



*Duplicate*

**AN ARTIFICIAL KEY TO COMMON SHRUB AND HERB  
SEEDS OF SOUTHERN MICHIGAN AND VICINITY**

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TABLE OF CONTENTS

	<u>Page</u>
<u>Acknowledgments</u> -----	1
<u>Introduction</u> -----	2
<u>Discussion of Methods and Materials</u> -----	3
<u>Key</u> -----	5
<u>Index to Scientific Names</u> -----	62
<u>Index to Common Names</u> -----	66
<u>Literature Cited</u> -----	70

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## INTRODUCTION

A knowledge of plant seeds is a valuable asset to the biologist and wildlife manager in many ways. Seeds form a major food for many of our important game and song birds, and a knowledge of their identity is the first essential requirement in food analysis of any type.

Weeds are ordinarily thought of as the principal source of seeds eaten by wildlife (1). Many factors, such as abundance of seed crops and availability and palatability of the species of seed on an area, effect the utilization of seeds by wildlife. For those interested in this phase, reference is made to publications such as those by McAtee (1) (2) and VanDersal (3).

The primary object of this key is to assist the user in identifying the food and cover plants present on a wildlife area, particularly in fall conditions, when plants are often leafless and extremely difficult to identify. It should also be of aid in stomach content analysis and in the identification of species considered as impurities of commercial seeds. Concerning stomach content analysis, due to the fact that the shape, surface texture and coloring is often altered by digestive action, a knowledge of internal characters and the ability to recognize the seed in its changed condition, is often a necessity.

It must be realized that this key is limited to the more common herb and shrub species, excluding grasses, of Southern Michigan and vicinity. However, in most cases,

species not included in the key would form such an insignificant part of the ground cover of a game area, that they would not be utilized to any extent by a game species or considered by the wildlife manager in analysis of the food and cover conditions. This paper is presented not as a completed work, but more as a good beginning for anyone interested in constructing a relatively complete key.

#### DISCUSSION OF METHODS AND MATERIALS

The main source of material used for study was the seed collection of the School of Forestry and Conservation, University of Michigan. This collection was supplemented by and checked, as much as possible, against field collections made by the writer during the fall and early winter of 1938, in the vicinity of Ann Arbor, Michigan.

All seed descriptions are based upon actual specimens, although free use of seed manuals such as Muenschers (4), Georgia (5) and Hillman and Henry (6), was made in checking the seed collection and field specimens. The most accurate set of drawings of Michigan weed seeds examined, are those by Hillman in the publication by Beal (7). The descriptions in this publication are also excellent. After making thorough investigation into the literature, it was discovered that about the only seed key now in published form is that by M. L. Bomhard (8). This key treats selected families as separate groups with an individual key to each group, but not keying out the families from each other.

Considering the paper in hand, an attempt was made at

first by the writer to construct a key based on a combination of natural and artificial characters, attempting to key out the families. However, due to such variations of external characters among families and genera, this was given up in favor of a purely artificial key to species, with all descriptions based upon observations of many individuals within a given species.

After examination of hundreds of individuals it was concluded that, in consideration of size, color, form and surface, surface character is the most distinctive and least variable. Because of this conclusion the major divisions of the key are based on surface. Until a person becomes familiar with variations in surface character, this classification may be slightly confusing, but in the long run it is the most dependable. An effort was made throughout the paper to keep descriptions as simple as possible, even favoring non-technical terms in many instances.

All descriptions are based on observations through a binocular microscope at about 10x magnification, varying slightly with the size of the seed. For field work a powerful hand lens serves the purpose very well. With exception of a very few exceedingly large seeds, magnification of at least 5x is necessary to make distinguishing characters plainly visible.

Illustrations were made by the use of a Leitz "Makam" photomicrographic camera in combination with a binocular microscope, using a magnification of 6x with the exception

of two, Cerastium vulgatum (Mouse-ear chickweed) and Arenaria serphyllifolia (Thyme-leaved Sandwort), which were taken at 15x magnification.

KEY\*

1 Seed surface smooth, usually glossy, not appearing spined, nor with surface pitted, netted, ridged, dusted, granular or lined under approximately 10 power magnification. General outline of seed even and regular or uneven----- 2 (P.48)

1 Seed surface not smooth ----- 3

3 Surface with bristly hairs, spines or spine-like projections exceeding 0.5 mm. in length----- 4

4 With one or more large prominent terminal projections (spines, awns, hooks, beaks etc.)----- 5

5 Seeds over 12 mm. longest measurement, including terminal projection ----- 6

6 Seeds 4 - 5 angled, with a terminal spinelike tip 2 - 4 mm. long, slightly margined between faces with about 10-20 slender spines along each face. Brown, 15 - 20 mm. long by 1.5-2 mm. wide----Dentaria diphylla (Pepper root)

(Fig. 1, Plate I)

5 Less than 12 mm. longest measurement ----- 7

7 Seeds definitely flattened bilaterally, 2 faces similar ----- 8

8 Obovate, with 2 awns about 3 mm. long, with barbs pointing backward; seed body with central longitudinal ridge, prickles mainly on edge and ridge, gray-brown, 8-10 mm. long including awns, 2-3 mm. wide -----

-----Bidens vulgata (Sticktite)

(Fig. 2, Plate I)

8 With a single terminal spine or beak ----- 9

9 Terminal spine about 4-5 mm. long with a terminal curl. Elliptical to ovate, flattened biconvex, slightly margined, redbrown, seed body 3-4 mm. long, by 1.5 mm wide-----

-----Geum sp. (Avens)

Fig. 3, Plate I)

9 Terminal spine 2-4 mm., often broken off, other end bluntly pointed, oblong to elliptical, flattened plane or biconvex, margin spiney haired, lite brown-----

\* Term seeds is used to include seed-like fruits such as achenes, nutlets etc. First line of species description usually eliminates or includes a seed being identified.



Fig. 1, Dentaria diphylla

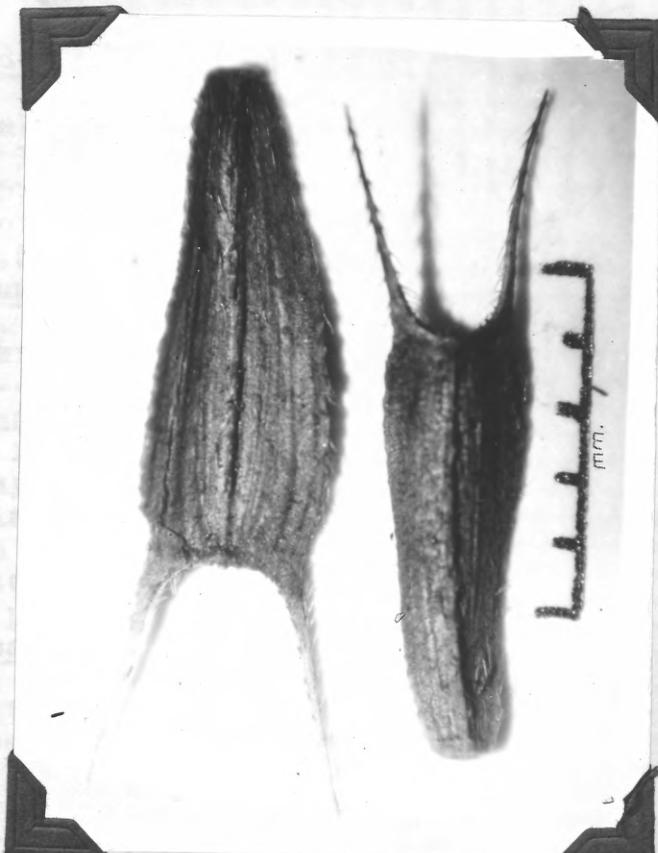


Fig. 2, Bidens vulgata



Fig. 3, Geum sp. (Avens)

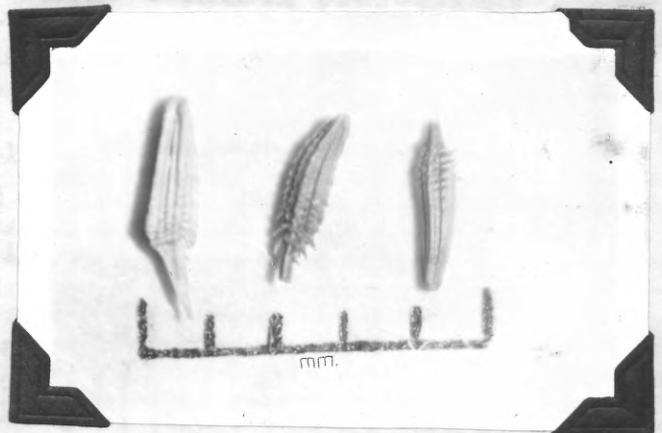


Fig. 4, Taraxacum officinale

- Filipendula rubra (Queen of the  
Prarie)
- 9 Terminal spine (or beak) about 0.5 mm. long  
(originally a thread like beak about 15 mm  
long) oblanceolate, upper half composed of  
about 12 barb-like toothed ridges, base trun-  
cate 1 - 1.2 by 3 - 3.5 mm., lite or dark  
brown -----Taraxacum officinale (Dandelion)  
(Fig. 4, Plate I)
- 7 Seeds not flattened bilaterally, or if so very slightly  
-----10
- 10 Achenes bearing numerous frail flattened spines  
along edges and in two rows lengthwise on one  
face; (spines on top may be very short or blunt).  
Seeds oval, slightly flattened, often approx-  
imately semi-circular in cross section; light  
brown striped with white, 2.5-4 mm. long includ-  
ing spine and terminal projection-----  
-----Daucus carota (Wild carrot)  
(Fig. 5, Plate II)
- 10 Achenes with 5-8 short teeth at apex-----11
- 11 Beak 1-2 mm. long, seeds broadly oval, approx-  
imately circular in cross section to slight-  
ly angled. Sides irregularly ridged, 2.5-  
3 mm. long, very dark red brown to light  
straw color--Ambrosia artemisifolia (Ragweed)  
(Fig. 6, Plate II)
- 11 Beak 2-3 mm. long, seed 7-9 mm., roughly  
pentagonal in cross section, 5 ridges termin-  
ating in 5 teeth (rarely 6), bullet like,  
surface gray brown, slightly mottled-----  
-----Ambrosia trifida (Great ragweed)  
(Fig. 7, Plate II)
- 4 Without one or more large prominent terminal projections  
-----12
- 12 Seeds approximately circular in outline (globose)--13
- 13 Gray brown to gray, 2.5 - 3.5 mm. in diameter,  
covered by frail spines (easily broken off when  
dried) single cup or hole on surface,-----  
-----Galium aparine (Cleavers)  
(Fig. 8, Plate II)
- 12 Not circular in outline, flattened-----14
- 14 Pods readily separating into about 5 joints,  
each containing a seed. Single joint ovoid to D  
shaped, margined, flattened biconvex, slight  
net work on surface, short hairs usually hooked,  
brown, joint 6 - 8 mm. longest measurement-----  
-----Desmodium canadense (Tick trefoil)  
(Fig. 9, Plate III)
- 14 Achenes (including prickly covering) ovoid to  
broadly elliptical, biconvexly flattened, with a  
single slight longitudinal ridge on each side,  
very short surface hairs, 2 ear like appendages  
at base, gray brown, 1-1 $\frac{1}{4}$  mm. long-----  
-----Urtica dioica (Stinging nettle)  
(Fig. 10, Plate III)

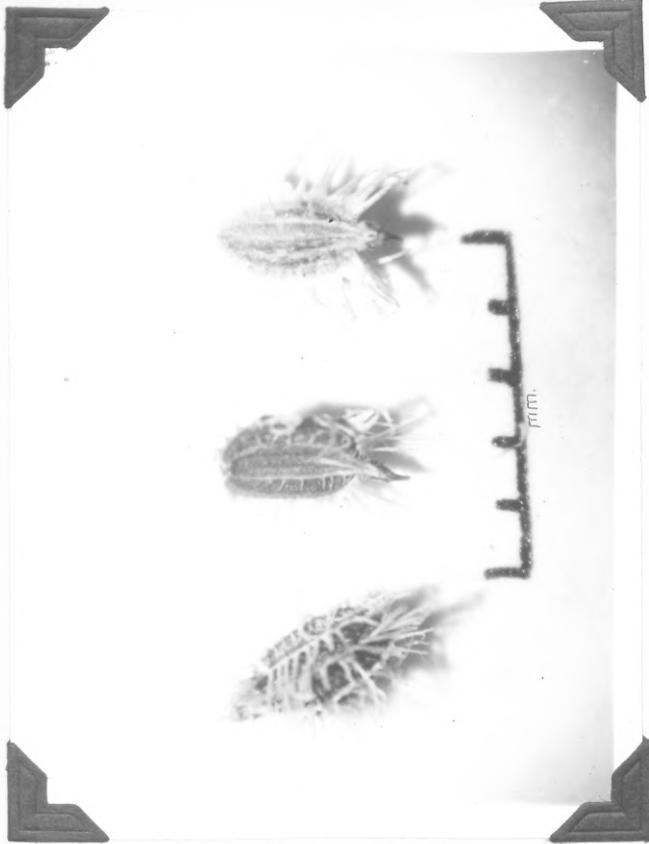


Fig. 5. Daucus carota



Fig. 6. Ambrosia artemisiifolia



Fig. 7. Ambrosia trifida

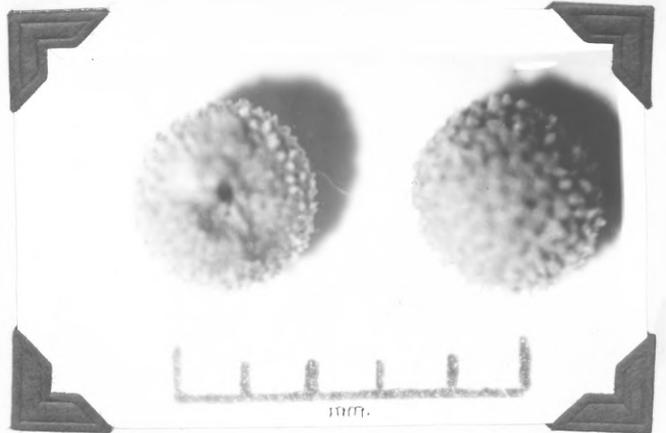


Fig. 8. Galium aparine

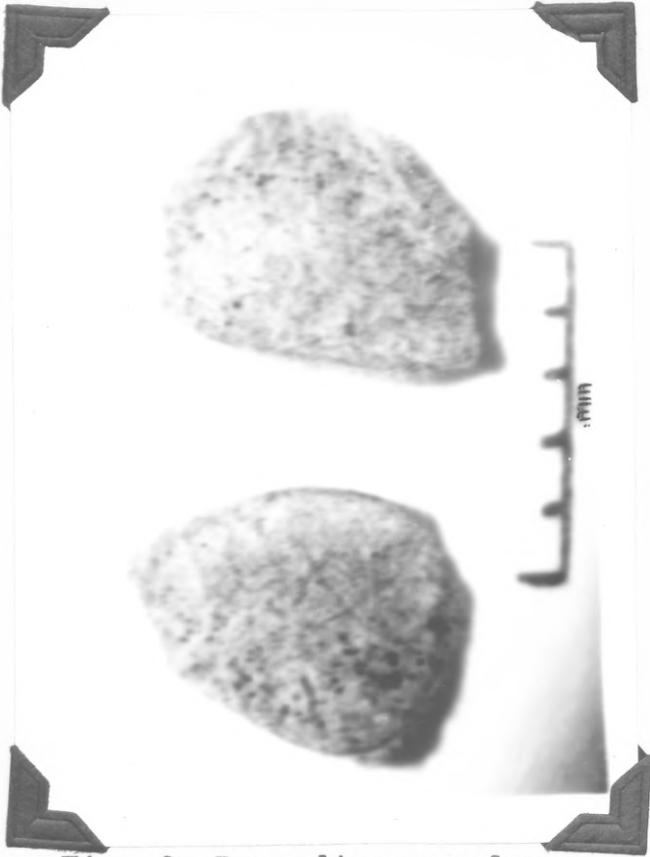


Fig. 9. Desmodium canadense

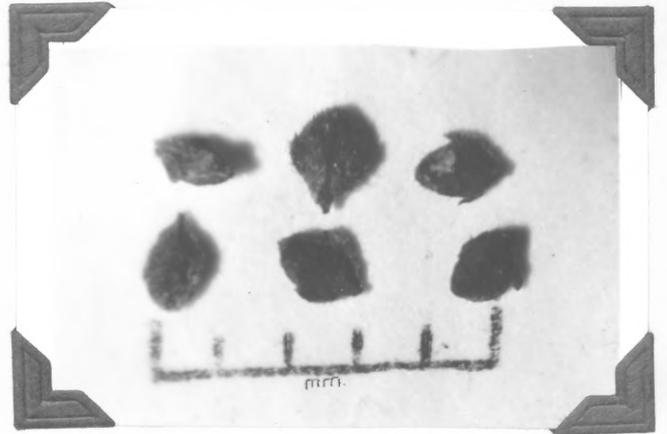


Fig. 10. Urtica dioica



Fig. 11. Thaspium sp.



Fig. 12. Cephalanthus occidentalis

- 3 Not spined or as above-----15
- 15 Surface with more than two complete raised lines or grooves on any face or side. Surface not pitted----16
- 16 Lines or grooves running longest way of the seed, at least on one face or side-----17
- 17 Seeds averaging 5 mm. or over longest measurement-----18
- 18 Extremely flattened, about 1 mm. or less thick-----19
- 19 Very broadly elliptical to circular in outline, 4 dark stripes alternating with 3 light ridges on one side, central ridge and 2 dark lines on other, all terminating in a blunt beak, approximately 4 by 5 mm.(over all)., yellow-----  
-----Thaspium sp. (Wild parsnip)  
(Fig. 11. Plate III)
- 18 Seeds not extremely flattened -----20
- 20 4 to 5 sided, narrowly wedge shaped, remains of stalk usually at broad end, usually 3 fine light colored lines running lengthwise of each side terminating at the tip, achene yellow, stalk dark red brown. 5 - 7 mm. long entire, about 2 mm. across broad end-----  
-----Cephalanthus occidentalis (Button Bush) (Fig. 12. Plate III)
- 20 Elliptical, approximately circular in cross section, but with about 8 slight longitudinal ridges, fine sandpapery surface, 5 - 6 by approx. 12 mm., light brown-----  
-----Elaeagnus argentea (Silver berry)  
(Fig. 13. Plate IV)
- 20 Not as above, surface lines distinct upraised ridges-----21
- 21 Surface lines wavy-----22
- 22 Yellow with approx. 12 distinct, very dark red resinous surface lines per side. Broadly elliptical to circular, biconvexly flattened. Approx. 4.5 by 5 mm.-Rhus canadensis (Low straggling sumac) (Fig. 14. Plate IV)
- 22 Orange with surface irregularly wrinkled into numerous lines. Irreg. D shaped, but often narrowed and approaching an ellipse, reddish brown, 3-5 by 5-7 mm.-----  
-----Podophyllum peltatum (May apple)  
(Fig. 15. Plate IV)
- 21 Surface lines approximately straight, not appearing dark red or resinous---23



Fig. 13. Elaeagnus argentea

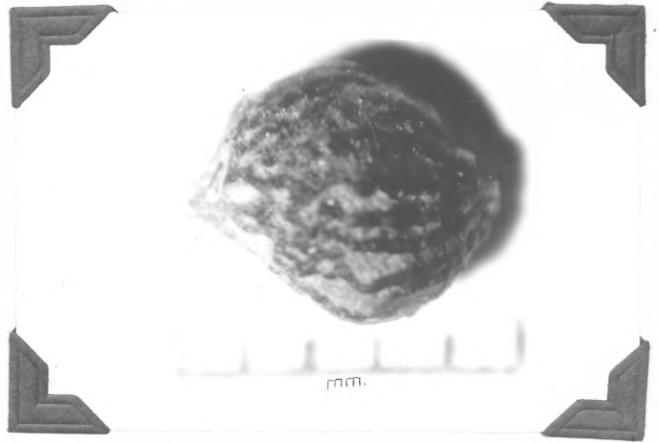


Fig. 14. Rhus canadensis

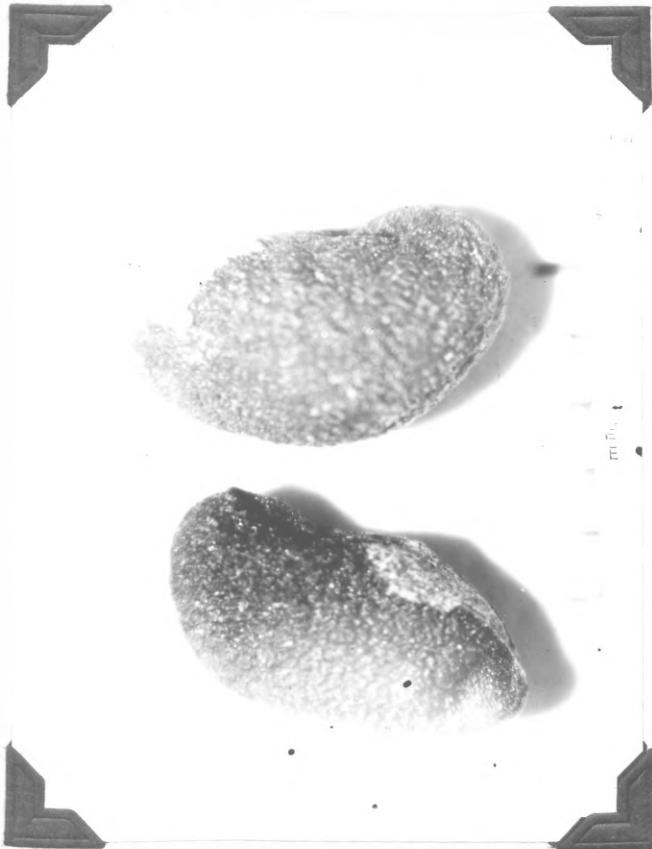


Fig. 15. Podophyllum peltatum

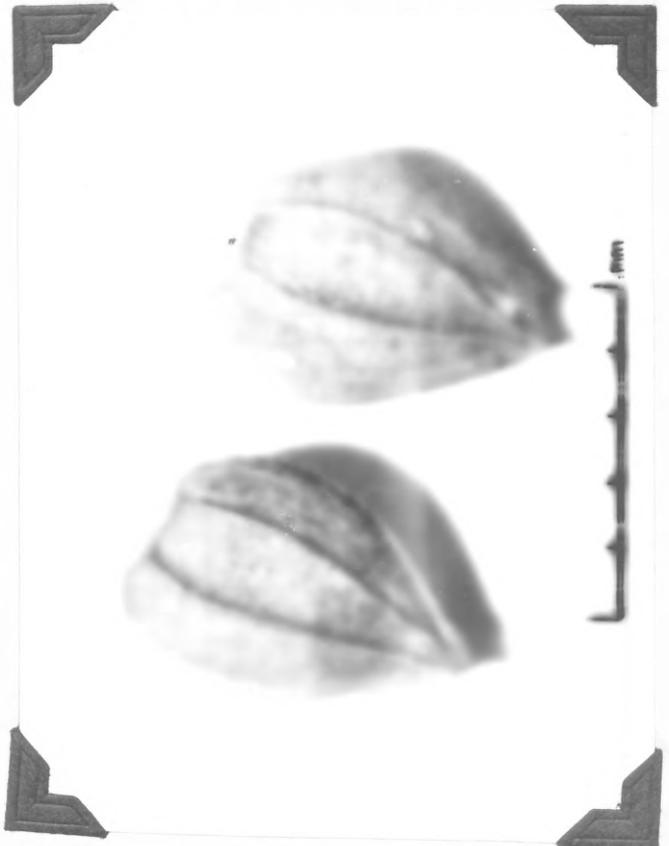


Fig. 16. Carpinus caroliniana

- 23 Seeds pear shaped, slightly biconvexly flattened, total 6 - 10 main surface lines, approx. circular in cross section sometimes, 4 by 5 mm., mouse gray-Carpinus caroliniana (Blue beech) (Fig. 16. Plate IV)
- 23 Very broadly oval to circular, 10 - 15 main surface lines total, approx. circular in cross section, 5 - 6 mm. in diameter, red-brown-----Arctostaphylos uva ursi (Bear-berry)(Fig. 17. Plate V)
- 20 Surface lines not distinct upraised ridges-----24
- 24 Approximately 8 surface lines, each forming a blunt ridge about level with surface, seeds broadly ovate in outline, broadly elliptical to circular in cross section. 4.5 - 5 mm. in diameter-----Cornus paniculata (Dogwood) (Fig. 18. Plate V)
- 17 Seeds averaging less than 5 mm. longest measurement---25
- 25 Seeds 2 mm. or less longest measurement -----26
- 26 Seeds 1 mm. or less long, D shaped to reniform, flattened biconvex, 6 - 12 curved forked ridges on each side, lite brown to white-----Potentilla monspeliensis (Rough cinquefoil)(Fig. 19 Plate V)
- 26 Seeds 1 - 2 mm. long-----27
- 27 D shaped to reniform, flattened biconvex, 6 - 15 curved forked, lite colored, much branched ridges on each side, often a keel like margin, seed brown, 1 - 1.3 by 0.8 mm.----Potentilla recta (Rough fruited cinquefoil) (Fig. 20 Plate V)
- 27 Canoe like. Two edges margined and approx. parallel, convergent at ends. White scar at one end. 3 - 5 longitudinal ridges on convex side only, branching and uniting at apex. 1.7 - 2 mm. by 0.5 - 0.8 mm., dull red brown-----Verbena hastata (Blue vervain) (Fig. 21. Plate V)
- 27 Same as above but shorter and broader, more elliptical. 1.5-1.8 by 0.8 - 1 mm.-----Verbena urticifolia (Netted leaved vervain)(Fig. 22. Plate V)
- 27 Not canoe like or as above -----28
- 28 Slightly irregularly flattened, acute edges very variable in shape, ranging from oblong, ovate, elliptical, rhomboidal to a trapezoid. Surface of slightly wavy fine lines running longitudinally on one side; radiating from scar on other side. Seeds brown to black, 1 - 1.5 mm. longest measurement--Plantago major (Common Plantain) (Fig. 23. Plate VI)

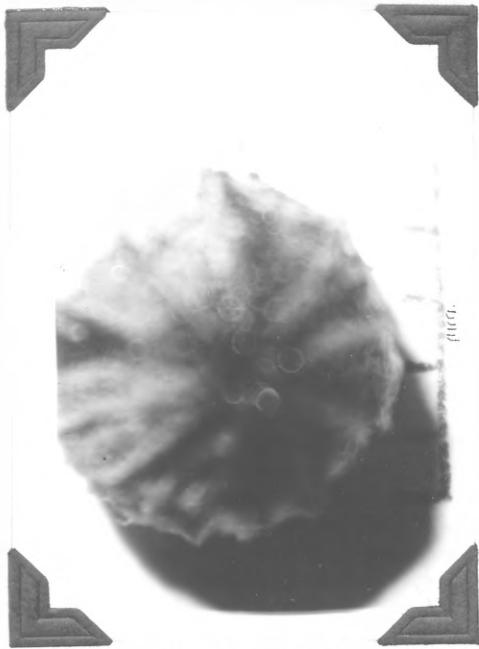


Fig. 17. Arctostaphylos uva ursi



Fig. 18. Cornus paniculata



Fig. 19. Potentilla monspeliensis



Fig. 20. Potentilla recta

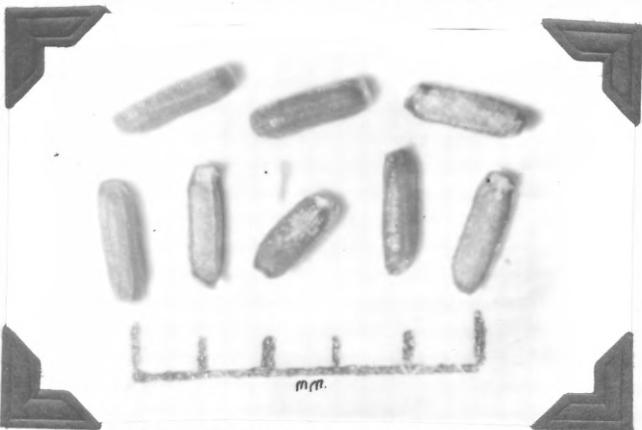


Fig. 21. Verbena hastata



Fig. 22. Verbena urticifolia

- 28 Biconvexly flattened with shallow longitudinal groove near one edge, ovate to D shaped, 6 - 10 dark surface lines (ridge like) curving parallel to edge, seed brown, about 2 mm. long -----Thlaspi arvense (Field pennycress) (Fig. 24. Plate VI)
- 28 Flattened, oblong, achenes sack like, white to gray enclosing dark red brown seed. Achene finely lined (striate) lengthwise. 1.8 - 2 mm. long by 0.5 - 1 mm. wide-----Achillea millefolium (Yarrow) (Fig. 25. Plate VI)
- 25 Seeds 2 - 5 mm. long -----29
- 29 Approximately circular or semi-circular in cross section-----30
- 30 Achenes in doubles joined by flat sides, broadly elliptical to ovoid. Single achene convex surface with 5 yellowish stripes alternating with 4 brown ones (oil tubes). Flat side with 2 brown stripes. Seed 3 - 3.5 mm. long-----Cicuta maculata (Water Parsnip) (Fig. 26. Plate VI)
- 30 Similar to above except stripes between the yellow ones dark brown, less distinct, and often absent on the flat side-----Sium cicutacfolium (Parsnip) (Fig. 27. Plate VI)
- 29 Not approximately circular or semi circular in cross section-----31
- 31 Approximately square in cross section -----32
- 32 Achenes somewhat tapering from base to apex, apex truncate and base bluntly pointed, 5, 6 - 8 longitudinal ridges per side, dark brown to black---Rudbeckia hirta (Black eyed Susan)(Fig. 28. Plate VI)
- 31 Not square in cross section-----33
- 33 With a crown of minute papery scales around truncate apex, achene light brown more or less mottled with black, 1 by 2 - 3 mm, slightly flattened, 4-5 angled, usually 2 - 5 fine grooves per face, surface often scale like-----Cichorium intybus (Chickory) (Fig. 29. Plate VI)
- 33 Apex not truncate or crowned with scales-----34
- 34 Single achene 5 angled, 5 faced, slender, elliptical but with entire seed curved. One face (inner face of paired achenes) with solitary flattened ridge or stripe; other 4 with 3 (sometimes 2) narrow ridges. Margins of faces yellow, remainder dark red. 1 - 1.5 by 4.5 - 5 mm.-----Carum carvi (Caraway) (Fig. 30. Plate VII)

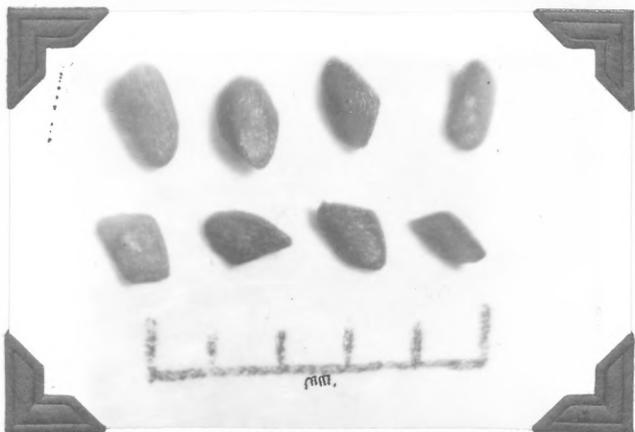


Fig. 23. Plantago major

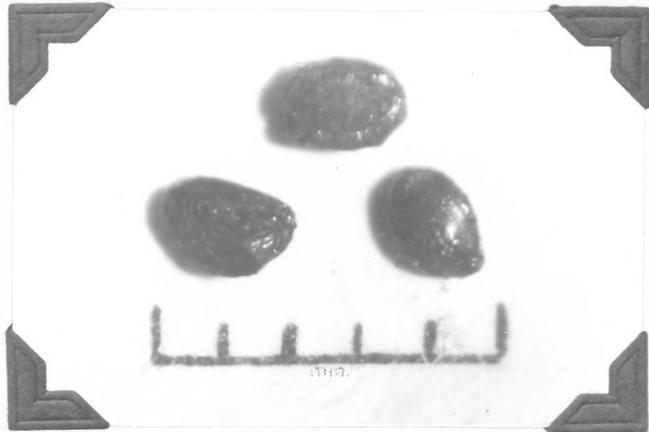


Fig. 24. Thlaspi arvense



Fig. 25. Achillea millefolium



Fig. 26. Cicuta maculata

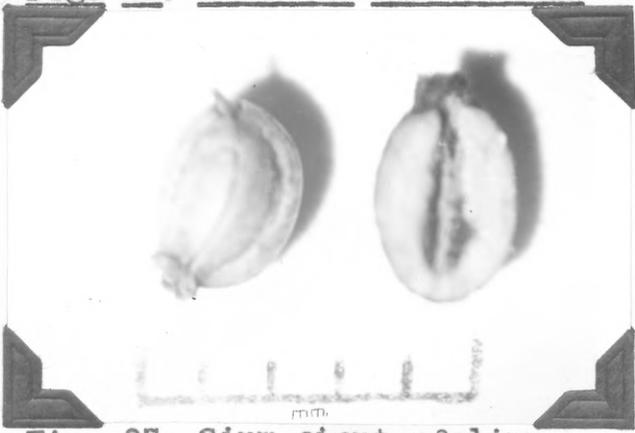


Fig. 27. Sium cicutacfolium



Fig. 28. Rudbeckia hirta



Fig. 29. Cichorium intybus

- 34 With 2 surfaces flattened, D shaped or ovate, wedge shaped laterally, slightly beaked at narrow end, approximately 50 plus very fine almost indistinct longitudinal ridges on each side, yellow, 2.5 - 3 by 1.8 - 2 mm-----  
-----Alisma plantago aquatica (Water plantain)(Fig. 31. Plate VII)
- 34 With one surface flat, other usually rounding, ovate to D shaped, cuneate, one end slightly beaked, surface lines in form of fine longitudinal wrinkle like ridges, under high magnification these lines are found pitted. Seed red brown, 1.5 by 2.5 - 3 mm.-----  
-----Aronia atropurpurea (Choke berry) (Fig. 32. Plate VII)
- 16 Surface lines or grooves not running lengthwise-----35
- 35 Seeds conical, apex flattened or concave, continuous circular line on surface due to long coiled embryo, about 1.5 - 2 mm. diameter at base, greenish gray to dark brown-----Salsola kali tenuifolia (Russian thistle)(Fig. 33 Plate VII)
- 35 Seeds not conical -----36
- 36 Seeds 1.5 mm. or less longest measurement-----37
- 37 Biconvexly flattened, D shaped to reniform, 4 - 12 indistinct branched raised lines running laterally joining at base. Dark brown, brown or gray, 1 mm. by 1 - 1.5 mm.-----  
-----Fragaria sp. (Wild strawberry) (Fig. 34. Plate VII)
- 36 Seeds over 1.5 mm. long-----38
- 38 Seeds less than 10 mm. long-----39
- 39 Elliptical to slightly pear shaped, approximately circular in cross section to somewhat flattened, single longitudinal wavy ridge with many lateral branches, dark gray, 3 - 5 by 4 - 5.5 mm.-----  
-----Impatiens pallida (Pale touch-me-not)(Fig. 35. Plate VII)
- 39 Approximately globose or semi-globose, surface or innumerable short curved ridges (appears like mass of small worms). Yellow, chocolate or "lite seal" brown. 3.5 - 4 mm. in diameter-----  
-----Polygonatum biflorum (Small solomons seal)(Fig. 36. Plate VIII)

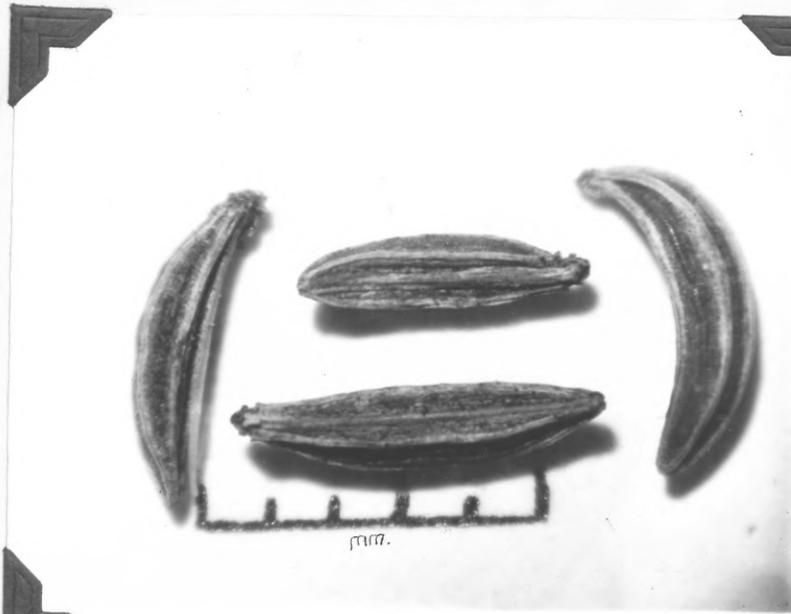


Fig. 30. Carum carvi



Fig. 31. Alisma plantago aquatica

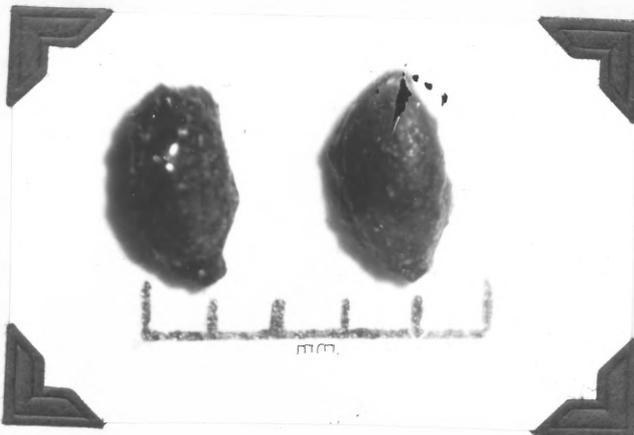


Fig. 32. Aronia atropurpurea

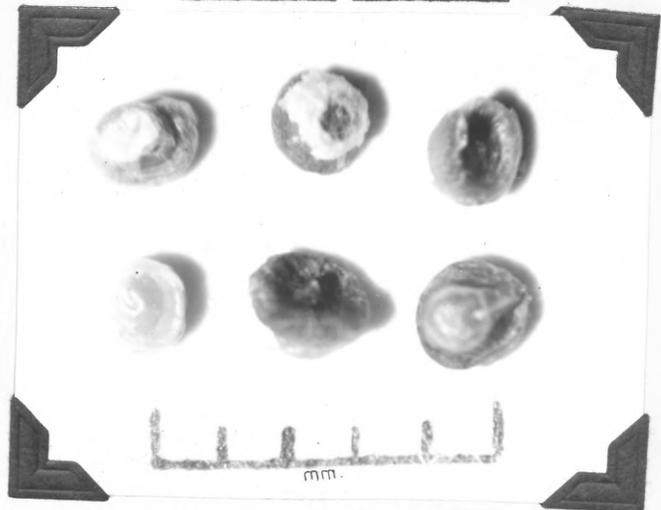


Fig. 33. Salsola kali tenuifolia

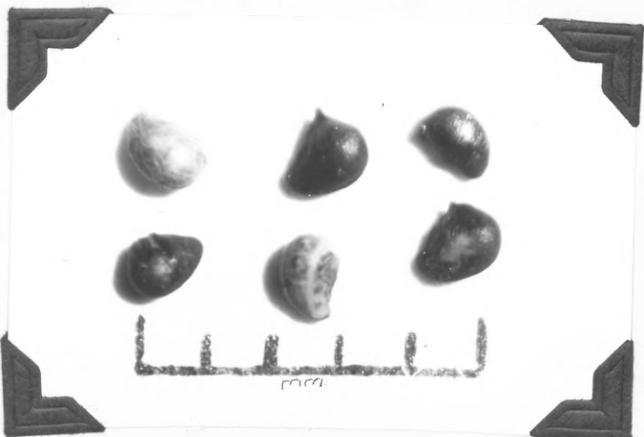


Fig. 34. Frageria sp.



Fig. 35. Impatiens pallida

- 15 Surface entirely or very nearly covered with many small hollows, pits or appearing netted. With or without a fine pubescence-----40
- 40 Seeds approximately globose or semi-globose, bead-like, fine netted or pitted surface marking discernible upon close observation-----41
- 41 Seeds 1 - 2 mm. in diameter, ranging from black to brown, bead like, surface finely netted, may be slightly flattened-Brassica sp.(Mustards)(Species not definitely separable by external characters)(Fig. 37 Pl.VIII)
- 41 Seeds 2 - 5 mm. in diameter -----42
- 42 Stalked-----43
- 43 Orange "testaceous" 4 - 5 mm. in diameter, surface rough, irregularly wrinkled into nets, approximately semi-globose, flattened side concave. Slight margin on "collar" at base of short stout stalk-----  
-----Arisaema triphyllum (Indian turnip)  
(Fig. 38. Plate VIII)
- 42 Not stalked -----44
- 44 Yellow, "cinnamon buff" 3.5 - 4 mm. in diameter, surface minutely pitted, marked by a brown or slightly purple scar, rarely semi-globose  
-----Smilacina racemosa (False Solomons seal)(Fig. 39. Plate VIII)
- 44 Dark brown "dusky drab" 3.5 - 4 mm. diameter, surface irregularly wrinkled into pits, marked by a large dark scar, rarely semi-globose-----Polygonatum biflorum (Small solomons seal)(Fig. 36. Plate VIII)
- 40 Seeds not globose or semi-globose-----45
- 45 Seeds 1 mm. or less longest measurement-----46
- 46 Rod shaped, cylindrical, ends rounded to slightly pointed, entire seed possesses about 24 rows of minute hollows or scars, brown, dark brown to black-Hypericum perfoliatum (St. Johns Wort)(Fig. 40. Plate IX)
- 46 Slightly angular and 6 sided, base truncate, apex rounded and narrower (thimble shaped), each lateral face a single row of 5 or 6 pits, pits alternating around seed, lite to dark brown-----Verbascum Blatteri (Moth mullen)  
(V. thapsus practically identical)  
(Fig. 41. Plate IX)
- 46 Irregularly angled or slightly flattened, varies greatly in shape, usually oblong to elliptical, ends either rounded or truncate, 6 - 8 longitudinal rows of pits, pits under 20 to 30 magnification. Appears finely netted, gray brown, 0.5 - 1 mm. longest measurement-----  
-----Scrophularia marilandica (Figwort)  
(Fig. 42. Plate IX)

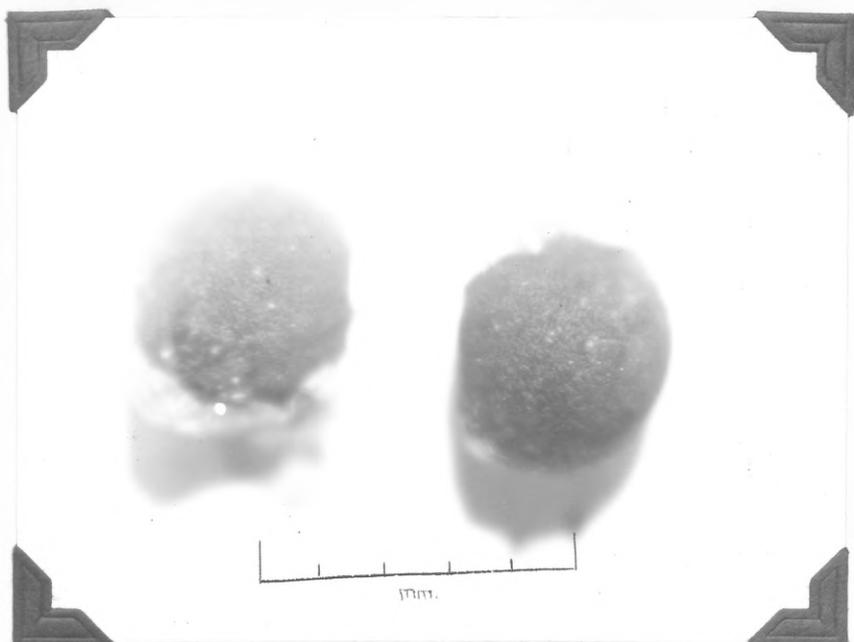


Fig. 36. Polygonatum biflorum

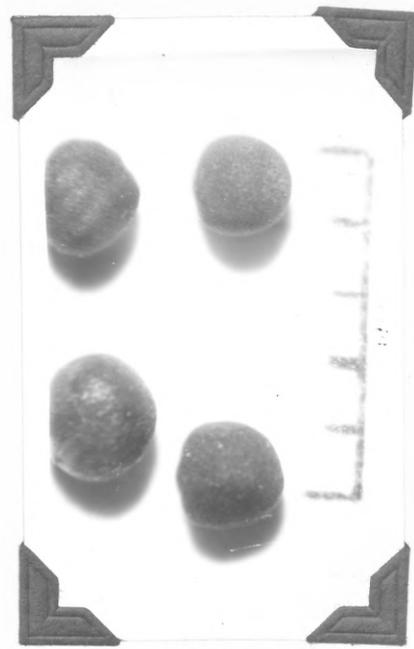


Fig. 37. Brassica sp.

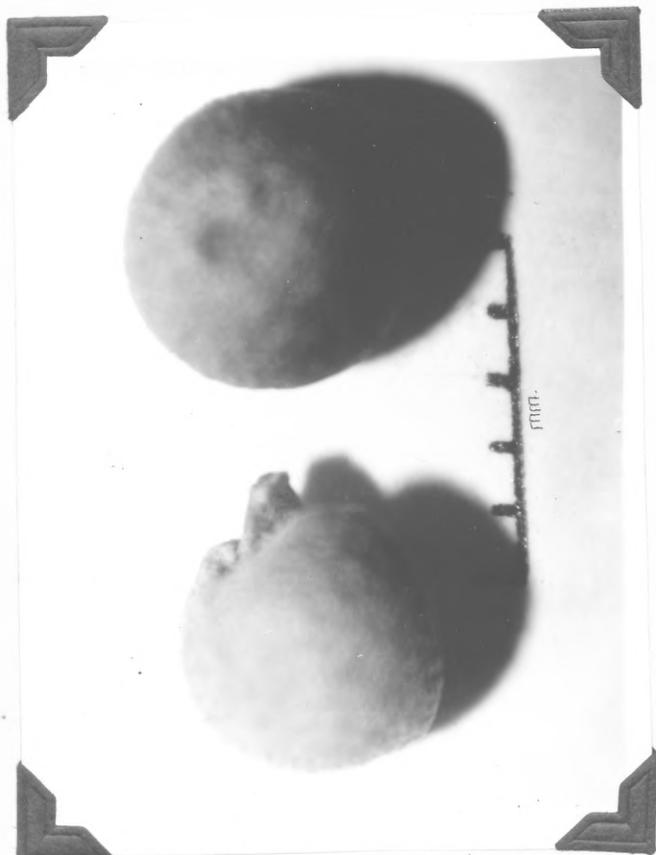


Fig. 38. Arisaema triphyllum



Fig. 39. Smilacina racemosa



Fig. 40 Hypericum perforatum

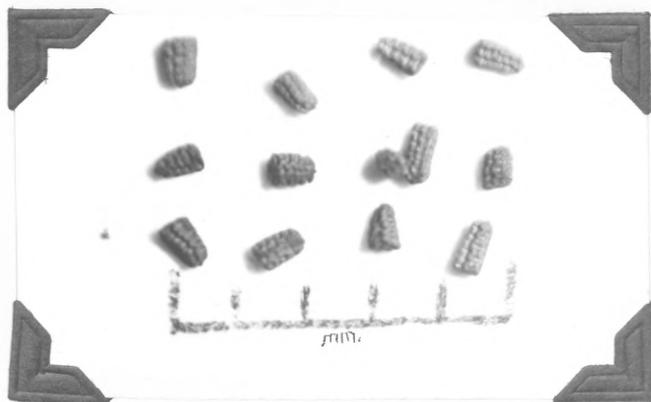


Fig. 41. Verbascum Blatteri

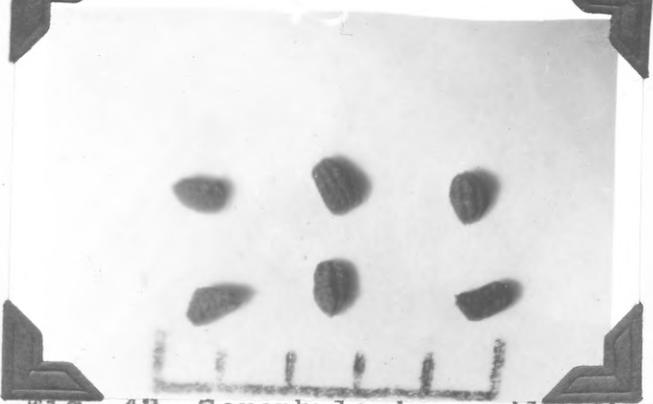


Fig. 42. Scrophularia marilandica



Fig. 43 Dasystema sp.

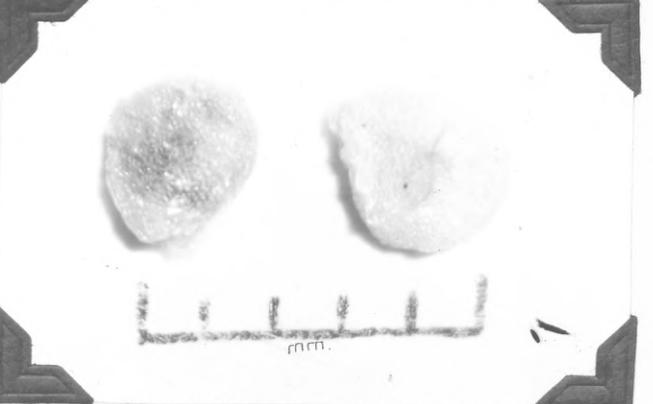


Fig. 44. Solanum dulcamera

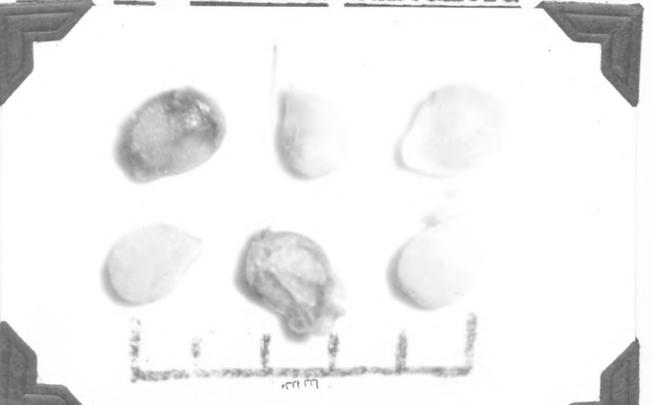


Fig. 45. Solanum nigrum

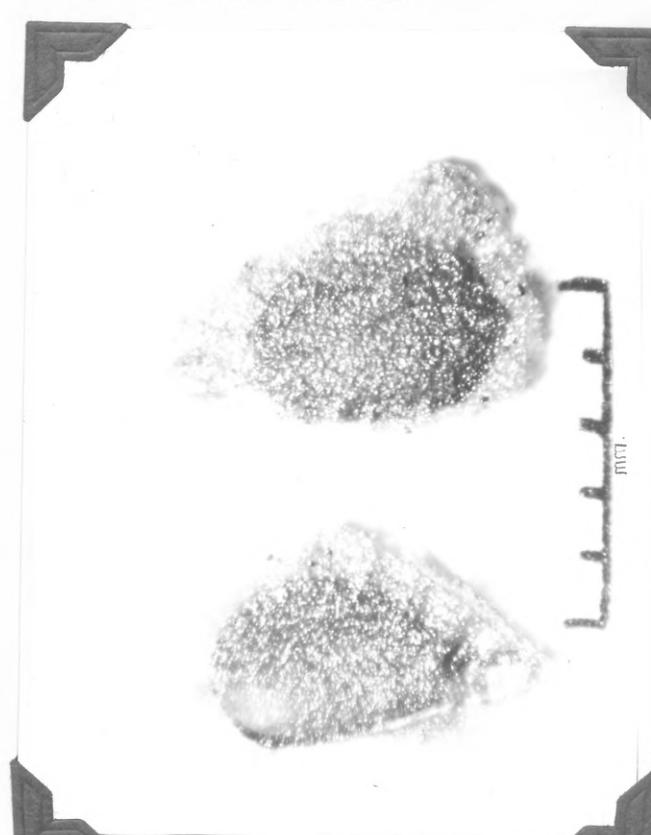


Fig. 46. Lilium philadelphicum

- 45 Seeds over 1 mm. longest measurement -----47
- 47 Seeds enveloped in a thin transparent envelope-----48
- 48 Envelope forming winglike margins, heavily netted, fan like to rectangular in shape, about 2 mm. long overall, transparent margin extends about 0.5 mm. beyond edge of seed proper. Seed gray-----Dasystema sp. (Foxglove)(Fig.43 Plate IX)
- 48 Broadly ovate, pear shaped, surface composed of many very minute pits, shiny, seed body approximately 2.5 by 4 mm., about 5 by 6 mm. over all, yellowish brown "cinnamon buff"-----  
-----Lilium philadelphicum (Wood Lily)  
(Fig. 46. Plate IX)
- 47 Not enveloped in a thin transparent envelope-----49
- 49 White or very lite yellow, flattened, circular to ovoid in outline-----50
- 50 Seeds 2 - 2.5 mm. across, somewhat shiny, slight notch at narrow tip-----  
-----Solanum dulcamera (White nightshade)  
(Fig. 44. Plate IX)
- 50 Seeds 1 - 1.5 mm. across, surface pits not as readily distinguishable, narrowed tip not notched-----Solanum nigrum (Black nightshade)  
(Fig. 45. Plate IX)
- 49 Not white or very lite yellow -----51
- 51 Flattened or angled (considered flattened when not approximately circular in cross section). In outline ellipsoid, oval, or D shaped-----54
- 54 Surface heavily and distinctly netted, approximately 20 to 40 deep hollows on a side, flattened biconvex, D shaped-----55
- 55 Seeds 2 by 3 - 4 mm., straight edge margined, lite brown or red brown-----  
-----Rubus invisus (Dewberry)  
(Fig. 47. Plate X)
- 55 Seeds 1 - 1.5 by 2 - 2.5 mm.-----56
- 56 Seeds somewhat angled and sides flattened, often about same thickness throughout, irregularly shaped and varies greatly, dark gray-----  
-----Rubus allegeniensis (Blackberry)  
(Fig. 48. Plate X)
- 56 More uniformly convexly flattened with straight (or slightly incurved) edge. Margined edge-----57
- 57 Seeds light gray to sandy color---  
----Rubus aculertissima (Red Raspberry)(Fig. 49. Plate X)
- 57 Seeds dark gray-----  
----Rubus occidentalis (Black Raspberry)(Fig. 50. Plate X)



Fig. 47. Rubus invisus

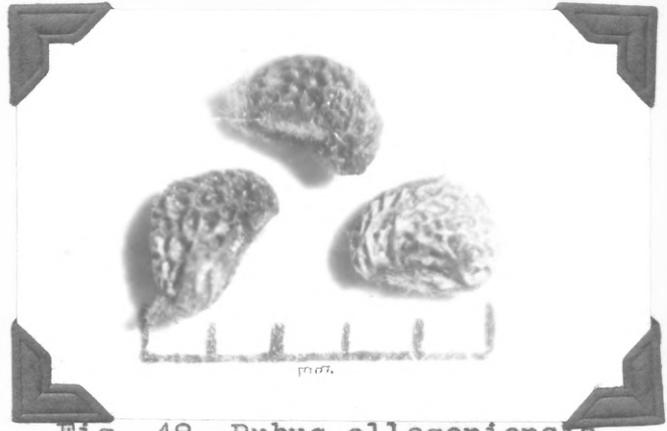


Fig. 48. Rubus allegeniensis



Fig. 49. Rubus aculeatissima



Fig. 50. Rubus occidentalis

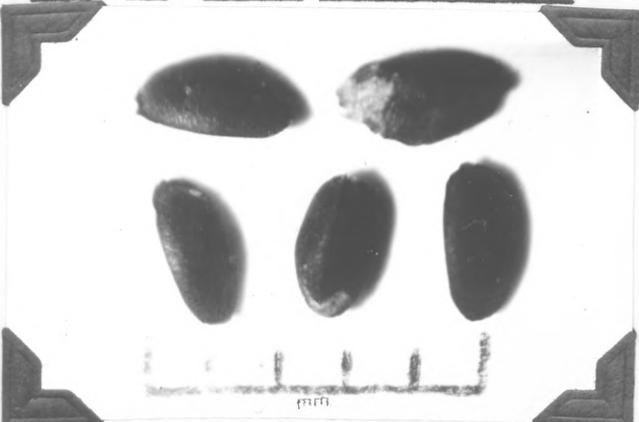


Fig. 51. Betonica officinalis



Fig. 52. Datura sp.

- 54 Surface finely netted or pitted, approximately 50 or more nets or pits per side -----58
- 58 Seeds angled or D shaped, usually cuneate-----59
- 59 Dark brown, "blackish brown"-----60
- 60 1.5 by 2.3 - 2.7 mm. Ellipsoid, 3 faced, one broad and rounding, other 2 flattened alike. Angles margined at one end, other end marked by a broad gray V shaped scar. Surface minutely pitted-----Betonica officinalis (Wood Betony) (Fig. 51. Plate X)
- 60 2.5 - 3 by 3 - 3.5 mm. D shaped or slightly reniform, cuneate, straight edge slightly notched usually, surface minutely pitted and broken into irregular elevations-----Datura sp. (Probably D. stramonium or D. Tatula)(Thorn apple) (Fig. 52. Plate X)
- 59 Light or reddish brown-----61
- 61 Regularly D shaped with broad rim around edge, pits distinct-----62
- 62 Seeds 2 - 2.5 by 3.5 - 4.5 mm., dark red or red brown, edges usually with a distinct rim and often about same thickness clear around. About 0.5 mm. thick at edge. Small scar at one end of straight edge-----Actaea rubra (Red baneberry) (Fig. 53. Plate XI)
- 61 Irregularly D shaped, no broad rim around edge-----63
- 63 Seeds 3 - 5 by 6 - 7 mm., red brown, irregularly D shaped, slightly cuneate. Often narrowed and approaching an ellipse. Surface pits very minute and tend to blend into short lines-----Podophyllum peltatum (May apple) (Fig. 15. Plate IV)
- 63 Seeds 2 - 3 by 3 - 3.5 mm., lite brown, irregularly angled. Various shapes. Often with two sides flat, similar and at right angles with third face rounding. Rarely globose-----Polygonatum commutatum (Great Solomons Seal)(Fig. 54. Plate XI)
- 58 Seeds flattened, not angled or D shaped, cuneate----64
- 64 Large, over 5 mm. longest measurement-----65
- 65 Light brown, 5 - 6 by 7 - 8 mm., very minutely pitted, ovate, slightly flattened, surface often broken by a few slight ridges-----Prunus virginiana (Choke cherry) (Fig. 55. Plate XI)
- 64 Less than 5 mm. longest measurement-----66
- 66 Light "Pecan" brown, with a definite rounded central ridge running about 3/4 length of seed, broadly ovoid to circular, surface pits minute, 2 - 2.5 by 2.5 - 3 mm.-----Lonicera tartarica (Tartarian Honeysuckle) (Fig. 56. Plate XI)



Fig. 53. Actaea rubra

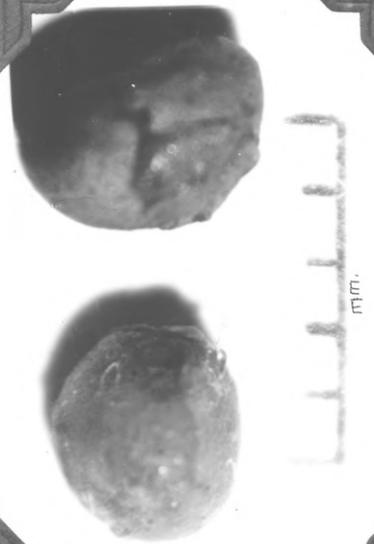


Fig. 54. Polygonatum

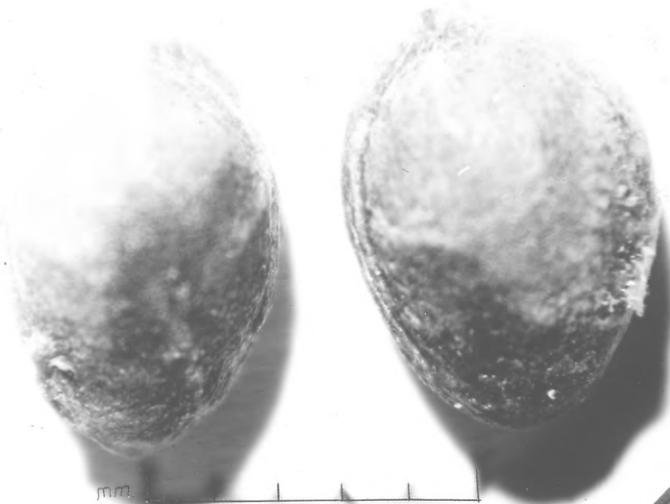


Fig. 55. Prunus virginiana

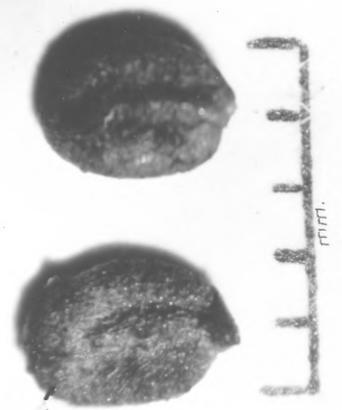


Fig. 56. Lonicera tartarica

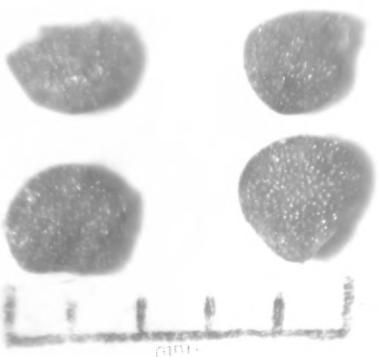


Fig. 57. Physalis ixocarpa

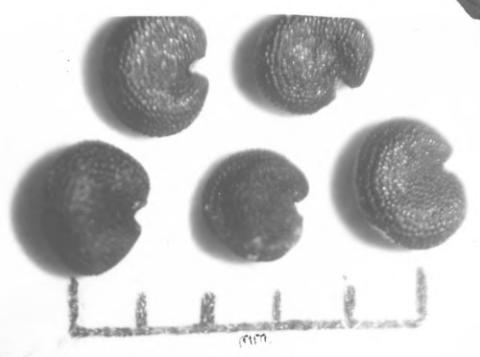


Fig. 58. Lonicera mackii

- 66 Reddish brown-----67  
67 Seeds 1 - 1.5 by 1.5 - 2 mm.-----68  
68 Ovoid to reniform (sometimes almost circular) nets more conspicuous near edge, and tend to parallel the edge, seed distinctly flattened-----  
-----Physalis ixocarpa (Ground cherry)  
(Fig. 57. Plate XI)  
67 Seeds 1.5 - 2 by 2.5 - 3.5 mm.-----69  
69 Ovoid or D shaped, surface pits very minute and roughly circular-----  
-----Lonicera mackii (Honeysuckle)  
(Fig. 58. Plate XI)
- 51 Not flattened, approximately circular or very broadly ovate in cross section-----70  
70 Seeds 1 - 1.5 by 3 - 5 mm.-----71  
71 Ellipsoid, (sometimes globose) surface finely but distinctly netted, sometimes a broad furrow lengthwise, brown-----  
-----Raphanus raphanistrum (Wild radish)  
(Fig. 59. Plate XII)  
70 Seeds 2.5 - 3 by 4.5 - 6 mm.-----72  
72 Elliptical, with a single longitudinal keel, broadly ovate in cross section, surface very minutely dotted with pits, brown-----  
-----Celastrus scandens (Bittersweet)  
(Fig. 60. Plate XII)  
70 Seeds 4.5 by 7 - 9 mm., brown or gray with dark brown or blackish streaks, elliptical or slightly oval, remains of short stalk on narrower end. Surface irregularly minutely pitted-----Benzoin aestivale (Spice Bush)  
(Fig. 61. Plate XII)
- 15 Surface not composed of many hollows, pits or netted---73  
73 Surface very finely tuberculate or granular, appearing as if finely dusted or roughened. Minute tubercles tending to blend together. (Compare with Number 73, page 44) Surface outline even or broken up by broad wrinkles or ridges-----74  
74 Seeds large, 4 mm. or over longest measurement---75  
75 Seeds 12 mm. long or over, stony-----76  
76 Flattened, elliptical, surface wrinkled and leathery, about 5 - 7 mm. by 15 mm., brown  
-----Sicyos angulatus (Wild cucumber)  
(Fig. 62. Plate XII)  
76 Approximately circular in cross section, elliptical, fine sandpapery surface, 5 - 6 by 12 mm., light brown-----  
-----Elaeagnus argentea (Silverberry)  
(Fig. 13. Plate IV)



Fig. 59. Raphanus raphanistrum



Fig. 60. Celastrus scandens



Fig. 61. Benzoin aestivale

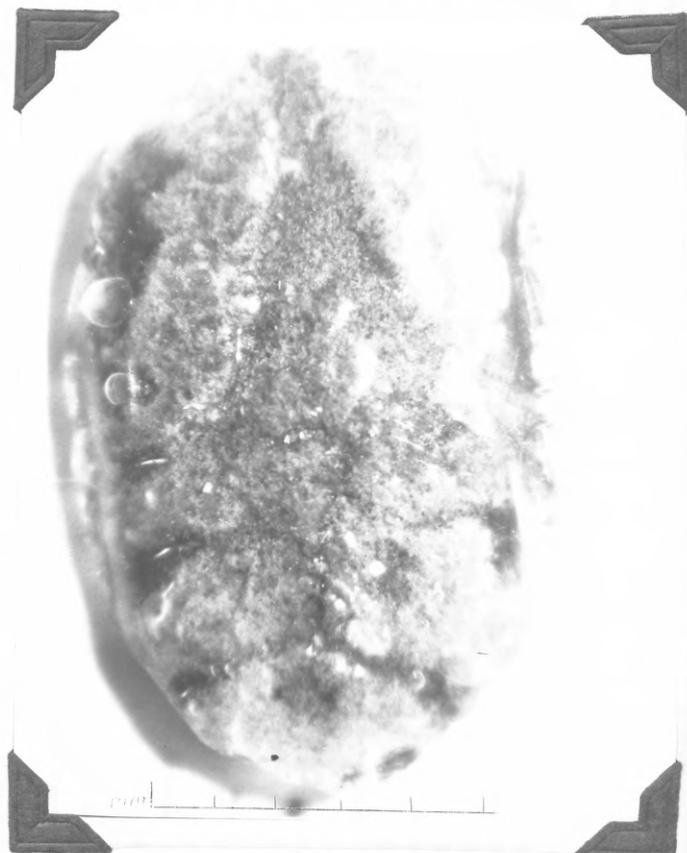


Fig. 62. Sicyos angulatus

- 75 Seeds less than 12 mm. longest measurement -----77
- 77 Seeds enveloped in a transparent papery like sack, broadly ovate, flat, sack 5 by 6 mm., seed body 3 by 4 mm., yellowish brown "cinnamon buff" -----  
-----Lilium philadelphium (Wood lily)  
(Fig. 46. Plate IX)
- 77 Not in a transparent sack-----78
- 78 Approximately globose or semi-globose-----79
- 79 One color, not streaked or spotted-----80
- 80 Yellow or orange-----81
- 81 Either approximately semi-globose or globose, surface irregularly wrinkled, stalked, 4 - 4 mm. in diameter. Orange-----  
---Arisaema triphyllum (Indian turnip)  
(Fig. 38. Plate VIII)
- 81 Approximately globose (rarely semi-globose), surface even, minutely roughened, not stalked but a brown scar present, 4 - 4.5 mm. in diameter, yellow "cinnamon" buff-----  
---Smilacina racemosa (False Solomons Seal)(Fig. 39. Plate VIII)
- 80 Reddish brown, yellowish brown to brown -----82
- 82 Over 3 mm. longest measurement---83
- 83 About 3 - 3.5 mm. longest measurement, light brown, surface may appear minutely pitted upon close observation. Very variable in shape, often with 2 sides flat, similar and at right angles, with third face rounding. Rarely globose  
-Polygonatum commutatum (Great  
(Fig. 54. Plate XI) Solomons Seal)
- 83 Larger, over 3.5 mm. longest measurement-----84
- 84 Very broadly ovoid, often slightly compressed on one or both sides of a central ridge, forming 1 or 2 U shaped faces, central ridge terminating in a scar, surface irregularly wrinkled, "walnut brown". 3.8 - 4 mm. in diameter  
-----Psedera quinquefolia (Virginia creeper)(Fig. 63. XIII)
- 84 Seeds similar to Psedera in shape, but surface more finely tuberculate, sandpapery, cuplike hollow on rounded side, lite or reddish brown, larger, about 5 mm. in diameter-----  
-----Vitis vulpina (Wild grape)  
(Fig. 64. Plate XIII)

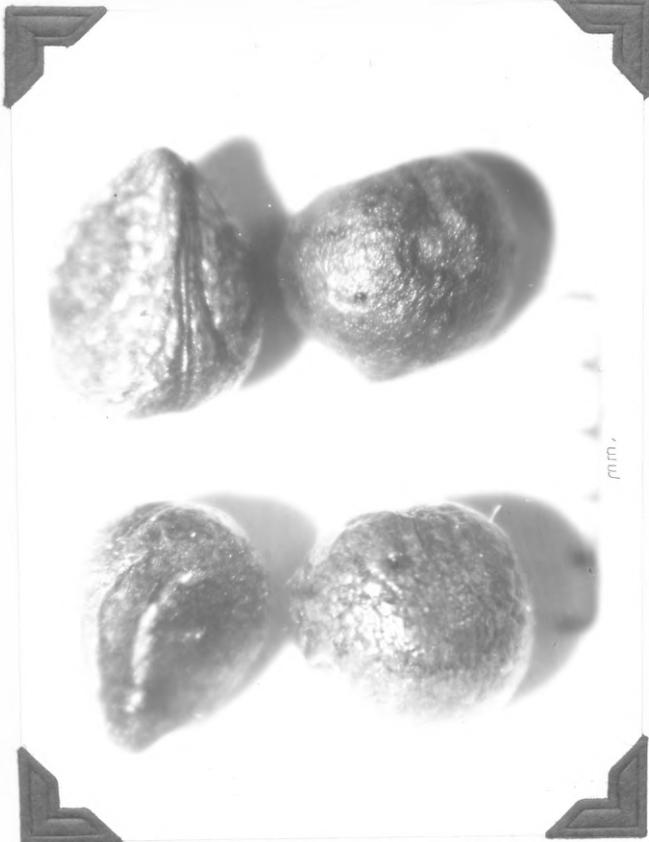


Fig. 63. Psedera quinquefolia

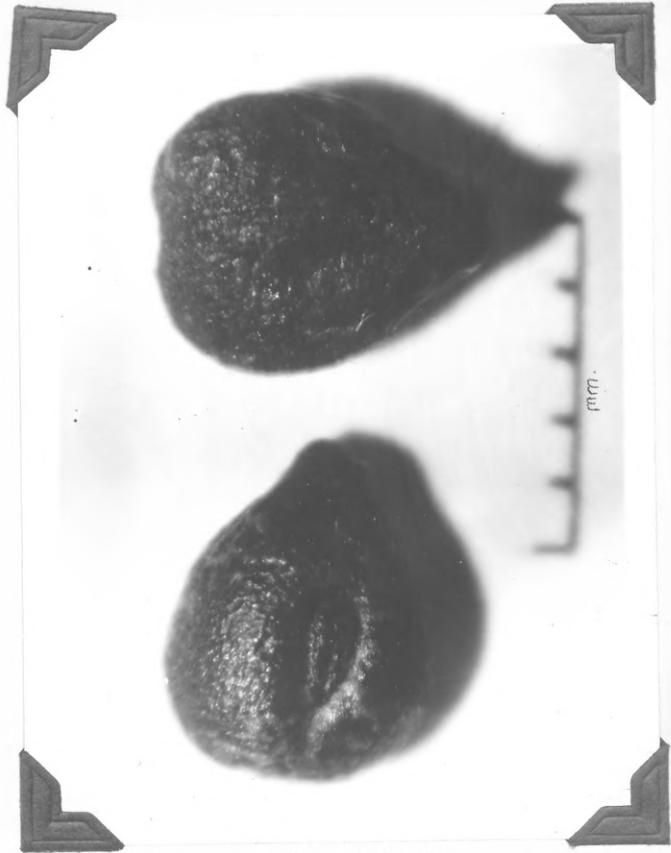


Fig. 64. Vitis vulpina

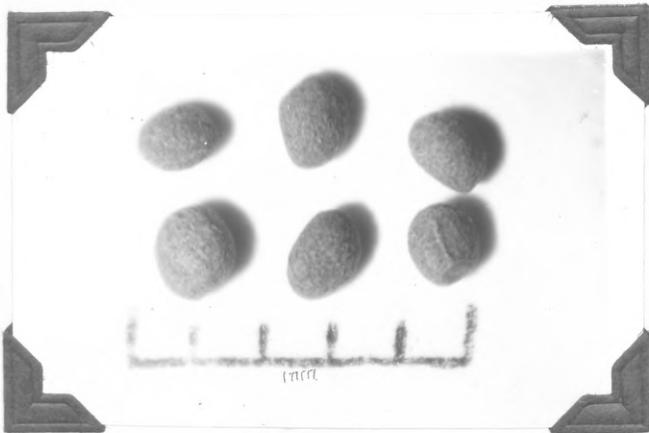


Fig. 65. Cuscuta arvensis

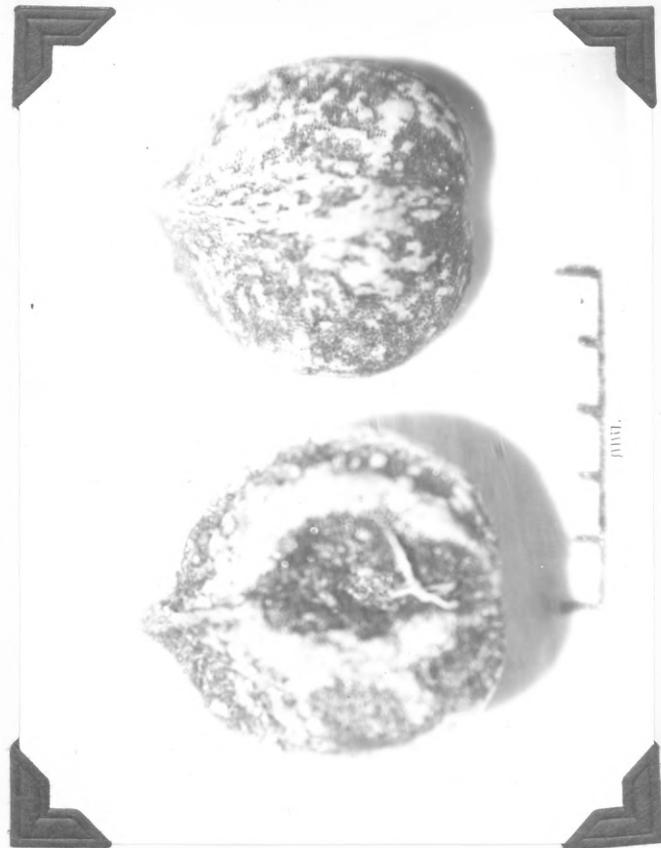


Fig. 66. Viburnum cassinoides

- 82 Seeds 1.5 to 1.8 mm. in diameter, yellow, light to dark brown. Globose or approximately so; one side may be indented from drying. Often broadly oval in outline. May be slightly angled due to crowding in pod. Surface minutely gradular or finely sand-papery. Common with alfalfa-----  
-----Cuscuta arvensis (Field Dodder)  
(Fig. 65. Plate XIII)
- 79 Seeds irregularly striped or streaked-----85  
85 Dark brown, irregularly streaked with gray, semi-spherical, ovoid to circular, a deep hollow on the flat side, rounded side broadly keeled, apex with tip, seed approximately 4 by 5 mm.-----  
-----Viburnum cassinoides (Wild rasin)  
(Fig. 66. Plate XIII)
- 85 Gray streaked with brown, seeds approximately spherical, irregularly deeply hollowed, 4 - 5 mm. in diameter-----Viburnum pubescens (Downy arrowhead)  
(Fig. 67. Plate XIV)
- 78 Distinctly flattened, two sided, not cuneate-----86  
86 D shaped (sometimes approaches a broad ellipse) Margins usually rounded, sides convex, plate or slightly concave, 2 by 4 - 5 mm., olive brown-----  
-----Aralia nudicaulis (Wild sarsparilla)  
(Fig. 68. Plate XIV)
- 86 Broadly ovoid to circular, larger, 4 - 6 by 6 - 10 mm.-87  
87 Seeds light brown-----88  
88 Extremely flattened, thin and almost papery, obovoid, small end truncate, surface appears very finely dusted; wrinkle like hem or margin, one side with longitudinal ridge about 2/3 its length. 7 - 8 by 4 - 6 mm.-----  
-----Asclepias incarnata (Swamp milkweed)  
(Fig. 69. Plate XIV)
- 88 Not extremely flat or papery. Ovate, flattened biconvex, surface very minutely dusted or pitted, often broken by a few slight ridges or lines, 5 - 6 by 7 - 8 mm.-----  
-----Prunus virginiana (Choke cherry)  
(Fig. 55. Plate XI)
- 87 Seeds dark brown-----89  
89 About 5 by 7 mm., usually with remains of a terminal stock present, sides with distinct longitudinal ridge separating 2 shallow grooves, often very finely pubescent-----  
-----Viburnum acerfolium (Maple leaf Vibernum)(Fig. 70. Plate XIV)
- 89 About 7 by 8 mm., broadly ovoid to elliptical, one surface flat, other slightly convex, slight ridge often evident down center longitudinally-----Viburnum lentago (Sweet Vibernum)  
(Fig. 71. Plate XV)

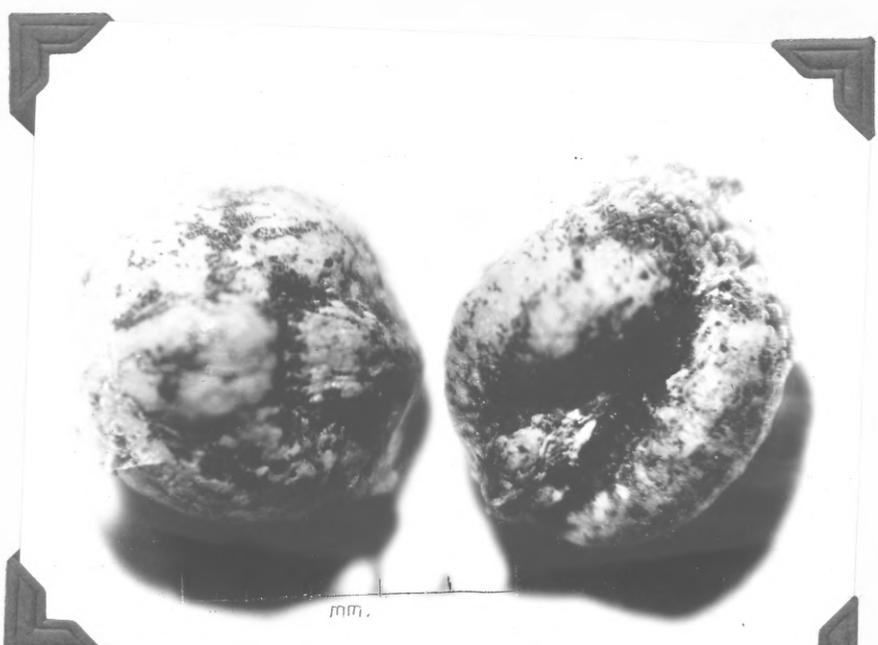


Fig. 67. Vibernum pubescens



Fig. 68. Aralia *Aronia*  
nudicaulis



Fig. 69. Asclepias incarnata



Fig. 70. Vibernum acerfolium

- 89 About 8 by 10 mm. Usually more evenly flattened biconvex. Otherwise very similar to *V. lentago*  
-----*Vibernum prunifolium* (Black Haw)  
(Fig. 72. Plate XV)
- 87 Light gray to pinkish cinnamon, irregularly streaked-90  
90 Pinkish cinnamon, one side convex to flat, other usually concave, 5 - 6 by 7 - 8 mm.-----  
-----*Vibernum opulus* (Hibush cranberry)  
(Fig. 73. Plate XV)
- 90 Gray streaked or brown spotted, sides often with shallow ovate groove, 4 - 5 by 6 - 7 mm.-----  
-----*Vibernum lanata* (Wayfaring tree)  
(Fig. 74. Plate XV)
- 86 Narrowly ovoid to elliptical, 2 -3 by 4 - 5 mm.-----91  
91 With an irregular central longitudinal ridge on outer covering. Evenly flattened biconvex or plane. Small hole on narrow end under outer covering-----  
-----*Symphoricarpos occidentalis* (Snow-berry)(Fig. 75. Plate XVI)
- 78 Seeds roughly D shaped and cuneate, or angled with angles not keeled-----92  
92 Seeds black-----93  
93 D shaped and cuneate, 3 - 4 by 4 - 5 mm. Face opposite acute angle broadly furrowed, other two faces usually deeply wrinkled by 1 - 3 hollows. Often with a fine white pubescence. (Surface like emery paper)  
-----*Ipomera sp.*(Morning Glory)  
(Fig. 76. Plate XVI)
- 92 Not black-----94  
94 2 - 4 by 4 - 4.5 mm., yellow or light brown, very irregularly angled and shaped. Usually ovoid in outline. Varys from semi-circular in cross section to one to many angled. Surface granular-----  
-----*Rosa multiflora* (Rambler rose)(Fig.77)
- 94 3 - 5 by 5 - 7 mm., reddish brown, face opposite acute angle rounding and narrow, i.e. reduced to a broad edge. Irregularly D shaped, but sometimes narrowed and approaching an ellipse-----  
-----*Podophyllum peltatum* (May apple)  
(Fig. 15. Plate IV)
- 94 Face opposite acute angle 2 - 3 mm. broad-----95  
95 Light "pecan" brown, often tinged with red, 5 - 6 mm. long. D shaped, cuneate, 2 faces similar and often shrunken, third rounding. Very finely roughened-----*Aronia arbutifolia* (Choke berry)  
(Fig. 78. Plate XVI)
- 95 Light cream, 4 - 5 mm. long, surface minutely granular-----*Ilex verticillata* (Michigan holly)  
(Fig. 79. Plate XVI)

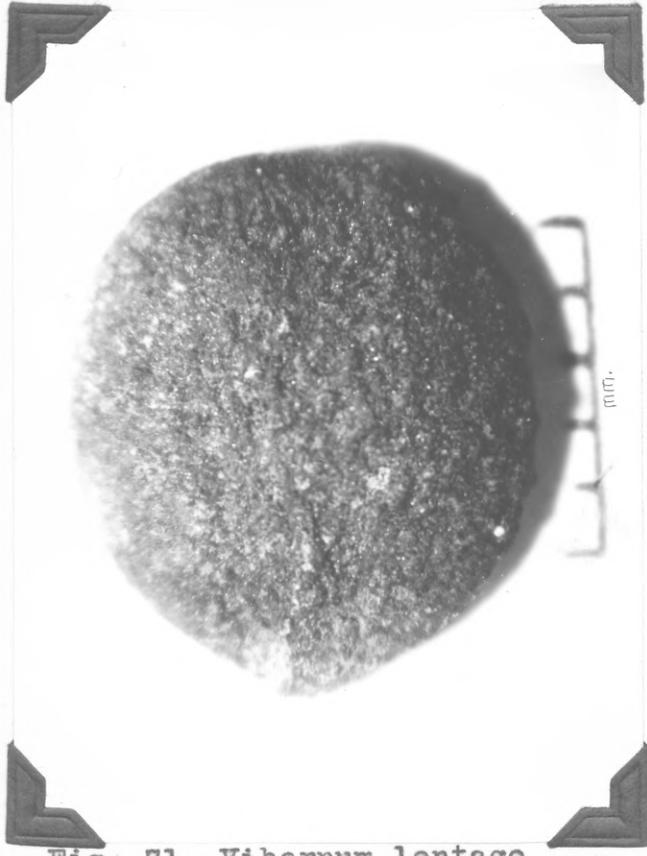


Fig. 71. Vibernum lentago

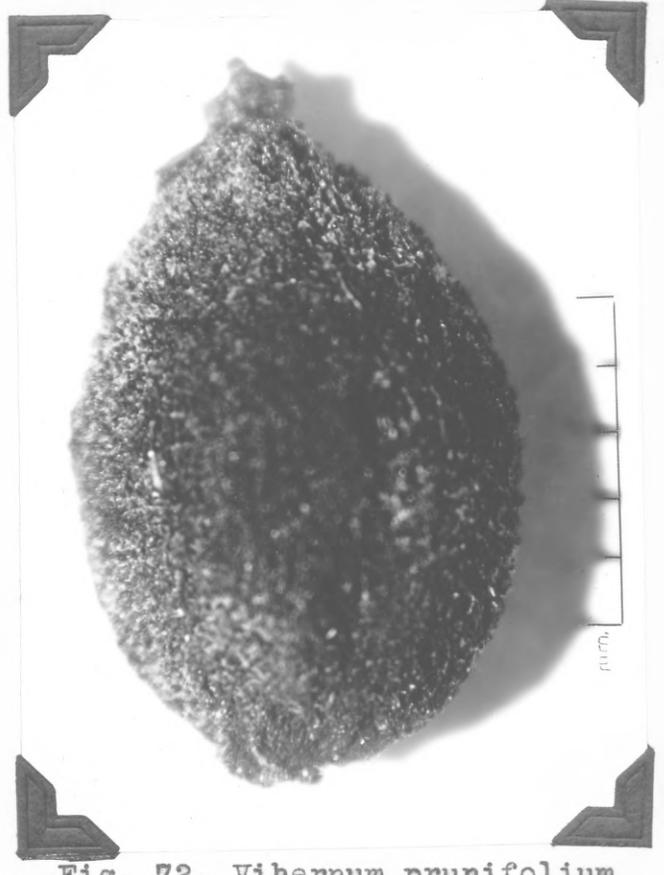


Fig. 72. Vibernum prunifolium

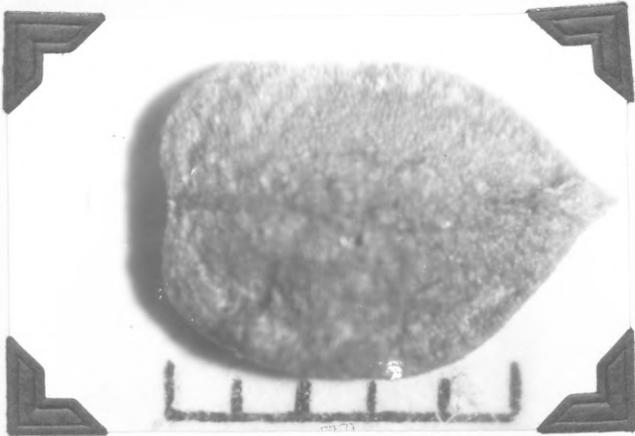


Fig. 73. Vibernum opulus



Fig. 74. Vibernum lanata

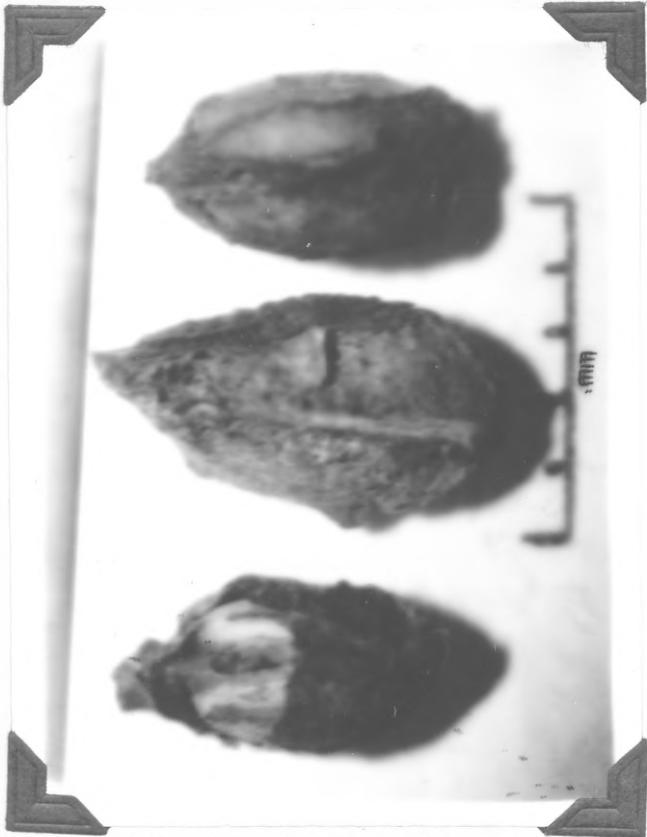


Fig. 75. Symphoricarpos occidentalis



Fig. 76. Ipomera sp.



Fig. 77. Rosa multiflora

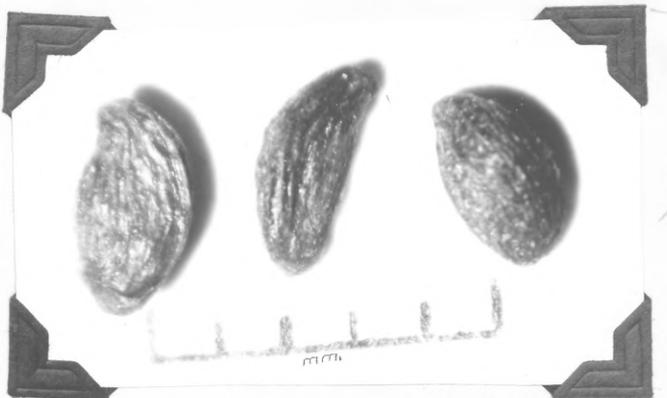


Fig. 78. Aronia arbutifolia

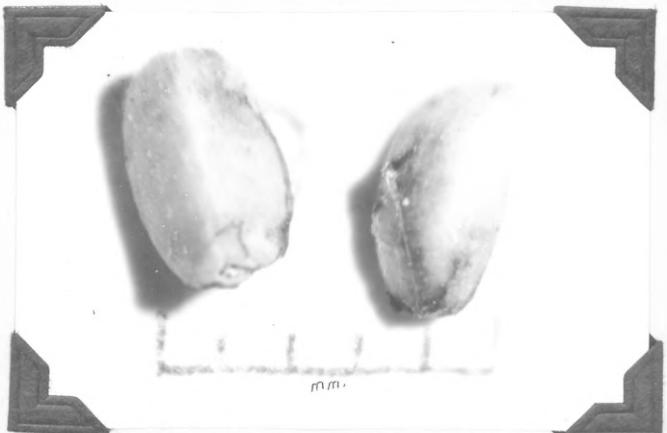


Fig. 79. Ilex verticillata

- 78 Seeds 3 - 6 angled with angles keeled or ridged-----96  
 96 Seeds four angled, gray brown or straw color-----97  
 97 Slightly flattened, ellipsoid, to ovoid,  
 narrow end truncate often, gray brown, 2.5  
 - 3 by 5 - 6 mm. -----  
 -----Impatiens biflorum (Jewel weed)  
 (Fig. 80. Plate XVII)
- 97 Square in cross section, approximately rect-  
 angular, a longitudinal rib down each face  
 and angle (eight ribs in all), surface minutely  
 hairy, about 1 by 3.5 - 4 mm., straw color----  
 -----Dipsacus sylvestris (Teasel)(Fig.81)
- 96 Achenes 3 - 5 angled or rarely appearing flattened  
 biconvex, blackish brown or dull brown spotted with  
 black-----98  
 98 Dull brown often spotted with black, about 2 mm.  
 broad end by 5 - 6 mm. long. Lanceolate, straight  
 or curved, ends truncate, surface often broken  
 by fine ridges-Arctium minus (Common burdock)  
 (Fig. 82. Plate XVII)
- 98 Very dark brown or "blackish brown. 1.6 by  
 2.3 - 2.7 mm. Ellipsoid, 3 faced, one face broad  
 and rounding, other two flattened alike. Angles  
 margined at one end; other marked by a broad  
 gray V shaped scar-----  
 -----Betonica officinalis (Wood Betony)  
 (Fig. 51. Plate X)
- 74 Seeds less than 4 mm. longest measurement -----99  
 99 Less than 2 mm. longest measurement -----100  
 100 Angled, margins or angles distinct and sharp---101  
 101 Three angles, appears very broadly elliptical  
 to circular when placed on largest face,  
 faces flat or slightly concave; two similar  
 and third broader. Margin of broad face  
 minutely incised. Brown, about 1 by 1.2mm.  
 -----Anagallis arvensis (Pimpernel)  
 (Fig. 83. Plate XVII)
- 101 Three to many angles, very irregular, often  
 pear shaped with apex truncate but may be any  
 shape, gray brown to gray-----  
 -----Decodon verticillatus (Swamp  
 loosestrife)(Fig. 84. Plate XVII)
- 100 Not angled, or if appearing so, margins or angles  
 broadly rounded-----102  
 102 Circular in cross section, broadly obovoid to  
 globose, a ridge (hilum) extending about one  
 third length from end. Tubercles often in  
 irregular lines, dark gray or reddish brown-  
 -----Acalpha virginica (3 seeded  
 mercury)(Fig. 85. Plate XVIII)



Fig. 80. Impatiens biflorum



Fig. 81. Dipsacus sylvestris

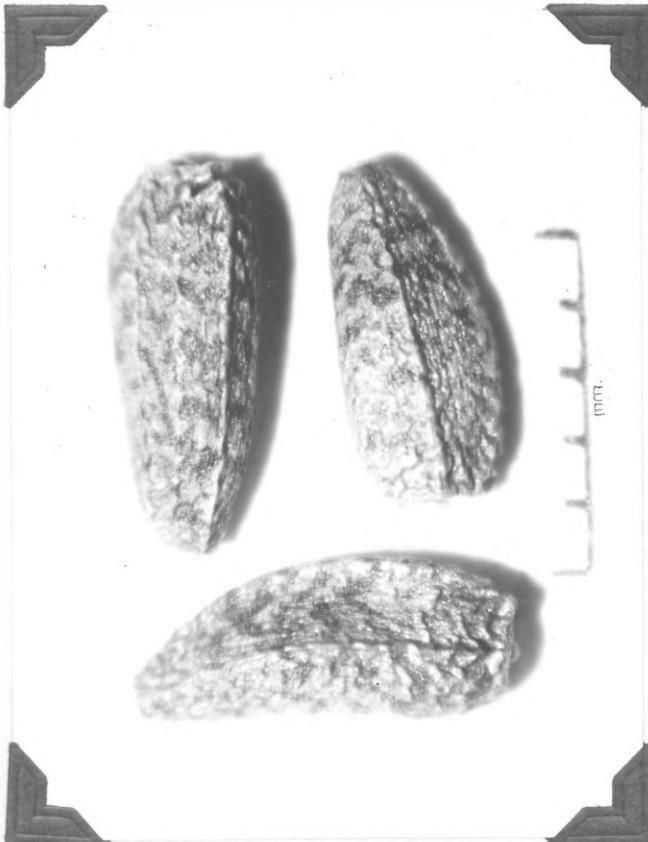


Fig. 82. Arctium minus

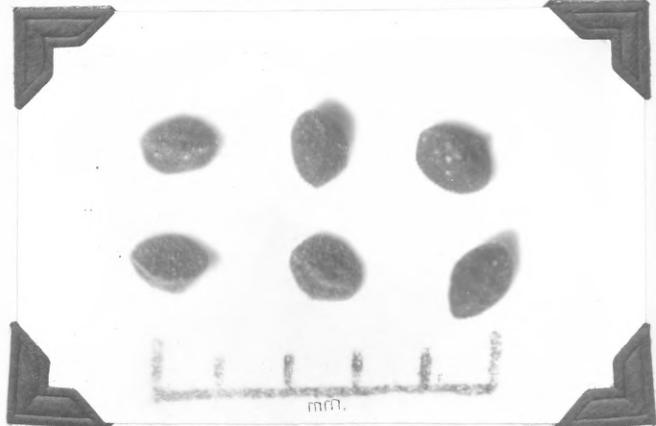


Fig. 83. Anagallis arvensis



Fig. 84. Decodon verticillatus

- 102 Not circular in cross section -----103
- 103 Notched, approximately circular in outline,  
wedge shaped toward the notch, sides concave,  
light brown-----Malva rotundifolia (Mallow)  
(Fig. 86. Plate XVIII)
- 103 Not circular in outline-----104
- 104 Seeds with small white triangular appendage,  
obovoid, slightly flattened, one side more  
flattened than the other, each side approx-  
imately equally divided by a pair of closed  
dark lines, surface minutely roughened, light  
to dark brown, about 1 by 2 mm.-----  
-----Prunella vulgaris (Corn speedwell)  
(Fig. 87. Plate XVIII)(Self heal)
- 104 With no terminal appendage, with central scar  
on one side, ovoid, 0.7 - 1 mm. long, ends  
slightly bent inward, dull light yellow-----  
-----Veronica arvensis (Corn speedwell)
- 104 Not centrally scarred, 1 - 2 mm. long-----105
- 105 Each side bearing 2 longitudinal grooves  
separating surface into 3 similar parts,  
oblong, reddish yellow-----  
-----Capsella bursa pastoris (Shepards  
purse)(Fig. 88. Plate XVIII)
- 105 Seeds with a single longitudinal ridge or  
groove-----106
- 106 Seeds two sided, equally flattened, one  
edge straight and other rounding,  
ovoid to rehiform, 1.5 - 1.8 mm.  
long, reddish yellow-----107
- 107 With a slight wing on broad end  
and round edge-----  
-----Lepidium virginicum (Wild pepper  
grass)(Fig. 89. Plate XVIII)
- 107 No wing on edge and end-----  
-----Lepidium apetalum (Pepper grass)
- 106 Sides not equally flattened, very  
irregularly shaped-----108
- 108 Longitudinal groove or ridge in-  
distinct, seeds any shape from  
oval to rectangular, center  
often circular in cross section  
and tapering to ends, light brown  
to gray-----  
-----Barbarea vulgaris (Wintercress)  
(Fig. 90. Plate XVIII)

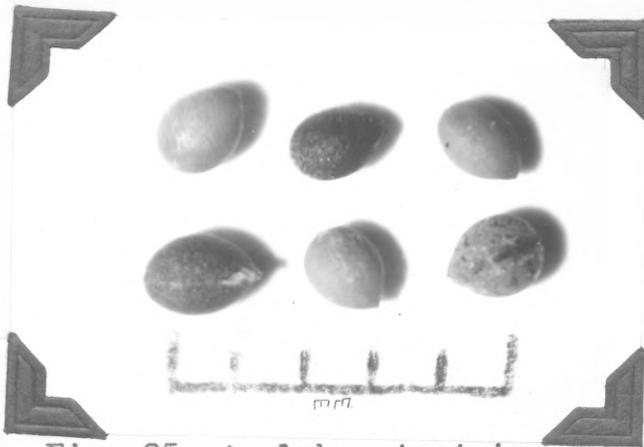


Fig. 85. Acalpha virginica

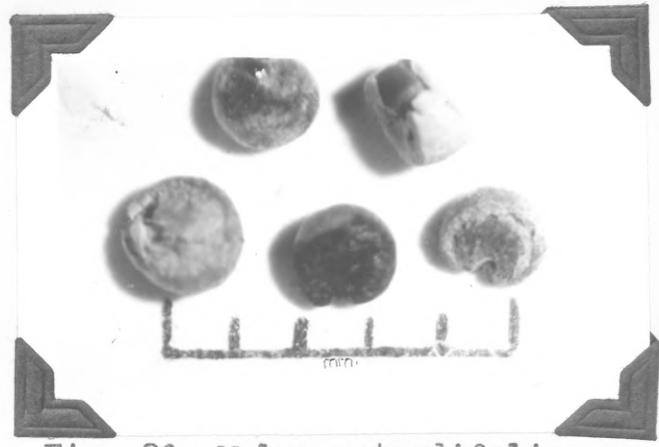


Fig. 86. Malva rotundifolia

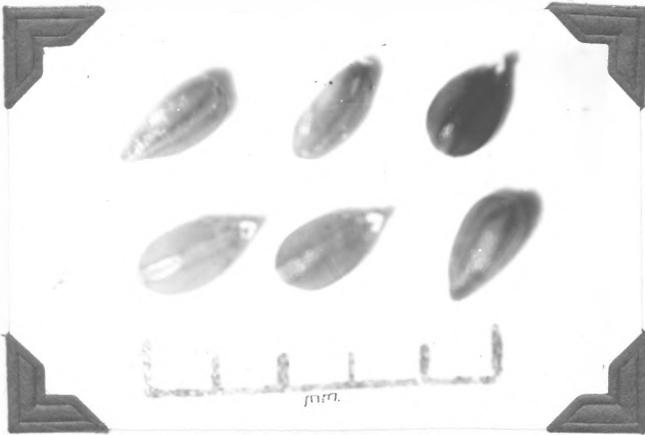


Fig. 87. Prunella vulgaris

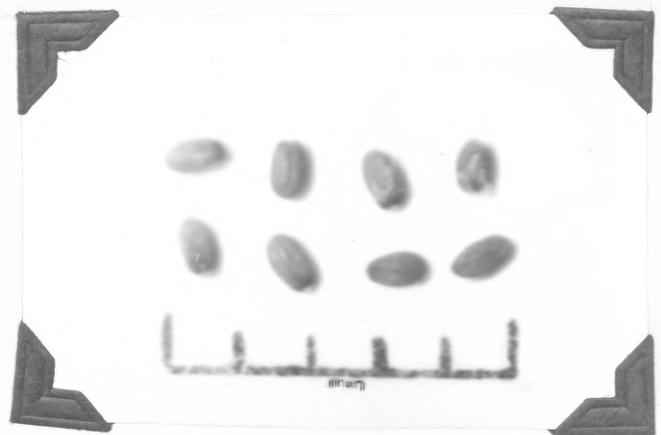


Fig. 88. Capsella bursa pastoris

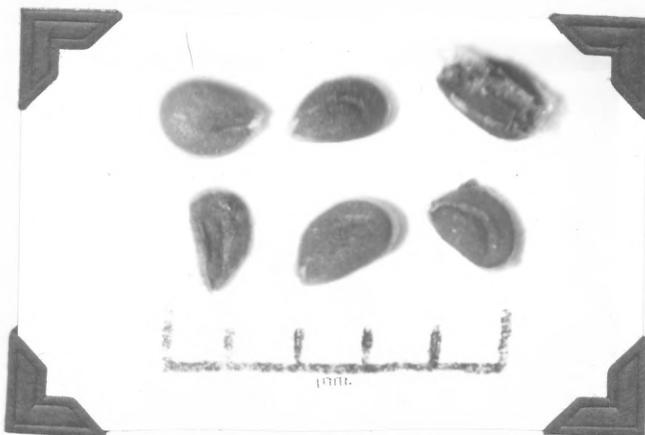


Fig. 89. Lepidium virginicum

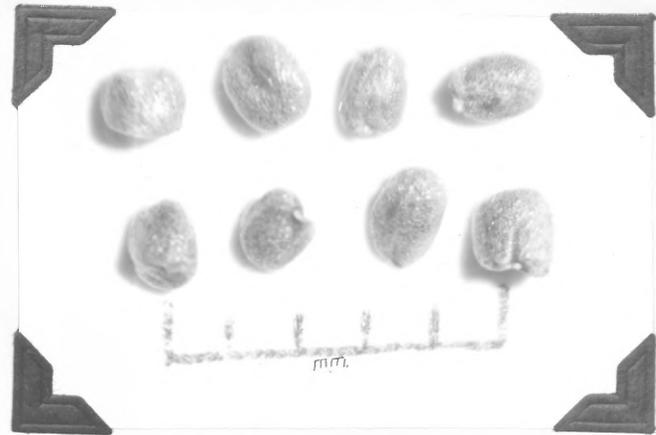


Fig. 90. Barbarea vulgaris

- 108 Longitudinal groove or ridge distinct,  
seeds reddish brown to yellow-----109
- 109 Seeds usually elliptical with one end  
bluntly truncated, approximately  
circular in cross section at middle  
and tapering to ends, surface minutely  
roughened, reddish brown to yellow,  
1 - 1.5 mm. long-----  
-----Sisymbrium officinale (Hedge Mustard)  
(Fig. 91. Plate XIX)
- 109 Very similar to S. officinale; ends  
usually more pointed-----  
-----Erysimum cheiranthoides (Worm  
seed mustard)(Fig. 92. Plate XIX)
- 109 Usually broad oval, ends not truncate,  
slightly flattened, general outline  
more rounding than Sisymbrium or Erysimum,  
reddish brown, 1-1.5 mm. long-----  
-----Camelina microcarpa (Small fruited  
else flax)(Fig. 93. Plate XIX)
- 105 Seeds not grooved-----110
- 110 Dull red brown, 1.2 by 1.3 - 1.7 mm. Has  
two lateral cavities at base full of chalky  
white tissue, elliptical, slightly flattened  
-----Nepeta Cataria (Catnip)  
(Fig. 94. Plate XIX)
- 99 Average 2 mm. or over longest measurement (less than 4 mm.)  
-----111
- 111 Seeds 3 angled, 3 faces similar, or evenly flattened  
biconvex, outline broadly ovate-----112
- 112 Surface tubercles or granules appearing  
striate lengthwise-----113
- 113 Dark red brown, about 1 mm. across face  
by 2 - 3 mm. long, flattened biconvex or  
3 faced, elliptical, apex acute, surface  
dull-----Polygonum Hydropiper (Smart weed)  
(Fig. 95. Plate XIX)
- 113 Jet black, about 2.8 mm. across face by 3  
mm. long, flattened and often slight ridge  
on center of one face, other slightly  
depressed, short abrupt apex-----  
-----Polygonum Pennsylvanicum (Penn.  
(Fig. 96.. Plate XIX) Persicaria)
- 113 Very similar to Polygonum Pennsylvanicum  
except smaller; about 1.8 by 2 - 2.3 mm.-----  
-----Polygonum persicaria (Ladys thumb)  
(Fig. 97. Plate XX)
- 111 Seeds 3 to many angled, faces not similar,  
irregular-----114



Fig. 91. *Sisymbrium officinale*

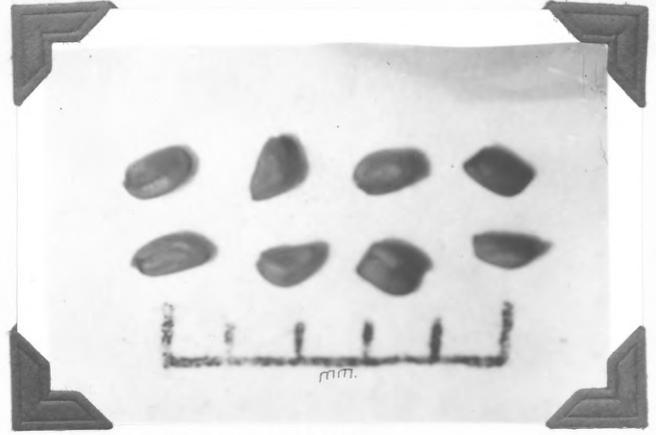


Fig. 92 *Erysimum cheiranthoides*

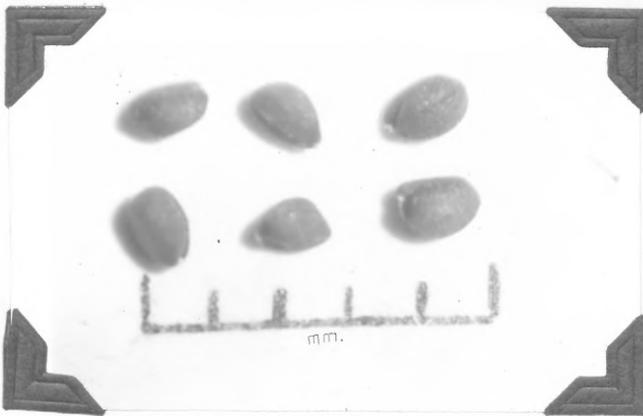


Fig. 93. *Camelina microcarpa*

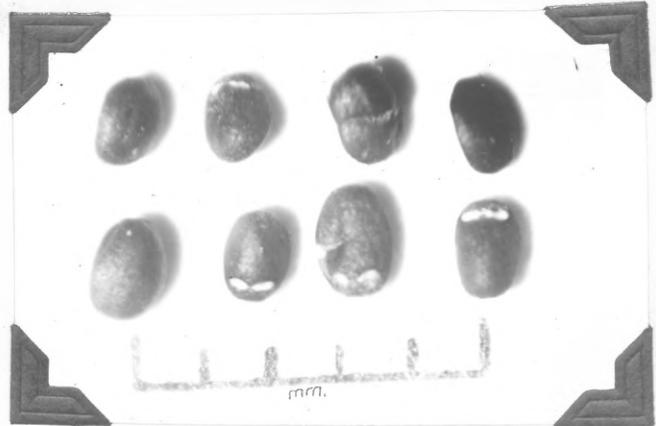


Fig. 94. *Nepeta Cataria*

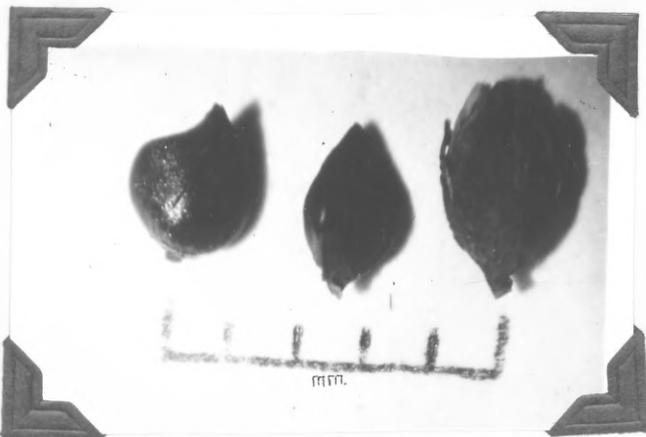
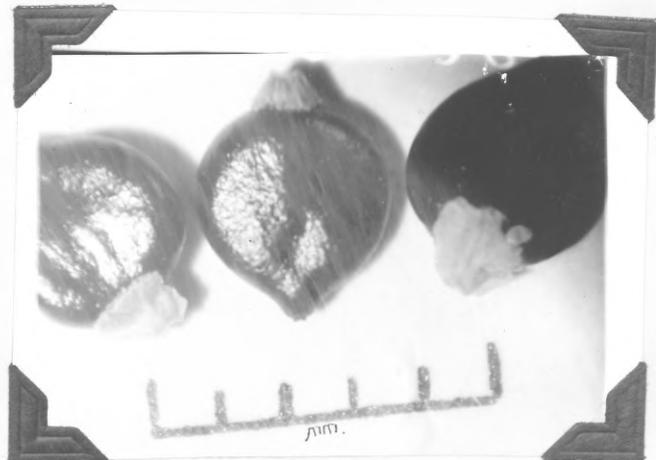


Fig. 95. *Polygonum Hydropiper*



*Polygonum Pennsylvanicum*  
Fig. 96.

- 114 Aprx truncate and cup like with a tubercle in center, lite brown, 2 - 3 mm. long, slightly flattened or 3 to many angled. Narrowly obovoid or oblong, curved or straight. Surface very minutely tuberculate or granular-Cirsium arvense (Canada thistle) (Fig. 98. Plate XX)
- 114 With no cup like apex -----115
- 115 Very dark brown to black, very variable in shape, oval, oblong, rhomboidal, edges between faces not margined, scar usually about in center on one side, 1.5 - 2.5 mm. long-----  
-----Plantago rugelli (Broad leaved plantain)(
- 115 Reddish brown, edges between faces margined -----116
- 116 Surface minutely ridged, shape usually 4 to 5 sided and often somewhat pyramidal, angles acute or with wing like border. Seeds 2 - 2.5 mm. long-----  
---Oenothera biennis (Evening primrose) (Fig. 99. Plate XX)
- 116 Surface not minutely ridged, evenly roughened or sometimes very faintly netted, very variable, usually 3 - 4 sided, very rarely flattened 2 sided, faces unevenly flattened and angles usually with wing like margin. 2 - 4 mm. long-----  
---Dodecatheon media (Shooting star) (Fig. 100. Plate XX)
- 111 Not 3 angled or as above-----117
- 117 Roughly star shaped in cross-section-----118
- 118 Very broadly ovate to circular in outline, fine broken lines or ridges sometimes visible on each face, about 2.5 by 2.5 mm., lite brown-----Aralia hispida (Bristly sasaparilla) (Fig. 101. Plate XX)
- 118 Identical with A. hispida, except often slightly smaller, more sharply angled and lighter buff color-----  
-----Aralia spinosa(Hercules club) (Fig.102)
- 117 Not star shaped in cross section-----119
- 119 Seeds hollowed out on one side, looks like a shallow canoe, elliptical to narrowly obovoid in outline, ends rounded alike----120
- 120 Outer face marked by single distinct shallow transverse groove, 2 small white margined pits in middle of concave side, surrounded by a lite colored elliptical

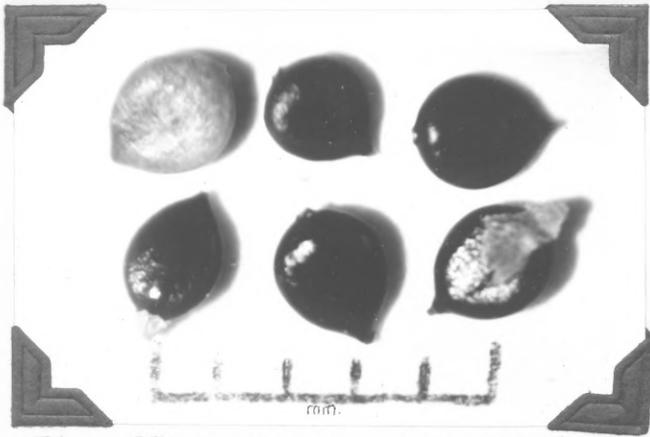


Fig. 97. Polygonum persicaria



Fig. 98. Cirsium arvense

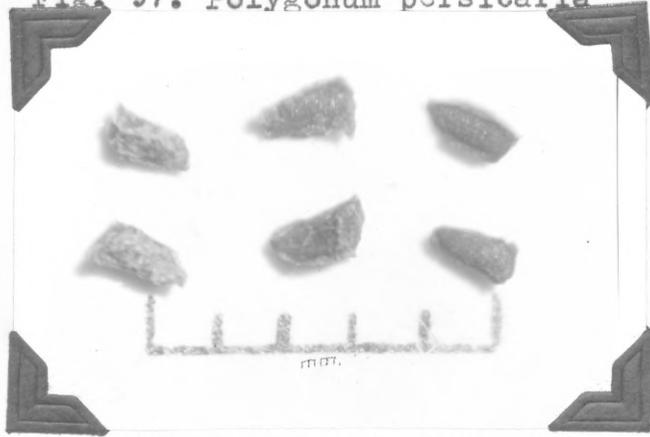


Fig. 99. Oenothera biennis

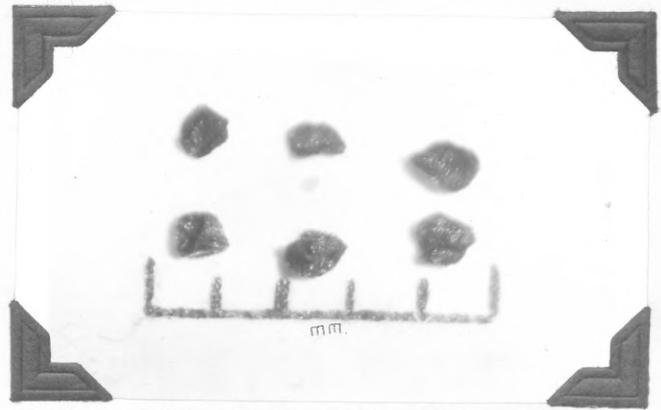


Fig. 100. Dodecatheon media



Fig. 101. Aralia hispida



Fig. 102. Aralia spinosa

- band. Dull, lite to dark brown, 2 - 2.4 mm.  
long-----Plantago aristata (Braced plantain)  
(Fig. 103. Plate XXI)
- 120 Outer face not marked by transverse groove, or  
if so very faint, dark scar in center of  
concave side and no lite colored band. 2 - 2.5  
mm. long, amber to brown-----  
-----Plantago lanceolata or Rhamnus sp.\*  
(Narrow leaved plantain)(Buckthorn)  
(Fig. 104 and Fig. 105. Plate XXI)
- 119 Not hollowed out on one side or as above-----121  
121 Seeds distinctly flattened, either D shaped,  
ovoid, or roughly circular in outline-----122  
122 Cuneate, ovoid, sides flattened, about  
2 by 2 - 3 mm., cream-buff, surface appears  
pebbled---Gaylussacia frondosa (Dangle berry)  
(Fig. 106. Plate XXI)
- 122 Not cuneate. D shaped, ovoid or approximately  
circular in outline; seeds may be hooked or  
beaked-----123  
123 With one end slightly hooked, a scar at  
the base of hook, sides rounded or  
flattened, edge below hook nearly straight,  
3 - 4 by 1.5 - 2 mm. Reddish brown or  
black-Amelanchier canadensis (Shad bush)  
(Fig. 107. Plate XXI)
- 123 Seeds distinctly notched or beaked-----124  
124 Single shallow notch at one edge,  
scar on inner side of notch, Seeds  
broadly obovoid to roughly circular,  
flattened, surface tubercles blunt  
and sometimes in form of minute  
ridges, creamy buff, 2.5 - 3 mm.  
longest measurement-----  
--Lycium halimifolium (Matrimony vine)(Fig.  
124 Two beaked, one beak larger and often/108)  
slightly curved. D shaped to ovoid,  
margin slightly keel like, 3 - 4 mm.  
buff to dark brown-----  
--Ranunculus acris (Tall buttercup)  
(Fig. 109. Plate XXII)
- 123 Not notched, or if so very slightly; not  
beaked-----125  
125 Gray olive or rarely brown, about 2.5  
by 3.5 mm., ovoid, flattened biconvex,  
2 mm thick. Slight furrow about  
three-fourths way around edge terminating  
in a small scar. Sandpapery surface---  
--Rhus typhina (Staghorn Sumac)  
(Fig. 110. Plate XXII)

\* Too many similar external characters to distinguish between.

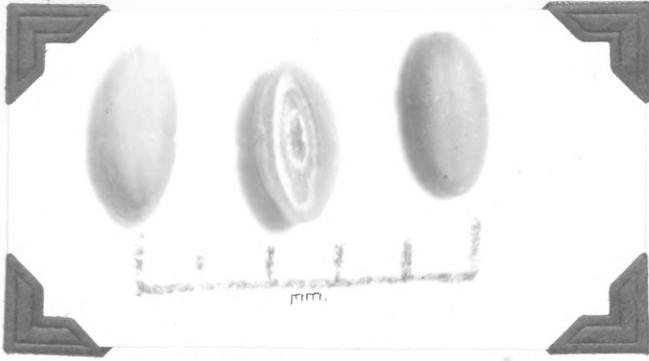


Fig. 103. Plantago aristata



Fig. 104. Plantago lanceolata



Fig. 105. Rhamnus sp.



Fig. 106. Gaylussacia frondosa



Fig. 107. Amelanchier canadensis

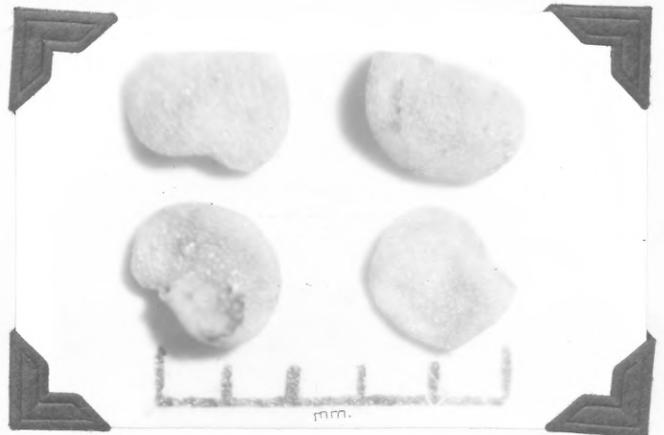


Fig. 108. Lycium halimifolium

- 121 Not distinctly flattened, roughly circular to very broadly elliptical in cross section-----126
- 126 Kidney shaped in outline, usually encircled by a groove terminating in a notch, about 3 - 3.5 mm. longest measurement, lite yellow to almost white-----Rhus toxicodendron (Poison Ivy) (Fig. 111. Plate XXII)
- 126 Ovate, elliptical to roughly circular in outline--127
- 127 Apex truncate and cup like with a tubercle in center. Light brown, 2 - 3 mm. long. Slightly flattened or 3 to many angled. Narrowly obovoid to oblong, curved or straight. Surface very minutely tuberculate or granular-----Cirsium arvense (Canada thistle) (Fig. 98. Plate XX)
- 127 With no cup like apex-----128
- 128 Buff color, very broadly elliptical to circular, 2.5 - 3 by 3 - 3.5 mm., surface wrinkled---Maianthemum canadense (False lily of valley)(Fig. 112. Plate XXII)
- 128 Blackish, brown or gray, obovoid with acute base, often slightly flattened on 3 sides, slight groove running about three-fourths length from base on opposite sides, 2 - 2.5 mm. long, surface like fine sandpaper-----Lepidium campestre (Field pepper grass)(Fig. 113. Plate XXII)
- 73 Surface with very distinct tubercles, blunt teeth like raised areas, the surface prominences larger and tend to stand out separately-----129
- 129 Seeds 2 mm or less longest measurement-----130
- 130 Seeds 1 mm. or less longest measurement-----131
- 131 About 0.5 mm. longest measurement, circular to slightly convexly flattened and slightly cuneate toward the notch, dull gray to red brown-----Arenaria serphyllifolia (Thyme leaved sandwort)(Fig. 114. Plate XXII)
- 131 Over 0.5 longest measurement-----132
- 132 Jet black shining, broadly oval in outline, flattened, edges rounding, slightly cuneate toward scar, furrowed about  $\frac{1}{4}$  way back from scar, surface tubercles appear star like, about 0.8 mm. long-----Portulaca oleraceae (Purslane) (Fig. 115. Plate XXIII)
- 132 Dull reddish yellow to brown-----133
- 133 Tubercles on side star like from above, in approximate concentric circles from notch, circular to broadly ovate in outline, flattened, about 0.8 - 0.9 mm. across-----Stellaria media (Common chickweed) (Fig. 116. Plate XXIII)



Fig. 109. Ranunculus acris



Fig. 110. Rhus typhina



Fig. 111. Rhus toxicodendron



Fig. 112. Maianthemum canadense

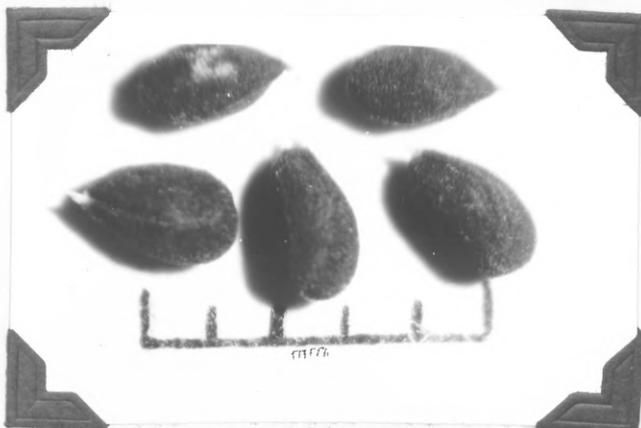


Fig. 113. Lepidium campestre

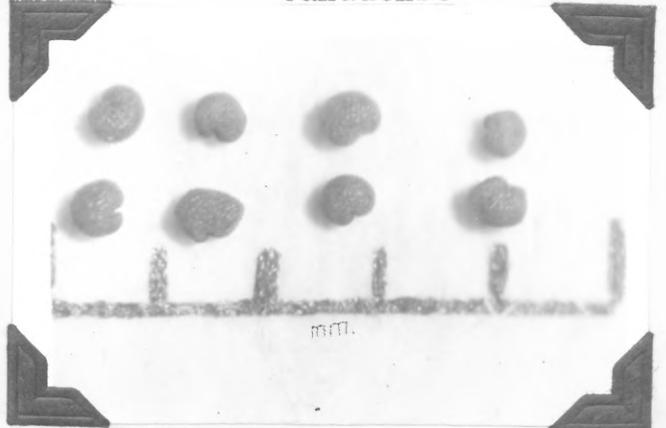


Fig. 114. Arenaria serpyllifolia

- 133 Tubercles on side appear as irregular shaped patches, not in concentric circles from notch, flattened plane or convex, ovate to circular in outline, shallow notch on edge about 0.8 mm. across-----  
-----Cerastium vulgatum (Mouse ear  
(Fig. 117. Plate XXIII)chickweed)
- 130 Seeds average over 1 mm. up to 2 mm. longest measurement-----134
- 134 Broadly ovate to circular in outline-----135
- 135 With a wing or sac like margin or envelope-136
- 136 Black or very dark brown, flat, wing margin notched and covered by numerous fine radiating ridges and central seed surface tuberculate. Seed and margin 1.5 - 2 mm. longest measurement  
-----Linaria vulgaris (Butter and eggs)  
(Fig. 118. Plate XXIII)
- 136 Creamy yellow, seed body at base of sac like margin, seed and margin ovate and apex of margin pointed, seed and margin approximately 1.2 by 1.5 mm.  
-----Boehmeria cylindrica (False nettle)  
(Fig. 119. Plate XXIII)
- 135 Without a wing or sac like margin or envelope-----137
- 137 Gray, short kidney shaped to circular. Slightly flattened with notch in one edge, tubercles with black spot on top and serrate edges (looks like tiny cog wheels). About 1.1 by 1.2 - 1.3 mm. ----Lychnis alba (White campion)  
(Fig. 120. Plate XXIII)
- 137 Dark lead color to black, short kidney shaped to circular, flattened convexly, quite deeply notched on one edge, 5 to 8 curved rows of short blunt shiny tubercles, edges not serrate, about 1.8 by 2 mm.-----  
-----Saponaria officinalis (Bouncing Betty)  
(Fig. 121. Plate XXIII)
- 134 Narrowly obovoid to oblong in outline, slightly cuneate, ends rounded or truncated, circular to slightly 4 angled in cross section, tubercles in approximately 10 longitudinal rows, 1.3 - 1.6 by 0.5 - 0.6 mm., light brown or creamy yellow-Anthemis cotula (Mayweed, Dogs  
(Fig. 122. Plate XXIII)fennel)

- 129 Over 2 mm. longest measurement-----138  
 138 Average 5 mm. or over longest measurement-----139  
 139 Extremely flattened, obovate, small end truncate, wing margined, raised areas on convex side in form of short ridges, concave side single longitudinal ridge; while in pod small end has tuft of silky hair, seed 6 - 9 mm. long by 3 - 5 mm., light brown-----  
 -----Asclepias syriaca (Common milkweed)  
 (Fig. 123. XXIV)
- 139 Not extremely flattened, approximately semi-circular to circular in cross section, nearly rhomboidal in appearance (both ends obliquely truncated), raised areas on surface uneven patches or broken lines, about 2 by 8 - 10 mm., brown-----Amsonia tabernaemontana (Dogbane)  
 (Fig. 124. Plate XXIV)
- 138 Less than 5 mm. longest measurement-----140  
 140 Very dark brown to black, 3 - 4 mm. longest measurement, roughly triangular to obovoid, slightly cuneate, notched just below narrow end, entire seed covered with rows of conspicuous teeth-----Agrostemma githago (Cockle)  
 (Fig. 125. Plate XXIV)
- 140 Lighter brown, about 2 - 2.2 mm. longest measurement, triangular in outline with rounded corners, very slightly cuneate, scar below point with a conspicuous flap like appendage partially covering it, surface dotted with light colored pimples  
 -----Hibiscus trionum (Flower of an hour)  
 (Fig. 126. Plate XXIV)
- 140 Not as above-----141  
 141 Gray, 1.5 mm. across halfway up, 2.5 - 3 mm. long, about 1 mm. across base, ovoid-conical one side more convex than other, slightly keeled, surface wrinkled and with numerous blunt tubercles, base obliquely truncate, dark, fairly smooth with 2 conspicuous white tubercles--Lithospermum arvense (Corn Gromwell)  
 (Fig. 127. Plate XXIV)
- - - - -
- 2 Seed surface smooth, usually but not always shiny, no definite roughness apparent under 10 - 20 power magnification----142  
 142 Seeds averaging 6 mm. or over longest measurement---143  
 143 Globose or approximately so-----144  
 144 Sometimes lop-sided but usually globose, surface silky smooth, outline broken often with sunken areas especially when dry, 6 - 6.5 mm., in diameter, light cream color-----  
 -----Lathyrus latifolius (Field pea)  
 (Fig. 128. Plate XXV)



Fig. 123. Asclepias syriaca



Fig. 124. Amsonia tabernaemontana

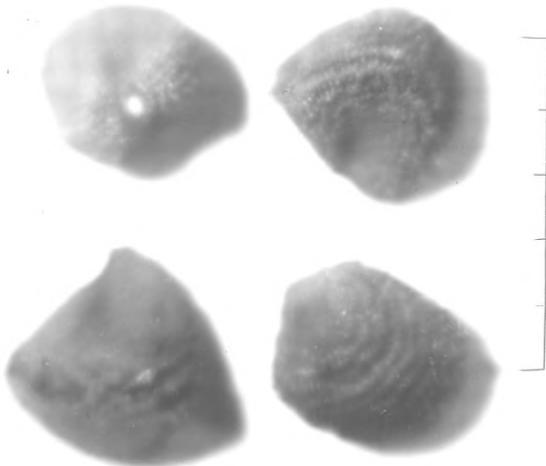


Fig. 125. Agrostemma githago

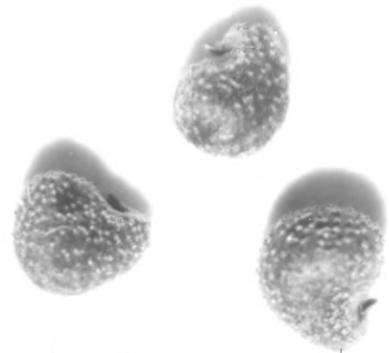


Fig. 126. Hibiscus trionum

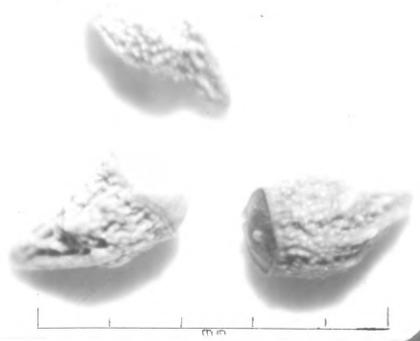


Fig. 127. Lithospermum arvense

- 143 Not globose-----145
- 145 Angled; very irregularly angled and shaped, usually somewhat ellipsoid or ovate, but often rectangular or square. Divided longitudinally by a groove--Rosa rugosa (Rugosa rose)  
(Fig. 129. Plate XXV)
- 145 Not angled, elliptical to narrowly oval, with one end pointed and other bluntly truncate due to a large light brown scar, surface may appear very slightly wrinkled. Seeds usually somewhat biconvex with a slight keel apparent at narrow end, very dark brown, shiny, 4 - 5 by 8 - 10mm.--Hammamelis virginiana (Witch hazel)  
(Fig. 130. Plate XXV)
- 142 Seeds 4 to 6 mm. longest measurement-----146
- 146 Approximately circular in cross section-----147
- 147 Oblong, sometimes short and approaching a globe, sometimes slightly flattened biconvex and one edge slightly incurved with a small scar about one third of way down from end, dark brown, dark reddish brown or buff, 3 by 4 - 5 mm.----Cassia chameycrista (Dwarf coffee weed)  
(Fig. 131. Plate XXV)
- 146 Flattened or angled, not circular in cross section  
-----148
- 148 Seeds light; yellow, grey to white. May be streaked with dark-----149
- 149 "Olive" gray with a touch of green, nearly circular in outline, flattened slightly biconvex, each end with a small circular scar or remains of a stalk, each side with 8 - 10 dark lines apparent under surface (often indistinct). Usually shiny, about 5 by 5 - 5.5 mm.-----  
-----Rhus vernix (Poison sumac)(Fig.132  
149 Yellow, buff to white Plate XXVI)  
-----150
- 150 Flattened, not angled-----151
- 151 Distinctly flattened, ovoid, sides often slightly concave, broad end rounding and narrower end marked by a small circular hole about 0.5 mm. in diameter. About 0.8 mm. thick, 2.5 - 3 by 4.5 - 5 mm.-----  
-----Symphoricarpus occidentalis (Snow berry)  
(Fig. 75. Plate XVI)
- 151 Achenes slightly flattened, oblong or narrowly obovate, one edge "humped" or curved near broad end (apex). Apex truncate with a short (about 0.5 mm.) stalk. Surface nearly white, finely streaked with brown. About 2 by 4 - 5 mm.-----  
-----Cirsium lanceolatum (Common Bull Thistle)  
(Fig. 133. Plate XXVI)



Fig. 128. Lathyrus latifolius



Fig. 129. Rosa rugosa

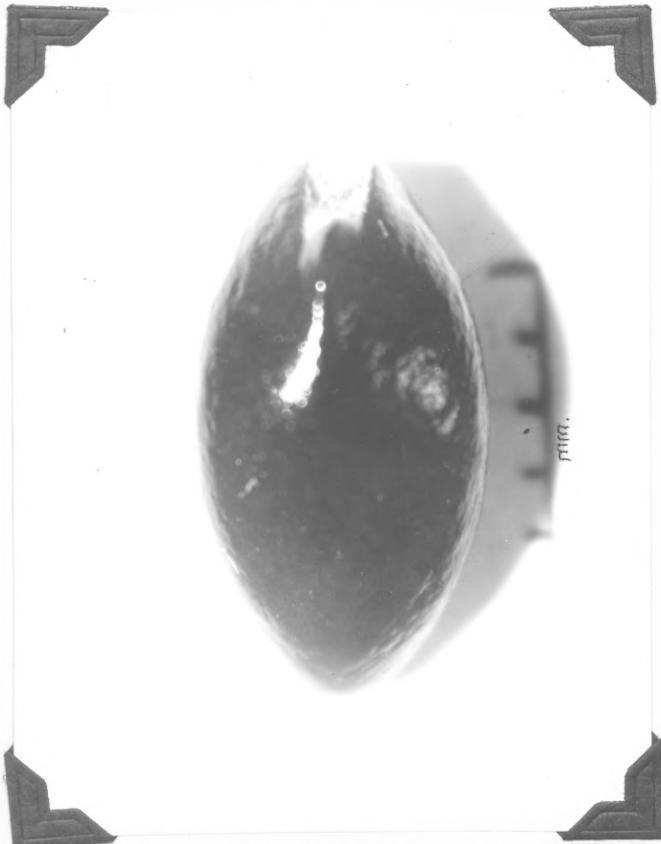


Fig. 130. Hamamelis virginiana



Fig. 131. Cassia chameycrista



Fig. 132. Rhus vernix

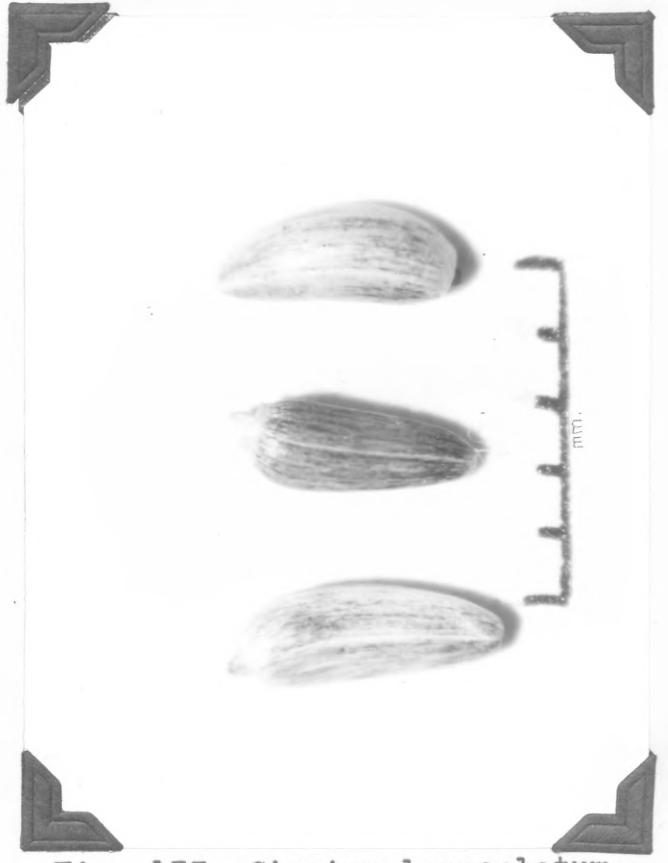


Fig. 133. Cirsium lanceolatum



Fig. 134. Robina pseudo-acacia

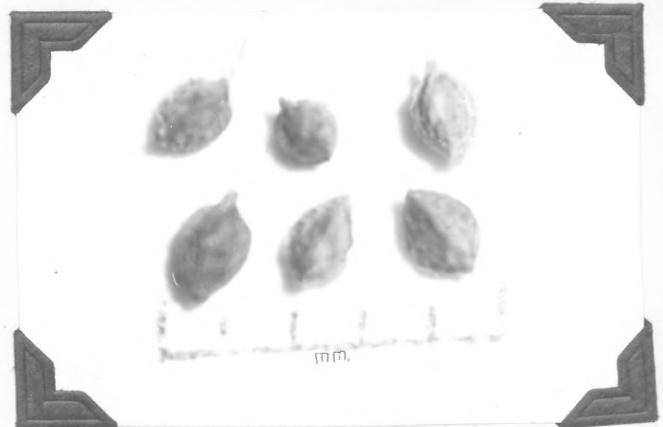


Fig. 135. Rumex crispis

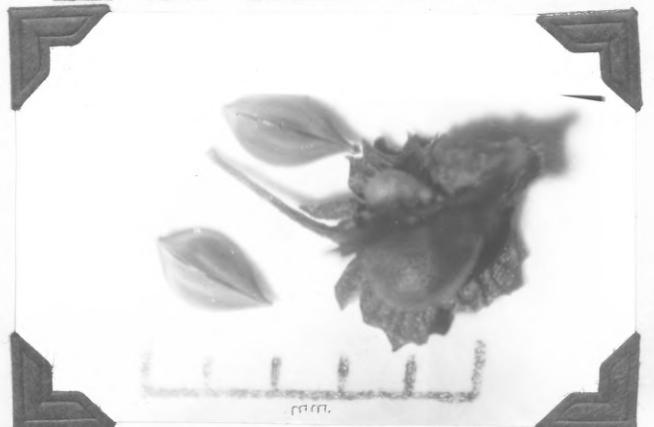


Fig. 136. Rumex obtusifolius

- 150 Angled, light cream, 4 - 5 mm. long, about 2 mm. wide, outer face rounding and other two plane and similar and divided by a straight line or edge. Outline ellipsoid or narrowly ovoid when straight edge up. Small approximately triangular scar at one end-----  
-----Ilex verticillata (Mich. Holly)  
(Fig. 79. Plate XVI)
- 148 Seeds dark; brown to black-----151
- 151 Black or brown covered with irregular darker blotches, sides flattened plane or slightly convex. Outline ovoid except one edge straight three fourths of length, then abruptly curving out with scar or remains of stalk in notch. (Amphitropus or half-anatropus). About 3 by 5 - 6 mm.-----Robinia pseudo-acacia (Black locust)  
(Fig. 134. Plate XXVI)
- 142 Seeds less than 4 mm. longest measurement-----152
- 152 Angled-----153
- 153 Three angled, 3 faces identical (Approximately an equilateral triangle in cross section)-----154
- 154 Brown-----155
- 155 Achene ovoid, angles prominent, sides convex but concave near base, apex abruptly acute, shining surface, rich red brown, 0.8 - 1.3 by 1.3 - 1.8 mm. (Achene covered by 3 heart shaped calyx wings about 3 - 3.4 mm. long, each wing bearing a large tubercle, one tubercle larger than other two-----  
-----Rumex crispis (Curled dock)  
(Fig. 135 Plate XXVI)
- 155 Ovoid to ellipsoid, angles a little less prominent, sides usually more convex and not concave near base, surface less polished, light brown, 1 - 1.4 by 0.9 - 2.3 mm. (Achene covered by 3 brown deltoid calyx wings about 4 mm. long with one large and two rudimentary tubercles)---  
-----Rumex obtusifolius (Bitter dock)  
(Fig. 136. Plate XXVI)
- 153 Three or more angles, all faces not alike-----156
- 156 Black-----157
- 157 Narrowly ovoid to elliptical with a longitudinal full length keel; usually 3 sided with side opposite keel flat or slightly convex, but sometimes entire seed rounded and bullet like, shiny, 1.5 by 2.3 - 2.8 mm.-----  
-----Aquilegia vulgaris (Garden columbine)  
(Fig. 137. Plate XXVII)
- 157 Identical but usually smaller, about 1.2 by 2 - 2.2 mm.-----  
-----Aquilegia canadensis (Wild columbine)  
(Fig. 138. Plate XXVII)



Fig. 137. Aquilegia vulgaris

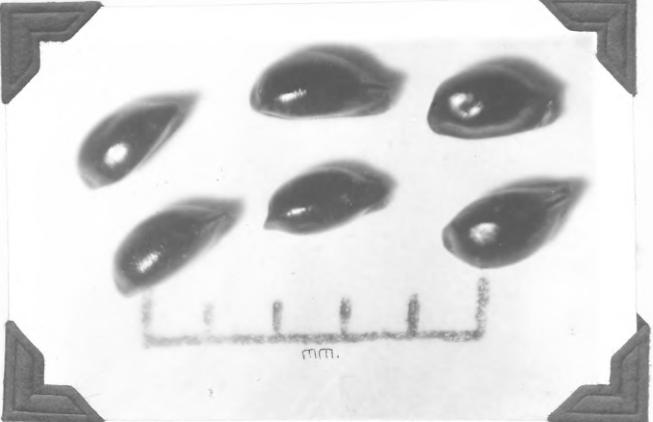


Fig. 138. Aquilegia canadensis



Fig. 139. Sida spinosa



Fig. 140. Monarda fistulosa

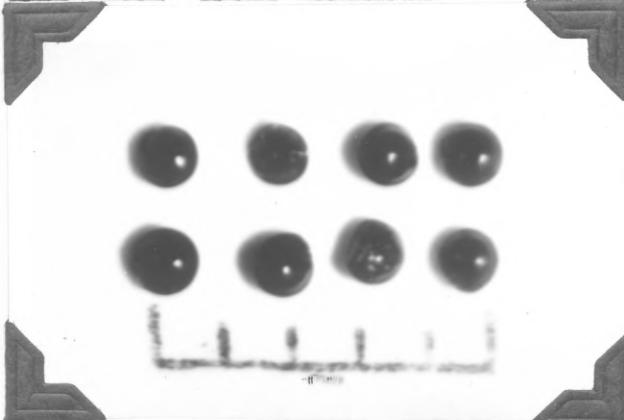


Fig. 141. Amaranthus graecizans

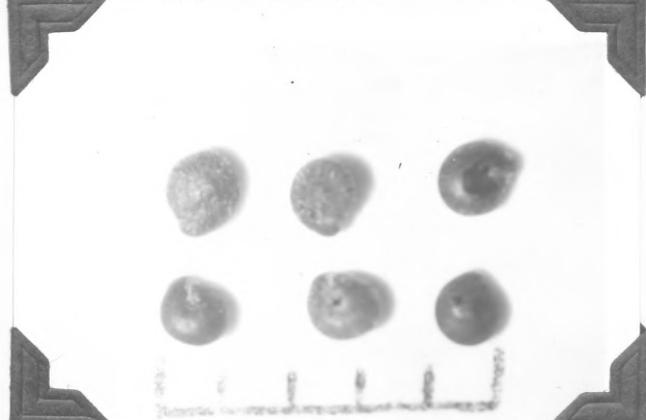


Fig. 142. Chenopodium album



Fig. 143. Amaranthus paniculata

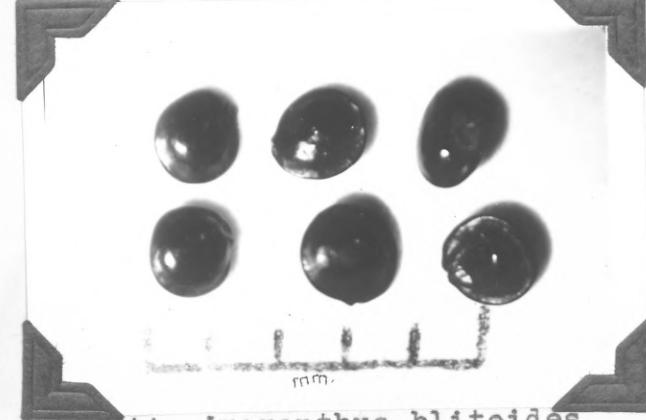


Fig. 144. Amaranthus blitoides

- 156 Reddish brown to brown-----158
- 158 D shaped and cuneate, with face opposite straight edge broad-----159
- 159 1.8 - 2.1 mm. long, dull or red brown, broadly ovoid (when straight edge up). Face opposite straight edge rounding, other two flat or concave. Straight edge projects slightly past one end in rudder like fashion with scar at this end in center of a depression--Sida spinosa (Sida)  
(Fig. 139. Plate XXVII)
- 159 3 - 4 mm. long, light cream, elliptical when straight edge up, small triangular scar at one end--Ilex verticillata (Michigan Holly)  
(Fig. 79. Plate XVI)
- 158 Ellipsoid or oblong-----160
- 160 Three faces, approximately triangular in cross section with one face broader. Broad face slightly convex with narrow dark line. Two prominent light colored scars at basal end; a scar on each narrow face. Brown or light brown, about 0.8 mm. broad base by 1.5 mm.-----Monarda fistulosa (Wild Bergamot)  
(Fig. 140. Plate XXVII)
- 152 Not angled-----161
- 161 Black or dark red brown, shining, flattened biconvex, very broadly ovoid or circular with uniformly curved edges, i.e. opposite edges similar-----162
- 162 Seeds 2 mm. or over longest measurement, apex abruptly pointed-----163
- 163 Very broadly ovoid, flattened with rounded edges or often a faint broad longitudinal ridge down center, surface granular, base obtuse or with part of calyx, 1.8 by 2 - 2.3 mm., black-----Polygonum Persicaria (Lady's thumb)  
(Fig. 97. Plate XX)
- 163 Similar except faint longitudinal ridge seldom present and seed larger, about 3 by 3 - 4 mm.--Polygonum Pennsylvanicum (Pennsylvania Persicaria)  
(Fig. 96. Plate XIX)
- 162 Less than 2 mm., apex not abruptly pointed---164
- 164 Small, 1 mm. or less-----165
- 165 Nearly circular, with a slight notch on one edge. Seed slightly margined, shining jet black or rarely red brown, 0.8 - 1 mm. in diameter-----Amaranthus graecizans (Tumble weed)  
(Fig. 141. Plate XXVII)
- 165 Generally large, about 1 mm., jet black, notch a little more distinct and with a slight curved groove from center to notch---Chenopodium album (Lamb's quarters)  
(Fig. 142. Plate XXVII)

- 165 Identical with *A. graecizans*, except  
seeds usually more red brown-----  
-----Amaranthus paniculata (Purple  
(Fig. 143. Plate XXVII) amaranth)
- 164 Over 1 mm. to 2 mm. longest measurement-----166  
166 Slightly notched, not grooved, small margin,  
highly polished, jet black, 1.4 - 1.5 mm.  
in diameter-----Amaranthus blitoides (Prostrate  
(Fig. 144. Plate XXVII) amaranth)
- 166 Very similar, usually more oval, i.e.  
*A. blitoides* more circular. Shining jet  
black, 1.3 by 1.4 - 1.5 mm.-----  
-----Amaranthus hybridicus (Pigweed)  
(Fig. 145. Plate XXVIII)
- 166 Same, generally smaller, 1 - 1.2 mm. long--  
-----Amaranthus retroflexus (Rough pigweed)  
(Fig. 146. Plate XXVIII)
- 166 With curved groove one side from notch to  
center-----167  
167 Circular to ovoid, one side usually more  
flattened than other, edge bluntly  
rounded, black, 1 - 1.3 mm. in diameter.  
(If not clean may appear gray, external  
papery covering often persistent)----  
-----Chenopodium album (Lamb's quarters) (Fig.  
142)
- 161 Not as above-----168  
168 Seeds 3 - 4 mm., longest measurement-----169  
169 Approximately globose or square, length, width,  
thickness about the same-----170  
170 With a narrow light colored scar about 2 mm.  
long on surface, usually approximately  
globose, reddish brown, brown, or brown  
splashed with darker brown or black. Surface  
dull-----Vicia angustifolia (Common vetch)  
(Fig. 147. Plate XXVIII)
- 169 Not globose, flattened biconvex-----171  
171 D shaped with a single prominent scar at one  
end of a straight edge-----172  
172 Straight edge bluntly hook like above  
scar, dark patch at opposite end of  
straight edge, buff, 2 by 3 - 3.5 mm.  
-----Thermopsis sp. (Thermopsis)  
(Fig. 148. Plate XXVIII)
- 172 Straight edge not bluntly hooked above  
scar, or if so very slightly, scar forms  
a slight notch, no dark patch at opposite  
end, greenish gray, yellow, buff or  
reddish brown, 2.5 by 3.5 - 4 mm.----  
-----Baptisa australis (Blue Flax Indigo)  
(Fig. 149. Plate XXVIII)

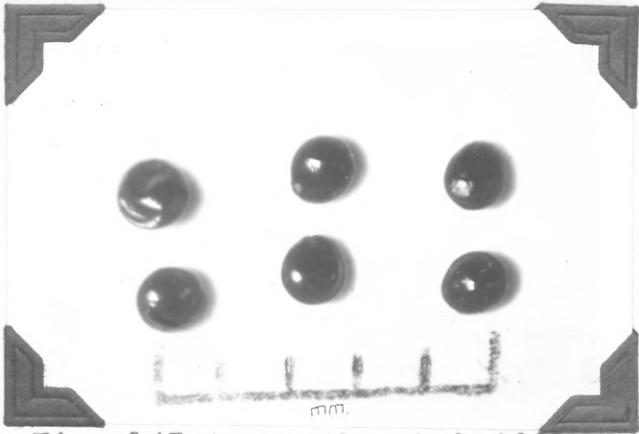


Fig. 145. Amaranthus hybridicus

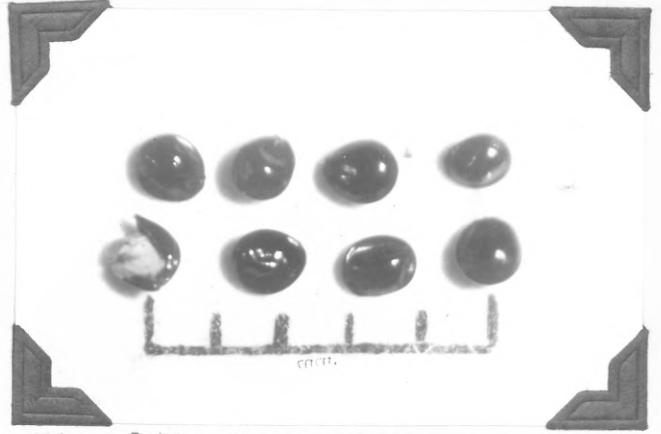


Fig. 146. Amaranthus retroflexus

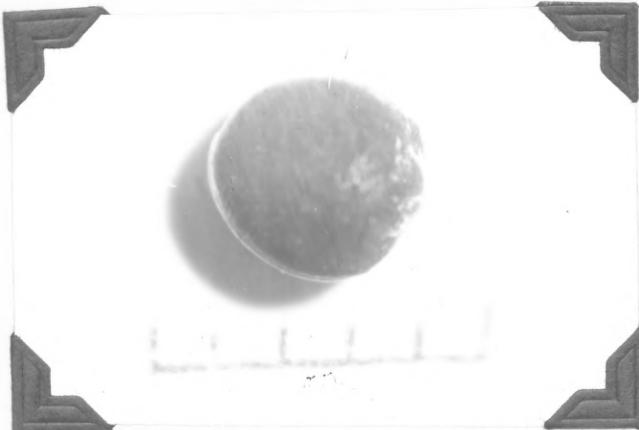


Fig. 147. Vicia angustifolia



Fig. 148. Thermopsis sp.



Fig. 149. Baptisa australis

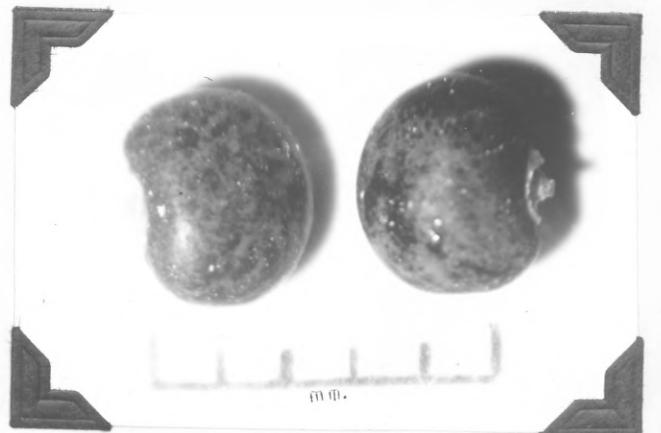


Fig. 150. Amphicarpa monoica

- 171 D shaped with a prominent scar at center of straight edge-----173  
 173 Flattened, faces almost plane, large light colored scar occupies most of straight edge. Seed brown splotched with black, dull, about 2.5 by 3 - 3.5 mm.-----  
 -----Amphicarpa monoica (Hog peanut)  
 (Fig. 150. Plate XXVIII)
- 171 Not D shaped-----174  
 174 Elliptical or narrowly ovoid-----175  
 175 Achene narrowly ovoid, edges rounding, apex pointed but usually with portion of calyx attached, or with short stalk. Brown, about 2 by 3 - 3.5 mm.-----  
 -----Polygonum virginianum (Knotweed)  
 (Fig. 151. Plate XXIX)
- 168 Seeds less than 3 mm. longest measurement-----176  
 176 Roughly heart shaped, average less than 1.5 mm. longest measurement-----177  
 177 Dull, dark green to brown, usually mottled, flattened, edges rounded and one thicker than the other, each side with a very slight shallow groove from notch about  $\frac{1}{3}$  to  $\frac{1}{2}$  length. One end truncate with a scar in center of end and other rounded, seed about 1.1 by 1.3 mm.-----Trifolium hybridum (Alsike clover)  
 (Fig. 152. Plate XXIX)
- 177 Somewhat shiny, yellow or light brown, not mottled. (Rare exceptions). Otherwise similar to T. hybridum except smaller and thinner; about 1 by 1.2 mm-----Trifolium repens (White clover)  
 (Fig. 153. Plate XXIX)
- 176 Ovoid or kidney shaped, slightly flattened, with a scar on one edge causing a slight to a distinct depression about  $\frac{1}{4}$  to  $\frac{1}{2}$  distance from the end. -----178  
 178 Oval, very slightly flattened biconvex. Scar about  $\frac{1}{3}$  length from end with only a slight notch if any. Outline regular. Surface even, not grooved-----179  
 179 Light yellow, reddish yellow or light brown, shiny, 1.3 - 1.5 by 2 - 2.5 mm.-----  
 -----Trifolium incarnatum (Crimson clover)  
 (Fig. 154. Plate XXIX)
- 179 Olive, dark greenish olive or with a tinge of purple. 1.5 by 2 - 2.5 mm.-----  
 -----Lespedeza hiruta (Bush clover)  
 (Fig. 155. Plate XXIX)
- 178 Distinctly flattened, scar on edge with a distinct notch, surface usually but not always with a shallow longitudinal groove-----180

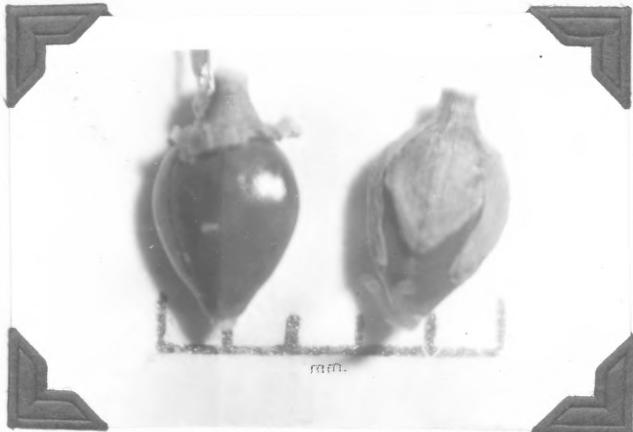


Fig. 151. Polygonum virginianum



Fig. 152. Trifolium hybridum

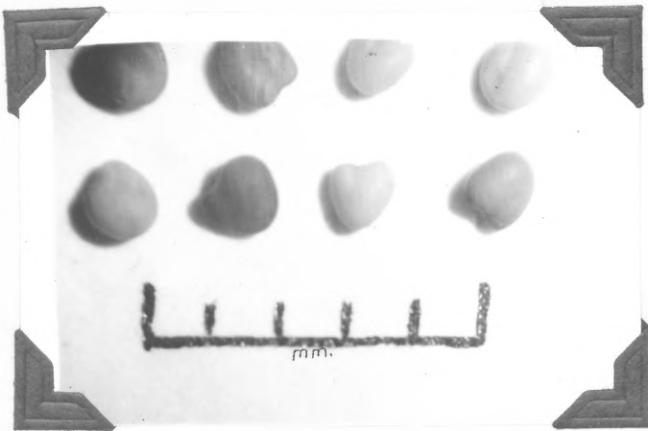


Fig. 153. Trifolium repens



Fig. 154. Trifolium incarnatum



Fig. 155. Lespedeza hiruta

- 180 Uniformly deep olive buff, reniform, narrowed at one end with a slight keel (raphe) on narrow edge just below and above scar. Large end approximately circular in cross section, seed about 1 by 2 mm.-----  
-----Physocarpus opulifolius(Nine bark)  
(Fig. 156. Plate XXX)
- 180 Not uniformly deep olive buff or with a noticeable keel on one edge-----181
- 181 Oval, with broad end obliquely truncated due to a very shallow notch. Scar in notch about a quarter length of seed distant from end-----182
- 182 Surface dull, shallow longitudinal groove from notch near edge, yellow or greenish yellow, 1.5 by 2 - 2.2 mm.-----  
-----Melilotus alba (White sweet clover)  
(Fig. 157. Plate XXX)Melilotus officinalis, sweet yellow clover, very similar except usually more uniformly green)
- 181 Reniform or oval with broad end more distinctly obliquely notched. Scar generally over  $\frac{1}{4}$  length from end, usually near middle of edge-----183
- 183 Seeds 2 - 2.5 mm. long, greenish yellow, cream to light brown, very irregular in shape, often reniform with scar on concave edge in a notch near center. Ends rounded, truncate or acute. Sometimes with a slight depression extending along edge from scar to end. 1 - 1.4 mm wide-Medicago sativa (Alfalfa)  
(Fig. 158. Plate XXX)
- 183 Seeds 1.5 - 1.9 mm. long, light yellow, light brown to purplish, more regular in shape, ovoid with seed scar near middle of one edge, slight depression on each side from scar to broad end---Trifolium pratense (Red clover)  
(Fig. 159. Plate XXX)
- 181 Generally D shaped with a tubercle and notch near center of straight or slightly concave edge. May range from D shaped to egg shaped. Flattened, dull, creamy yellow or greenish yellow, 1 - 1.2. by 1.8 - 2.3 mm.-----Medicago lupina (Black Medic)  
(Fig. 160. Plate XXX)
- 181 Ovoid, ends rounding or narrow end squarely truncated. Narrow end scarred. Flattened biconvex on one side with a central longitudinal ridge, dark brown, ends darker than center. 1.8 - 2 by 2.5 - 3 mm..Ceanothus americana (New Jersey Tea)  
(Fig. 161. Plate XXX)

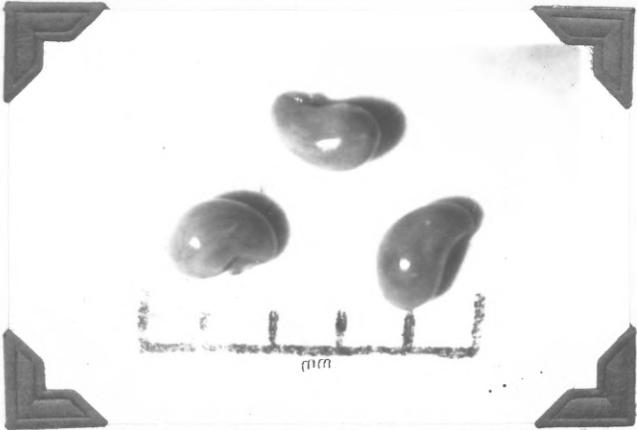


Fig. 156. Physocarpus opulifolius



Fig. 157. Melilotus alba



Fig. 158. Medicago sativa

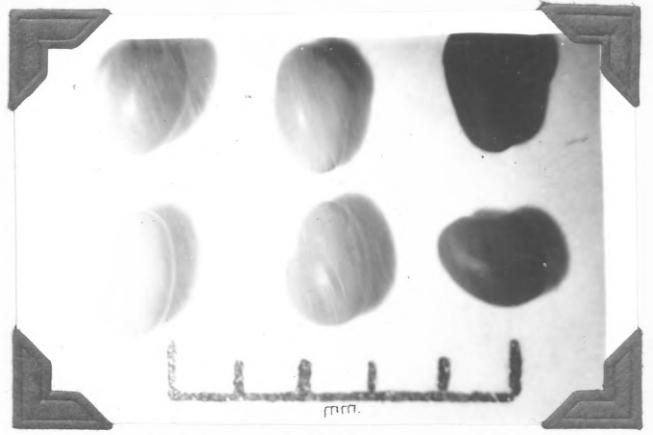


Fig. 159. Trifolium pratense



Fig. 160. Medicago lupina



Fig. 161. Ceanothus americana

INDEX  
Scientific names

	<u>Page</u>
Achillea millefolium.....	14
Actaea rubra.....	23
Agrostema githago.....	48
Alisma plantago aquatica.....	16
Ambrosia trifida.....	7
Ambrosia artemisifolia.....	7
Amelanchier canadensis.....	42
Amsonia tabernaemontana.....	48
Amphicarpa monoica.....	58
Amaranthus gracezans.....	55
Amaranthus paniculata.....	56
Amaranthus blitoides.....	56
Amaranthus hybridicus.....	56
Amaranthus retroflexus.....	56
Anthemis cotula.....	46
Anagallis arvensis.....	34
Aquilegia vulgaris.....	53
Aquilegia canadensis.....	53
Arctostaphylos uva ursi.....	12
Aronia atropurpurea.....	16
Arisaema triphyllum.....	27
Aronia arbutifolia.....	31
Aralia nudicaulis.....	29
Aralia hispida.....	40
Aralia spinosa.....	40
Asclepias incarnata.....	29
Asclepias syrica.....	48
Arctium minus.....	34
Arenaria serphyllifolia.....	44
Baptisa australis.....	56
Barbarea vulgaris.....	36
Betonica officinalis.....	23-34
Bidens vulgata.....	5
Benzoin aestivale.....	25
Boehmeria cylindrica.....	46
Brassica sp.....	18
Carpinus caroliniana.....	12
Cassia chameycrista.....	50
Carum cervi.....	14
Capsella bursa pastoris.....	36
Camelina macrocarpa.....	38
Ceanothus americana.....	60
Cerastium vulgatum.....	46
Celastrus scandens.....	25
Cephalanthus occidentalis.....	10
Chenopodium album.....	55
Cirsium lanceolata.....	50
Cirsium arvense.....	40-44

	<u>Page</u>
<i>Cichorium intybus</i> .....	14
<i>Cicuta maculata</i> .....	14
<i>Cornus paniculata</i> .....	12
<i>Cuscuta arvensis</i> .....	29
<i>Daucus carota</i> .....	7
<i>Dasystoma</i> sp.....	21
<i>Datura</i> sp.....	23
<i>Decodon verticillatus</i> .....	34
<i>Desmodium canadense</i> .....	7
<i>Dentaria diphylla</i> .....	5
<i>Dipsacus sylvestris</i> .....	34
<i>Dodecatheon media</i> .....	40
<i>Elaeagnus argentea</i> .....	10-25
<i>Erysimum cheiranthoides</i> .....	38
<i>Filipendula rubra</i> .....	7
<i>Fragaria</i> sp.....	16
<i>Galium aparine</i> .....	7
<i>Gaylussacia frondosa</i> .....	42
<i>Hammamelis virginiana</i> .....	50
<i>Hibiscus trionum</i> .....	48
<i>Hypericum perforatum</i> .....	18
<i>Impatiens biflorum</i> .....	34
<i>Impatiens pallida</i> .....	16
<i>Ipomera</i> sp.....	31
<i>Ilex verticillata</i> .....	31-53-55
<i>Lathyrus latifolius</i> .....	48
<i>Lespedeza hirsuta</i> .....	58
<i>Lepidium apetalum</i> .....	36
<i>Lepidium campestre</i> .....	44
<i>Lepidium virginicum</i> .....	36
<i>Linaria vulgaris</i> .....	46
<i>Lithospermum arvensis</i> .....	48
<i>Lilium philadelphicum</i> .....	21-27
<i>Lonicera tartarica</i> .....	23
<i>Lonicera mackii</i> .....	25
<i>Lycium halimifolium</i> .....	42
<i>Lychnis alba</i> .....	46
<i>Malva rotundifolia</i> .....	36
<i>Maianthemum canadense</i> .....	44
<i>Melilotus alba</i> .....	60
<i>Medicago sativa</i> .....	60
<i>Medicago lupina</i> .....	60
<i>Monarda fistulosa</i> .....	55
<i>Nepeta cataria</i> .....	38
<i>Oenothera biennis</i> .....	40
<i>Physalis ixocarpa</i> .....	25
<i>Physocarpus opulifolius</i> .....	60
<i>Plantago rugelii</i> .....	40
<i>Plantago aristata</i> .....	42

	<u>Page</u>
Plantago lanceolata.....	42
Plantago major.....	12
Portulaca oleraceae.....	44
Polygonum hydropiper.....	38
Polygonum Pennslyvanicum.....	38-55
<b>Polygonum persicaria.....</b>	<b>38-55</b>
Polygonum virginianum.....	58
Podophyllum peltatum.....	10-23-31
Potentilla monspeliensis.....	12
Potentilla recta.....	12
Polygonatum biflorum.....	16-18
Polygonatum commutatum.....	23-27
Prunus virginiana.....	23
Prunella vulgaris.....	36
Psedera quinquefolia.....	27
Ranunculus acris.....	42
Raphanus raphanistrum.....	25
Rhamnus sp.....	3
Rhus canadensis.....	10
Rhus typhina.....	42
Rhus toxicodendron.....	44
Rumex obtusifolius.....	53
Rhus vernix.....	50
Rumex crispis.....	53
Rosa rugosa.....	50
Rosa multiflora.....	31
Robina pseudocacia.....	53
Rudbeckia hirta.....	14
Rubus invisus.....	21
Rubus allegeniensis.....	21
Rubus aculertissima.....	21
Rubus occidentalis.....	21
Saponaria officinalis.....	46
Salsola kali tenuifolia.....	16
Scrophularia marilandica.....	18
Sida spinosa.....	55
Sicyos angulatus.....	25
Sium ciutacfolium.....	14
Sisymbrium officinale.....	38
Smilacina racemosa.....	18-27
Solanum dulcamera.....	21
Solanum nigrum.....	21
Symphoricarpos occidentalis.....	31-50
Stellaria media.....	44
Taraxacum officinale.....	7
Thlaspi arvense.....	14
Thaspium sp.....	10
Thermpsis sp.....	56
Trifolium hybridum.....	58

Trifolium repens.....58  
Trifolium incarnatum.....58  
Trifolium pratense.....60  
Urtica dioica.....7  
Verbena hastata.....12  
Verbena urticifolia.....12  
Verbascum blateri.....18  
Veronica arvensis.....36  
Vibenum cassinoides.....29  
Vibenum incarnata.....29  
Vibenum nudicaulis.....29  
Vibenum pubescens.....29  
Vibenum lentago.....29  
Vibenum prunifolium.....31  
Vibenum acerfolium.....29  
Vibenum opulus.....31  
Vibenum lanata.....31  
Vicia angustifolia.....56

INDEX  
Common names

	<u>Page</u>
Alfalfa.....	60
Avens.....	5
Baneberry, red.....	23
Bearberry.....	12
Bitterdock.....	53
Bittersweet.....	25
Blackeyed Susan.....	14
Blackberry.....	21
Black Haw.....	31
Black locust.....	53
Black medic.....	60
Blue beech.....	12
Bouncing Betty.....	46
Bristly sasaparilla.....	40
Button bush.....	10
Burdock, common.....	34
Buckthorn.....	42
Butter and eggs.....	46
Bull thistle.....	50
Canada thistle.....	40-44
Catnip.....	38
Caraway.....	14
Chickweed, common.....	44
Chickweed, mouse eared.....	46
Corn speedwell.....	36
Cherry, ground.....	25
Cherry, choke.....	23-29
Choke berry.....	16-31
Chickory.....	14
Cleavers.....	7
Clover, Alsike.....	58
Clover, white.....	58
Clover, crimson.....	58
Clover, bush.....	58
Clover, white sweet.....	60
Clover, red.....	60
Cockle.....	48
Corn gromwell.....	48
Curled dock.....	53
Dandelion.....	7
Dangle berry.....	42
Dewberry.....	21
Dogbane.....	48
Dogwood.....	12
Downy arrowhead.....	29
Dwarf coffee weed.....	50
Evening primrose.....	40

False lily-of-the-valley-----	44
False nettle.....	46
Field pennycress.....	14
Field dodder.....	29
Field pepper grass.....	44
Field pea.....	48
Figwort.....	18
Flower-of-an-hour.....	48
Foxglove.....	21
Garden columbine.....	53
Hercules club.....	40
Hedge mustard.....	38
High bush cranberry.....	31
Honeysuckle.....	25
Hog peanut.....	58
Indian turnip.....	18-27
Jewel weed.....	34
Knotweed.....	58
Ladys thumb.....	38
Low straggling sumac.....	10
May apple.....	10-23-31
Mallow.....	36
Matrimony vine.....	42
Mayweed.....	46
Milkweed, common.....	48
Michigan holly.....	31-53
Morning Glory.....	31
Moth mullen.....	18
Mustards.....	18
New Jersey Tea.....	60
Nine bark.....	60
Nightshade, white.....	21
Nightshade, black.....	21
Parsnip.....	14
Pennsylvania persicaria.....	38
Pepper grass.....	36
Pimpernel.....	34
Pepper root.....	5
Plantain.....	12
Plantain, broad leaved.....	40
Plantain, braced.....	42
Plantain, narrow leaved.....	42
Plantain, water.....	12
Poison ivy.....	44
Poison sumac.....	50
Pale touch-me-not.....	11
Purslane.....	12
Queen of the prarie.....	7
Ragweed, common.....	7
Ragweed, great.....	7

Raspberry, red.....	21
Raspberry, black.....	21
Rambler rose.....	31
Rugosa rose.....	50
Rough cinquefoil.....	12
Rough fruited cinquefoil.....	12
Russian thistle.....	16
Self heal.....	36
Shooting star.....	40
Shepard's purse.....	36
Silver berry.....	10
Smart weed.....	5
Small fruited false flax.....	38
Small Solomon Seal.....	16-18
Snow berry.....	31-50
Solomons Seal, false.....	27
Solomons Seal, great.....	23-27
Spice bush.....	25
Staghorn sumac.....	42
St. Johns wort.....	18
Stick tight.....	5
Swamp milkweed.....	29
Swamp loosestrife.....	34
Teasel.....	34
Three seeded mercury.....	34
Thorn apple.....	23
Thyme leaved sandwort.....	44
Tall buttercup.....	42
Vervain, blue.....	12
Vervain, netted leaved.....	12
Vibenum, maple leaf.....	29
Vibenum, sweet.....	29
Virginia creeper.....	27
Water parsnip.....	10
Wild parsnip.....	10
Wild carrot.....	7
Wayfaring tree.....	31
White campion.....	46
Witch hazel.....	50
Winter cress.....	36
Wild strawberry.....	16
Wild radish.....	25
Wild cucumber.....	25
Wild grape.....	27
Wild rasin.....	29
Wild sarsparilla.....	29

	<u>Page</u>
Wild peppergrass.....	36
Wild columbine.....	53
Wood lily.....	21-27
Wood Betony.....	23-34
Wormseed mustard.....	38
Yarrow.....	14

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