Many useful and some harmful plants may be studied. It is important to know plants that should be preserved and plants that should be destroyed; what to pick; what to

let remain; what to avoid; and to realize that if too many of the flowering plants are picked that a great part of the natural beauty of the country is being destroyed. Many species are in serious danger of becoming extinct because of the ruthless picking of the flowers and tearing up of the roots by the thoughtless. Some of the orchids, the trailing arbutus, and plants that are rare should seldom, if ever, be picked.

It can hardly be said of any family of plants that all are good or all are bad, but each has its good and its bad members; for example, the Solanaceae or Nightshade Family has *Solanum carolinense*, the Horse Nettle, which is a rank prickly weed and a nuisance, although the blossoms and fruits are rather attractive; it also included in its family such plants as *Solanum tuberosum* (Potato) and *Lycopersicon esculentum* (Tomato) which are used extensively for food; the *Petunias* and *Solanum Dulcamara* (European Bittersweet) are used for ornamentation; *Datura* (Jimson or Jamestown Weeds) which are rank growing poisonous weeds but may be useful as a source of atropin.

With the exception of a few bacteria neither plants nor animals can live on the inorganic compounds found in the air, water, and soil. The elements from these compounds must first be combined to form more complex substances, such as sugar and starch substances, and later, by additional changes, oils and proteins are formed, before they can be regarded as food or serve to nourish living things. The

only organisms that can combine these elements and form food are the green plants.

All the familiar plants of our gardens; fruits, vegetables, and flowers, as well as the cereals, are the descendants of wild plants which have been improved by cultivation, by careful selection of variations, by preservation of sports, and by crossing and hybridization. We still use many of the plants that grow wild, such as the trees, the berries, the nuts, and certain plants for medicines.

The writer is interested in making a contribution to botanical phases of the new program by suggesting an abundance of environmental material that teachers in class rooms may use in pursuing any particular outline of work. In order to do this she undertook to do three things:

1. To prepare a suggested organization of material that teachers might use in the study of plants and of plant life.
2. To select the wild flowers and trees of Northeastern Virginia which might be most advantageously used by teachers to teach all or some phases of the proposed organization of material.
3. To present suggested units of organization which might serve as sample procedures in the utilization of the material gathered on wild flowers and trees.

Chapter II.

Outline of the Course in the Study of Plants

The organization of the outline of the botanical phases of the science course herewith presented is of an empirical nature. Such an outline can have little purely objective basis unless it grows out of careful accurate records of actual experimentation. The outline proposed here was not based upon objective evidence, but grew out of the author's subjective evaluation in teaching science for three years, her professional preparation in science, and her pursuit of the hobby of plant collecting and identification. These factors, combined with a careful evaluation of educational literature in the teaching of science, form the basis for the teaching organization proposed in this chapter.

It is not the idea of the author to prepare an outline in the form of a course of study to be followed, but to suggest to the teacher major phases of the field of botany and their related topics. Two major phases of botany are chosen for presentation:

1. The Flowering Plants
2. Microscopic Plants and Their Relation to Human Welfare

Under each of these major phases is suggested an outline of material which may be studied.

The Flowering Plants

I. Flowers and fruits

A. Function of a flower --- reproduction

B. Structure of flower and function of its parts

1. Sepals, calyx

2. Petals, corolla

3. Stamen

a. Anther---produces pollen

b. Filament---supports anther

4. Pistil, carpels

a. Stigma---receives pollen

b. Style---passageway for pollentube

c. Ovary---produces ovules

5. Receptacle

C. Plants illustrating floral parts and their functions

1. Evening Primrose

2. Jamestown or Jimson Weed

3. Wild Rose

4. Morning Glory

5. Mullein

6. Buttercup

7. Lily

8. Yucca

9. May Apple

10. Fruit Blossoms

11. Virginian Cowslip---Bluebells

D. Kinds of flowers

1. Complete flower

a. Sepals and petals

- b. Stamens and pistil
 - 2. Perfect flower---has both essential organs
 - a. Stamen
 - b. Pistil
 - 3. Imperfect flower---lacks one essential organ
 - a. Staminate flowers---those having stamens
 - b. Pistillate flowers---those having pistils
- (1) Examples
- (a) Willows
 - (b) Oaks
 - (c) Walnut
 - (d) Poplars
 - (e) Mulberry
 - (f) Birch
 - (g) Squash

E. Pollination

- 1. Process
- 2. Kinds
 - a. Self-pollination
 - b. Cross-pollination
- 3. Agents of cross-pollination
 - a. Wind
 - b. Bees and other insects
 - c. Humming birds
 - d. Water
 - e. Man

F. Structural adaptations for pollination

- 1. Plants suggested for study of pollination

- a. Clovers, especially Red Clover
 - b. Butter and Eggs
 - c. Daisy
 - d. Mints
 - e. Lily
 - f. Mountain Laurel
 - g. Yucca
 - h. Leeseatife
 - i. Touch-me-not
 - j. Honeysuckle
 - k. Trumpet Creeper
 - l. Corn
- G. Growth of pollen tubes
- 1. Germination of pollen tube
 - 2. Growth of pollen tube through style
 - 3. Pollen tube enter ovule
- H. Fertilization
- 1. Sperm nucleus unites with egg nucleus
- I. Formation of the embryo
- J. Growth of the embryo
- K. Maturing of the fruit
- L. Uses of the fruit to the plant
- 1. Holds the seeds
 - 2. Protects the seeds
 - 3. Distributes seeds
- M. Types of fruits
- 1. Fleshy fruits
 - a. Examples
 - (1) Cherry

- (2) Grape
- (3) Apple
- (4) Persimmon
- (5) Berries

2. Dry fruits

a. Examples

- (1) Iris
- (2) Mustard
- (3) Violet
- (4) Evening primrose
- (5) Maple
- (6) Elm
- (7) Peas
- (8) Touch-me-not

N. Adaptation of seeds for dispersal

1. Tufts of hair

a. Examples

- (1) Dandelion
- (2) Milkweed
- (3) Wild Lettuce
- (4) Clematis
- (5) Thistle

2. Winged seeds

a. Examples

- (1) Maple
- (2) Elm
- (3) Linden
- (4) Ash

3. Barbed seed

a. Examples

- (1) Cocklebur
- (2) Spanish Needles
- (3) Beggar-ticks

4. Explosives

a. Examples

- (1) Touch-me-not
- (2) Wild Geranium
- (3) Witch Hazel

0. Factors in seed dispersal

1. Wind

- a. Suggested seeds for study---see N. 1 and 2

2. Birds

a. Suggested fruits for study

- (1) Wild Cherry
- (2) Poke Weed
- (3) Partridge Berry
- (4) Bitter Sweet
- (5) Black Haw

3. Man and other animals

a. Suggested seeds for study

- (1) See N. 3
- (2) Nuts

4. Water

a. Suggested seeds for study

- (1) Water Lily
- (2) Yellow Pond Lily
- (3) Cocconut

P. Economic importance of fruits

1. Food
2. Propagation
3. Fibers
4. Harmful weed seeds
5. Poisonous fruits

II. Seeds and germination

A. Function of a seed

1. To produce a new plant

B. External structure of a seed

1. Seed coat, testa
2. Hilum, scar
3. Micropyle

a. Suggested seeds for use

- (1) Beans
- (2) Peas
- (3) Castor-oil Bean
- (4) Corn

C. Types of seeds

1. Dicotyledon

a. Examples

- (1) Beans
- (2) Peas
- (3) Seeds of the majority of plants
studied

2. Monocotyledon

a. Examples

- (1) Jack-in-the-Pulpit

- (2) Pickerel Weed
- (3) Field Garlic
- (4) Star of Bethlehem
- (5) Corn
- (6) Grains

D. Internal structure of seeds and adaptations of the parts

- 1. Seed coat, testa---protection
- 2. Cotyledons---usually contains stored food
- 3. Embryo, young plant
 - a. Plumule
 - b. Hypocotyl
- 4. Endosperm---present only in some seeds---furnishes feed for embryo plant

E. Conditions necessary for germination

- 1. Moisture
- 2. Certain temperature
- 3. Air
- 4. Stored food
- 5. Dormancy in many instances

F. Stages in germination

- 1. Swelling of seed
- 2. Food digestion and translocation
- 3. Emergence from seed coat
- 4. Roots penetrate the soil

G. Conditions necessary for growth of a green flowering plant

1. Light
2. Air
3. Moisture
4. Favorable temperature
5. Soil for most plants

H. Economic importance of seeds

1. Food
2. Medicine
3. Lubricant
4. Beverages

III. Roots

A. Functions of roots

1. Absorption of water and soluble mineral salts
from soil
 - a. Conditions of absorption
 - b. Osmosis and diffusion---their importance
2. Anchorage
3. Storage of reserve food
4. Containing nitrogen---fixing bacteria
 - a. Examples
 - (1) Beans
 - (2) Peas
 - (3) Clovers
5. Securing food from hosts
 - a. Examples
 - (1) Dodder
 - (2) Mistletoe

6. Climbing---example, Ivy

7. Propagation

8. Respiration

B. Kinds of roots

1. Primary---first root

2. Secondary---roots branching off from main root

3. Tertiary---roots branching off from secondary
roots

C. Forms of roots

1. Tap roots

a. Fleshy

(1) Suggested plants to use

(a) Wild Potato-vine

(b) Dock

(c) Carrot

(d) Beet

b. Non-fleshy

(1) Suggested plants to use

(a) Common Cheeses

(b) Chicory

(c) Milkweed

(d) Wild Lettuce

2. Fibrous roots

a. Suggested plants to use

(1) Clovers

(2) Blue-eyed Grass

(3) Day Flower

(4) Day Lily

(5) Wild Strawberry

- (6) Grasses
- (7) Indian Tobacco
- (8) Corn
- 3. Fascicled roots
 - a. Suggested plants to use
 - (1) Anemone
 - (2) Dahlia
- 4. Adventitious roots
 - a. Suggested plants to use
 - (1) Wild Strawberry
 - (2) Ground Ivy
 - (3) Partridge Berry
 - (4) Corn
- 5. Aerial roots
 - a. Suggested plants to use
 - (1) Trumpet Creeper
 - (2) English Ivy
- 6. Prop root
 - a. Suggested plant to use
 - (1) Corn
- 7. Aquatic roots
 - a. Suggested plants to use
 - (1) Duckweed
 - (2) Water Hyacinth
 - (3) Yellow Pond Lily
- 8. Parasitic roots
 - a. Suggested plants to use
 - (1) Dodder
 - (2) Mistletoe

D. Structure and function of various parts of a root

1. Epidermis---protection
2. Cortex---stores food
3. Central cylinder---transports liquids---stores
 food
4. Sieve tubes---food conducting tissue
5. Ducts---water conducting vessels
6. Growing point, meristem---increases length of
 root
7. Root cap---protects growing portion
8. Root hairs---absorb moisture and mineral salts
 - a. Suggested plants, seedlings, and sprouted
 seeds to use
 - (1) Pigweed
 - (2) Partridge Pea
 - (3) Black Nightshade
 - (4) Mustard
 - (5) Bean or pea seedlings
 - (6) Radish seeds (sprouted)
 - (7) Mustard seeds (sprouted)
 - (8) Wheat, oats (sprouted)

E. Response of roots to environmental factors

1. Gravity
2. Water
3. Oxygen

F. Duration of roots

1. Annuals---live one season
2. Biennials---live two seasons
3. Perennials---live many years

G. Economic importance of roots

1. Food
2. Drugs
3. Flavorings
4. Beverages
5. Help prevent erosion
6. Help prevent floods
7. Help to maintain a water supply
8. Propagation

IV. Stems**A. Functions of stems**

1. Communication between roots and other parts
of plant for passage of water, mineral
salts, and foods
2. Support leaves
3. Support flowers, fruits and seeds
4. Storage of reserve food
5. Propagation
 - a. Corms
 - b. Tubers
 - c. Bulbs
 - d. Rhizomes
 - e. Stolons and layering

B. Processes of propagating by stems

1. Slipping
2. Grafting
3. Budding
4. Layering

C. Internal structure of dicotyledonous stems and the function of the parts

1. Bark, periderm
 - a. Epidermis---protection
 - b. Cortex---food-making and digestion
 - c. Bast fibers Phloem---conduct food
 - d. Bast tubes
2. Cambium---growth
3. Wood region, xylem
 - a. Wood fibers---support and strengthen the stem
 - b. Ducts---conduct liquids up the stem
4. Pith---food storage
5. Vascular rays---store and conduct food vertically and radially
6. Fibrovascular bundle
 - a. Phloem
 - b. Cambium
 - c. Xylem

(1) Suggested plants for use

- (a) Indian Hemp
- (b) Touch-me-not
- (c) Lilac
- (d) Elder
- (e) Horsechestnut
- (f) Willow
- (g) Wild Sunflower
- (h) Castor-oil Plant

(i) Daisy

(j) Plantain

**D. Internal Structure of a Monocotyledonous stem
and the function of the parts**

1. Rind---protection
2. Pith---support vascular bundles
3. Fibrovascular bundles---for support and con-
duction

a. Phloem---carry liquids down stems

b. Xylem---carry liquids up stems

(1) Suggested plants for use

(a) Asparagus

(b) Day Lily

(c) Star of Bethlehem

(d) Narcissus

(e) Pickeral Weed

(f) Cat Tail

(g) Corn

E. External structure of dicotyledonous stems

1. Terminal bud
2. Lateral bud
3. Leaf scar
 - a. Bundle scars
4. Bud scar
5. Bud scale scars
6. Lenticels

F. Different forms of stems

1. Erect**a. Examples**

- (1) Mallow
- (2) Joe Pye Weed
- (3) Golden Rod
- (4) Touch-me-not
- (5) Indian Cucumber-root

2. Prostrate and creeping**a. Examples**

- (1) Common Purslane
- (2) Carpet Weed or Indian Chickweed
- (3) Ground Ivy
- (4) Partridge Berry
- (5) Hog Peanut

3. Climbing and twining**a. Examples**

- (1) Morning Glory
- (2) Climbing Hemp Weed
- (3) Black Bindweed
- (4) Passion Flower
- (5) Perennial Pea

4. Shortened ("stemless plants")**a. Examples**

- (1) Dandelion
- (2) Whitlow Grass
- (3) Saxifrage

5. Underground stems---roots-stock or rhizomes

a. Examples

- (1) Asparagus
- (2) Golden Club
- (3) Blood Root
- (4) Yarrow
- (5) Wild or False Spikenard
- (6) May Apple

6. Tubers

a. Examples

- (1) Jerusalem Artichoke
- (2) White or Irish Potato

7. Bulbs

a. Examples

- (1) Grape Hyacinth
- (2) Star of Bethlehem
- (3) Onion
- (4) Garlic

8. Corms

a. Examples

- (1) Jack-in-the-Pulpit
- (2) Blazing Star
- (3) Dog's-teeth Violet
- (4) Crocus

G. Economic importance of stems

- 1. Food
- 2. Shelter
- 3. Fuel
- 4. Propagation

5. Clothing
6. Furniture
7. Medicine
8. Cordage
9. Many other uses

V. Leaves

A. General structure of a typical leaf

1. Blade
2. Petiole
3. Stipules
 - a. Suggested leaves for study
 - (1) Sycamore
 - (2) Red Clover
 - (3) Wild Rose
 - (4) Apple
 - (5) Willow

B. Types of veining

1. Paralleled-veined
 - a. Examples
 - (1) Lily
 - (2) Narcissus
 - (3) Iris
 - (4) Orchids
 - (5) Onion
 - (6) Day Flower
 - (7) Pickersel Weed
 - (8) Cat Tail
2. Net-veined

a. Palmately veined

(1) Examples

(a) Grape

(b) Maple

(c) Clover

b. Pinnately veined

(1) Examples

(a) Walnut

(b) Ash

(c) Locust

c. Different forms of leaves

1. Simple leaves

a. Suggested leaves for study

(1) Oaks

(2) Tulip Tree

(3) Maples

(4) Aspen

(5) Pear

2. Compound leaves

a. Suggested leaves for study

(1) Locust

(2) Hickory

(3) Wild Strawberry

(4) Cinquefoil

(5) Horse Chestnut

(6) Wild Rose

(7) Clovers

D. Leaf arrangement

1. Rosette

a. Examples

- (1) Mullein
- (2) Meth Mullein
- (3) Rattlesnake Weed

2. Alternate

a. Examples

- (1) Linden
- (2) Elm
- (3) Lobelias

3. Opposite

a. Examples

- (1) Horse Chestnut
- (2) Coral or Trumpet Honeysuckle
- (3) Bouncing Bet

4. Whorl

a. Examples

- (1) Indian Cucumber-root
- (2) Rue Anemone
- (3) Whorled Pegenia
- (4) Pipsissewa

E. Microscopic structure of a leaf and the function of the parts

- 1. Epidermis---protection
- 2. Palisade cells---photosynthesis
- 3. Spongy cells---photosynthesis, respiration, digestion, assimilation
- 4. Stomata---respiration, transpiration, admit carbon dioxide and give off oxygen for food manufacture

5. Guard cells---surround stomata

a. Suggested leaves for study

- (1) Common Day Flower
- (2) Petunia
- (3) Eleocharis
- (4) Pickersel Weed
- (5) Spiderwort

F. Functions of leaves

1. Photosynthesis

a. Compounds necessary for carbohydrate manufacture

- (1) Water from the soil
- (2) Carbon dioxide from the air

b. Other requirements for carbohydrate manufacture

- (1) A living green plant-chlorophyll
- (2) Sunlight shining on the plant
- (3) Air and favorable temperature
- (4) Certain chemical changes

c. Products made

- (1) Sugar
- (2) Starch

2. Respiration

3. Digestion

4. Assimilation

5. Circulation

6. Transpiration

G. Formation of fats and proteins

1. Formation of fats and proteins not fully understood
2. Fats and proteins formed after carbohydrates are made
3. Formation of fats and proteins depend on a supply of carbohydrates
4. Nitrogen, and usually other mineral salts utilized in formation of proteins
5. Chlorophyll and light not essential for formation of protein
6. Composition of proteins complex
7. Proteins formed in other living cells of plants

H. Economic importance of leaves

1. Food
2. Medicine
3. Beverages
4. Flavorings
5. Shelter
6. Propagation

VI. The cell and protoplasm

- A. History of the discovery of cells
- B. Definition of a cell
- C. Structure of a cell
 1. Cell wall
 2. Protoplasm

a. Cytoplasm

- (1) Plastids
- (2) Mitechendria
- (3) Inclusions (other contents)

b. Nucleus

- (1) Chromatin
- (2) Nucleolus

3. Vacuole and cell sap

D. Shapes and sizes of cells

E. Assimilation and growth

F. Cell division

G. Protoplasm---the physical basis of life

- 1. Living part of cell
- 2. Jelly-like substance
- 3. Almost colorless

VII. The plant as a whole

A. Organ---a part of a living thing which performs
some special function

B. Organs of a plant

- 1. Roots
- 2. Stems
- 3. Leaves
- 4. Flowers

C. Tissue---a group of similar cells having the same
function

- 1. Examples of tissues studied
 - a. Epidermal tissue

b. Pith tissue

c. Food conducting tissue

D. Cell---unit of structure in living things

E. Protoplasm---the living material of which cells
composed and the physical basis of life

VIII. Economic importance of the wild flowering plants

A. Plants that are said to be of medicinal value

1. Examples

a. Arnica

b. Blue Flag

c. Horehound

d. Mints

e. Mustards

f. Wild Cherry

g. Witch Hazel

h. Ginseng

i. Jimson Weed

Note: About 300 medicinal wildings regarded as
standard by physicians¹

B. Plants that may be used for food

1. Examples

a. Nuts

b. Berries

c. Fruits

1. Clute, William Nelson. The Useful Plants of the
World. Willard N. Clute and Company, Indianapolis, Ind.

- d. Dandelion
- e. Mustards
- f. Cress
- g. Wild Potato Vine
- h. Jerusalem Artichoke
- i. Pokeweed---very young stem and leaves in
the spring

C. Plants as sources of beverages

- 1. Examples
 - a. Sassafras
 - b. Chicory
 - c. Mints

D. Plants as sources of dyes

- 1. Examples
 - a. Wild Indigo
 - b. Goat's Rue, *Tephrosia virginiana*
 - c. Osage Orange
 - d. Blood Root
 - e. Alders
 - f. Walnut

E. Plants as sources of tannin

- 1. Examples
 - a. Oak
 - b. Willow
 - c. Sumac
 - d. Chestnut

F. Plants as sources of vegetable soaps or saponins

- 1. Examples

- a. Bouncing Bet, Soapwort
- b. Gumweed
- c. Corn Cockle

G. Plants as sources of textiles

1. Examples

- a. Basswood
- b. Indian Hemp
- c. Willow
- d. Oak
- e. Yucca

H. Necessity for preservation of some plants

1. Examples

- a. Arbutus
- b. Mountain Laurel
- c. Rhododendron
- d. Lady's Slipper
- e. Flowering Dogwood
- f. Birdfoot Violet
- g. Cluebell
- h. Coral Honeysuckle
- i. Gentian
- j. Ginseng
- k. Hepatica
- l. Holly
- m. Orchids, all species
- n. Partridge Berry

I. Value of legumes

1. Value to the soil
2. Value in crop rotation
 - a. Nitrogen cycle
3. Forage crop
4. Coverage crop

J. Examples of legumes

1. Alfalfa
2. Clovers
3. Peas
4. Beans

K. Trees and forests in relation to man

1. Trees of street and locality
2. The planting and care of trees
3. Value of trees for commercial purposes
 - a. Lumber
 - b. Furniture
 - c. Fuel
 - d. Rayon
 - e. Paper
 - f. Charcoal
 - g. Farm implements
 - h. Musical instruments
 - i. Many other uses
4. Value of trees to birds and other animals
 - a. Protection
 - b. Home
 - c. Food

5. Value of trees in regulating the flow of streams and in preventing floods
6. Value of trees in preventing erosion
7. Forests and their relation to rainfall
8. Forests and their relation to climate
9. Forests and their relation to soil
10. Our forests' wealth

L. Dangers that threaten our forests

1. Fires
2. Insects
3. Destructive lumbering
4. Grazing
5. Fungi

M. The United States Forest Service

1. Reforestation
2. Protection of forests
 - a. Laws
 - b. Forest rangers

N. Some of the poisonous plants

1. Examples
 - a. Pokeweed-root, also berries to man
 - b. May Apple-root
 - c. Elder-bark
 - d. BlackNightshade---all except fully ripe berries
 - e. Foxglove
 - f. Indian Tobacco
 - g. Jimson Weed
 - h. Mountain Laurel

- 1. Poison Ivy
- j. Snow-on-the-Mountain
- k. Corn Cockle---seeds

IX. Other plants useful to mankind

A. Kinds

- 1. Cereal plants
- 2. Other food plants
- 3. Plants as sources of flavors
- 4. Plants as sources of drugs
- 5. Plants that are of aesthetic value

X. Improvement of plant life

XI. The work of Liberty Hyde Bailey

XII. The interdependence of plants and animals

A. Plants depend upon animals

- 1. Carbon dioxide
- 2. Nitrogenous wastes

B. Animals depend upon plants

- 1. Oxygen
- 2. Food
- 3. Shelter

C. Plants depend upon other plants

- 1. Nitrogen-fixing bacteria
- 2. Bacteria that cause decay

D. Animals depend upon other animals

- 1. Food

E. The balanced aquarium

XIII. Oxygen

XIV. Carbon cycle

XV. Nitrogen cycle

Classification of Plants

Branch I

Thallophytes---plants having no true stems and leaves.

Example, Algae---having chlorophyll

Fungi---no chlorophyll

Branch II

Bryophytes---the mosses and their allies

Branch III

Pteridophytes---the ferns and their allies

Branch IV

Spermatophytes---seed bearing plants

a. Gymnosperms---seeds exposed---pine, spruces,
et cetera

b. Angiosperms---true flowering plants

**Microscopic Plants and Their
Relation to Human Welfare**

I. Algae

A. Kinds

1. Blue-green
2. Green
3. Brown
4. Red

B. Structure

1. One-celled
2. Number of cells

C. Uses

1. Supports animal life in the water
2. Food for man in some places, as, in China and Japan
3. Iodine and potassium salts
4. Agar-agar
5. Fuller's earth

D. Reproduction

1. Asexual
2. Sexual
 - a. Origin of sex
 - b. Advantages of sex

II. Fungi and their economic importance to man

A. Kinds

1. Molds

- a. Beneficial, as in the making of Roquefort cheese
 - b. Destroy food, cloth, et cetera
- 2. Yeasts
 - a. Used in making bread
 - b. Used in the making of alcohol
 - c. Spoil foods
- 3. "Mushroom" or "toadstools"
 - a. Many mushrooms edible
 - b. Many mushrooms poisonous
- 4. Bracket fungi
 - a. Destroy trees
- 5. Rusts
 - a. Destroy grain crops---wheat rust
 - b. Destroy pine trees---white pine blister rust
- 6. Smuts
 - a. Destroy corn---corn smut
- 7. Blights
 - a. Chestnut blight or canker---destroy chestnut trees
- 8. Bacteria
 - a. Size---very minute
 - b. Forms or kinds
 - (1) Coccus
 - (2) Bacillus
 - (3) Spirillum
 - c. Structure

- (1) One-celled

- (2) No definite nucleus

- d. Mobility

- (1) Many move by means of flagella

- e. Reproduction

- (1) Fission

- f. Growth

- g. Conditions necessary for growth

- (1) Food

- (2) Moisture

- (3) Favorable temperature

- (4) Oxygen (most of them)

- h. Distribution

- (1) Air

- (2) Water

- (3) Soil

- B. Economic importance of bacteria

- 1. Bacteria in relation to soil

- a. Nitrogen fixation

- b. Decay of organic materials

- 2. Bacteria in relation to industry

- a. Give flavor to meats and cheese

- b. Preservation of food

- c. Tanning of leather

- d. Retting flax, jute, hemp

- e. Curing tobacco

- f. Making vinegar

- g. Souring of milk
- h. In the preparation of sponges for market
- 3. Decay of feeds
- 4. Bacteria cause numerous diseases to man and other animals
- C. Means of destroying bacteria
 - 1. Dry intense heat
 - 2. Boiling
 - 3. Sunlight
 - 4. Fumigation
 - 5. Sugaring
 - 6. Salting
 - 7. Disinfectants
 - 8. Antiseptics
 - 9. Prolonged drying
 - 10. Prolonged freezing

Chapter III

Classification of Plants Suggested for Teaching

Methods and Sources of Collection of Plants

After the preparation of the outline on plants which might be used for the teaching of science in the high school, the writer set out to identify plants which may be most useful for teaching the various phases of the outline.

At least once a week, for a period of more than a year, a field trip was made to collect and observe plants. Records of the time of blossoming and of the place grown were noted, and the plants were identified, if possible, by means of "A Key to the Families of Flowering Plants", by Robert F. Griggs¹, "Gray's New Manual of Botany,"² and later checked with Britton and Brown³ and with speci-

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1. Griggs, Robert F. "A Key to the Families of Flowering Plants." Published by the author, Washington, D.C. 1928, 1932.
 2. Robinson, B.L. and Fernald, M.L. "Gray's New Manual of Botany." Seventh Edition. A Handbook of the flowering plants and ferns of the central and northeastern United States and adjacent Canada. American Book Company, New York, 1908.
 3. Britton, N.L. and Brown, A. "An Illustrated Flora of the Northern United States and Canada and the British Possessions from Newfoundland to the Parallel of the Southern Boundary of Virginia, and from the Atlantic Ocean to the 102nd. Meridan." 3 Vols. 2nd. Ed. Charles Scribner's Sons, New York City, 1913.
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mens already identified in my collection. Many plants were pressed and dried for future reference, and for addition to the collection.

Most of trips taken were in the vicinity of Alexandria, Virginia. The territory, in and near the city, along all the roads leading from the city in various directions, along the old Telegraph Road, and at Occoquan, was covered. Observations of plants were also made along the Jefferson Davis Highway and the vicinities of Richmond and Williamsburg, though these plants were not recorded in this classification. All of the plants listed can be found in the vicinity of Northeastern Virginia. The author does not claim to have cataloged nearly all of the plants found in this region, but a majority of those listed can be secured easily during the time mentioned.

No attempt has been made to classify the ferns, mosses, grasses, and fungi, as time will not permit the teaching of each particular kind in detail, nor is it deemed necessary for the scope of this study.

The plants were classified according to "Gray's Manual of Botany" (Seventh Edition). The names of all plants are given in Latin or Greek so that the real or scientific name for any plant is the same no matter whether it is seen in our own scientific magazines or books or in the scientific publications of any other nation: for example, the white oak of the United States is "Quercus alba." The family name is given first in Latin or Greek

and also in English, if there is a common name for it. In some families the features of the plants of different genera are quite obvious, but in others they are too obscure for the amateur to recognize easily. The generic name written with the specific name constitute the real name or scientific name of a plant. The generic name is written first and shows the relationship of all the plants which bear it, for example, "Viola" means any of the violets. The second word signified the species and often indicates some characteristics of the plant, or it may tell the part of the country where found, or the person in whose honor it was named; for instance, *Viola pedata*, bird-foot violet, a particular species of violet. In some instances the names of the species have been omitted, as in the goldenrods. The writer does not claim to be able to identify each species well enough to name it; then also one species is as good as another for this study. A few other species names are omitted as the writer could not decide which was the correct one; there is a probability of errors in a few species, because of their similarity. They should be checked with a standard herbarium.

"A Key to the Families of Flowering Plants", by Robert F. Griggs, Professor of Botany, George Washington University, will be helpful to the teacher in the identification of plants to families. Then the family can be looked up in "Gray's Manual of Botany" or a simpler book such as Mathews' "Field Book of American Wild Flowers."¹

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1. Mathews, F. Schuyler. "Field Book of American Wild Flowers." G.P. Putnam's Sons, New York City.
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The following list of plants has been prepared as available for use:

Classification of Plants

Fall

Chenopodiaceae---Goosefoot Family

Kochia Scoparia (L.) Schrad.

Annual, erect, branching. Leaves narrowly lanceolate to linear. Flowers in small axillary clusters, sessile. Plant turns red in late autumn. Frequently cultivated. August-October.

Phytolaccaceae---Pokeweed Family

Phytolacca decandra L.

Common Pokeweed

A smooth plant with a large poisonous root sending up stalks several feet high. Terminal racemes, calyx white. Berries, dark-purple, ripe in autumn. Vacant fields, fence rows. July-October

Portulacaceae---Purslane Family

Portulaca oleracea L.

Purslane

Stout prostrate annual weed, with glabrous fleshy branching stems. Leaves sessile, thick and succulent, wedge-obovate spatulate or oval, entire, smooth. Flowers light yellow, small, solitary and sessile, opening in sunshine in the mornings. In fields and waste places. July-October.

Ranunculaceae---Crowfoot Family

Clematis virginiana L.

Virgin's Bower

High climbing vine with slender glabrous green stems. Leaves normally 3-foliolate; leaflets ovate, acute, dark green above, heart-shaped at the base. Flowers small, greenish white, numerous in loosely spreading cymose clusters. Achenes several or many, in small globose clusters each tipped by a curved feathery persistent style. Low moist woods, riverbanks, streams. July-September.

Leguminosae---Pulse Family

Cassia Chamaecrista L.

Partridge Pea

Annual, suberect; branches usually simple, ascending.

Leaflets 10-15 pairs, linear-oblong, oblique at the base. Flowers bright yellow, showy, on slender pedicels. Roadsides, fields. July-September.

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Cassia nictitans L.

Wild Sensitive Plant

Annual, erect or decumbent, branching. Leaflets 10-20 pairs, oblong-linear. Flowers very small, yellow, on short pedicels. Roadsides, fields. July-October.

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Lespedeza virginica (L.) Britton

Slender Bush-Clover

Erect, slender. Leaves crowded, oblong. Flowers crowded, purplish. Roadsides. September-October.

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Amphicarpa monica L.

Wild or Hog Peanut

Slender, simple or sparingly branched, pubescent. Leaflets broadly ovate or rhombic-ovate, acute at the apex. Racemes of petaliferous flowers; flowers purplish. Roadsides, edge of woods, streams. July-October.

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Strophostyles umbellata (Muhl.)
Britton

Pink Wild Bean

Perennial; stem slender, trailing. Leaflets ovate, lanceolate or oblong. Flowers several, pink on long peduncles. Roadsides. July-October.

Euphorbiaceae---Spurge Family

Euphorbia maculata L.

Milk Purslane

Prostrate or ascending; stems puberulent or hairy. Leaves oblong-linear. Involucres in lateral clusters. Open places. June-November

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Euphorbia marginata Pursh.

Snow-on-the-Mountain

Stem stout, 1-3 feet high, erect, hairy. Leaves sessile, ovate or oblong, acute. Umbel has 3 rays; glands of involucre with broad white appendages. Escaped from gardens. August-October.

Malvaceae---Mallow Family

Hibiscus oculiroseus

Mallow

Erect herb, with showy flowers. In lowland and near streams and in marshes. July-October

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Abutilon Theophrasti Medic.

Velvet Leaf Indian
Mallow

Tall annual, 2-6 feet high. Leaves roundish-heart-shaped, velvety. Flowers yellow. Carpels 12-15, hairy, beaked. Waste places, vacant lots. July-November.

Hypericaceae---St. John's-Wort Family

Ascyrum stans Michx.

St. Peter's Wort

Stem suberect, 2-edged, 1-2 feet high. Leaves clasping, oval or oblong, thickish. Cymes terminal, few-flowered; flowers yellow; outer sepals round-cordate, inner lanceolate; petals obovate. Dry woods and roadsides. July-October.

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Ascyrum hypericoides L.

St. Andrew's Cross

Low, much branched from the base, diffuse or ascending. Leaves oblong or obovate, sessile, narrow. Flowers terminal or also axillary, yellow. Outer sepals oval or ovate, sometimes cordate, obtuse, inner narrower; petals oblong-linear. Sandy or rocky soil. July-October.

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Hypericum canadense L.

Annual or perennial by short leafy offshoots; stems slender. Leaves 1-3 nerved, linear to linear-lanceolate. Cymes naked except for the bracts, flower yellow. Low grassy places. July-October.

***Hypericum punctatum* Lam.**

Stem terete, sparingly branched. Leaves oblong, rounded at tip. Flowers crowded; petals pale yellow marked with dark lines and dots. Roadsides and low waste places. July-October.

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***Hypericum mutilum* L.**

Small-Flowered St.

John's Wort

Pale green slender herb, much-branched stem. Leaves ovate to oval or oblong, blunt. Flowers pale yellow to light orange, small. Along shady streams. July-October.

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***Hypericum gentianoides* (L.) BSP.**

Orange Grass,

Pinweed

Small weedy herb 5-15 inches high, with wirelike angled much-forked branchlets ascending close together. Leaves reduced to subulate scales. Flowers very small, short-lived. Dry barren fields, woods, gravel banks. July-October.

Lythraceae---Loosestrife Family***Cuphea petiolata* (L.) Koenig.**

Clammy Cuphea

Annual, erect, very viscid-pubescent, branched. Leaves, ovate-lanceolate. Flowers axillary, short-peduncled, purple. Dry fields. July-November.

Melastomaceae---Melastoma Family***Rhexia virginica* L.**

Meadow-Beauty

Stem stout, square, 1-1½ feet high. Leaves ovate or ovate-oval, acute at apex, margins ciliate-serrulate. Flowers magenta, four petals. Pastures, roadsides, marshes. July-September.

Onagraceae---Evening Primrose Family***Jussiaea decurrens* (Walt.) DC**

Smooth shrub-like perennial herb, stem erect, 1-2 feet high. Leaves lanceolate, alternate. Flowers yellow. Wet places. June-September.

Umbelliferae---Parsley Family

Foeniculum vulgare Mill.

Fennel

Perennial, branched, 2-4 feet high. Leaves very finely dissected into capillary segments; petioles broad, clasping. Umbels large, yellow flowers. Waste places. July-October.

Ericaceae---Heath Family

Clethra alnifolia L.

Sweet Pepperbush

Shrub with alternate serrate leaves, and white flowers in terminal heary racemes. Damp places. July-September.

Gentianaceae---Gentian Family

Gentiana Andrewsii Griseb.

Closed Gentian

Perennial; stout, 1-2 feet high. Leaves ovate-lanceolate and lanceolate. Corolla oblong, club-shaped, blue, closed. Roadsides and fields. September-November.

Asclepiadaceae---Milkweed Family

Asclepias incarnata L.

Swamp Milkweed

Smooth, the stem 2½-4 feet high. Leaves lanceolate or oblong-lanceolate. Umbels numerous, corymbed, many-flowered. Corolla rose-purple. Near streams and in other damp places. July-October.

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Acerates viridiflora Ell.

Stems ascending 1-2½ feet high. Leaves oval to oblong, thick. Umbels nearly sessile, dense and globose; flowers green. Dry fields and roadsides. June-September.

Convolvulaceae---Convolvulus Family

Ipomoea pandurata (L.) G.F.W. Mey.

Wild Potato Vine,
Man-of-the-Earth

Perennial, trailing or climbing. Leaves broadly ovate, cordate. Peduncles 1-5 flowered. Corolla open-funnel-form, white, with purple in the tube. Fields, roadsides. June-October.

Ipomoea purpurea (L.) Roth

Morning-glory

Annual, pubescent; twining or trailing. Leaves broadly ovate, deeply cordate. Peduncles slender, 1-5 flowered. Corolla funnelform, blue, purple, pink, variegated or white. Fields and waste places. July-October.

Ipomoea hederacea Jacq.

Ivy-leaved Morning-glory

Annual, pubescent; stem twining or climbing, slender, hairy. Leaves ovate-orbicular, long-petioled, deeply 3-lobed, cordate at the base. Corolla funnel-form, tube nearly white, limb light blue. Gardens, fields. July-October.

Ipomoea lacunosa L.

Small-flowered White Morning-glory

Annual, stem twining. Leaves slender-petioled, broadly ovate, cordate. Peduncles 1-3 flowered; corolla funnel-form, white. Fields. July-October.

Ipomoea coccinea L.

Small Red Morning-glory

Annual, stem twining. Leaves ovate to orbiculate, deeply cordate. Peduncles few-several-flowered. Corolla bright red. Cultivated fields, roadsides. July-October.

Cuscuta Gronovii Willd.Common Dodder,
Love Vine

Stem coarse, orange yellowish; flowers white, campanulate, 5 toothed. On herbs and shrubs. June-October.

Verbenaceae---Vervain Family*Verbena urticifolia* L.

White Vervain

Perennial, usually pubescent. Stem slender, erect, branched. Leaves ovate, oblong or oblong-lanceolate, serrate, petioled. Spikes, long, loosely panicle; flowers very small, white. Roadsides and waste grounds. June-October.

Labiatae---Mint Family*Trichostema dichotomum* L.

Blue Curls, Bastard Pennyroyal

Annual, minutely viscid-pubescent; stem slender, rather stiff, much-branched. Leaves oblong or oblong-lanceolate. Flowers paniculate, borne 1-3 together; corolla blue. Dry fields, gravel banks. July-October.

Monarda punctata L.

Horse Mint

Perennial, minutely downy. Leaves petioled, lanceolate, serrate. Flower-clusters axillary and terminal, numerous; bracts white or purplish; corolla yellowish, purple-spotted. Dry fields, sandy grounds. July-October.

Hedeoma pulegioides (L.) Pers.

American Penny-royal

Erect, branching, hairy. Whorls few-flowered; corolla bluish. Dry soil. July-October.

Pycnanthemum flexuosum (Walt) BSP.

Stem slender, stiff, 1½-2½ feet high. Leaves linear or linear-lanceolate, entire. Heads somewhat downy, densely corymbose, corolla whitish or purplish. Fields and roadsides. July-October.

Mentha spicata L.

Spearmint

Glabrous, perennial, erect. Leaves oblong or ovate-lanceolate, serrate. Whorls of flowers in terminal spikes; corolla pale purple or whitish. Low ground and waste places. July-October.

Mentha piperita L.

Peppermint

Perennial, glabrous, erect. Leaves lanceolate, petioled, dark green, sharply serrate. Whorls of flowers in terminal dense or interrupted spikes; corolla pale purplish or whitish. Wet ground and waste places. June-October.

Perilla frutescens (L.) Britton.

Erect, branching, purple or purple-green; stem stout, 1-3 feet high, leafy. Leaves long-petioled ovate, coarsely toothed. Racemes terminal and axillary; corolla purple to white. Waste places. July-November.

Solanaceae---~~Night~~shade Family*Lycopersicon esculentum* Mill.

Tomato, Love Apple

Strayed from cultivation. June-October.

Datura Stramonium L.

Jamestown or Jimson Weed

Annual, glabrous; stem green to purple, stout, 1-5 feet high. Leaves thin, ovate, irregularly sinuate-lobed, the lobes acute. Flowers white, large. An ill-scented weed. Fields and roadsides. July-October.

Scrophulariaceae---Figwort Family*Verbascum Thapsus* L.

Common Mullein

Erect, stout, densely woolly, throughout. Leaves oblong, thick. Flowers yellow, numerous in dense elongated spikes. Fields and waste places. June-October.

Mimulus ringens L.

Monkey-flower

Stem square, sometimes winged. Leaves opposite, sessile, lanceolate, serrate. Flowers pale blue to pinkish or whitish; corolla irregular. Wet places. June-October.

Gerardia pupurea L.

Purple Gerardia

Annual, glabrous, stem slender, branched. Leaves narrowly linear. Flowers rose-purple or paler. Fields. August-November.

Bignoniaceae---Bignonia Family*Tecoma radicans* (L.) Juss.

Trumpet Creeper

A woody vine, climbing or prostrate. Leaves petioled, odd-pinnate; leaflets 7-11 ovate to lanceolate. Flowers corymbd, 2-9 flowered; corolla tubular-funnel-form orange and scarlet. Woods, roadsides. June-October.

Rubiaceae---Madder Family*Cephalanthus occidentalis* L.

Button-bush

Shrub with opposite or verticillate leaves; leaves ovate or oval, entire. Flowers sessile, white. Low grounds. June-October.

Diodes teres Walt.

Buttonweed

Rigid, usually rough, prostrate. Leaves linear-lanceolate, rough. Flowers lilac or purplish, small. Sandy soil. June-October.

Lobeliaceae---Lobelia Family*Lobelia cardinalis* L.

Cardinal Flower

Perennial; stem slightly pubescent, leafy. Leaves oblong to oblanceolate, crenulate or denticulate. Flowers racemose, numerous, bright red. Wet places. July-September.

Lobelia siphilitica L.

Great Lobelia

Perennial, stem pubescent, rather stout, leafy 1-3 feet high. Leaves oblong or lanceolate, irregularly crenate-dentate, sessile. Flowers bright blue in dense racemes. Moist soil. August-October or November.

Lobelia Nuttallii R. and S.

Stem weak, very slender, loosely branched. Basal leaves spatulate to ovate; stem leaves linear. Flowers delicate blue, loosely racemose. Sandy soil, roadsides. June-October.

Compositae---Composite

Vernonia noveboracensis Willd.

Ironweed

Tall leafy perennial, with stout rigid stem 3-8 feet high. Leaves alternate, linear-lanceolate to oblong-lanceolate, serrate. Head 30-40 flowered; involucre brilliant purple. Roadsides, along streams. July-November.

Elephantopus carolinianus Willd.

Elephant's Foot

Perennial with alternate leaves; leaves ovate-oblong. Heads discoid, 2-5 flowered, several together forming a compound pedunculate head, purple. Dry woods. August-October.

Elephantopus tomentosus L.

Elephant's Foot

Perennial, erect, villous-pubescent, 1-2 feet high. Basal leaves obovate to narrowly spatulate. Heads large, flowers purple. Moist soil. August-October.

Eupatorium capillifolium (Lam.) Small

Dog Fennel

Erect, paniculately much branched, 4-10 feet high. Leaves crowded, pinnatifid. Racemose-paniculate, 3-6 flowered; flowers greenish yellow. Fields. September-October.

Eupatorium hyssopifolium L.

Pubescent, 1-2 feet high. Leaves linear, opposite. Inflorescence densely cymose-paniculate; flowers white. Fields and roadsides. August-October.

Eupatorium coelestinum L.

Mist Flower

Pubescent 1-3 feet high. Leaves opposite, petioled, ovate, dentate. Inflorescence cymose-corymbose; flowers blue. Moist soil. July-October.

Eupatorium purpureum L.

Joe-Pye-Weed

Stem stout, erect, hollow 3-10 feet high. Leaves verticillate in 3's - 6's, ovate-lanceolate, petioled, serrate. Heads numerous; involucre cylindric; flowers pink or purple. Moist soil. July-November.

Eupatorium album L.

White Thoroughwort

Erect, pubescent, 1-3 feet high. Leaves opposite, sessile, oblong-lanceolate, serrate. Inflorescence cymose-paniculate; heads numerous; flowers white. Dry fields and roadsides. July-October.

Mikania scandens (L.) Willd.Climbing Hempweed or
Boneset

Twining plant. Leave ovate or hastate, deeply cordate at the base. Heads in compound clusters borne at the ends of the branches; flowers white or pink. Swamps and moist places. July-October.

Liatris squarrosa Willd.

Blazing Star

Erect perennial 8-20 inches high from a roundish corm, or tuber. Leaves rigid, linear. Heads sessile or short-peduncled, 15-60 flowered; flowers rich purple. August-October.

Grindelia squarrosa (Pursh.) Dunal.Gum Plant, Tar
Weed

Erect 1-2 feet high. Leaves spatulate to linear oblong, dentate. Heads 1-2 inches broad; disks and rays yellow. Dry soil. July-October.

Aster grandiflorus L.

Stems erect, rigid, loosely and much branched. Leaves small, oblong-linear. Heads large, terminating the branches; rays bright violet. Dry open fields. September-November.

Aster patens Ait.

Stem slender, rough, 1-3 feet high, with widely spreading branches. Leaves ovate-oblong to oblong-lanceolate, rough. Heads mostly solitary at end of slender branches; rays deep blue-purple. Dry, open places. August-November.

Aster cordifolius L.Common Blue Wood
Aster

Stems nearly glabrous, much branched, the spreading branches bearing very numerous panicle heads. Leaves thin, rough, sharply serrate. Rays violet or blue. September-December.

Aster ericoides L.

Stem glabrous 1-3 feet high. Basal leaves spatulate, dentate; stem leaves linear to linear-lanceolate, entire. Heads numerous; rays 15-25, white, or tinged with rose. Dry open places. August-November.

Aster dumosus L.

Glabrous, rather stiff, usually paniculately branched 1-5 feet high. Leaves linear, entire. Heads scattered, numerous; rays white, pale blue or pale violet. Fields and waste places. August-November.

Aster vimineus Lam.

Smoothish, tall, bushy. Leaves linear or narrowly lanceolate. Heads small, crowded; rays white. Damp fields and roadsides. August-October.

Aster paniculatus Lam.

Stem smoothish, high, much branched. Leaves lanceolate. The branches and scattered heads loosely paniculate; rays white or purplish. Pastures and along streams. August-November.

Aster lateriflorus (L.) Britton.

Stem much branched. Basal leaves often withered and missing; stem leaves lanceolate, serrate. Heads racemously unilateral upon very short minutely leafy branches. Rays white or pale purple. Waste places. August-November.

Aster linariifolius L.

Stem low, slender, leafy. Leaves numerous, small, rigid and entire, linear. Heads large, solitary or terminating simple branches. Rays violet. Dry woods and roadsides. September-November.

Erigeron ramosus (Walt.) B.S.P. Daisy Fleabane

Tall, erect, stem leaves linear-oblong; basal and lower leaves spatulate or oblong, usually serrate. Heads rather numerous; rays white, or sometimes purplish. Fields. May-November.

Gnaphalium polycephalum Michx. Common Everlasting

Erect woolly annual. Leaves lanceolate. Heads clustered at the summit of panicled-corymbose branches, ovoid-conical before expansion; bracts whitish. Fields and woods. July-November.

Polymnia uvedalia L. Leafcup

Roughish-hairy, stout 3-10 feet high. Leaves broadly ovate, angled and toothed, almost sessile. Heads few in terminal clusters; rays 10-15 linear-oblong, yellow. Damp woods and river-bottoms. July-October.

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Silphium trifoliatum L.

Tall perennial with copious resinous juice. Stem-leaves lanceolate, pointed, rough, short-petioled, in whorls of 3 or 4. Heads composed of a corymbose-panicled yellow flowers. Woods and roadsides. July-October.

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Parthenium integrifolium L. American Feverfew

Perennial 1-4 feet high from a tuberous thickened rootstock. Leaves ovate-oblong, crenate-dentate. Heads numerous in a dense terminal corymb; rays white. Dry soil, fields and roadsides. June-September.

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Ambrosia trifida L. Great Rag-Weed

Stout stem, rough-hairy. Leaves large deeply 3-lobed; the lobes oval-lanceolate and serrate, petioled. Racemes of greenish flowers. Fields and waste places. July-November.

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Ambrosia artemisiifolia L. Hog-Weed

Annual, pubescent, 1-6 feet high. Leaves thin, 1-2 bipinnatifid, petioled. Racemes very numerous. A pernicious weed. July-November.

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Xanthium commune Britton. Cocklebur

Coarse annual, with branching stems, and alternate toothed or lobed petioled-leaves. Flowers in spike-like racemes. A weed. Waste places. July-October.

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Galinsoga parviflora Cav.

Annual weed. Leaves opposite, ovate, crenate-serrate. Heads several-flowered, small; rays 4-5 white; disk-flowers perfect, yellowish. Fields, waste places. June-November.

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Cirsium discolor (Muhl.) Spreng.

Branching perennial. Leaves deeply pinnatifid, prickly. Flowers light purple or pink. Fields and roadsides. July-November.

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Cirsium lanceolatum (L.) Hill

Common or Bull
Thistle

Stem stout, branched, tall, leafy to the heads.
Leaves lanceolate, deeply pinnatifid, stout prickles.
Flowers purple. Pastures and roadsides. July-November.

Lactuca canadensis L.

Wild or Tall Lettuce

Stem leafy up to the inflorescence, 3-10 feet high.
Leaves mostly sinuate-pinnatifid, the upper lanceolate
and entire. Flowers pale yellow. Open places. June-
November.

Chrysopsis mariana (L.) Nutt.

Perennial, stout, villous-pubescent. Corymbosely
branched at the summit. Leaves oblong or lanceolate.
Flowers yellow. Dry soil. August-October.

Helianthus atrorubens L.

Rough, hairy; stem slender, tall. Leaves ovate or
oval to oblong-lanceolate, or the lowest heart-shaped,
serrate, petioled. Heads small, corymbed, rays yellow.
Dry woods. August-October.

Helianthus tuberosus L.

Jerusalem Artichoke

Perennial by fleshy thickened rootstocks. Stem
pubescent or hirsute, branched above, 6-12 feet high.
Leaves ovate or ovate-oblong, petioled. Flowers yellow.
Moist soil. September-November.

Coreopsis verticillata L.

Perennial; stem stiff, much branched, slender, leafy.
Leaves divided into 3 sessile leaflets which are pinnately
parted. Dry soil. June-October.

Bidens frondosa L.

Beggar-Ticks

Annual; stem erect, branched 2-3 feet high. Leaves
slender-petioled, pinnately 3-5 divided lanceolate,
serrate. Heads numerous; rays small, yellow. Damp soil.
August-October.

Bidens bipinnata L.

Spanish Needles

Annual; stem erect, freely branching, rather slender.
Leaves petioled, pinnately dissected. Heads numerous;
rays 3-4 yellow, short. Achenes linear, barbed. Fields.
July-October.

Helenium autumnale L.

Perennial, stem rather stout, 2-6 feet high. Leaves oblong, lanceolate or ovate-lanceolate, dentate. Heads numerous; borne on long peduncles; rays bright yellow. Swamps and wet meadows. August-November.

Aretium Lappa L.

Great Burdock

Stem much branched, tall. Leaves broadly ovate, petioled. Heads subcorymbose; flowers purple or white. Waste places. July-October.

Lactuca floridana (L.) Gaertn.

Leaves all lyrate or runcinate, or rarely entire, the upper often with a heart-shaped clasping base. Heads numerous, rays blue. Moist open places. July-October.

Lactuca spicata (Lam.) Hitchc.

Tall, nearly smooth, very leafy. Leaves pinnatifid, coarsely toothed. Heads in a large and dense compound panicle, rays blue to white. Moist places. July-October.

Prenanthes serpentaria Pursh.

Lion's-Foot, Gall-of-the-Earth

Stem smooth, 1-4 feet high, corymbose-panicled at summit. Leaves pinnatifid. Heads chiefly clustered at the tip of the elongate branches; flowers purplish, greenish-white, or cream-color. Dry soil. September-October.

Lythraceae---Loosestrife Family*Lythrum Salicaria* L.

Spiked Loosestrife

Tall, leaves lanceolate, heart-shaped at base; flowers magenta, trimorphous. Wet meadows and shores. June-October.

Compositae*Solidago*Many varieties of
goldenrod

Perennial erect herb, simple, or little branched. Heads or spike, axillary panicles, cymose-corymbose or capitate clusters. Usually golden yellow, some pale yellow and white. Fields. July-November.

Pontederiaceae---Pickerel-Weed Family*Pontederia cordata* L.

Pickerel-weed

Stem stout, 1-3½ feet tall; leaves heart-shaped, blunt; spike dense, from a spathe-like bract; flowers bright blue or violet sometimes yellow-spotted within, irregular. Borders of ponds and slow streams, also marshes. June-October.

Commelinaceae---Spiderwort Family*Commelina hirtella* Vahl.

Stems stout, erect or ascending. Leaves lanceolate, roughish, the sheaths brown-bearded. Spathes crowded. Seeds smooth. In moist soil. August-October.

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Commelina communis L.

Day-Flower

Stem rather weak, much jointed. Two petals are large, rounded and blue, the third is tiny and colorless; the whole flower peeps out from a clasping, cordate, heart-shaped leaf or spathe. Waste places. June-October.

Orchidaceae---Orchis Family*Epipactis pubescens* (Willd.) A.A. Eaton.Rattlesnake
Plantain

Stem stout, 6-20 inches high; leaves green with white nerves and veins; perianth 2½ to 3 inches long; lip globose, ventricose, stigma with 2 short teeth. Dry woods. August-September.

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Spiranthes Beckii Lindl.

Ladies' Tresses

Plant with a solitary subcylindrical or spindle-shaped root, bearing a small slender raceme of white flowers; perianth 2-3 mm. long. Dry soil. August-October.

Spring

Salicaceae---Willow Family

Salix---several species

Willow

Leaves lanceolate, petioled. Buds covered by a single scale, with an inner usually adherent membrane. Catkins appearing before or with the leaves. March-May.

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Populus alba L.

White Poplar, Silver-
Leaved Poplar

The younger branches and the under surface of the rhombic-oval sinuate-toothed acute leaves white tomentose. Catkins long and drooping. April-May.

Juglandaceae---Walnut Family

Carya---several species

Trees with hard and very tough wood. Two kinds of flowers, the sterile below and the fertile above, above the leaves. May.

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Juglans nigra L.

Black Walnut

Leaflets 11-17, ovate-lanceolate, taper-pointed, somewhat heart-shaped or unequal at base. Flowers monoecious, the sterile or catkins (Aments); the fertile solitary or in small cluster or spike. Fruit a kind of dry drupe, with a crustaceous or bony nutshell. April-May.

Betulaceae---Birch Family

Corylus americana Walt.

Hazelnut, Filbert

Shrub, the young shoots russet-brown, densely pubescent. Leaves ovate, or broadly oval, pointed. Staminate aments most solitary; involucre of the nut compressed. In thickets. April-March.

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Betula

Birch

Tree, with dentate or serrate leaves, scaly buds and flowers of both kinds in aments expanding before or with the leaves. Thin bark. April-May.

Alnus

Alder

Shrubs or trees, with dentate or serrulate leaves, flowers of both kinds in aments. March-April.

Fagaceae---Beech Family

Fagus grandifolia Ehrh.

Beech

Large tree with smooth light gray bark; leaves cuneate at base, taper-pointed, coarsely toothed. April-May.

Quercus (At least a dozen species)

Oaks

Trees, with pinnatifid lobed dentate crenate or entire leaves. Flowers very small, green or yellowish, appearing with or before the leaves. Valuable timber. May-June.

Castanea pumila (L.) Mill.

Chinquapin

A spreading shrub or small tree. Leaves oblong, sharply serrated. Involucres small, often spiked. Nuts enclosed in burs. June.

Urticaceae---Nettle Family

Ulmus americana L.

American or White Elm

Tree, gray flaky bark. Leaves ovate-oblong or oval, abruptly pointed, sharply serrate. Flowers in close fascicles. Samara ovate-oval. March-April.

Morus rubra L.

Red Mulberry

Tree with brown rough bark. Leaves heart-ovate, serrate, rough above, downy beneath. Flowers frequently dioecious. Fruit dark purple, long. April-May.

Maclura pomifera (Raf.) Schneider

Tree with ridged brown bark and spreading branches.

Leaves ovate to oblong-lanceolate, pointed, rounded at the base. Flowers dioecious; the staminate in loose short racemes; the pistillate in a dense globose head. Syncarp globose, yellowish-green, large. May-June.

Aristolochiaceae---Birthwort Family

Asarum canadense L.

Wild Ginger

Leaves kidney-shaped, more or less pointed; calyx bell-shaped, brown-purple inside. Rich woods. April-May.

Loranthaceae---Mistletoe Family

Phoradendron flavescens (Pursh.) Nutt.

American
Mistletoe

A branching glabrous or slightly pubescent shrub, the twigs rather stout, brittle at the base. Leaves oblong or obovate, dark green. Flowers small, dioecious. Berries globose, whitish. Parasitic on deciduous leaved trees. May-June.

Aristolochiaceae---Birthwort Family

Asarum virginicum L.

Wild Ginger

Perennial herb. Leaves basal, from a cluster of rootstocks, cordate-ovate, or reniform, entire, thick. Flowers dull-red or purplish-brown. Woods and shady banks. April-May.

Caryophyllaceae---Pink Family

Stellaria pubera Michx.

Great or Star
Chickweed

Perennial, usually upright or partly so, with branching stems. Leaves nearly sessile, elliptic to oblong-ovate $\frac{1}{2}$ - 2 inches long. Flowers white, in loose cymose clusters, terminal on the stem or its branches; petals 5 notched or cleft. Moist shady banks and woods. April-June.

Cerastium viscosum L.

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Mouse Ear Chickweed

Annual, tufted stems ascending or spreading, pubescent. Leaves ovate or obovate, or the lower spatulate.

Flowers in glomerate cymes. Fields, roadsides. April-July.

Silene pennsylvanica Michx.

Wild Pink

Perennial, tufted, 4 - 10 inches high, viscid-pubescent. Basal leaves spatulate, or oblanceolate, acute or obtuse. Flowers pink, about 1 inch broad in terminal cymes. Petals wedge-form, slightly notched. Gravelly and rocky places. April-June.

Agrostemma Githago L.

Corn Cockle

Erect, 1 - 3 feet high, densely pubescent with whitish appressed hairs. Leaves linear-lanceolate and grasslike. Flowers purplish-red to pale pink, showy. Grain fields, roadsides. June-August.

Portulacaceae---Purslane Family

Claytonia virginica L.

Spring Beauty

Perennial herb 4 - 9 inches high, arising from deep tuberous base. Leave 2, linear and grasslike. Flowers deep pink to pale pink, veined with darker tints, $\frac{1}{2}$ - $\frac{3}{4}$ inch broad, in loose spreading terminal racemose cluster. Moist open woods and damp grassy places. March-May.

Ranunculaceae---Crowfoot Family

Ranunculus abortivus L.

Small-Flowered Crowfoot

Biennial, slightly succulent 6 - 24 inches high, primary root-leaves round-heart-shaped with a wide shallow sinus or kidney-form; those of the stem 3 - 5 parted or divided, toothed. Petals pale yellow. Shady hillsides, along brooks. April-June.

Ranunculus bulbosus L.

Bulbous Buttercups

Erect from a bulbous-thickened base, hairy 6 - 18 inches high. Leaves petioled, 3-divided, all variously lobed and cleft. Flowers bright yellow about 1 inch broad; petals 5 - 7. Fields and along roadsides. April-July

Thalictrum polygamum Muhl.

Tall Meadow Rue

Tall perennial, 2 - 9 feet high. Leaves about thrice

compound, leaflets pale-green, round-oval, wedge oblong. Flowers white, small and numerous in a large loose terminal panicle. Moist low ground, woodlands, swamps. June-August.

Anemonella thalictroides (L.) Spach. --- Rue Anemone

Low, glabrous, 4 - 9 inches high, the flowering stem arising from the cluster of tuberous roots. Leaves 2 - 3 ternately compound; summit of flowering stem occupied by a whorl of bracts resembling leaflets. Flowers few, white or pink, slenderly petioled. Sepals 5 - 10. Woods. April-May.

Hepatica triloba Chaix. --- Hepatica

Leaves long-petioled with 3 ovate obtuse or rounded lobes; those of the involucre also obtuse; sepals 6 - 12, blue, purplish, or nearly white. Shady banks and woodlands. February-April.

Anemone quinquefolia L. --- Wood Anemone, Wind-flower

Stem slender, 4 - 8 inches high. Basal leaves 5 parted. Solitary flower; sepals 4 - 9, obovate or oval, white or purplish. Woods. April-May.

Anemone virginiana L. ---

Hairy, 2 - 3 feet high, stout. Basal leaves long-petioled, the blades deeply parted into 3 - 5 wedge-oblong cleft. Flowers usually white or greenish. Woods, roadsides. June-August.

Clematis ochroleuca Ait. ---

Erect perennial. Leaves opposite. Flower solitary, greenish, usually nodding from the summit of an elongate terminal silky peduncle. Sepals 4 - 5 thick, silky, forming a bell-shaped corolla-like structure. Achenes tipped by long yellowish brown or cream-colored feathery recurved styles. Open, dry, or deep damp woods. May-June.

Delphinium Ajacis L. --- Larkspur

Erect annual herb with slender, branching stem. Leaves alternate, short-petioled, the blades finely divided and forked. Flowers dark blue, pale blue or whitish. Escaped from cultivation. May-July.

Cimicifuga racemosa (L.) Nutt.

Black Snakeroot,
Black Cohosh

Erect perennial, 2-7 feet high from a thick knotted rootstock; leaves 2-3 ternately and then often quaternately compound; leaflets oblong-ovate or elliptic, all toothed or out-lobed, acute. Flowers white; racemes compound, terminal, 6 inches to 3 feet long. Woods. June-August.

Magnoliaceae---Magnolia Family

Liriodendron Tulipifera L.

Tulip Tree

Leaves smooth, broadly ovate or nearly orbicular in outline, truncate or broadly notched at the apex, truncate, rounded or cordate at the base. Flowers erect, greenish-yellow, orange-colored within. Cone of fruit dry, oblong, acute. May-June.

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Magnolia macrophylla Michx.

Great-Leaved Magnolia

Tree. Leaves obovate-oblong, cordate at the base, pubescent and white beneath. Flowers large, white with a purple spot at the base. May-August.

Calycanthaceae---Calycanthus Family

Calycanthus floridus L.

Hairy Strawberry-shrub

Shrub; leaves ovate or oval, acute or obtuse, narrowed at the base, soft-downy or pubescent beneath. Flowers dark purple or brownish with a strong odor of strawberries when crushed. Frequently planted for ornament. April-August.

Anonaceae---Custard Apple Family

Asimina triloba Dunal.

Common Papaw

Shrubs or small trees. Leaves thin, obovate-lanceolate, pointed. Flowers dark purple. Along banks of streams. April-May.

Berberidaceae---Barberry Family

Pedophyllum peltatum L.

Mandrake, May Apple

Smooth erect herb 9-18 inches high, perennial by a stout rootstock. Leaves on fleshy flowering-stem mostly

2, large, deeply lobed. Flower solitary, white 1 - 2½ inches broad, on a short stout peduncle. Fruit an ellipsoid berry, at maturity yellow. April-May.

Berberis vulgaris L.

Common Barberry

Shrub, the branches arched and drooping at the ends. Leaves obovate or spatulate, closely bristle-toothed. Drooping many-flowered racemes. Berries ellipsoid, scarlet when ripe. June.

Lauraceae---Laurel Family

Sassafras variifolium (Salisb.) Ktze. Sassafras or Ague Tree

Tree. Bark rough in irregular ridges, aromatic. Leaves oval and entire or mitten-shaped. Flowers small, racemes several or numerous in the umbels, peduncled. April-May.

Papaveraceae---Poppy Family

Sanguinaria canadensis L.

Bloodroot

Glabrous, glaucous, especially when young. Rootstock ½ - 1 inch thick, several inches long, reddish (surcharged with red-orange acrid juice). Sepals 2; petals 8 - 12, spatulate oblong, white. Flowering scape above leaf. Rich woods. April-May.

Papaver Rhoeas L.

Poppy

Erect 1 - 2 feet high. Flower red. Foliage deeply notched. Waste fields. Wheat fields. May-June.

Fumariaceae---Fumitory Family

Dicentra Cucullaria (L.) Bernh.

Dutchman's Breeches

Scape and slender-petioled leaves from a sort of granulate bulb; lobes of leaves linear, leaves finely cut. The slender scape bears 4 - 10 pretty but odd, white flowers tipped with cream-color. Woods, moist lands. April-May.

Cruciferae---Mustard Family

Draba Verna L.

Whitlow Grass

Small; leaves radical, oblong or lanceolate. Racemes elongated in fruit. Pods varying from round-oval to oblong-lanceolate. Fields. February-May.

Dentaria laciniata Muhl.

Toothwort, Pepper-
Root

Tubers deep seated; cauline leaves 3, whorled or nearly so, the lateral leaflets deeply cleft; basal leaves when present, similar. Flowers white or pink; pods linear, ascending. Moist rich woods. April-May.

Barbarea vulgaris R. Br.

Winter Cress,
Yellow Rocket

Lower leaves lyrate, the terminal division round and usually large; upper leaves obovate, cut-toothed, or pinnatifid at the base. Flowers bright yellow, somewhat racemose. Pods erect or ascending on spreading pedicels. Fields, roadsides. April-June.

Sisymbrium canescens Nutt.
var. *brachycarpon* (Richards) Wats.

Tansy-Mustard

Erect or ascending herb $\frac{1}{2}$ - $2\frac{1}{2}$ feet high. Leaves deeply and doubly pinnatifid. Flowers yellowish, minute, grouped at the ends of terminal racemes. Dry soil. May-July.

Saxifragaceae---Saxifrage Family

Saxifraga virginiana Michx.

Early Saxifrage

Leaves obovate or oval-spatulate, narrowed into a broad petiole, crenate-toothed, thickish. Flowers in clusters and loosely paniced cymes, white. Dry or rocky woodlands. March-May.

Hauchera americana L.

Alum Root

Stem glandular and more or less hirsute with short hairs; leaves roundish, with short rounded lobes and crenate teeth. Flowering calyx broadly campanulate, nearly regular. Petals very small, greenish. Woods. May-August.

Philadelphus coronarius L.

Mock Orange, Garden
Syringa

Shrub 8 - 10 feet high. Leaves short-petioled, oval,

elliptic, denticulate. Flowers numerous, racemose at the ends of the branches. In gardens and escaped from gardens. May-June.

Hamamelidaceae---Witch-Hazel Family

Liquidambar Styraciflua L. Sweet Gum

Tree. Leaves petioled, sub-cordate at the base, deeply 5 - 7 lobed, smooth and shining. Flowers usually monoecious, in globular heads or catkins. April-May.

Platanaceae---Plane Tree Family

Platanus occidentalis L. Sycamore.

Tree. Leaves mostly truncate at the base sinuate-lobed or toothed, lobes sharp-pointed. Both staminate and pistillate flowers. May.

Rosacea---Rose Family

Pyrus coronaria L. American Crab

Tree. Leaves ovate or elliptic, serrate. Flowers pink or white. April-May.

Pyrus communis L. -- Pear

Tree. Leaves ovate, elliptic or obovate, slender petioles. Flowers white. April-May.

Pyrus Malus L. -- Apple

A common fruit tree of cultivation often escaping to woods. April-May.

Fragaria virginiana Duchesne -- Wild Strawberry

Rather stout, tufted, dark green, villous-pubescent. Petioles 2 - 6 inches long; leaflets of a firm slightly coriaceous texture. Flowers white; petals obovate. Fruit red. Fields. May.

Potentilla recta L. -- Rough-fruited Cinquefoil

Erect, rather stout, branched above, villous-pubes-

cent, 1-2 feet high. Leaves digitately 5-7 foliate, all but the upper petioled. Leaflets oblanceolate. Flowers terminal, cymose, yellow, numerous. Waste fields. May

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Corn canadense Jacq.

Stem and petioles sparingly hairy. Leaves soft-pubescent beneath, the basal of 3-5 leaflets or undivided, those of the stem divided, toothed. Flowers white. Shaded places. June-August.

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Rubus occidentalis L.

Black Raspberry

Glaucous, stems cane-like, recurved, armed with small hooked prickles. Leaflets ovate, acuminate, coarsely incised-serrate. Flowers white. Fruit purple-black. Fence rows, ravines. May-June.

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Rubus frondosus Bigel.

Blackberry

Canes arched-recurving, stout prickles. Leaflets 3-5, obovate. Flowers white. Common in waste places. May-June.

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Prunus serotina Ehrh.

Wild Black Cherry

Tree, with reddish-brown branches. Leaves thick, oval, oval-lanceolate or ovate. Flowers white, elongated racemes, spreading or drooping. Fruit dark purple or black. May.

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Amelanchier canadensis (L.) Medic.

Shad Bush

Tree or shrub. Leaves ovate to ovate-oblong, finely serrated, petioled. Flowers many, in drooping racemes, white. Open woods and near woods. April-May.

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Prunus Cerasus L.

Sour or Morello Cherry

Tree. Leaves ovate or oval-lanceolate, dentate. Flowers white in umbels. April-May.

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Prunus Persica (L.) Stokes

Peach

Small tree. Leaves lance-oblong, serrate. Flowers pink. April-May.

Leguminosae---Pulse Family

Gleditsia triacanthos L.

Honey Locust

Tree. Thorns stout, often triple or compound. Leaflets lanceolate-oblong, serrate. Racemes solitary or clustered, slender, drooping, dense. Flowers greenish. Pods linear, elongated often twisted, filled with a sweet pulp between the seeds. May.

Cercis canadensis L.Redbud, American
Judas-tree

Tree. Leaves simple, petioled, cordate-orbicular, blunt pointed, rather thick. Flowers several together in sessile umbellate clusters, appearing before the leaves. Corolla red-purple. Woods, roadsides. April-May.

Lupinus perennis L.

Wild Lupine

Perennial, erect, somewhat hairy. Leaves slender-petioled; leaflets 7 - 11, oblanceolate. Flowers in a long raceme, purplish-blue. Dry, sandy soil. May-June.

Psoralea pedunculata (Mill.) Vail.Samsen's Snake-
root

Stems erect 1 - 2 feet high, slender. Leaflets lanceolate or narrowly oblong. Racemes axillary and terminal on long peduncles; flowers purplish. Dry soil. April-August.

Tephrosia virginiana L.Goat's Rue, Cat-Gut,
Wild Sweet Pea

Erect or ascending, silky pubescent with whitish hairs 1 - 2 feet high. Roots long, fibrous, tough. Leaves short-petioled; leaflets 7 - 25 oblong. Flowers large and numerous, clustered in a terminal raceme or panicle, yellowish-white marked with purple. Dry sandy banks, waste places. May-July.

Robinia Pseudo-Acacia L.Common Locust, False
Acacia

Tree. Leaves odd-pinnate. Racemes slender, loose; flowers white, fragrant. Pod smooth. May-June.

Robinia hispida L.Bristly Locust,
Rose Acacia

A much-branched shrub. Leaflets 9 - 13 stalked, broadly ovate or oblong, entire. Racemes loose; flowers deep rose-color. May-June.

Vicia angustifolia L.

Smaller Common Vetch

Annual, glabrous or puberulent; stem slender. Leaves short-petioled, or nearly sessile; leaflets 4 - 16, linear. Flowers 1 or 2 in the upper axils, purple, small. Pod linear. Fields and waste places. April-July.

Vicia villosa Roth.

Hairy or Winter Vetch

Long hairy trailing stems. Leaflets many. Flowers violet and white, in many-flowered, somewhat 1-sided spike-like racemes. Fields and roadsides. May-August.

Linaceae---Flax Family

Linum virginianum L.

Tall, 1 - 2 feet high, stem and branches subterete. Leaves thin, deep green, oblanceolate. Flowers scattered. Shady waysides, dry places. June-September.

Linum medium (Planch.) Britton

Slender erect perennial, corymbosely branched above. Leaves firm, linear-lanceolate, entire. Flowers yellow, in slender spike-like racemes. Roadsides and dry places. July-September.

Oxalidaceae---Wood Sorrel Family

Oxalis violacea L.

Violet Wood Sorrel

Base bulbous, scaly; leaves radical; leaflets obcordate. Scapes several, commonly exceeding the leaves, umbellately several-flowered. Petals rose-purple. Woods. May.

Geraniaceae---Geranium Family

Geranium maculatum L.

Wild Crane's-bill

Perennial, pubescent, erect, 1 - 2 feet high. Basal leaves long-petioled nearly orbicular, divided, toothed and cleft. Stem-leaves 2, opposite. Flowers rose-purple; umbellate inflorescence. Woods, and by streams,

shaded places. April-June.

Geranium carolinianum L.

Carolina Crane's- bill

Annual, erect, generally branched. Leaves about 5-parted, cut and cleft. Flowers in compact clusters, pale pink or whitish. Rocky places, poor soil, fields. May-August.

Anacardiaceae---Cashew Family

Rhus glabra L.

Smooth Sumac

Shrub. Leaflets 11 - 31, whitened beneath, lanceolate-oblong, pointed, serrate. Flowers greenish-white or yellowish. Common in dry soil. June-July.

Rhus Toxicodendron L.

Poison Ivy, Poison Oak

A woody vine, climbing by numerous aerial rootlets, or erect and bushy. Leaves petioled, 3-foliate. Leaflets ovate or rhombic. Flowers minute, greenish, in small loose slender axillary racemes or panicles. Poisonous to many people. Woods, fields, roadsides. May-July.

Rhus quercifolia (Michx.) Stend.

Poison Oak

A low branching shrub, spreading by underground branches. Leaves long-petioled, 3-foliate; leaflets ovate to obovate, irregularly lobed, toothed or sinuate-margined. Panicles 1 - 3 inches long. Woods, fields, roadsides. May-June.

Aquifoliaceae---Holly Family

Ilex opaca Ait.

American Holly

A tree of slow growth. Leaves oval, flat, the wavy margins with scattered spiny teeth. Flowers in loose clusters along the base of the young branches and in the axils. Fruit red. Woods. April-June.

Celastraceae---Staff Tree Family

Celastrus scandens L.

Waxwork, Bitter-Sweet

Twining shrub; leaves ovate-oblong, finely serrate,

pointed. Flowers small, greenish, in raceme-like clusters terminating the branches. The opening orange-colored pods displays the scarlet covering of the seeds, very ornamental in autumn. Fencerows, roadsides. June.

Evonymus americanus L.

Strawberry Bush

Shrub 2 - 8 feet high, upright or straggling. Leaves almost sessile, bright green, thick, ovate-lanceolate or oblong-lanceolate. Flowers greenish-purple. Fruit a 3 - 5 lobed, rough-warty, dull crimson capsule, splitting open at maturity to disclose the scarlet-coated seeds. Moist woods or along streams. May-June.

Aceraceae---Maple Family

Acer saccharinum L.

White or Silver Maple

Tree. Leaves deeply 5 lobed, the sinuses rather acute, silvery-white underneath. Flowers on short pedicels, in umbel-like clusters. March-April.

Acer rubrum L.

Red or Swamp Maple

Tree. Leaves broadly ovate to suborbicular, truncate or cordate at the base; 3 - 5 acuminate lobes irregularly serrated and notched. Flowers on short pedicels in umbel-like clusters, red or sometimes yellowish. March-April.

Sapindaceae---Soapberry Family

Aesculus Hippocastanum L.

Horse-chestnut

Tree. Leaves long-petioled; leaflets 5 - 7, obovate, abruptly acuminate at the apex, cuneate-narrowed to the base, irregularly crenulate-dentate. Inflorescence rather dense; corolla spreading, white, spotted with red and yellow. Fruit globose, prickly. May-June.

Vitaceae---Vine-Family

Pseodera quinquefolia (L.) Greene

Virginia Creeper

Trailing or climbing woody vine. Petioles rather long; leaf-blades alternate, compound; leaflets 5, rarely 3 or 7. Flowers greenish, small; inflorescence paniculate. Woods, thickets, roadsides. May-July.

Vitis Labrusca L.

Fox-grape

Climbing vine. Leaves very broadly cordate-ovate, rather faintly dentate. Flowers minute, greenish, in panicles. Berries (grapes) globular, dark bluish-purple. Low woods, thickets, streams. May-June.

Vitis cordifolia Michx.

Frost Grape, Chicken Grape

High climbing vine. Leaves coarsely dentate with very acute teeth. Inflorescence loose or compact. Berries small, black, shining. Moist thickets, banks of stream. May-June.

Tiliaceae---Linden Family

Tilia americana L.

Basswood

Tree. Leaves large, heart-shaped, green and glabrous. Flowers in small cymes hanging on axillary peduncles, cream-color, honey-bearing, fragrant. May-June.

Tilia Michauxii Nutt.

Tree. Leaves smaller than *T. americana*, rather densely pubescent. May-June.

Tilia heterophylla Vent.

White Basswood

Tree. Leaves larger than *T. Michauxii*, smooth and bright green above, silvery-whitened with a fine down underneath. May-June.

Malvaceae---Mallow Family

Althaea rosea Cav.

Hollyhocks.

The hollyhocks of gardens, sometimes persistent after cultivation. May-August.

Violaceae---Violet Family

Viola pedata L.

Bird's-foot or Crow-foot Violet

Low stemless herb. Leaves basal, nearly glabrous,

3-divided, the lateral divisions pedately 3-5 parted. The upper petals of corolla dark violet, the 3 lower lilac-purple, all beardless. Fields, roadsides, woods. April-May.

Viola papilionacea Pursh.

Meadow or Common Blue
Violet

Perennial, robust, from a stout branching rootstock. Leaves all basal, reniform or ovate, cordate. Corolla deep violet. Moist fields, groves, roadsides. April-May.

Viola serotia Willd.

Woolly Blue Violet

Rootstock stout, often branching. Leaves villous-pubescent, the blade ovate to obicular or even reniform. Corolla violet or lavender, occasionally white. Moist meadows, woods. April-June.

Viola Rafinesquii Greene.

Wild Pansy

Very slender, often branched from the base. Leaves small, the earliest suborbicular, the later obovate to linear-oblongate. Flowers, bluish-white to cream-colored petals. Woods and open places. March-May.

Viola pubescens Ait.

Downy Yellow Violet

Softly pubescent. Stem often solitary; leaves 2-4 near the summit, broadly ovate with cordate or truncate-decurrent base, crenate-dentate. Flowers rise on slender peduncles from the axils of the leaves, bright yellow, bearded. Woods, thickets. April-May.

Viola lanceolata L.

Lance-leaved or Water
Violet

Leaf-blades lanceolate to narrowly linear-elliptic. Petioles long, slender. Flowers pale. Open bogs and moist meadows. April-May.

Viola cucullata Ait.

Marsh Blue Violet

Glabrous. Leaves broadly ovate to reniform, cordate, finely crenate-serrate. Corolla violet-blue, darker colored at the throat. Moist lands. April-June.

Passifloraceae---Passion Flower Family

Passiflora lutea L.

Passion Flower

Herbaceous, climbing or trailing. Leaves broader than long, cordate at base, with 3 wide obtuse rounded lobes. Flowers greenish yellow. Berry globose-ovoid. Woods, thickets. May-August.

Onagraceae---Evening Primrose Family

Oenothera laciniata Hill.

Stems ascending or decumbent, simple or branched. Leaves oval-lanceolate, sinuate-dentate or often pinnatifid. Flowers axillary, yellow. Fields. May-August.

Araliaceae---Ginseng Family

Panax trifolium L.

Dwarf Ginseng, Ground Nut

Glabrous 3 - 8 inches high. Root globose, deep. Leaflets 3 - 5, oval to oblanceolate, sessile, obtuse, dentate or serrate. Flowers white, tiny, in an umbel. Moist woods and thickets. April-May.

Cornaceae---Dogwood Family

Cornus florida L.

Flowering Dogwood

Tree. Leaves ovate, pointed, acutish at the base. Bracts of the involucre obcordate. Fruit ovoid, scarlet. Flowers greenish-yellow. Woods. April-May.

Nyssa sylvatica Marsh.

Black Gum

Tree. Leaves oval to obovate, glabrous or villous-pubescent. Flowers fertile, at the summit of slender peduncles. Fruit ovoid, bluish-black. Leaves turn bright crimson in autumn. April-May.

Ericaceae---Heath Family

Chimaphila umbellata (L.) Nutt.Prince's Pine,
Pipsissewa

Leafy 4 - 16 inches high. Leaves wedge-lanceolate, sharply serrate. Peduncle 2 - 8 flowered; petals flesh-color. Dry woods. June-August.

Rhododendron nudiflorum (L.)
Terr.

Pinkster Flower, Wild
Honeysuckle

Shrub with oblong or obovate leaves. Flowers pink to nearly white, expanding before or with the leaves. Corolla tube is long, five lobes. Open woods. April-May.

Chimaphila maculata (L.) Pursh.

Spotted Wintergreen

Stem extensively trailing, sending up erect branches. Leaves lanceolate, ovate-lanceolate, sharply serrate, dark green and mottled with white. Flowers few, corymbose or umbellate, white or pinkish. Dry woods. June-August.

Rhododendron maximum L.

Great Laurel

Tall shrub. Leaves oblong, lanceolate-oblong or broadly oblanceolate, dark green. Corolla $1\frac{1}{2}$ - 2 inches broad; rather deeply 5-cleft, rose-color, varying to white. Low woods and along streams. June-July.

Kalmia latifolia L.

Mountain Laurel

Leaves mostly alternate, bright green, ovate-lanceolate or oblong, acute at each end, petioled. Corymbs terminal, many-flowered, clammy-pubescent. Flowers pink or white. Woods. May-June.

Epigaea repens L.

Trailing Arbutus,
Mayflower

Creeping plant; stems tough, hairy and branched. Evergreen with alternate leaves, slightly heart shaped at base. Flowers in terminal clusters, five-parted, delicate pink, very fragrant. Sandy woods, or in rocky soil on hill-sides. March-May.

Gaylussacia frondosa (L.) T. & G.

Blue Tangle,
Dangleberry

Erect shrub 2 - 4 feet high. Leaves oval to obovate, entire. Flowers few, nodding, greenish to pink, small, in loose racemes. Fruit dark blue. Moist woods. May-June.

Gaylussacia dumosa (Andr.) T. & G.

Dwarf Huckleberry

A branching shrub, 1 - 2 feet high. Leaves oblong

obovate, obtuse, entire. Flowers white or red-tinged, on short glandular-hairy pedicels scattered along leafy-bracted racemes. Sandy soil, also in swamps. May-June.

Primulaceae---Primrose Family

Lysimachia quadrifolia L.

Loosestrife

Stem simple. Leaves whorled in 4's or 5's, lanceolate to lance-ovate. Flowers on long capillary peduncles from the axils of the leaves. Corolla yellow, dark streaked or spotted. Moist or sandy soil. June-July.

Steironema ciliatum (L.) Raf.

Fringed Loosestrife

Perennial, stem erect 1 - 3 feet high. Leaves opposite, ovate to ovate-lanceolate; petioles ciliate. Flowers bright yellow on thread-like peduncles. Low grounds, thickets. June-August.

Ebenaceae---Ebony Family

Diospyros virginiana L.

Common Persimmon

Tree, leaves thickish, ovate-oblong. Flowers mostly 4-parted; corolla greenish-yellow. Fruit globose, reddish-yellow. Sweet when ripe, astringent when green. Fields, woods. May-June.

Oleaceae---Olive-Family

Ligustrum vulgare L.

Privet or Prim

Shrub with entire leaves and small white flowers in terminal panicles. Leaves smooth, lanceolate or oblong. Used for low hedges. June-July.

Chionanthus virginica L.

Fringe Tree, Old Man's Beard

Tree, Leaves oval, oblong, or obovate-lanceolate. Flowers on slender pedicels; panicles drooping; petals 1 inch long or more. Banks of streams. May-June.

Syringa vulgaris L.

Common Lilac

Shrub. Leaves ovate, entire, petioled. Flowers lilac-purple or white, in large terminal thyrses. May.

Apocynaceae---Dogbane Family

*Vincetoxicum L.*Common Periwinkle,
Myrtle

Perennial, trailing, glabrous. Leaves oblong to ovate, entire. Flowers solitary in some of the axils, blue; peduncles slender. Fields, cemeteries. February-June.

Apocynum cannabinum L.

Indian Hemp

Roots deep; stem branched, nearly glabrous. Leaves ovate-oblong to lanceolate. Cymes dense, flowers greenish-white. Fields and thickets. June-August.

Convolvulaceae---Convolvulus Family

Convolvulus arvensis L.

Field Bindweed

Stems trailing, very slender, simple or branched. Leaves ovate or oblong, entire, acutish at apex, sagittate at the base. Peduncles 1 - 4 flowered; corolla pink or nearly white. Fields and waste places. May-October.

Boraginaceae---Borage Family

*Mertensia virginica (L.) Link.*Virginian Cowslip,
Bluebells

Very smooth, pale, erect, 1 - 2 feet high; leaves obovate, veiny. Corolla trumpet-shaped, blue; flowers in loose and short panicle or corymbed raceme-like clusters. Very showy. Low meadows and along streams. April-May.

Myosotis laxa Lehm.

Forget-me-not

Perennial, stem very slender, appressed-pubescent. Leaves oblong-lanceolate or spatulate, obtuse. Racemes very loosely many-flowered; corolla blue with a yellow eye. Wet places. May-July.

Labiatae---Mint Family

Nepeta hederacea (L.) Trevisan

Ground Ivy

Creeping and trailing. Leaves petioled, round-kidney-shaped, orenate. Corolla thrice the length of the calyx, light blue. Damp or shady places. April-July.

Salvia lyrata L.**Lyre-leaved Sage**

Perennial, hairy; stem nearly simple and naked. Root-leaves lyre-shaped or sinuate-pinnatifid. Whorls loose and distant, forming an interrupted raceme. Corolla about an inch long, blue-purple. Edge of thicket and streams. May-June.

Salvia utricifolia L.**Wild Sage**

Erect perennial. Leaves coarsely serrate, ovate. Clusters several-flowers, in terminal interrupted spikes. Corolla blue and white. Woods. April-June.

Solanaceae---Nightshade Family**Lycium halimifolium Mill.****Common Matrimony Vine**

Shrub with long sarmentose recurved-drooping branches. Leaves oblong or spatulate-lanceolate, narrowed into a short petiole. Flowers funnel-form, greenish-purple. Berries ovoid, orange-red. About dwellings. May-August.

Scrophulariaceae---Figwort Family**Pentstemon hirsutus (L.) Willd.**

Perennial 1 - 3 feet high. Leaves oblong to lanceolate, the lowest ovate or oblong. Corolla dull violet or purple (or partly whitish); flowers thyrseid or in open racemose panicles. Fields and woods. May-July.

Orobanchaceae---Broom-Rape Family**Orobanche uniflora L.****One-Flowered Cancer-Root**

A parasitic plant with a subterranean scaly stem, often branched, each branch sending up 1 - 4 slender 1-flowered scapes. Corolla white or pale violet. Woods. April-June.

Bignoniaceae---Bignonia Family**Catalpa Bignonioides Walt.****Catalpa**

Tree, with thin bark. Leaves broadly ovate entire, densely pubescent beneath. Flowers nearly white, inconspicuously spotted, bell-shaped, in large terminal erect panicles, showy. May-June.

Rubiaceae---Madder Family

Houstonia caerulea L.

Bluets

Erect perennial, glabrous, from dense tufts. Leaves spatulate or oblanceolate. Flowers solitary on filiform terminal and axillary peduncles; corolla salverform, blue. Open grassy places. April-July.

Mitchella repens L.

Partridge-berry,
Twin-berry

Stem slender, trailing, slightly pubescent. Leaves ovate-orbicular, petioled, pinnately veined, dark green. Peduncle bears 2 sessile white flowers at the summit. Drupes red. April-June.

Galium aparine L.

Cleavers, Goose Grass

Annual, weak, reclining, bristle-prickly backward, hairy. Leaves in a whorl, lanceolate, rough. Flowers white, peduncled. Fruit bristly. Moist soil. April-July.

Galium triflorum Michx.

Sweet-Scented Bedstraw

Slender perennial, with erect or ascending, somewhat stiff and rough-edged stem. Leaves whorled in 4's, linear to narrowly lanceolate. Flowers white. Damp places. May-July.

Caprifoliaceae---Honeysuckle Family

Viburnum prunifolium L.

Black Haw

Shrub. Leaves oval, obtuse or slightly pointed, finely and sharply serrate. Cyme sessile, several rayed; flowers white. Drupe flattened-ellipsoid, blue-black. Woods, fencerows. May-June.

Sambucus canadensis L.

Common Elder

Shrub, the stems but little woody, the younger ones with large white pith. Leaflets 5 - 11, oblong. Flowers white, numerous in long-peduncled flat-topped compound cymes. Along streams and damp roadsides. May-July.

Compositae---Composite Family

Erigeron pulchellus Michx.

Robin's Plantain

Perennial producing offsets from the base, pubescent. Stems simple, bearing few large heads on slender peduncles. Rays light bluish-purple. Hills and banks. April-June.

Sericocarpus asteroides (L.) BSP. White-topped Aster

Stem pubescent 1 - 2 feet high. Leaves basal obovate or spatulate, dentate; upper leaves oblong-lanceolate. Heads densely-clustered. Roadsides and woods. June-August.

Antennaria neodioica Greene. Pussy's Toes

Forms broad mats; stems slender. Basal leaves obovate; stem-leaves scattered, linear. Corymbs ordinarily loose. Open woods, fields. April-June.

Antennaria plantaginifolia (L.) Richards Plantain-Leaved Everlasting

Basal leaves broadly ovate to oblanceolate; stem-leaves scattered, lanceolate. Heads loosely or densely corymbese. Woods and meadows. April-June.

Senecio aureus L. Golden Ragwort

Perennial, glabrous; stem rather slender $\frac{1}{2}$ - $2\frac{1}{2}$ feet high. Basal leaves cordate-ovate, lower stem leaves lanceolate, usually pinnatifid; upper small, sessile. Heads several, peduncled in an open corymb; rays golden-yellow. Swamps and wet places. April-June.

Krigia virginica (L.) Willd. Dwarf Dandelion

Annual; scapes several a foot or less high. Leaves tufted, spatulate, lanceolate or pinnatifid, sinuate. Flowers yellow. April-August.

Centaurea Cyanus L. Bluebottle, Bachelor's Button

Annual, woolly; stem leafy, branched, 1 - $2\frac{1}{2}$ feet high. Leaves linear or linear-lanceolate. Flowers blue, purplish, pink, red, or white. Escaped from gardens. May-August.

Typhaceae---Cat-Tail Family*Typha latifolia* L.

Common Cat-Tail

Tall water-loving herb, perennial by fleshy root-stocks. Flat sheathing leaves. The staminate and dark brown pistillate parts of spike usually contiguous. Marshes and along streams. June-July.

Araceae---Arum Family*Arisaema triphyllum* (L.) SchottJack-in-the-Pulpit,
Indian Turnip

Leaves mostly 2, divided into 3 parts; flowers commonly dioecious; spathe with the petioles and sheaths pale green, or often dark purple or variegated. Corm, turnip-shaped. Moist woods and thickets. May-June.

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Oreontium aquaticum L.

Golden Club

Leaves ascending or floating, deep dull green above, pale beneath. Spadix narrow, cylindrical, pointed, golden yellow. Brooks and ponds. April-May.

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Symplocarpus foetidus (L.) Nutt.

Skunk Cabbage

Leaves ovate, cordate, short-petioled; spathe spotted and striped with purple and yellowish-green, ovate, incurved. Spathe precedes the leaves. An ill-smelling herb. Low woods and wet shady banks. February-April.

Commelinaceae---Spiderwort Family*Tradescantia virginiana* L.

Spiderwort

Glabrous or slightly pubescent, succulent, green stems, stout, tall. Leaves flat, long. Inflorescence a loose umbel or cluster; flowers blue or purplish, rarely white. Rich soil, moist or shady ground, streams. May-August.

Liliaceae---Lily Family*Uvularia perfoliata* L.

Bellwort

The stem, reaching the length of 6-18 inches, rises

from a short root-stalk. A single, straw-colored flower is pendant from the end of each drooping branch; it is long, bell-shaped, with 6 narrow divisions. The leaves are light green, lance-shaped, and pierced by the stem. In moist woods and thickets. May.

Okesia sessilifolia (L.) Wats. Wild Oats, Sessile-leaved Bellwort

Glabrous, stem slender, naked or bearing 1 or 2 leaves below the fork. Leaves oblong or oblong-lanceolate. Flowers greenish yellow. In moist woods and thickets. April-May.

Allium vineale L. Field Garlic

Bulb ovoid, coats membranous. Stem erect 1-2 feet tall; leaves narrow. Inflorescence a dense terminal 2-3 bracted umbel. Flowers green or purple. Fields and roadsides. May-July

Hemerocallis fulva L. Day Lily

Scapes 3-6 feet high, stout, mostly longer than the leaves. Leaves narrowly linear, grasslike, acute tipped. Flowers tawny-orange, 4-5 inches long, funnellform, opening for a day. Roadsides, ravines. Escaped from cultivation. June-August.

Erythronium americanum Ker. Yellow Adder's-Tongue, Dog-Tooth Violet

The single 6-parted flower grows at the top of a scape from 5 to 10 inches high. Two elliptical-lanceolate leaves clasp the scape at the base, near the scaly bulb; leaves pale green, mottled with purple and white. Moist woods or swamps. April-May.

Ornithogalum umbellatum L. Star of Bethlehem, Summer Snow Flakes

The scape, rising from a coated bulb, is from 6 to 10 inches high; at the top is a loose terminal cluster of waxy-white blossoms. The 6 sepals are rather greenish on the outside. Leaves are long, linear, and channeled. Escaped from gardens, closes at night. May-June.

Ornithogalum nutans L.

Drooping Star of
Bethlehem

Bulb ovoid 1-2 inches long. Scape stout, a foot or more high; flowers numerous, racemose, nodding on short pedicels. Escaped from gardens. May.

Muscari racemosum (L.) Mill

Grape-Hyacinth

Perianth globular or ovoid, minutely 6-toothed. Leaves and scape from a coated bulb; the small blue flowers in a dense raceme, musk-scented. Escaped from gardens. April-May.

Yucca filamentosa L.

Adam's Needle

Leaves numerous, long, narrow, rough on the back; panicle large, its branches divergent or ascending; flowers white, numerous on a stout bracteate scape 3-8 feet high. Escaped from gardens. Roadsides. June-July.

Smilacina racemosa (L.) Desf.

Wild or False Spike-
nard

Long, curving, zigzag stem, deeply ribbed leaves and feathery terminal flower clusters. 1-3 feet high, alternating large, oval, sharply pointed leaves, with parallel veins and wavy edges. Perennial rootstock, fleshy and thick. Moist, rich woods. May-June.

Smilax rotundifolia L.

Common Green Brier

A woody climbing vine with sharp prickles; climbs by means of tendrils. Leaves are alternate, round-ovate, pointed at tip, and somewhat heart-shaped at the base. Flowers, few, greenish; perianth bell-shaped. Woods, hedgerows. May-June.

Polygonatum biflorum (Walt.) Ell.

Small Solomon Seal

Perennial, thick, fleshy and knotted rootstalks. Greenish bell-shaped flowers, hanging in pairs on slender peduncles from the axils of the leaves. Alternate leaves. Woods. April-June.

Polygonatum commutatum (R. & S.)
Dietr.

Great Solomon's
Seal

Glabrous, stem stout or slender. Leaves lanceolate or ovate, partly clasping. Peduncles several-flowered. Moist woods and along streams. May-June.

Medeola virginiana

Indian Cucumber Root

Stem rises from a thick horizontal rootstalk from 1 to 3 feet high; 5-9 ovate-lanceolate, pointed leaves located midway on the stem; at top, three smaller leaves. Above these or perhaps below are 3 flowers of a pale greenish-yellow color. Rich damp woods. May-June.

Smilax ecirrhata (Engelm.) Wats.

Stem glabrous, erect. Tendrils none (or only the upper-most petioles tendril-bearing). Leaves often whorled at the summit, ovate-elliptical. Flowers 10-20, in an umbel. Woods. May-June.

Dioscoreaceae---Yam Family

Dioscorea villosa L.

Wild Yam-Root

Leaves ovate, entire, slender petioled; flowers greenish yellow nearly sessile, in drooping panicles and spicate racemes; capsules membranous, yellowish green, 3-winged, with 2 or sometimes only 1 thin-winged seed in each cavity. Damp woods and thickets. May-June.

Amaryllidaceae---Amaryllis Family

Hypoxis hirsuta (L.) Coville.

Star Grass

Stemless small herb, with grassy and hairy linear leaves and slender few-flowered scapes. Flowers yellow. Meadows and open woods. May-August.

Narcissus Pseudo-Narcissus L.

Daffodil

Bulbous herb, flowers solitary or several on leafless scapes. Leaves linear, basal. Flowers yellow. Meadows. March-May.

Narcissus poeticus L.

Poet's Narcissus

Bulbous herb. Leaves basal, linear. Flowers on leafless scapes, white. Meadows and near houses. May.

Iridaceae---Iris Family

Iris pseudacorus L.

Yellow-Flag

Long linear leaves, bright yellow flowers. Marshes and river banks. May-June.

Iris versicolor L.

Larger Blue Flag

Stem stout. Leaves sword-shaped. Flowers short pedicled, violet-blue, variegated with yellow, green and white. Wet places. May-June.

Sisyrinchium angustifolium Mill.

Blue-eyed Grass

Slender perennial. Leaves basal, narrowly linear. Stems narrow, linear, grasslike. Inflorescence a simple irregular umbel of a few flowers borne on stalklike pedicels. Flowers blue-violet. Grassy places and open woods. May-August.

Orchidaceae---Orchis Family

Cypripedium acaule Ait.

Pink Lady Slipper

Scape 6-15 inches high, rather stout. Leaves two, basal, elliptic, wide, thick. Flower lip large, drooping pink, with a slit in front. Sandy or rocky woods. May-June.

Cypripedium parviflorum Salisb.

Yellow Lady Slipper

var. *pubescens* (Willd.) Knight

Leaves oval, acute; sepals ovate-lanceolate, greenish-yellow, dotted and streaked with madder-purple markings, lip golden-yellow. Mostly in woods. May-June.

Pegonia verticillata (Willd.) Nutt.

Whorled Pegonia

Plants 8-12 inches high, a whorl of five obovate or lanceolate sessile leaves at the summit. Flowers solitary; sepals madder-purple, linear; petals oblong-lanceolate; lip wedge-shaped, three-lobed, with a hairy crest down the middle. Moist woods. May.

Spring and Fall

Polygonaceae---Buckwheat Family*Rumex crispus* L.

Yellow Dock

Smooth perennial 2-5 feet high. Leaves lanceolate with wavy-curved margins. Flowers slenderly petioled in whorls along the racemose branches, greenish. Common weed of farms and roadsides. May-October.

Rumex acetosella L.

Field or Sheep Sorrel

Stems erect, slender, from a creeping rootstock. Leaves linear or lanceolate, halberd form, pediceled. Flowers in erect paniced racemes, very small. Common weed in fields. April-November.

Rumex obtusifolius L.

Bitter Dock

Perennial, glabrous, dark green; stem stout. Lowest leaves ovate-heart-shaped, the upper oblong-lanceolate. Flowers loosely whorled. Fields, roadsides, waste places. June-October.

Polygonum Persicaria L.

Lady's Thumb

Annual; stem erect or ascending, $\frac{1}{2}$ -2 feet high. Leaves lanceolate or linear-lanceolate, short-petioled, entire. Spikes ovoid or short-cylindric, dense, erect; flowers pink or purplish. Waste places. June-October.

Polygonum hydropiperoides Michx.

Mild Water Pepper

Perennial; stem smooth, branching. Leaves narrowly lanceolate. Spikes erect, slender; flowers small, flesh-color or almost white. Wet places. June-October.

Polygonum sagittatum L.Arrow-Leaved Tear
Thumb

Stems square-angled with numerous harsh reflexed prickles. Leaves arrow-shaped, short-petioled. Flowers minute, greenish or rose-color in terminal heads or racemes. Wet places. June-October.

Polygonum aviculare L.

Knot-Weed

Prostrate herb, bluish-green. Leaves sessile or short petioled, scattered oblanceolate. Flowers small. Sepals mostly 5, often tipped with white or pink. Fields, roadsides, gardens. May-November.

Polygonum convolvulus L.

Black Bindweed

Trailing or twining annual vine with roughish or twisted stem. Leaves ovate-sagittate, or lanceolate-sagittate, slenderly petioled. Flowers greenish, in small axillary clusters or racemes loosely flowered; calyx 5 parted; stamens 8; achenes 3-angled, dull black. In waste and cultivated fields. June-October.

Eragrostis esculentum Moench.

Buckwheat

Annual, glabrous except at the nodes, stem grooved when old, 1-3 feet high. Leaves hastate, petioled. Flowers composed of corymbose racemes of white, greenish, or rose-colored flowers. Fields, remaining after cultivation. June-October.

Chenopodiaceae---Goosefoot Family*Chenopodium album* L.

Lamb's Quarters, Pig-weed

Annual, erect, commonly branched. Leaves varying from rhombic-ovate to lanceolate or the upper-most linear. Flower clusters spiked-panicled, gray-green or white. Fields, gardens, waste places. June-October.

Illecebraceae---Knotwort Family*Scleranthus annuus* L.

Low rough gray-green annual weed, with stiff, usually much branched semiprostrate stem. Leaves very small, sessile, opposite, entire, linear. Flowers minute, greenish in clusters. Calyx cup-shaped, 5 lobed; petals none. Stamen 10- or 5. Waste places and roadsides. April-October.

Aizoaceae*Mollugo verticillata* L.

Carpet Weed

Small prostrate annual weed, forming mats. Leaves whorled, sessile or short-petioled, linear-oblanceolate. Flowers small, white, on slender pedicels. Cultivated and waste places. June-November.

Caryophyllaceae---Pink Family

Stellaria media (L.) Cyrill Common Chickweed

Annual, weak, tufted, much branched, decumbent or ascending. Leaves ovate or oval. Flowers small in terminal leafy cymes or also solitary in the axils. Waste places, fields. January-December.

Saponaria officinalis L. Bouncing Bet, Soapwort

Stout perennial, sparingly branched, leafy, 1-2 feet high. Leaves ovate or oval, strongly ribbed, acute. Flowers pink about one inch broad in dense terminal corymbs. Roadsides and waste places. June-October.

Dianthus Armeria L. Deptford Pink

Annual, erect, stiff, finely pubescent, 6-18 inches high; branches few, nearly erect. Leaves linear, hairy; flowers clustered; petals small, rose-color with white dots, crenate. Fields and along roadsides. May-October.

Nymphaeaceae---Water Lily Family

Nymphaea advena (Ait.) Fernald. Yellow Pond Lily,
Cew Lily

Aquatic perennial, with stout horizontal rootstock embedded in the mud of pond or river-bottoms. Flowers yellowish-green 1-3 inches broad, solitary on long fleshy peduncles arising from the rootstock. Ponds, lakes, and slow streams. May-September.

Nymphaea odorata (Ait.) Woodville and Sweet-scented
Wood. Water Lily

Rootstock thick. Leaves orbicular, deeply-cordate-cleft at the base. Flowers white, sweet-scented. In ponds and slow streams. June-September.

Cruciferae---Mustard Family

Lepidium virginicum L. Wild Pepper-grass

Basal leaves obovate or spatulate in outline, generally with a large terminal lobe and numerous small lateral ones, all dentate; stem leaves lanceolate or oblong-linear. Flowers white, small. A common weed of roadsides and fields. May-November.

Capsella Bursa-Pastoris (L.) Medic. Shepherd's Purse

Annual weed. Leaves chiefly basal, extremely variable in foliage and outline of pod. Flowers, white, minute. Roadsides and waste places. March-November.

Raphanus sativus L. Radish

Erect, freely branching 1-2 feet high. Leaves lyre-shaped, rough. Flowers pale purple. Pods thick. Old fields and near where formerly cultivated. June-October.

Brassica nigra (L.) Koch. Black Mustard

Erect, freely and widely branching. Leaves pinnatifid. Flowers bright yellow, racemes. Pods narrowly linear. Fields. May-November.

Rosaceae---Rose Family

Duchesnea indica (Andr.) Focke. Indian Strawberry

Silky-pubescent, tufted and forming leafy runners, dark green. Leaflets obovate or broadly oval, crenate or dentate, obtuse at the apex. Flowers, yellow. Fruit red, spongy and tasteless. Grassy places. May-October.

Potentilla canadensis L. Five-finger. Common Cinquefoil

Prostrate herb. Stem spreading, flowering from the node above the second well-developed node. Leaves divided. Flowers yellow. Dry soil, fields. April-October.

Rosa virginiana Mill. Low or Pasture Rose.

Stems often tall and stout, with stout hooked prickles. Leaflets dark green, rather thick. Flowers corymbose or solitary. Fields, roadsides. May-September.

Rosa palustris Marsh. Swamp or Wild Rose

Bushy 1-3 feet high. Leaflets usually seven, varying considerably in outline, oval, oblong, ovate-lanceolate, finely and simply serrate. Flowers corymbose, or solitary. Low grounds or swamps. June-September.

Leguminosae---Pulse Family

Baptisia tinctoria (L.) R. Br. Wild Indigo.

Erect, glabrous, succulent, much branched 2-4 feet

high. Leaves petioled, three-foliolate. Leaflets obovate or oblanceolate sessile or nearly so. Racemes numerous, few-flowered, terminal. Flowers bright yellow. Road-sides, open woods. June-September.

Trifolium repens L. **White Clover**

Smooth perennial; the slender stems spreading and creeping. Leaflets inversely heart-shaped or merely notched. Heads small and loose. Corolla white. Fields, waste ground and open places. May-December.

Trifolium Hybridum L. Alsike Clover

Perennial, erect or ascending, 1-2 feet high, branching. Leaves long-petioled; leaflets all from the same point, short-stalked, obovate. Flowers pink or pinkish; heads globose, long-peduncled. Meadows and waste places. April-November.

Trifolium procumbens L. Low Hop-clover

Similar to agrarium. Stems spreading or ascending, pubescent. Leaflets wedge-obovate, notched at the end. Corolla yellow. Sandy fields, roadsides. May-November.

Trifolium agrarium L. **Yellow or Hop-Clover**

Smoothish annual, somewhat upright 4-12 inches high. Leaflets obovate-oblong, all three from the same point and nearly sessile. Corolla yellow, persistent, becoming dry and brown in age. Fields and roadsides. April-November.

Trifolium arvense L. Rabbit-Foot or Stone
Clover

Slender erect annual, with usually soft-hairy branched stem 8-16 inches high. Leaves short-petioled. Leaflets all from the same point, linear or oblanceolate. Heads become very soft-silky and grayish, ovoid-cylindrical. Headsides, fields. May-October.

Trifolium incarnatum L. **Crimson or Italian**
Clover

Annual, erect, pubescent, little branched. Leaves long-petioled; stipules broad. Leaflets all from the same point, very nearly sessile, obovate or obcordate. Heads terminal, oblong, 1-2½ inches long; flowers sessile; corolla crimson. Fields and waste places. Cultivated for cattle and for nitrogenizing the soil. May-September.

Trifolium Pratense L.**Red Clover**

Perennial, pubescent, branching, decumbent or erect, $\frac{1}{2}$ -2 feet high. Leaves longpetioled; leaflets short-stalked, all from the same point, oval, oblong, or obovate. Heads globose or ovoid, sessile (rarely peduncled). Flowers red. May-November.

Melilotus officinalis (L.) Lam.**Yellow Sweet Clover.
Yellow Melilot**

Erect, usually tall. Leaves petioled, rather distant; leaflets oblong or slightly oblanceolate, serrate. Racemes numerous, slender. Flowers yellow, sweet fragrance. Roadsides, waste places. May-November.

Melilotus alba Desr.**White Melilot. White
Sweet Clover**

Erect, 3-10 feet high, branching. Leaflets narrowly obovate to oblong, serrate. Flowers in spike-like racemes, small, white, fragrant. Roadsides, waste places. May-November.

Medicago sativa L.**Alfalfa**

Branching perennial 1-2 feet high. Leaves petioled; leaflets oblanceolate or obovate, dentate, toward the apex. Peduncles $\frac{1}{2}$ -2 inches long, bearing a dense short raceme of violet or blue flowers. In fields and waste places. Cultivated for feed for cattle. May-October.

Desmodium**Tick Trefoil**

Several species.

Perennial herbs with pinnately 3-foliolate leaves, stipellate. Flowers in axillary or terminal racemes, often panicle, purple or purplish. Pod flat, roughened with minute hooked hairs. Roadsides, fields, woods. June-October.

Lotus corniculatus L.**Bird's-foot Trefoil**

Perennial, from a long root. Stems slender. Leaves 3-foliolate, short-petioled; leaflets obovate, oblanceolate or oblong. Corolla bright yellow in slender-penduncled umbels. Dry meadows, roadsides. June-October.

Lathyrus latifolius L.**Everlasting or
Perennial Pea**

Perennial. Stem high-climbing, broadly winged. Stipules lanceolate. Leaflets oblong-lanceolate to elliptic. Flowers showy, pink purple to white. Escaped from cultivation. May-October.

Rhynchosia erecta (Walt.) DC.

Erect perennial herb; leaves pinnately 3-foliolate, tomentose; leaflets oval to oblong. Flowers yellow, racemes short. Dry soil. May-September.

Oxalidaceae---Wood Sorrel Family

Oxalis filipes Small.

Plant bright green, very slender, pubescent. Stem erect or decumbent. Leaves long petioled, leaflets obcordate. Flowers yellow. Woods or open places. May-October.

Oxalis stricta L.

Yellow Wood-Sorrel

Erect herb 5-15 inches high. Leaflets pale green. Flowers yellow, borne mostly in two's and three's. Woods, fields, roadsides. April-October.

Geraniaceae---Geranium Family

Erodium cicutarium (L.) L' Her. Storksbill

Annual, hairy. Stem low, spreading. Leaves pinnate, the leaflets sessile, 1-2 pinnatifid. Flowers pink or purple. Waste places and fields. April-October.

Geranium molle L.

Dave's-foot, Crane's-bill

Weak, spreading, soft-pubescent. Leaves orbicular, cleft, crenate. Petals rose-colored, notched, small. Lawns, waste places. May-September.

Polygalaceae---Milkwort Family

Polygala mariana Mill.

Annual, slender, glabrous, at length much branched above. Basal leaves none; stem-leaves linear. Flowers rose-purple. Roadsides, fields. June-November.

Euphorbiaceae---Spurge Family

Euphorbia corollata L.

Flowering Spurge

Perennial, slender, with milky sap and strong rootstock. Leaves ovate, lanceolate, or linear, entire,

obtus. Flower-clusters long peduncled, in much forked terminal umbels, involucre small and calyx-like, with showy white appendages. Fields, roadsides. May-October.

Balsaminaceae---Touch-Me-Not-Family

Impatiens biflora Walt.

Spotted Touch-Me-Not

Annual, 2-5 feet high, branched. Leaves thin, ovate or elliptic, coarsely toothed. Peduncles axillary, 2-4 flowered; flowers horizontal, orange-yellow, mottled with reddish brown. (Name from the sudden bursting of the pods when touched). Moist places. July-October.

Malvaceae---Mallow Family

Malva rotundifolia L.

Common Mallow, Cheeses

Stems procumbent from a deep biennial root. Leaves round-heart-shaped, on long petioles, crenate, obscurely lobed. Flowers clustered in the axils, whitish, tinged with pink or blue. Fruit a round fleshy disk composed of 10-20 wedge-shaped 1-seeded carpels. Waste places, gardens. March-November.

Hibiscus Syriacus L.

Shrubby Althaea,
Rose of Sharon

Tall shrub, smooth. Leaves rhombic or wedge-ovate, pointed, cut-toothed or lobed. Corolla large. A cultivated plant. Found in thickets and by fence rows and roadsides. June-October.

Hypericaceae---St. John's-Wort Family

Hypericum perforatum L.

Common St. John's-wort

Stem much branched and corymbed, producing runners from the base. Leaves linear-oblong, with pellucid dots. Flowers bright yellow; petals blackdotted. Fields, roadsides. June-October.

Cistaceae---Rockrose Family

Lechea racemulosa Lam.

Pinweed

Upright stem. Leaves linear, stiffish. Flowers greenish to ruddy, small. Barren waste places, roadsides. June-October.

Onagraceae---Evening Primrose Family

Ludwigia alternifolia L.

Seed-box

Erect, branching 2-3½ feet high. Leaves lanceolate to linear-lanceolate. Flowers axillary, short peduncled, solitary, yellow petals which fall away when the plant is moved. Shady banks, roadsides, swamps. June-October.

Oenothera longipedicellata (Small)
Robinson

Sundrops

Perennial, slender 1-2½ feet high. Basal leaves spatulate or obovate-spatulate; stem leaves few, linear-lanceolate. Flowers yellow, showy. Roadsides and low grounds. May-September.

Oenothera biennis L.

Evening Primrose

Erect, stout, biennial 1-6 feet high. Leaves lanceolate to ovate-lanceolate, acute or acuminate. Flowers opening in the evening 1-2½ inches broad, yellow, showy; calyx-tube slender, long. Fields. June-November.

Circaea lutetiana L.

Enchanter's Nighshade

Erect, branching, finely pubescent, 1-2 feet high. Leaves ovate, acuminate at the apex, rounded or slightly cordate at the base, remotely denticulate. Flowers white, minute, on slender spreading pedicels in elongated terminal racemes. Woods and shady places. June-September.

Umbelliferae---Parsley Family

Sanicula canadensis L.

Perennial, with slender glabrous stems 1-3 feet high. Leaves 3-5 foliate, leaflets obovate, serrate. Flowers mostly greenish-white, in umbels. Woods and thickets. May-September.

Celeriac graveolens (L.) Britton

Celery

Stem erect, 1-3 feet high. Leaves pinnate, leaf-segments 3 or 5, thin, broadly ovate to oval, coarsely toothed. Terminal umbels; flowers very small. Waste places. May-October.

Daucus Carota L.

Wild Carrot, Queen
Anne's Lace

Biennial weed; stem bristly; ultimate leaf-segments

lanceolate and cuspidate. Umbel 2-4 inches broad; rays numerous, crowded. Flowers white, rarely pink. Fields, and waste places. June-November.

Ericaceae---Heath Family

Monotropa uniflora L.

Indian Pipe

Scapes white, glabrous, usually clustered 4-10 inches high from a mass of matted brittle roots, turning dark in drying. Flowers terminal, inodorous, nodding, oblong-campanulate. Moist rich woods. June-October.

Primulaceae---Primrose Family

Anagallis arvensis L.

Peor Man's Weather-glass

Annual, diffuse, usually much branched. Leaves ovate or oval, opposite. Flowers, small, red. Waste fields, gardens. May-October.

Leganiaceae---Legania Family

Polypermum procumbens L.

Annual weed, with prostrate or ascending stiff stems. Leaves linear, or awl-shaped. Flowers small, almost wheel-shaped. Sandy fields and dry roadsides. May-October.

Asclepiadaceae---Milkweed Family

Asclepias tuberosa L.

Butterfly-weed

Perennial, stout, rough-hirsute stem. Leaves alternate, mostly sessile, oblong-lanceolate, hairy. Flowers bright orange, many, in irregular umbels or cymose clusters, terminal. Roadsides, fields. June-October.

Boraginaceae---Borage Family

Echium vulgare L.

Blue-Weed, Blue Devil

Rough bristly biennial. Stem erect 1-2½ feet high. Leaves oblong, or linear-lanceolate, sessile. Flowers showy, bright blue, in short one-sided spikes, forming a

narrow thyrsus. Fields and waste places. May-October.

Labiatae---Mint Family

Marrubium vulgare L.

Common Horehound

Stem erect, stout, woolly. Leaves oval to ovate, petioled, crenate-toothed. Whorls dense, many flowered, axillary; flowers whitish. Waste places. May-September.

Nepeta Cataria L.

Catnip

Perennial, densely canescent, pale green. Stem stout, erect, branched. Leaves ovate to oblong, coarsely crenate-dentate, mostly cordate at the base. Flower-clusters spiked at the end of the stems and branches; corolla nearly white, dark-dotted. Near dwellings; a common weed. June-October.

Prunella vulgaris L.

Heal-All
Carpenter-Weed

Erect perennial. Leaves ovate-oblong, entire or toothed. Flowers in terminal spikes; corolla violet, blue, purple, rarely white. Fields, roadsides, edges of woods. May-October.

Lamium amplexicaule L. Henbit.

Leaves rounded, deeply crenate-toothed. Flowers magenta-purple in axillary and terminal clusters, lower lip of corolla spotted. In waste and cultivated ground. February-November.

Solanaceae---Nightshade Family

Solanum nigrum L.

Common Nightshade

Annual, glabrous, or nearly so; stems erect, branched. Leaves ovate, many-toothed. Flowers white, in small umbel-like clusters, drooping. Berries globular, black. Cultivated fields, roadsides. June-October.

Solanum carolinense L.

Horse Nettle

Perennial, rough-hairy stem; stem conspicuously beset with stiff sharp yellow prickles. Leaves alternate, obovate, prickly petioles and midribs, irregularly-lobed. Flowers pale violet or white. Fields and roadsides. May-October.

Petunia axillaris (Lam.) BSP.

White Petunia

Strayed from cultivation. To the writer's knowledge has persisted for at least ten years. June-November.

Petunia violacea Lindl.

Violet Petunia

Escaped from garden. June-November.

Scrophulariaceae---Figwort Family

Verbascum blattaria L.

Hoar Mullein

Stem erect, slender. Leaves oblong, ovate or lanceolate, dentate or pinnatifid. Raceme loose; corolla yellow. Meadows and waste places. June-October.

Verbascum blattaria var. *albiflorum*
Ktze.

Similar to *Verbascum blattaria* but flowers are white with a tinge of purple. Meadows and waste places. June-October.

Linaria canadensis (L.) Dumont.

Slender, glabrous; flowering stem nearly simple. Leaves flat, linear or linear oblong. Flowers in slender long racemes, pale blue. Dry sandy fields. May-October.

Linaria vulgaris Mill.

Butter and Eggs

Perennial, pale green; stems slender, erect, very leafy. Leaves linear, entire, alternate. Flowers densely racemose, yellow, spurred. Fields and roadsides. June-November.

Linaria cymbalaria (L.) Mill.

Kenilworth or
Coliseum Ivy

Stem trailing, branched. Leaves slender-petioled, reniform-orbicular, 3-9 lobed. Flowers axillary, solitary, blue. June-November.

Veronica agrestis L.

Field or Garden
Speedwell

Annual, pubescent; stems very slender, creeping or procumbent. Leaves ovate, crenate, short-petioled, the lower opposite, the upper alternate. Flowers, small, blue, slender-peduncled. Fields. May-October.

Gerardia flava L.

Downy False Fox-
glove

Perennial, downy, stem erect. Leaves oblong, lanceolate, usually opposite. Corolla yellow, $1\frac{1}{4}$ -2 inches long. Woods, roadsides. June-October.

Plantaginaceae---Plantain Family

Plantago major L.

Common Plantain

Perennial; rootstock short, thick, erect. Leaves long-petioled, mostly ovate, obtuse, entire or coarsely dentate. Spike linear-cylindric, usually very dense; flowers minute. Lawns, waysides. May-November.

Plantago aristata Michx.

Leaves narrowly linear, mostly 1-3 ribbed. Bracts very conspicuous, linear, rigid. Fields and roadsides. May-November.

Plantago lanceolata L.

English Plantain

Leaves lanceolate or lance-oblong. Spike dense. Flowers small, perfect. Grass lands. April-November.

Rubiaceae---Madder Family

Houstonia purpurea L.

Perennial, stout, erect, tufted, branched. Leaves ovate-lanceolate, sessile. Flowers in terminal cymose clusters; corolla purple or lilac. May-September.

Houstonia longifolia Gaertn.

Perennial, usually tufted, erect, mostly glabrous. Leaves oblong-lanceolate to linear. Flowers in corymbed cymes; corolla pale purple. Dry open places. May-September.

Caprifoliaceae---Honey suckle Family

Lonicera japonica Thunb.

Japanese Honey suckle

Pubescent, climbing high or trailing, woody vine. Leaves opposite, ovate, entire. Flowers in pairs from the upper axils, peduncled, white or pink, fading to yellow. Escaped from cultivation. May-November.

Lonicera sempervirens L.

Trumpet or Coral
Honeysuckle

Slender shrubby vine. Leaves oval, obtuse, conspicuously glaucous. Flowers verticillate in terminal interrupted spikes; corolla scarlet or yellow. Roadsides, by woods. April-October.

Campanulaceae---Bluebell Family

Specularia perfoliata (L.) A. DC

Venus' Looking-
glass

More or less pubescent; stem densely leafy, slender. Leaves orbicular, clasping. Flowers solitary or 2-3 together in the axils, sessile; corolla blue or violet. Fields. May-October.

Campanula rapunculoides L.

Perennial by slender rootstock. Stem smoothish or finely pubescent; lower leaves long-petioled, cordate-ovate; upper ovate-lanceolate, serrate-dentate. Flowers short pedicels, drooping, one-side raceme; corolla bell-shaped, blue. Fields and roadsides. June-September.

Compositae---Composite Family

Silphium Anteriocus L.

Starry Robin-weed

Stem pubescent, 2-4 feet high. Leaves oblong or oval-lanceolate, coarsely-toothed, rough-hairy. Heads nearly solitary, large; flowers yellow. Dry sandy soil. June-October.

Rudbeckia hirta L.

Black Eyed Susan

Biennial, rough and hairy throughout. Stem simple

or branched 1-2½ feet high. Leaves nearly entire, lower spatulate, upper lanceolate, sessile. Rays 10-20 orange; disk globose-ovoid, purple-brown. Fields and roadsides. May-November.

Gaillardia

Gaillardia

Perennial; stem roughish 1-2 feet high. Leaves oblong-lanceolate. Heads about 2 inches broad; rays yellow. Dry fields. May-November.

Achillea millefolium L.

Common Yarrow

Perennial from horizontal root-stocks. Leaves finely dissected into narrow pinnatifid segments. Heads numerous on a tall stem, in terminal somewhat convex or nearly flat-topped corymbs; rays usually white, sometimes pink. Fields. May-November.

Anthemis cotula L.

Mayweed

Annual, acrid, ill-scented. Leaves finely 3-pinnately dissected. Rays white; disk flowers yellow. Fields, wasteplaces. May-November.

Chrysanthemum leucanthemum

Ox-eye Daisy

var. pinnatifidum Lessq. and Lamotte

Perennial 1-2 feet high. Basal leaves obovate, - oblong, or spatulate, coarsely dentate, pinnatifid; stem leaves mostly sessile. Heads solitary on long naked peduncles; rays 20-30, white; disk flowers yellow. Pastures, meadows, a troublesome weed. May-November.

Cirsium virginianum (L.) Michx.

Virginia Thistle

Stem slender, pubescent. Leaves oblong-lanceolate, somewhat clasping. Flowers purple. Open woods. June-October.

Cichorium intybus L.

Chicory, Blue Sailors

Perennial from a long deep tap-root. Stems stiff, much branched. Basal leaves spreading, runciate-pinnati-

fid, dentate, spatulate. Upper leaves smaller. Heads numerous 1-1½ inches broad, 1-4 together in sessile clusters. Flowers blue, or sometimes white. Roadsides, fields, waste places. May-November.

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Taraxacum officinale Weber.

Common Dandelion

Leaves coarsely pinnatifid, sinuate-dentate. Heads large, orange-yellow. Pastures, fields. Very common. Every month of the year.

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Senecus asper (L.) Hill.

Spiny-Leaved Sow-Thistle

Annual, leaves undivided, lobed or sometimes pinnatifid, spiny-teethed, the auricles of the clasping base rounded. Flowers yellow. Waste places, roadsides. May-November.

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Senecus oleraceus L.

Common Sow-Thistle

Stem leaves pinnatifid, or rarely undivided, slightly toothed with spiny teeth, clasping with a heart-shaped base. Flowers yellow. Waste places. May-November.

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Hieracium venosum L.

Rattlesnake-Weed,
Poor Robin's Plantain

Stems solitary or several from the same root, slender, leafless, or 1-3 leaves, basal leaves tufted, obovate or oblong-spatulate. Heads commonly numerous, flowers yellow. Dry woods and open sandy places. May-October.

Liliaceae---Lily Family

Asparagus officinalis L.

Asparagus

Perennial with much branched stems from thick and matted rootstocks, and small greenish-yellow axillary flowers on jointed pedicels. Narrow thread-like branchlets, acting as leaves. Roadsides, fence rows, escaped from cultivation. May-October.

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Chapter IV

Sample Teaching Units

The Root, The Absorbing Organ and Anchor of the Plant.

Divisions:

1. Anchorage
2. Absorption

Specific objectives:

1. To develop the concept that the root is the organ of absorption.
2. To understand how a root carries on its work.
3. To get an understanding of the relationship between structure and function.
4. To know how root hairs absorb water.
5. To know the value of roots to man.

Problem:

How are roots adapted to carry on their work and how do they absorb water and mineral matter.

Topics for investigation and discussion:

1. The structure and function of roots and root hairs.
2. Kinds of roots.
3. Factors influencing the direction and growth of roots.
4. Osmosis and diffusion.
5. The soil and its relation to roots.
6. Food storage in roots and its economic importance.
7. Roots and their economic importance to the soil.
8. Value of roots to man.

Suggested pupil activities:

1. Digging soil away from plant (weed) to observe position of roots.
2. Bringing in different kinds of roots.
3. Putting plants in tumblers - one in empty tumbler - one in tumbler with water.
4. Going on a field trip to observe plants in their natural environment and to observe roots of different kinds of plants.
5. Reading about roots.
6. Placing plants with roots in colored solution.
7. Sprouting grain, radish seeds, nasturtium seeds, etc., for root hairs.
8. Examining root hairs under the microscope.
9. Making diagrams and labeling parts of:

- a. Tap root

- (1) Cross-section
- (2) Lengthwise section

Suggested roots to use

- (a) Wild Potato-vine
- (b) Dandelion
- (c) Chicory
- (d) Dock
- (e) Carrot
- (f) Parsnip
- (g) Beet

- b. Fibrous root

- (1) Clover
- (2) Grass
- (3) Wild Strawberry

10. Examining root tip under a microscope.
11. Observing or demonstrating the principle of osmosis.
12. Listing roots used for food by man.
13. Observing demonstrations of:
 - a. Influence of gravity on direction and growth of roots.
 - b. Effects of water on growth of roots.
14. Reporting on problems such as; Economic importance of roots to man, etc.

Suggested procedure:

The day before starting the unit ask each pupil to bring two or three plants (weeds) with as much root as possible. (Different kinds of roots if possible).

Teacher should have two potted plants (weeds) one with tap root, one with fibrous roots.

Have pupils wash roots of plants carefully, place them on the table or on a string stretched across the room, and give all an opportunity to examine them.

Ask pupils where they got the roots and what differences they notice.

Teacher demonstration. Ask questions leading up to demonstration as:

Why plants have roots

Why plants have different kinds of roots

Do roots vary in different types of soil?

Did you ever wonder how much of a plant is under ground?

Take the two potted plants and pull soil carefully from

the roots. Let plant fall. Ask pupils what use of roots this shows. Wash roots carefully and note types.

Let plant wither or take withered plants of pupils and place in water. Leave until next day and see what happens. What does this show? (The anemone and vinca both wilt very quickly but will straighten up in a short time upon being placed in water).

Demonstration:

To show what part of roots water and mineral salts pass through place seedlings, also older plants in red ink and water or any red material that will mix with water. Pokeweed berries may be used. (Set up this experiment the day before it is to be used). Take plants out and cut crosswise and lengthwise sections of roots to observe path liquid has taken.

May have pupils sprout seeds at home or at school on moist blotting paper in covered jars and observe from day to day until they show fuzzy root hairs.

Seeds may be planted in glass jars, of moist sand, sawdust, earth, etc., next to the edge of the jar so that root hairs may be observed.

Take up two or more of the plants and pot them (Tin cans may be used). Pot one being very careful not to injure the root hairs. Break root hairs off the roots of the second plant and pot it. Observe what happens after a few days. What does this show?

Demonstration:

Make artificial root hair. Set up demonstration for osmosis using an egg. The eggs and glass tube represent a root hair. Have pupils observe and explain how this helps to understand the work of root hairs. May ask such questions as,

What does the egg represent?

The membrane?

The material in the egg?

The material in the tube?

How did it get there?

Optional:

May set up experiment for osmosis using a carrot, turnip, etc.

May let pupils examine root hairs, a root tip and sections of roots under a microscope.

May let pupils test roots for food nutrients.

May set up an experiment for showing the effect of gravity on roots.

Hang up moist sponge, plant seeds in it, and observe direction of growth of roots.

May observe experiment showing effect of water on growth of roots.

May demonstrate how roots give off acid.

May make drawings of different kinds of roots.

Pupils may read about roots.

The following outline is suggestive:

A. Function of roots

1. Absorb moisture and mineral salts from the soil.

2. Anchor the plant in the ground.
3. Store food.
4. Convert atmospheric nitrogen into nitrates by means of the nitrogen-fixing bacteria. Ex. Beans, peas, clovers.
5. Secure food from hosts. Ex. dodder, mistletoe.
6. Aid the plant in climbing. Ex. ivy
7. Respiration.
8. Reproduction.

B. Kinds of roots.

1. Primary - first root.
2. Secondary - roots branching off from main root.
3. Tertiary - roots branching off from secondary roots.

C. Forms of roots

1. Tap - Ex. dandelion, dock
2. Fibrous - Ex. clovers, grass
3. Fascicled - Ex. anemone, dahlia
4. Aerial - Ex. ivy
5. Adventitious - grow from stem - Ex. strawberry, geranium slip.
6. Aquatic - Ex. duckweed, water hyacinth
7. Prop - Ex. corn
8. Parasitic - Ex. dodder, mistletoe

D. Structure and function of various parts of roots

1. Epidermis - outer covering - protection.
2. Cortex - middle portion - stores food.
3. Central cylinder - inner portion - transporta-

tion of liquids up and down the root. Stores food.

4. Root hairs - outgrowths of epidermis - absorb moisture and mineral salts.
5. Root cap - tip of root - protects growing portion.
6. Growing tip (meristem) - increases the length of the root.

E. Response of roots to environmental factors

1. Gravity
2. Water
3. Oxygen

F. Duration of roots

1. Annual - live one season
2. Biennial - live two seasons
3. Perennial - live many years

G. Economic importance of roots

1. Food - Ex. wild potato vine
2. Drugs - Ex. pleurisy root
3. Flavors - Ex. ginger, sassafras
4. Beverages - Ex. sassafras, ginger
5. Sugar - Ex. sugar beet
6. Help prevent erosion
7. Help prevent floods
8. Help to maintain a water supply
9. Contain nitrogen fixing bacteria that enrich the soil
Ex. clovers, alfalfa, beans, peas.

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Materials for unit:

Stand and apparatus for setting up osmosis experiment.
 Egg.

Sealing wax or paraffin or candle

Several jars or glasses

Red ink, eosine, pokeweed berry juice, or any red liquid

Sharp knife or razor knife

Blotting paper

Seeds, as grain, peas, beans, radish, weed seeds, nasturtium, etc.

Fleshy roots, as, wild potato vine root, dandelion, carrot, beet

Fibrous roots, as, clovers grasses, and numerous weeds

Sponge

Weeds

Microscope

Flower pots or tin cans

Sawdust

Sand

Soil

If wish to test for food nutrients

Iodine solution

Fekling's solution

Nitric acid

Test tubes

Brown paper

Alcohol lamp (if room is not equipped with gas)

Samples of objective tests:

True - false: If the statement is true put a circle around T; if false, circle the F.

1. Roots are of use only to absorb soil water. T F
2. The use of the rootcap is for absorption of water. T F
3. Root hairs are fitted for the absorption of soil water and mineral matter. T F
4. The growing point is used to protect the root. T F
5. Roots are useful to help prevent erosion. T F

Completion. Fill in the blanks with the correct words.

1. The organs that hold plants in the ground are _____.
2. Plants take in water through their roots by means of _____.
- 3-4. Two kinds of roots studied were _____ and _____.
5. The _____ protects the growing point of the root.

Multiple - Choice. One of the answers is correct. Put the number of the correct answer on the line at the right.

1. Sugar is made from the roots of
 - 1) sweet corn
 - 2) beets
 - 3) red maples
 - 4) sweet potatoes
2. An example of a tap root is the
 - 1) onion
 - 2) corn
 - 3) bean
 - 4) dandelion

The Uses of Wild Flowering Plants

Objectives:

1. To arouse in pupils an abiding interest in plants, for the sake of the pleasure and intellectual profit and culture that such an interest offers for the employment of leisure out of doors.
2. To arouse in pupils an interest in the value of plants, and in their influence upon the lives of people.
3. To know some of the uses of wild plants in order that they may better appreciate them.
4. To recognize the economic importance of trees.
5. To become interested in the problem of conservation.

Topics for investigation:

1. The uses of wild flowering plants.
2. Necessity for the preservation of some plants.
3. Value of legumes.
4. Wild flowers in literature.
5. Trees of streets and locality.
6. The planting and care of trees.
7. Value of trees for ornamentation and for comfort.
8. Value of trees to birds and other animals.
9. Value of trees in regulating the flow of streams and in preventing floods.
10. Value of trees in preventing erosion.
11. Trees as protection against storms.
12. Trees and their effect upon climate.
13. Trees and their effect upon rainfall.
14. Trees and their effect upon soil.

15. Our forest wealth.
16. Uses of trees for commercial purposes.
17. The United States Forest Service.
18. Reforestation.
19. Dangers that threaten our forests.

Suggested pupil activities:

1. Writing to the Wild Flower Preservation Society of Washington, D. C. for material about wild flowers that should be preserved.
2. Writing to the Department of Agriculture for materials. (other places also, see bibliography).
3. Reading about wild flowers.
4. Taking trips to vacant lots and to the country to observe wild flowers in their native habitats.
5. Collecting wild flowers for a school herbarium.
6. Preparing an exhibit of some useful wild flowers.
7. Listing or making a table of wild plants that are or may be useful and tell how useful.
8. Observing and reading to find out what wild plants are of value for ornamental purposes.
9. Learning how to use wild flowers for ornamental purposes.
10. Reading to find out the origin of some of our food plants.
11. Investigating to find out how plants are improved and how we get new kinds of plants.
12. Consulting persons who know the wild flowers to find out what flowers are in danger of extermination.
13. Reading about legumes to find out what they are, and about their relation to the soil.
14. Visiting the woods to find out how plants and trees contribute to the soil.

15. Finding out what common products are obtained from plants.
16. By observation and investigation find the ways in which trees give pleasure.
17. Reading to find out how plants are useful in regulating the flow of streams and in preventing floods.
18. Reading about erosion.
19. Visiting a bank, along a roadside, a hillside, or any field where erosion has taken place.
20. Visiting lumber yards or mills to see the different grains and to find out the different kinds used for different purposes.
21. Visiting trees and woods and noting the uses of trees to bees, birds, and other animals.
22. Investigating the value of different kinds of wood.
23. Visiting an antique dealer to find out the kinds of woods most of the valuable antiques are made of.
24. Finding out how antiques are imitated now without actually using the same kind of wood.
25. Preparing an exhibit showing some of the value of trees, some dangers that threaten them, and some means of protection of our forest products.
26. Making a scrap book.
27. Writing a paper on any of the topics in the outline.
28. Preparing oral reports on any of the topics.
29. Starting a wild flower garden.

Suggested procedure:

Note: It is hoped that the teacher has encouraged the observation and identification of many of the wild flowers during the detailed study of plants. If enough incentive has been given the pupils by the teacher, they will have a good collection of plants ready to use for this study. For example, if

pupil's interests are aroused by the suggestion that they make collections of wild flowers, individual collections if they wish, but each pupil try to contribute at least one or more different kinds of plants for a school collection, certainly many of the common flowers will have been learned incidentally without giving a specific time or period to this work.

The day before starting this work or on Friday the pupils may be asked if they would like to try to see how many uses they can find for the wild flowering plants. Many pupils will respond to the request, "Let's all keep our eyes open between now and Monday and see how many wild flowers and plants we can find," if it is put to them as a challenge. They may be asked to examine each flower and plant carefully to see if they can notice or think of any possible use of it and be ready to report their findings to the class at its next meeting.

Be sure to give pupils an opportunity to make their reports.

The teacher may ask such questions as:

What wild flowers can you call by name when you see them?

Do you think that the wild flowers and plants are of any value?

If they are of value, how? to whom?

The teacher may expect many answers to the first question, and to other questions such replies, as, "Some are pretty;" "Some of no uses, merely weeds;" "Some as nectar for bees," will be received. The answers will vary according to the uses taught in connection with the previous work and also with the

kinds of pupils in the particular class.

Then the pupils may be asked: "How are plants used in your community to make it a more attractive place in which to live?" "How have we got out cultivated plants of to-day?"

Note: Many of the pupils will not think of trees as flowering plants until this matter is brought to their attention.

The teacher may tell the pupils that primitive man was not at first a cultivator of the soil but probably lived on the berries, fruits, and nuts that he saw about him ready to be eaten. Man has developed our cultivated plants of to-day not merely by cultivation of wild plants, but by careful selection of variations, preservation of sports, and crossing and hybridization. This process of improvement is still going on. "Cultivation can produce better individuals, but it cannot produce of itself better races."¹ Suggest that the

I. Ganong, William F. The Living Plant. Henry Holt and Company, New York, 1913.

pupils read some of the writings of Liberty Hyde Bailey to find out some of the things that have been done with plants.

A field trip may be taken either for the purpose of observation and recognition, or for the purpose of collecting.

Now the pupils may be asked to name all the uses of the wild flowering plants that they have found, and, if necessary, the teacher may add to the list. Then she may ask the pupils to make lists or tables of:

Wild plants of which the roots and tubers are edible.

Wild seeds of food value.

Wild fruits and berries of food value.

Edible leaves and stem.

Beverages from wild plants.

Medicinal wild plants worth knowing.

Miscellaneous uses of wild plants as for condiments and perfumes, soap, fibers, dyes, tanning, etc.

Plants in danger of extermination that should be preserved.

Wild flowers that are worth while for their beauty.

Note - There are more than 200 edible wild plants now known in North America.¹

1. Glute, William Nelson. The Useful Plants of the World. Willard N. Glute and Company, Indianapolis, Indiana, 1932

Discussions may be had whenever necessary and such questions may be brought to the attention of the class, as

Can you explain why all the plants you find listed as edible are not used extensively for food now as they grow wild and without our care?

The teacher may bring out the fact that many plants are useful in one region and nuisances in another. Plants that are useful at one time may become useless through the development of cheaper and better substitutes or through changes in

in our way of living. Plants that are of no use may become valuable through the discovery of their properties by scientific investigation or through development of new needs. The goldenrods, though objects of beauty, are persistent as weeds to the farmer. They have acquired a bad reputation, but undeserved, among sufferers from hayfever. Edison worked and experimented with the goldenrods, and in 1930 he patented a process for extracting rubber from them. A pupil may make a report on "Edison and the Goldenrod."

Instead of listing or making tables, pupils may make exhibits or booklets on the wild plants that are useful. Individual exhibits or booklets may be made or the pupils may work in groups, each selecting the phase or phases of work that he desires.

If the class has not made booklets before on work of this type a few helpful hints may be given as:

Select the material for cover, cut it somewhat larger than the leaves and work out a good color scheme.

Paint, sketch with pen and ink, or make a silhouette on the frontispiece.

Arrange words on the frontispiece carefully.

Make a table of contents.

Make an index.

The arrangement of the work, the placing of pictures, specimens, drawings, clippings, and other material will have much to do with making the booklet a big success.

"Turtex Service Leaflets" may be obtained, free of charge

on many subjects from the Furtox Service Department, General Biological Supply House, 761-763 East 69th Place, Chicago, Illinois.

For this study the following Furtox service leaflets may be helpful.

Field Collecting Hints - Botany.

Preserving Botanical Specimens.

Making Biology Charts.

Preparing and caring for a Herbarium Collection.

Lantern Slides Any Teacher Can Make.

It is supposed, that in the discussions that have taken place, that the uses of wild plants to animals have been brought out; such as, the clovers for forage crops, other wild plants eaten, protection and hiding places for birds and other animals, and food and homes for bees and other insects.

If the value of legumes to the soil has not been taught, it may receive due attention here.

Ask the pupils to read about legumes. Bring in specimens of clovers, wild beans and peas and observe the nodules or tubercles on the roots. (This may be studied in relation to bacteria).

Now the value of trees may be studied and pupils may be asked.

Did you ever plant a tree?

Where did you plant it? Why?

Tell us what preparations you made and how you planted

the tree?

Who planted the trees by the driveway?

Why were they put there?

Why do many people object and protest when large trees are removed to widen streets?

What has been done in Washington about many trees?

How did they move some of the large trees?

Questions to answer while studying this project:

1. Who owns a tree?
2. What is tree surgery?
3. What is a forest?
4. How are forests of use to man?
5. How are forests of use to other animals?
6. What is forestry?
7. Why is reforestation necessary and what is being done about it?
8. What is meant by conservation and what is being done to conserve our forests?

Pupils may be asked to read the "Primer of Forestry" by Gifford Pinchot. Make a list of all products made and obtained from wood that you can. Illustrate by making sketch drawings or by pasting cut-outs by as many as you can.

Take a trip to a field or a bank where erosion has taken place; also, if possible to a stream where the course of the stream has changed due to the cutting of trees along its bank.

Visit a woods or forest to examine the soil under the trees in order that the pupils may see how porous the soil is and understand how this soil, caused by the decay of leaves,

sticks, etc., allows the water to soak in rather than run off as on hard land when there are hard rains.

Pupils may be asked to write a concise paragraph on such topics as;

1. Value of trees in regulating the flow of streams and in preventing floods. (Forests and water).
2. Value of trees in preventing erosion. (Forests and erosion)
3. Trees as protection against storms.
4. Value of trees for ornamentation and for comfort.
5. Value of trees to birds, bees, and other animals.
6. Trees and their effect upon climate.
7. Our forest wealth.
8. The United States forest service.
9. Reforestation.
10. Forest rangers.
11. The planting and care of trees
12. Forestry schools.
13. Duties of a forester.
14. Forest nurseries.
15. Forest reserves.
16. ~~Tree~~ surgery.

The topics given may be used as written work (selections being made by the pupil and teacher as to which topics are chosen and the minimum number), or for oral reports, or simply for discussion by the group. Time is an important element that often enters into the way our work is conducted as well as the amount that can be accomplished, as does the particular class

that is being taught.

Then the pupils may be asked to make a detailed outline to show the dangers that threaten our forests.

Make an outline of how our forests are protected.

Make a poster or a scrap book of articles made of wood.

Visit a lumber mill to find out the prices of different kinds of lumber. A committee may do this and report to the class on their findings.

A boy scout may make a demonstration to show how to build and later leave a camp fire.

Find out the

1. Most expensive wood
2. The strongest wood
3. The heaviest wood
4. The most durable wood
5. The lightest wood
6. The cheapest wood
7. The wood that takes the highest polish.
8. The wood that has the most beautiful grain.

Note: This may be done with the unit on identification instead of at this time.

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Wild Flower Preservation Society. 3740 Olive St., Washington, D. C.

How One Can Become Acquainted With Trees.

Objectives:

1. To familiarize the pupil with the native trees and so interest him in living things around him.
2. To develop the ability to make and record accurate observations.

Topics for investigation and discussion:

1. Trees of streets and parks or trees of our community.
2. Deciduous and evergreen trees.
3. The native trees and shrubs of Virginia.

Suggested pupil activities:

1. Studying a tree or trees in the school yard, at home, and along the streets.
2. Taking a trip to the country to study trees in the open and also to a woods to study trees in the woods.
3. Collecting and preserving leaves of trees.
4. Collecting and preserving fruit of trees.
5. Collecting and preserving flowers of trees.
6. Learning to identify a tree by its bark.
7. Learning some characteristics of some families of common trees.
8. Observing and noting position or arrangement of buds, leaves, and twigs.
9. Observing and noting forms and sizes of trees.
10. Making blue print of leaves.
11. Making exhibit of skeleton leaves.
12. If studied in the spring, making a spring calendar of

of the appearance of the flower and leaves.

13. Visiting lumber yards to see the grains of the different woods.
14. Making a collection of bark (may be from dead trees) or may make exhibit of wood.
15. Identifying trees by means of pamphlets, keys, and books.
16. Preparing reports on trees.
17. Collecting poems or quotations about trees.
18. Keeping a notebook of the general characteristics of each tree learned. If possible an illustrated book.
19. Making drawings of trees or of flowers, fruits, bud arrangements and leaves of trees.

Suggested procedure:

The day before starting this unit the pupils may be asked to bring in twigs from trees for their lesson the next day.

Let pupils observe and make comments on the twigs brought in. The teacher should have some twigs with the different bud arrangements.

Then she may tell the pupils that there are certain features of deciduous trees (trees that drop their leaves each autumn) that should be known before they proceed with a discussion of their characteristics. While there are many different kinds of trees in the United States, the number of given species in any given locality is not very large. Does it not add to the pleasure and enjoyment in one's daily life if he can call by name these friends of the yards, streets, fields and forests?

It depends upon the time of year when this unit is taught

whether flowers, fruits and leaves are available. If it is taught in the late fall, winter or early spring the leaves and fruits of many of the trees may have been collected and preserved for this study early in the season.

The teacher may hold up a twig, as one of a horse chestnut and ask the pupils to notice that the buds are opposite; if in leaf that the leaves are opposite. Then let them observe a maple twig which has the same conditions. Next may let them examine such twigs as the aspen, the hickory etc, and notice that the buds and leaves are alternate.

Each pupil may select a twig and after each part has been identified they may be asked to make drawings of a twig with opposite bud arrangement and also of one with alternate bud arrangement labeling the:

terminal bud

lateral bud

bud scar

bud scales

leaf scar

lenticels

rings

Now the pupils may be told that the arrangement of twigs, of buds, and of leaves help in the identification of trees. Only three families of our common large flowering trees have opposite leaves and this will help in the identification. Look at the twigs and see if the leaves or (in winter) the buds are opposite. The tree (if it is of a large size or grows

large) belongs to the maple, ash, or horse chestnut family. If the leaves are simple, maple; if pinnately compound of several leaflets, it is an ash; if a palmately compound of 5-7 leaflets, it is a horse chestnut. Other trees having opposite twig arrangement are the flowering dogwoods (except one species) and the catalpa. All other deciduous trees have alternate twig and leaf arrangement.

Then the pupils may be given certain characteristics of bark, as, the sycamore with its branches of a mottled appearance, the bark flaking off and exposing whitish or yellowish patches of inner bark; the thorns of locusts, prickly ash, and osage orange; the sweet gum with its striking peculiar corky ridges on the twigs and their peculiar fruit - a rough stalked or prickly ball, an inch or more in diameter.

It will possibly be better not to give too many directions before observing some trees as the pupils may become discouraged.

It is necessary to have some good book on the subject to discover the names of the trees studied, as well as a good easy key for the pupils. "The eye and the judgment are the dependable things. A book makes a good staff." (1)

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1. Rogers, Julia Ellen. The Tree Book, a Popular Guide to a Knowledge of the Trees of North American and Their Uses and Cultivation. Doubleday, Doran and Company, Inc., Garden City, New York, 1931.
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Pupils may be taken out to a tree in the open and asked

to make a sketch of the tree. Do not expect anything at first except merely an outline of the tree showing the shape and the proportions. It will probably take much questioning and many suggestions to get these. After the tree has been sketched, looked at by all, and commented upon, the pupils may be asked to fill in the trunk and branches with foliage. By careful suggestions and questions pupils will be led to see their many mistakes and this should teach them to observe more closely.

With some easy key as, "Key to Common Kinds of Trees" by William H. Lamb, "Common Forest Trees of Virginia" by Chapin Jones and other books given for reference the pupil may begin by identifying the trees in the school yard first; then those on his block or at his home, and then extend his identification to a larger area.

In studying a tree, not only the flowers, leaves, buds, fruit, and bark should be studied but also the size, form, and any other distinguishing characteristics.

A field trip may be taken to see how many trees the pupils are able to identify. Pupils should carry notebooks and pencils and make notes not only of the names of the trees but also of any characteristics that will enable them to know certain trees whenever seen.

Pupils may make a map of a definite area, showing streets, sidewalks, lots, etc., and locate the trees by circles. All the trees of the same kind may be numbered alike and the name corresponding to the number given by the side or below the map. (If in the country a similar survey may be made of a given area.)

May have pupils make a collection of flowers, fruits, leaves, and sections of branches for a school collection.

A good collection of wood may be made by pupils who have access to proper materials for this work. Pupils should be given definite instructions about this as they are apt to damage trees.

Some may make tree notebooks showing preserved leaves, flowers, fruits (if the fruit is bulky it may be sketched) and small pieces of bark.

Every pupil should have a tree notebook and each time he learns a new tree he should write the name of it in his book with a picture if possible of the leaf, bud arrangement, fruit, flowers and the chief characteristics of the particular tree. (He may sketch the parts not in season or possible get possibly get pictures to use).

Instead of a notebook the pupils may use heavy construction paper and have a sheet for each tree.

The United States Forest Service will lend to schools, under certain conditions, a set of samples of 64 important woods, pamphlets, charts, and table giving information about these.

Pupils should know some of the characteristics and be able to identify

Locust, Black and Honey

Walnut, Black

Hickory (not different species)

Maples

Poplar

Tulip Tree

Oak (several species)

Sycamore

Sweet Gum

Fruit Trees

Apple

Pear

Peach

Plum

Cherry

Catalpa

Persimmon

Willows

Magnolia

Elm

Birch

Linden or Basswood

Mulberry

Wild Cherry

Pine

Cedar

The evergreens, the cedar and pine are usually known by most pupils. If there are other evergreens convenient the pupils may learn the names of as many as they have time. Pupils may report on the evergreens that have been used for ornamentation and tell what trees or shrubs are used and how they

improve the appearance of a home.

Pupils may also plan the evergreens and shrubbery that ~~h~~ they would like to plant and the arrangement of these for a given home.

Directions for making skeleton leaves:

1. Place leaves in saucepan of water and add heaping tablespoon of cleaning powder. Let boil 15 minutes.
2. Place leaves in clear water for a few minutes.
3. Put a leaf on a dinner plate and let water drip on it - leaf will spread out and water will remove the pulp.
4. Transfer to blotting paper.
5. Mount under glass.

Waxing leaves

1. Scatter small bits of wax or paraffin over leaf.
2. Press with a modern hot iron.

Making blue prints of leaves

1. Place blue print on piece of cardboard.
2. Put leaf on blue print.
3. Cover with glass plate.
4. Clip together and expose to bright sunlight till paper turns to a bronze shade. 2 to 5 min.
5. Remove to shady place - wash for 5 minutes in running water.
6. Dry.

Formula for Blue Print Paper

Solution I

Potassium ferricyanide

1 oz.

Water, distilled	5 oz.
Gum Arabic	1 drachm

Solution II

Iron-ammonia citrate (green)	1½ oz.
Water, distilled	5 oz.
Gum Arabic	1 drachm

Mix equal parts.

Coat paper in the dark by use of oil lamp or yellow light.

Dry quickly.

Keep in dry, dark place.

Print until the dark parts are bronzed and then wash thoroughly in cold water.

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