BRASSICACEAE
OF BUTTE COUNTY, CALIFORNIA

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CRUCIFERAE (BRASSICACEAE)
OF BUTTE COUNTY, CALIFORNIA

Robert E. Preston\(^1\)
Department of Biological Sciences
California State University, Chico
Chico, California 95929

On the cover: the upper stems and silicles of Thysanocarpus radians, a spring annual common in the Valley Grassland and Foothill Woodland.

\(^1\)Current address: Department of Botany, University of California, Davis,
Davis, California 95616
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ABSTRACT

The distribution of species of Cruciferae is documented for Butte County, California. The Cruciferae are the fifth or sixth best represented plant family in Butte County, with 57 taxa known to occur. Thirty-two taxa are native and 25 are introduced. This paper is primarily intended for students of the Butte County flora as a guide to the identification and distribution of the crucifers occurring in the county. An identification key, comments on habitat preferences, and distribution maps are also provided.
Location map of Butte County, California, showing towns, roads and waterways mentioned in this paper.
INTRODUCTION

The Cruciferae are one of the largest families of flowering plants, with over 3000 species represented in more than 400 genera, occurring mostly in temperate regions. In California, the Cruciferae are the fifth largest family (Smith and Noldenke, 1960), and in Butte County, they are the fifth or sixth largest (Taylor et al, 1980). Yet, most people are familiar only with the cultivated species: those grown for food, such as cabbage, broccoli, and cauliflower (Brassica oleracea and its varieties), radishes (Raphanus sativus), horseradish (Armoracia rusticana), and prepared mustard (seeds of Brassica nigra); or, those grown as ornamentals, such as candytuft (Iberis amara), sweet alyssum (Lobularia maritima), and money plant (Lunaria annua). Although the majority of wild crucifers have no value to humans, people world-wide use various local species for greens (personally, I can't see how anyone could enjoy them!).

Several members of the Cruciferae are widely recognized as economically important weeds. If one considers that much of Butte County is under cultivation, it is not surprising that 25 of the 57 crucifer taxa known to occur in the county are introduced weeds. Although some taxa are serious agricultural pests, such as hoary cress (Cardaria draba) or perennial peppercress (Lepidium latifolium), others, like watercress (Nasturtium officinale), may have been introduced for food. Several weedy species, particularly those of Brassica, are showy, with brilliant yellow displays often seen in many orchards and fields during late winter and early spring. Others are low-growing and easily overlooked, such as wartcress (Coronopus
didymus), which is commonly found as a lawn weed.

This paper is intended as a guide to the taxa of Cruciferae occurring in wild populations in Butte County. Students of the Butte County flora may find this guide useful for identifying crucifer specimens, especially when mature fruits are lacking. Crucifer species are often difficult to distinguish, with mature fruits being the most important diagnostic feature for identification. Unrelated species sometimes share similar habits and vegetative characteristics, posing problems even to experts.

Students of Butte County phytogeography may also find this paper useful. Crucifers occur in every plant community of Butte County. Some are found in highly specific habitats—Arabis and Streptanthus species are usually restricted to rock outcrops. Others, such as Lepidium nitidum and Athysanus pusillus, are distributed throughout several different plant communities.

This treatment also is a record of which taxa currently exist in the county. Many of the taxa listed occur in temporary habitats, their localities changing from year to year. A few can become serious agricultural pests and are eradicated soon after their discovery, such as Cardaria draba. I have not included in this list a few taxa which have been collected in Butte County: Eruca sativa, collected by A.A. Heller in 1914; Barbarea verna, collected by G. Spurlock in 1935; and Thlaspi arvense, collected by J.D. Jokerst in 1984. These three were collected as single specimens and are uncommon weeds that are unlikely to become established in the county.

The key to the taxa of crucifers occurring in Butte County is artificial, that is, the taxa are not grouped according to phylogenetic relationships, but rather to their most easily observed features. The key is
divided into two sections: the first, specimens lacking mature fruits; the second, specimens possessing mature fruits. The most important characters used in this key are size and shape of fruits, size and color of flowers, shape and margin characteristics of leaves, and type of pubescence, if present. Figures have been provided in the key to eliminate the need for continual reference to a glossary.

Full descriptions for the taxa are not provided. Instead, references are given to previously published descriptions and illustrations in easily available sources. The sources are abbreviated as J (Jepson, 1936), A (Abrams, 1944), R (Robbins et al, 1950), MK (Munz and Keck, 1973) and NR (Niehaus and Ripper, 1976), and the page (p) or figure number (f) is given. Nomenclature follows Munz and Keck (1973) for the native species and Rollins (1981) for the introduced species, with the following exceptions: Caulanthus lasiophyllus (Al-Shehbaz, 1973), Dentaria integrifolia (Jepson, 1925), Rorippa spp. (Stuckey, 1972), and Streptanthus drepanoides (Kruckeberg and Morisson, 1983).

Habitat information is included for every taxon along with comments which may help to explain variation within the taxon. Plant communities given in the habitat descriptions follow Ornduff (1974), whose scheme is relatively simple and easy to use. Distribution maps are provided for most of the taxa. The map dots are based on collection localities of specimens examined from the California State University, Chico, herbarium (CHSC), and the personal herbarium of Lowell Ahart, specimens in the personal collection of the author, and from personal observations made in the field by the author. Although voucher specimens were not designated, specimens of every taxon listed in this paper are on file at CHSC. Comments on the reproductive
biology of the crucifer taxa occurring in Butte County can be found in Preston (1983).

I wish to thank the many people who assisted with this project by providing specimens and locality data, especially Sue Taylor, Jim Jokerst, Lowell Ahart, and Mike Foster, whose tip about a population of *Arabis breweri* led to my discovery of the only known population of *Streptanthus drepanoides* occurring outside of the Coast Ranges. I am especially grateful to Rob Schlising, who suggested that I work with the Cruciferae and who has given me much support and guidance. Joe DiTomaso, Bruce Baldwin, and June McCaskill kindly reviewed the manuscript and offered helpful comments. The Butte County location map was provided by Charles Nelson, Department of Geography, California State University, Chico.
Artificial Key to the Taxa

1 Flowers present .......................... 2  
   Flowers lacking .......................... 58

2(1) Calyx urn-shaped (Fig. 1), the sepals yellow or purplish, but not entirely green .......................... 3  
   Calyx tubular to open, but not urn-shaped (Fig. 2), the sepals usually green .......................... 7

3(2) Middle cauline leaves pinnatifid with linear lobes .... Streptanthus diversifolius  
   Middle cauline leaves simple, entire to dentate .......................... 4

4(3) Cauline leaves narrowly lanceolate ....  
       .................... Streptanthus polygaloides  
   Cauline leaves oblong, ovate, or broadly lanceolate .......................... 5

5(4) Lower cauline leaves broadly ovate (Fig. 3); filaments of upper stamens fused, with a conspicuous dark central stripe ..........................  
       ............... Streptanthus drepanoides  
   Lower cauline leaves spatulate (Fig. 4); filaments of upper stamens not fused, but separate .......................... 6

6(5) Sepals yellow, less commonly purple; petals white, with yellow or purple veins; upper cauline leaves orbicular, the uppermost above the lowest flower in the raceme (Fig. 5)  
       ............... Streptanthus tortuosus  
   Sepals greenish-purple; petals purple; upper cauline leaves ovate to broadly oblong, the uppermost below the lowest flower in the raceme  
       ............... Streptanthus cordatus

7(2) Petals white, pink, or purple ......... 8  
   Petals yellow or orange .................. 41

8(7) Petals small, less than 4 mm long ....... 9  
   Petals 4 mm or more long .................. 26

9(8) Leaves simple, entire to dentate ....... 10  
   Leaves pinnatifid to pinnate .............. 20
10(9) Leaves all in a basal rosette .......................... 11
Cauline leaves present .............................. 12

11(10) Petals entire, ca. 1 mm long .......................... Athyranus pusillus
Petals bifid (Fig. 6), ca. 2 mm long ...................... Draba verna

12(10) Pubescence of forked or dendritic hairs (Fig. 7) ..................... 13
Pubescence of simple hairs .......................... 14

13(12) Cauline leaves sessile, auriculate
(Fig. 8) .......... Capsella bursa-pastoris
Cauline leaves sessile, but not auriculate (Fig. 9) . Arabidopsis thaliana

14(12) Basal leaves in a conspicuous rosette .......................... 15
Basal leaves not in a conspicuous rosette .......................... 16

15(14) Cauline leaves linear to narrowly lanceolate (Fig. 10) ................. 17
Cauline leaves broadly lanceolate (Fig. 11) ............... Thysanocarpus radians

16(14) Cauline leaves auriculate (Fig. 8) .................................. 17
Cauline leaves sessile or petioled, but not auriculate .................. 18

17(16) Petals 2-3 mm long; ovary pubescent .................. Cardaria pubescens
Petals 3-4 mm long; ovary glabrous .......................... Cardaria draba

18(16) Lower leaves 5-8 cm wide, finely dentate (Fig. 12); stamens 6 .......... 19
Lower leaves 1-2 cm wide, coarsely dentate (Fig. 13); stamens 4 .......... 19

19(18) Petals vestigial; plants with a strong unpleasant odor .................. 19
Lepidium pinnatifidum
Petals ca. 1 mm long; plants without a strong unpleasant odor ............ 19
Lepidium virginicum
20(9) Lower leaves pinnate with rounded leaflets (Fig. 14) ................. 21
Lower leaves pinnatifid, the lobes linear to narrowly lanceolate, acute (Fig. 15) .......................... 22

21(20) Basal leaves in a conspicuous rosette; upper cauline leaves pinnatifid with linear lobes; stems erect .......... Cardamine oligosperma
Basal rosette lacking; upper cauline leaves pinnate with rounded to lanceolate leaflets; stems often prostrate and rooting at the nodes .
.......................... Nasturtium officinale

22(20) Upper cauline leaves simple; pubescence of forked or dendritic hairs (Fig. 16) . Capsella bursa-pastoris
Leaves all pinnatifid; pubescence of simple hairs only ......................... 23

23(22) Flowers in short axillary racemes arising at regular intervals along the main stem (Fig. 17); stems typically prostrate .... Coronopus didymus
Flowers in terminal racemes; stems typically erect ......................... 24

24(23) Petals present, 1-2 mm long ........
.......................... Lepidium nitidum
Petals vestigial ......................... 25

25(24) Stamens 2; leaves typically bipinnatifid (Fig. 18) . Lepidium strictum
Stamens 4; leaves pinnatifid with widely spaced linear lobes (Fig.19) .
.......................... Lepidium dictyotum

26(8) Leaves less than 2 cm broad, linear to oblong or lanceolate, simple to dentate .. 27
Leaves more than 2 cm broad, pinnate to pinnatifid, or if simple, then deltoid to oblong ..................... 34

27(26) Pubescent with malpighiaceous hairs (Fig. 20); flowers in dense, crowded racemes ............... Lobularia maritima
Pubescence, if present, of simple or dendritic (Fig. 16) hairs; flowers in elongate racemes ............... 28
28(27) Petals purple, 6-12 mm long ........ 29
Petals white, pink, or rose, 4-6 mm long ......................... 31

29(28) Basal leaves narrowly oblanceolate (Fig. 21); upper stem and pedicels hirsute. . . Arabis sparsiflora var. arcuata
Basal leaves broadly oblanceolate (Fig. 22); upper stem and pedicels often glabrous ......................... 30

30(29) Stems erect; leaves 1-3 cm long; petals 6-8 mm long .............. Arabis brevifolia var. brevifolia
................ Stems often prostrate; leaves 3-10 cm long; petals 10-12 mm long ........ Arabis brevifolia var. austinae

31(28) Plants glabrous .... Arabis suffrutescens
Plants pubescent ..................... 32

32(31) Pubescence of simple or forked hairs; leaves ciliate on the margins (Fig. 23) .............. Arabis rectissima
Pubescence of dendritic hairs (Fig. 24); leaves not ciliate-margined .... 33

33(32) Plants robust; basal leaves 6-15 cm long, usually dentate; cauline leaves sessile and auriculate (Fig. 25) ....
...................... Arabis glabra
Plants small; basal leaves 2-5 cm long; cauline leaves sessile, but not auriculate (Fig. 26) .. Arabis platysperma

34(26) Leaves pubescent with simple hairs .. 35
Leaves essentially glabrous .............. 37

35(34) Leaves all simple, deltoid to ovate;
petals dark purple ............ Lunaria annua
Leaves mostly pinnatifid; petals white or rose-purple .................... 36

36(35) Base of root swollen, its diameter exceeding that of the stem (Fig. 27);
petals rose purple or white .................. Raphanus sativus
Base of root not swollen, its diameter the same as that of the stem (Fig. 28); petals yellow or white ...
.................. Raphanus raphanistrum
37(34) Stems usually prostrate, often rooting at the nodes; petals 4-6 mm long; rhizomal leaves not present...

.......................... Cardamine breweri
Stems erect, not rooting at the nodes; petals 8 mm or more long; leaves originating from the rhizomes in addition to those on the stem (Fig. 29) .......................... 38

38(37) Rhizomal leaves compound (Figs. 29 & 30); leaves green, not leathery ....... 39
Rhizomal leaves simple (Fig. 31); leaves typically gray-green and leathery .......................... 40

39(38) Rhizomal leaves pinnate to palmately compound, the leaflets as broad as long (Fig. 29) ..................

.......................... Dentaria integrifolia var. californica
Rhizomal leaves palmately compound, the leaflets longer than broad (Fig. 30) ........... Dentaria tenella var. palmata

40(38) Cauleine leaves simple ............

.......................... Dentaria pachystigma var. pachystigma
Cauleine leaves pinnatifid ............
.......................... Dentaria pachystigma var. dissectifolia

41(7) Petals less than 3 mm long ............ 42
Petals greater than 3 mm long ............ 47

42(41) Pubescent with stellate or dendritic hairs (Fig. 32) .......................... 43
Pubescence, if present, of simple hairs .......................... 44

43(42) Upper cauleine leaves bipinnate, the leaflets with narrow linear lobes (Fig. 33) ........... Descurainia sophia
Upper cauleine leaves pinnate, the leaflets oval to lanceolate, entire to merely dentate (Fig. 34) ............

.......................... Descurainia richardsonii

44(42) Upper cauleine leaves entire, perfoliate (Fig. 35) ..........................

.......................... Lepidium perfoliatum
Upper cauleine leaves dentate to pinnatifid, sometimes auriculate (Fig. 36), but not perfoliate ............ 45
45(44) Stems erect and branched above, usually more than 40 cm tall .......
...... *Rorippa palustris* ssp. *occidentalis*
Stems erect or prostrate, freely branching from near the base, less than 40 cm tall ................. 46

46(45) Stems prostrate; leaves pinnatifid (Fig. 37) .........................
...... *Rorippa curvisiliqua* var. *orientalis*
Stems erect; leaves dentate (Fig. 38)
...... *Rorippa curvisiliqua* var. *occidentalis*

47(41) Petals yellow-orange to orange; leaves lanceolate, entire to dentate; pubescent with malpighiaceous hairs (Fig. 39a) .............. *Erysimum capitatum*
Petals yellow; leaves, at least the basal, spatulate to oblong, dentate to pinnatifid; glabrous or pubescent with erect hairs ............. 48

48(47) Plants pubescent with dendritic hairs (Fig. 39b) ............... *Arabis glabra*
Plants glabrous or with simple hairs only .............................. 49a

49a(48) Plants essentially glabrous; upper cauline leaves auriculate (Figs. 40 & 41) ......................... 49b
Plants pubescent or with scattered simple hairs; upper cauline leaves sessile or petioled, but not auriculate (Fig. 42) ............. 50

49b(49a) Upper cauline leaves lanceolate, entire (Fig. 40); petals 6-8 mm long ............... *Brassica campestris*
Upper cauline leaves pinnatifid (Fig. 41); petals 4-6 mm long ............ *Barbarea orthoceras*

50(49a) Stems prostrate, less commonly erect, 10-30 cm long; racemes leafy (Fig. 43) .............. *Tropidocarpum gracile*
Stems erect, more than 30 cm tall; racemes leafless ........................ 51

51(50) Petals 15-20 mm long ................
......................... *Raphanus raphanistrum*
Petals less than 10 mm long ............ 52
52(51) Upper cauline leaves deltoid to ovate, entire or with rounded lobes (Fig. 44); sepals reflexed 
........................................ Sinapis arvensis
Upper cauline leaves lanceolate and entire or pinnatifid with acute lobes 
........................................ 53

53(52) Upper cauline leaves lanceolate, entire to merely dentate ........... 54
Upper cauline leaves pinnatifid ..... 56

54(53) Lower cauline leaves irregularly pinnatifid with narrow acute lobes (Fig. 45); petals pale yellow ........
........................................ Caulanthus lasiophyllus
Lower cauline leaves pinnatifid or lobed, the lobes rounded; petals bright yellow .................. 55

55(54) Upper cauline leaves entire, long-petioled, pendulous (Fig. 46); basal leaves sparsely pubescent; petals 7-8 mm long ............ Brassica nigra
Upper cauline leaves denticulate, short petioled, not pendulous (Fig. 47); basal leaves densely pubescent; petals 5-6 mm long ... Hirschfeldia incana

56(53) Upper cauline leaves pinnatifid with linear lobes (Fig. 48) ............... 
........................................ Sisymbrium altissimum
Upper cauline leaves pinnatifid to lobed with oblong to lanceolate lobes, the terminal lobe hastate (Fig. 49) ....................... 57

57(56) Lower cauline leaves with truncate terminal lobe (Fig. 50); petals ca. 3 mm long; plants erect and branched above ............ Sisymbrium officinale
Lower cauline leaves with rounded terminal lobe (Fig. 51); petals 7-8 mm long; plants branched from near the base ............ Sisymbrium orientale

58(1) Fruit a silicle, less than three times longer than wide (Fig. 52) .... 59
Fruit a silique, three or more times longer than wide (Fig. 53) ........... 75
59(58) Silicles indehiscent when mature, 1-seeded ................................ 60
Silicles dehiscent when mature, 2- to many-seeded .......................... 62

60(59) Silicles pubescent with hooked hairs, not winged; stem and leaves pubescent with branching hairs. Athysanus pusillus
Silicles glabrous or with straight hairs, winged all around; stem and leaf pubescent with simple hairs .... 61

61(60) Pedicels straight or recurved only at the tips; silicles 8-10 mm long, the wing entire (Fig. 54) ................
................. Thysanocarpus radians
Pedicels recurved; silicles 3-8 mm long, the wing usually perforate
(Fig. 55) .......... Thysanocarpus curvipes

62(59) Silicles flat, oval, 30-45 mm long ..
.......................... Lunaria annua
Silicles of various shapes, but less than 10 mm long ....................... 63

63(62) Silicles obcordate (Fig. 56) ........
....................... Capsella bursa-pastoris
Silicles orbicular to oval .......... 64

64(63) Silicles inflated, with conspicuous styles 1-1.5 mm long ............ 65
Silicles flattened, the style less than 1 mm long .......................... 66

65(64) Silicles cordate, reniform, glabrous
(Fig. 57) ............... Cardaria draba
Silicles oval, as long or longer than broad, pubescent (Fig. 58) ........
........................... Cardaria pubescens

66(64) Silicles flattened parallel to the broad partition (Fig. 59) ........ 67
Silicles flattened contrary to the narrow partition (Fig. 60) ........... 68

67(66) Silicles orbicular, ca. 2.5 mm long; plants many-branched from the base, the stems leafy .... Lobularia maritima
Silicles oval, ca. 3-5 mm long, 3-4 mm wide; stems slender and few-branched, the leaves basal ... Draba verna
68(66) Silicles 1 mm long, 2 mm wide, the valves rounded, slightly inflated, not winged or with prominent apical teeth (Fig. 61) .......... Coronopus didymus
Silicles 1.5 mm or more long, orbicular to oval, often winged or with prominent apical teeth (Fig. 62) ............................... 69

69(68) Cauline leaves perfoliate (Fig. 63).
................. Lepidium perfoliatum
Cauline leaves sessile or petiolated, but not perfoliate ........... 70

70(69) Cauline leaves entire to merely dentate, spatulate .................. 71
Cauline leaves narrow, pinnatifid .... 73

71(70) Plants robust, up to a meter tall; basal leaves 10 cm or more long, 5-8 cm wide, the cauline smaller; stems mostly glabrous ...... Lepidium latifolium
Plants slender, 50 cm or less tall; basal leaves less than 10 cm long, 1-2 cm wide; stems pubescent ........ 72

72(71) Silicles orbicular, ca. 1.5 mm long; plants with a strong unpleasant odor
................. Lepidium pinnatifidum
Silicles oval, 2.5-4 mm long; plants without a strong unpleasant odor ....
...................... Lepidium virginicum

73(70) Leaves bipinnatifid (Fig. 64); sepals persistent until fruits nearly mature; pedicels flattened, with a winged margin (Fig. 65) ............... Lepidium strictum
Leaves pinnatifid (Fig. 66); sepals deciduous along with the petals and stamens; pedicels flattened, but not wing-margined (Fig. 67) ............... 74

74(73) Apices of silicles with prominent teeth (Fig. 68); valves prominently reticulate; silicles convex both above and below ........ Lepidium dictyotum
Apices without prominent teeth (Fig. 69); valves smooth, shiny; silicles convex above, concave below ........
............................. Lepidium nitidum
75(58) Siliques indehiscent, often strongly constricted between the seeds ... 76
Siliques dehiscent when mature, not constricted between the seeds ... 77

76(75) Siliques 3-6 mm thick, strongly constricted between the seeds; roots not swollen, about as thick as the stem (Fig. 70) ... *Raphanus raphanistrum*
Siliques 6-8 mm thick, not constricted between the seeds; roots swollen, thicker than the stem (Fig. 71) ... *Raphanus sativus*

77(75) Siliques flattened contrary to the narrow partition (Fig. 72); racemes leafy ... *Tropidocarpum gracile*
Siliques not flattened, or flattened parallel with the partition (Fig. 73); racemes leafless ... 78

78(77) Siliques less than 2 cm long ... 79
Siliques 2 cm or more long ... 92

79(78) Plants pubescent with stellate or dendritic hairs (Fig. 74) ... 80
Plants glabrous or pubescent with simple hairs only ... 83

80(79) Leaves simple, entire to dentate ... 81
Leaves pinnatifid ... 82

81(80) Leaves all basal; siliques 2-3 mm wide ... *Draba verna*
Cauline leaves present; siliques 1 mm or less wide ... *Arabidopsis thaliana*

82(80) Upper cauline leaves bipinnate, the leaflets with narrow linear lobes (Fig. 75) ... *Descurainia sophia*
Upper cauline leaves pinnate, the leaflets oval to lanceolate, entire to dentate (Fig. 76) ... *Descurainia richardsonii*

83(79) Plants essentially glabrous, occasionally with a few short hairs on the lower leaf petioles ... 84
Plants sparsely pubescent to hirsute ... 89
84(83) Siliques flat, dehiscing explosively
(Fig. 77) ........................................ 85
Siliques cylindrical, not dehiscing
explosively ........................................ 86

85(84) Basal leaves pinnatifid, in a
conspicuous rosette; upper cauline
leaves pinnatifid with narrow lobes;
plants erect, not rooting at the
nodes ................... Cardamine oligosperma
Basal leaves simple to pinnatifid,
not in a basal rosette; upper cauline
leaves pinnate with oval leaflets;
plants often prostrate and rooting at
the nodes ................... Cardamine breweri

86(84) Stems mostly prostrate ............... 87
Stems mostly erect ......................... 88

87(86) Leaves pinnate with ovate leaflets
(Fig. 79); stems often rooting at the
nodes ............... Nasturtium officinale
Leaves pinnatifid, the lobes oblong
to lanceolate, acute (Fig. 81); stems
not rooting at the nodes .............
..... Rorippa curvisiliqua var. orientalis

88(86) Stems branching from near the base;
leaves simple, sharply dentate (Fig.
81) ................................................... 89
...... Rorippa curvisiliqua var. occidentalis
Stems usually single and branched
above; leaves pinnatifid (Fig. 82) ...
..... Rorippa palustris ssp. occidentalis

89(83) Plants 10-30 cm tall; basal leaves
pinnate with rounded leaflets; upper
leaves pinnatifid with narrow lobes;
siliques flat, dehiscing explosively
when mature ........... Cardamine oligosperma
Plants usually more than 40 cm tall;
basal leaves pinnatifid; upper leaves
simple to pinnatifid with oblong to
lanceolate lobes; siliques cylindric,
not dehiscing explosively .............. 90
90(89) Siliques tapering to the tip, not with a conspicuous beak (Fig. 83); cauline leaves pinnatifid, the terminate lobe truncate (Fig. 84) 

...................... Sisymbrium officinale
Siliques of uniform thickness, with a conspicuous beak 1-2 mm long (Figs. 85 & 87) ...................... 91

91(90) Beak 1-seeded (Fig. 85); upper cauline leaves short-petioled, not pedulous, dentate (Fig. 86); basal leaves hirsute, with many lateral lobes ...................... Hirschfeldia incana
Beak empty (Fig. 87); upper cauline leaves long-petioled, pendulous, entire (Fig. 88); basal leaves sparsely pubescent, with few lateral lobes ...................... Brassica nigra

92(78) Pedicels arched or reflexed downwards (Fig. 89) ...................... 93
Pedicels horizontal to erect .............. 97

93(92) Plants pubescent, at least on the lower stems ...................... 94
Plants essentially glabrous .............. 95

94(93) Pubescence of forked and simple hairs; leaves entire, ciliate on the margins (Fig. 90) ...... Arabis rectissima
Pubescence of simple hairs only; lower cauline leaves irregularly pinnatifid, not ciliate on the margins ............ Caulanthus lasiophyllus

95(93) Siliques 3-6 mm wide; basal leaves entire, oblanceolate, usually present when in fruit ...... Arabis suffrutescens
Siliques 1-2 mm wide; basal leaves pinnatifid, usually deciduous before mature siliques are present .............. 96

96(95) Upper cauline leaves narrowly linear ...................... Streptanthus polygaloides
Upper cauline leaves orbicular, perfoliate .... Streptanthus diversifolius

97(92) Plants pubescent with simple to branching hairs ...................... 98
Plants essentially glabrous .............. 107
98(97) Leaves, at least the basal, pinnatifid ....................... 99
Leaves simple, entire to merely dentate ....................... 102

99(98) Upper cauline leaves bipinnatifid (Fig. 91); pubescence of stellate or dendritic hairs (Fig. 92) .............
......................... Descurainia sophia
Upper cauline leaves simple to pinnatifid; pubescence of simple hairs ......................... 100

100(99) Siliques 2-5 cm long, 3-4 mm thick, with a long, winged beak (Fig. 93) ..
......................... Sinapis arvensis
Siliques 5-10 cm long, 1-2 mm thick, without a beak ......................... 101

101(100) Plants 50-100 cm tall, erect and widely branched above; upper cauline leaves pinnatifid with linear lobes (Fig. 94) ........... Sisymbrium altissimum
Plants 20-60 cm tall, branching from near the base, often sprawling; upper cauline leaves pinnatifid with broad lobes, the terminal lobe hastate (Fig. 95) ........... Sisymbrium orientale

102(98) Siliques square in cross-section; pubescence of mamillo-hairy hairs (Fig. 96) ............. Erysimum capitatum
Silicles flattened; pubescence of dendritic hairs (Fig. 92) ............. 103

103(102) Siliques many, erect and appressed to the stem, ca. 1 mm wide .... Arabis glabra
Siliques few to many, horizontal to erect, but not appressed to the stem, more than 1 mm wide ............. 104

104(103) Siliques erect to ascending, straight, 3-5 mm wide (Fig. 97); cauline leaves sessile but not auriculate (Fig. 98) .. Arabis platysperma
Siliques ascending to horizontal, often arcuate, ca. 2 mm wide (Fig. 99); cauline leaves sessile and auriculate (Fig. 100) ............. 105
105(104) Basal leaves narrowly ob lanceolate (Fig. 101); upper stem and pedicels hirsute. *Arabis sparsiflora* var. *arcuata*
Basal leaves broadly ob lanceolate (Fig. 102); upper stem and pedicels usually glabrous

106(105) Stems erect; leaves 1-3 cm long ....

107(97) Leaves all petioled, not auriculate (Fig. 103); stems slender, herbaceous, bending or crushing easily; roots fibrous or rhizomatous

Leaves auriculate, only the basal petioled (Fig. 104); stems wiry or stout and woody, not bending easily; tap roots present

108(107) Stems erect to more commonly prostrate, often rooting at the nodes; siliques 1.5-2.5 cm long, dehiscing explosively when mature; rhizomal leaves not present

109(108) Rhizomal leaves simple (Fig. 106); leaves grey-green, thick and leathery

110(109) Cauline leaves simple, sometimes with one or two small lateral lobes ....

111(109) *Dentaria pachystigma* var. *pachystigma*

112(108) *Arabis breweri* var. *breweri*

113(108) Stems usually sprawling; leaves 3-10 cm long ..... *Arabis breweri* var. *austinae*

114(107) *Cardamine breweri*

115(108) Stems erect, not rooting at the nodes; siliques 3-5 cm long, not dehiscing explosively; rhizomal leaves present (Fig. 105)

116(108) Rhizomal leaves typically compound (Figs. 105 & 107); leaves green, thin, not leathery

117(109) *Dentaria pachystigma* var. *dissectifolia*
111(109) Rhizomal leaves pinnately to palmately compound, the leaflets as broad as long (Fig. 108) .......... 
... Dentaria integrifolia var. californica 
Rhizomal Leaves palmately compound, the leaflets longer than broad (Fig. 109) ........... Dentaria tenella var. palmata 

112(107) Leaves, at least the lower, pinnatifid; siliques straight, not strongly flattened, 2-5 cm long ...... 113 
Leaves all simple, entire to dentate; siliques usually arcuate, strongly flattened, 5-12 cm long ........... 114 

113(112) Siliques with a stout conical beak 1-1.5 cm long; upper cauline leaves simple, lanceolate (Fig. 110) ........ 
................................. Brassica campestris 
Siliques without a beak; upper cauline leaves pinnatifid ........... 
................................. Barbarea orthoceras 

114(112) Uppermost cauline leaves orbicular, above the lowermost siliques (Fig. 112) .............. Streptanthus tortuosus 
Uppermost cauline leaves ovate to broadly lanceolate, below the lowermost siliques ............... 115 

115(114) Stems branching from near the base; leaves ovate; siliques ca. 1 mm wide 
................................. Streptanthus drepanoides 
Stems mostly simple; leaves lanceolate; siliques 2-4 mm wide .... 
................................. Streptanthus cordatus
LIST OF TAXA

**Arabidopsis thaliana** (L.) Heynh.

Descr: J (p 44, as *Sisymbrium t.*); A (p 267); R (p 205); MK (p 232)
Illus: A (f 1999)

Distr: *A. thaliana* has only been collected once in Butte County, in an open area in Montane Forest along Highway 32, about 16 km north of Forest Ranch. However, this species can be expected to become better established in the county, as it is quite common throughout much of the state.

**Arabis breweri** Wats. var. **breweri**

**Arabis breweri** var. **austinae** (Greene) Rollins

Descr: J (p 65); A (p 313); MK (p 262)
Illus: A (f 2129)

Distr: *A. breweri* (Map 1) occurs on rocky outcrops in Montane and Subalpine Forest, at elevations of 450-2135 m. It occurs on volcanic outcrops on and near Humboldt Peak, on granite outcrops in the canyon of the North Fork of the Feather River, and on limestone outcrops near Milsap Bar on the Middle Fork of the Feather River. Variety *austinae* (Map 2) occurs primarily on basalt outcrops in Foothill Woodland, at elevations of 90-475 m.

Variety *breweri* is highly variable, with a tendency to be larger at lower elevations. Populations occurring in the canyon of the North Fork of the Feather River have individuals typical of var. *breweri* and other individuals which appear more robust. These robust individuals are
similar in size to var. austinae (see below), but differs from var. austinae in being erect, having straighter, more horizontal siliques, and often being abnormally branched. In addition, pollen grains from these individuals appear abnormal, being both larger than typical for var. breweri, and 3- to 5-colpate, rather than the usual 3-colpate. Interestingly, greenhouse-grown individuals of var. austinae are quite similar to the robust Feather River canyon individuals (personal observations). A more careful study of this situation seems to be in order.

Var. austinae differs from var. breweri by its robust size and larger leaves and flowers, although the two varieties have similar overall habits. Variety austinae may form large mats of leaves over half a meter in diameter, from which one to several flowering racemes arise. The stems of var. austinae are often prostrate. In one population near Cape Horn, southeast of Paradise, I observed an individual whose prostrate leafless stems stretched over 1.5 m from the base to the current year's leaves.

**Arabis glabra** (L.) Bernh.

**Descri:** J (p 61); A (p 302, as Turritis g.); MK (p 258)

**Illus:** A (f 2096); NR (p 141)

**Distr:** A. glabra (Map 3) occurs in meadows, canyon slopes, and other open areas in Montane Forest, at elevations of 450-1500 m. Flower color in A. glabra appears to be polymorphic, as I observed flowers ranging in color from creamy white to pale rose in several populations.
Arabis platysperma Gray

Descr: J (p 71); A (p 310); MK (p 265)
Illus: J (f 138); A (f 2116); NR (p 268)
Distr: A. platysperma (Map 4) occurs in open rocky areas in Upper Montane and Subalpine Forest, at elevations of 1340-2025 m.

Arabis rectissima Greene

Descr: J (p 68); A (p 314); MK (p 265)
Illus: A (f 2135); NR (p 29)
Distr: A. rectissima (Map 5) occurs on open dry slopes in Upper Montane Forest, at elevations of 1410-1900 m. It is similar in appearance to A. holboellii, but has very conspicuous ciliate-marginated leaves.

Arabis sparsiflora Nutt. in T.& G. var. arcuata (Nutt.) Rollins

Descr: J (p 69, as A. arcuata); A (p 314, as A. maxima); MK (p 261)
Illus: A (f 2133)
Distr: A. sparsiflora var. arcuata (Map 6) grows on granitic soils and from cracks on granite outcrops in the canyons of the North and Middle Forks of the Feather River, in Montane Forest at elevations of 470-670 m.

Arabis suffrutescens Wats.

Descr: J (p 70); A (p 311); MK (p 265)
Illus: A (f 2124)
Distr: In Butte County, A. suffrutescens is only known to occur on rocky exposed slopes on Humboldt Peak, in Subalpine Forest, at about 2135 m elevation.

Athyranus pusillus (Hook.) Greene

Descr: J (p 98); A (p 298); R (p 206); MK (p 253)
Illus: A (f 2087); R (f 113)
Distr: *A. pusillus* (Map 7) occurs most commonly in thin soils of Foothill Woodland, but is also widespread in the county from Valley Grassland to Montane Forest, at elevations of 45-1400 m.

**Barbarea orthoceras** Ledeb.

Descr: J (p 51); A (p 276, as *B. americana*); MK (p 238)

Illus: A (f 2021); NR (p 145)

Distr: *B. orthoceras* (Map 8) grows in meadows, on the banks of streams, and occasionally on roadsides, in Montane Forest, at elevations of 550-1970 m.

**Brassica campestris** L.

Descr: J (p 48); A (p 274); R (p 208); MK (p 236)

Illus: A (f 2016); R (f 116); NR (p 141)

Distr: *B. campestris* (Map 9) is an introduced weed most commonly found in cultivated fields of agricultural portions of the county, west of Highway 99, at elevations of 25-400 m. It less frequently occurs in other disturbed areas such as roadsides, although a vigorous population can presently be found at the old Chico dump on Humboldt Road.

**Brassica nigra** (L.) Koch

Descr: J (p 49); A (p 274); R (p 214); MK (p 236)

Illus: A (f 2014); R (f 119)

Distr: *B. nigra* (Map 10) is an introduced weed occurring mostly on levees and banks of ditches in agricultural areas of the county, west of Highway 99, at elevations of 20-60 m. *B. nigra* is often confused with other mustards growing in the county and can best be distinguished by the short empty beak of its siliqua and by its strap-like, pendulous upper cauline leaves. The illustration of *B. nigra* given in Niehaus and Ripper (1976)
shows the leaves of the similar *Sinapis arvensis*.

**Capsella bursa-pastoris** (L.) Medic.

Descr: J (p 91); A (p 291); R (p 218); MK (p 247)

Illus: A (f 2061); R (f 122); NR (p 27)

Distr: *C. bursa-pastoris* (Map 11) is an introduced weed common in disturbed urban areas and cultivated areas of the county and less common in pastures of Valley Grassland and Foothill Woodland. It occurs mostly at elevations of 25-305 m, but has been observed at the margins of a meadow at Cherry Hill, elevation 1426 m. The basal leaves of *C. bursa-pastoris* are polymorphic. Within a single population, leaf shape may vary from nearly entire to pinnatifid with opposite, irregularly-shaped lobes.

**Cardamine breweri** Wats.

Descr: J (p 55); A (p 279); MK (p 242)

Illus: J (f 133); A (f 2032); NR (p 31)

Distr: *C. breweri* (Map 12) grows on stream banks and in standing water at the margins of springs and streams, in Montane Forest, at elevations of 725-1675 m.

**Cardamine oligosperma** Nutt.

Descr: J (p 56); A (p 282); MK (p 242)

Illus: A (f 2039); NR (p 31)

Distr: *C. oligosperma* (Map 13) is a common annual found on thin soils from Valley Grassland to Montane Forest, at elevations of 35-670 m.

**Cardaria draba** (L.) Desv.

Descr: J (p 82, as *Lepidium d.*); A (p 258, as *L. d.*); R (p 220); MK (p 225)
Illus: A (f 1971); R (f 124); NR (p 25)

Distr: C. draba is an introduced weed considered an undesirable pest by the State of California. Although there are currently no extant populations of C. draba in the county, it has been observed here in the past (L. Ahart, personal communication), and older collections do exist (not seen; M.S. Taylor, personal communication).

**Cardaria pubescens** (C.A. Mey.) Rollins

Descr: J (p 90, as Hymenophyza p.); A (p 258, as H. p.); R (p 222); MK (p 225)

Illus: A (f 1971); R (f 124); NR (p 25)

Distr: Like C. draba, C. pubescens is a noxious introduced weed. It has recently been collected at a roadside near Jarbo Gap, but probably does not occur as frequently as C. draba.

**Caulanthus lasiophyllus** (Hook. & Arn.) Pays.

Descr: J (p 38, as Thelypodium t.); A (p 246, as T. t.); R (p 242, as T. t.); MK (p 216, as T. t.)

Illus: A (f 1934); R (f 144); NR (p 31, as T. t.)

Distr: C. lasiophyllus grows near and at the base of rocks in Foothill Woodland. In Butte County, C. lasiophyllus occurs on the Ahart Ranch near Honcut at 45 m elevation and in Upper Bidwell Park in Chico at 340 m elevation.

AI Shehbaz (1973), in a revision of the genus Thelypodium, determined that C. lasiophyllus was morphologically distinct from other members of Thelypodium. C. lasiophyllus is autogamous, unlike most of the other members of Caulanthus, and has reduced flowers that are not typical for Caulanthus. This caused confusion over the taxonomic
position of C. lasiophyllus, which otherwise is morphologically similar to other members of Caulanthus.

Coronopus didymus (L.) Sm.

Descr: J (p 81); A (p 263); R (p 223); MK (p 230)
Illus: A (f 1991); R (f 127)
Distr: C. didymus is an introduced weed common in lawns in many parts of the state. It is small, low-growing, and easily overlooked. For this reason, it has only recently been discovered to exist in Butte County. It is common in lawns on the campus of C.S.U., Chico, and is to be expected in lawns in other urban parts of the county.

Dentaria integrifolia Nutt. var. californica (Nutt.) Jeps.

Descr: J (p 57); A (p 283, as D. californica); MK (p 243, as D. c.)
Illus: J (f 134); A (f 2043); NR (p 31, as D. c.)
Distr: D. integrifolia var. californica (Map 14) occurs under trees on stream banks and at the base of north-facing cliffs, in Riparian and Foothill Woodland, at elevations of 150-300 m.

D. integrifolia var. californica has been, and still is, surrounded by nomenclatural confusion. There is some question whether Dentaria should continue to exist as a genus separate from the closely related Cardamine. For example, Hitchcock et al (1964) treats Dentaria as synonymous of Cardamine because several species in the Pacific Northwest have characteristics intermediate between Dentaria and Cardamine. In California, however, all Dentaria species are quite distinct from Cardamine species. On top of this, Detling (1936), in his revision of West Coast Dentaria, treated D. integrifolia as a variety of D. californica. However, Jepson (1925) had previously combined the two
species under *D. integrifolia*, a change overlooked or ignored in many later floras. Jepson's recombination has priority according to article 57 of the International Code of Botanical Nomenclature (1983).

**Dentaria pachystigma** Wats. var. *pachystigma*

**Dentaria pachystigma** var. *dissectifolia* Detling

**Descri:** A (p 283); MK (p 243)

**Illus:** A(f 2042); Detling (1936, f 2)

**Distr:** Var. *pachystigma* (Map 15) occurs on shaded rocky slopes in Montane Forest, at elevations of 300-720 m. Var. *dissectifolia* (Map 16) is usually found in more mesic portions of serpentine outcrops, at elevations of 485-1040 m. Var. *dissectifolia* can sometimes be found on non-serpentine soils in Montane Forest adjacent to serpentine outcrops. However, these plants do not appear as vigorous as those growing in serpentine soil.

**Dentaria tenella** Pursh var. *palmata* Detling

**Descri:** MK (p 244)

**Illus:** Detling (1936, f 1)

**Distr:** *D. tenella* var. *palmata* occurs in only one known locality in Butte County. It is found at the margins of a small meadow on the Butte/Plumas County border, about 7.2 km southeast of Jonesville, in upper Montane Forest, at 1950 m elevation.

**Descurainia richardsonii** (Sweet) O.E. Schultz var. *viscosa* (Rydb.) Detling

**Descri:** A (p 269); MK (p 233)

**Illus:** A (f 2002); NR (p 145)

**Distr:** *D. richardsonii* var. *viscosa* has only one Butte County locality, found in the dry portions of the small meadow mentioned above for *Dentaria tenella* var. *palmata*.
Descrainia sophia (L.) Webb

Descr: J (p 44, as Sisymbrium s.); A (p 268); R (p 244); MK (p 233)
Illus: A (f 2001); R (f 143)

Distr: *D. sophia* is an introduced weed collected only once in Butte County, on the bank of an irrigation ditch along Dayton-Durham Road, about 4.8 km south of Chico. This population may not persist, but the presence of established populations in neighboring counties suggests that *D. sophia* might eventually become established in Butte County.

Draba verna L. var. verna

*Draba verna* var. *aestivalis* Lejeune

Descr: J (p 94); A (p 292); R (p 226); MK (p 249)
Illus: A (f 2065); R (f 129); NR (p 27)

Distr: *D. verna* is a small introduced annual that occurs on thin disturbed soils, often on roadsides, from Valley Grassland to Montane Forest, at elevations of 45-1020 m. Var. *verna* (Map 17) and var. *aestivalis* (Map 18) are distinguished from each other by the shape of their siliques. Var. *verna* has longer, narrower siliques (about three times longer than broad) than var. *aestivalis*, which has an oval silique (about as broad as long). Although adjacent populations of the two varieties occur, var. *aestivalis* appears to be the first to appear in the spring (contrary to what its varietal name suggests!)

Erysimum capitatum (Dougl.) Greene

Descr: J (p 73); A (p 318); MK (p 268)
Illus: A (f 2142); NR (pp 147, 225)

Distr: *E. capitatum* (Map 19) occurs on dry rocky slopes and flats, in Montane Forest, at elevations of 455-2135 m.
Hirschfeldia incana Lagreze-Fossat

Descr: J (p 50, as Brassica i.); A (p 274, as Sinapis i.); R (p 211, as B. geniculata); MK (p 236, as B. g.)

Illus: A (f 2013); R (f 118); NR (p 141, as B. g.)

Distr: H. incana (Map 20) is an introduced weed of dry disturbed sites, most commonly on roadsides and on dredger tailings, at elevations of 20-1100 m.

Hirschfeldia incana is one of two introduced mustard species traditionally placed in Brassica by authors of American floras. All members of the tribe Brassiceae are morphologically similar. It is little wonder that American workers such as Bailey (1922) and Wheeler (1938), perhaps having seen only a limited number of introduced or cultivated species, were unwilling to accept the European treatment which recognizes dozens of genera and hundreds of species for the tribe. However, the current large-scale effort, by several groups of European workers, to resolve the classification of the tribe by careful treatment of an immense collection of cytological and micromorphological data, appears to support the European treatment of the tribe (Vaughan and Whitehouse, 1971; Harberd, 1972; Gomez-Campo and Tortosa, 1974; Clemente-Munoz and Hernandez-Bermejo, 1980). Accordingly, prominent North American authorities on the Cruciferae are now accepting the European treatment and are recognizing Hirschfeldia and Sinapis as worthy of generic rank (Mulligan and Bailey, 1975; Rollins, 1981).

Lepidium dictyotum Gray

Descr: J (p 89); A (p 262); MK (p 228)

Illus: A (f 1988)
Distr: *L. dictyotum* is known in Butte County only from the Gray Lodge Wildlife Management Area west of Gridley, where it has been collected on seldom-used levee roads.

*Lepidium latifolium* L.

Descr: R (p 230); MK (p 226)

Illus: R (f 132)

Distr: *L. latifolium* is an introduced perennial weed which occurs near the Rutherford Road entrance to Gray Lodge Wildlife Management Area, west of Gridley. This species is on the state's list of noxious weeds, and this population will probably be eradicated before long. However, *L. latifolium* is a common weed in the state, and considering the rate at which it spreads, it would be expected to periodically be re intro duced.

*Lepidium nitidum* Nutt.

Descr: J (p 87); A (p 262); R (p 230); MK (p 228)

Illus: A (f 1985); R (f 134); NR (p 25)

Distr: *L. nitidum* (Map 21) is a common annual growing on thin soils, from Valley Grassland to Foothill Woodland, at elevations of 40-730 m.

*Lepidium perfoliatum* L.

Descr: J (p 83); A (p 259); R (p 232); MK (p 226)

Illus: A (f 1974); R (f 135); NR (p 149)

Distr: *L. perfoliatum* is an introduced weed browning along roadsides in Gray Lodge Wildlife Management Area, west of Gridley. This is the only known extant population in Butte County, although a collection has been made at Paradise Dam, north of Magalia.
Lepidium pinnatifidum Ledeb.

Descr: MK (p 227)

Illus: (none available)

Distr: L. pinnatifidum is one of four Lepidium species in Butte County known to occur only at Gray Lodge Wildlife Management Area, west of Gridley. It is an introduced weed which grows along Rutherford Road. Specimens of L. pinnatifidum from Gray Lodge differ from typical L. pinnatifidum in that the lower leaves are dentate, not pinnatifid. However, J.T. Howell at the California Academy of Sciences has examined specimens collected at at Gray Lodge and has verified that they are indeed L. pinnatifidum (T.C. Fuller, 1981, personal communication).

Lepidium strictum (Wats.) Rattan

Descr: J (p 86, as L. pubescens); A (p 262, as L. bipinnatifidum);
R (p 232, as L. p.); MK (p 227)

Illus: A (f 1986)

Distr: L. strictum (Map 22) is an introduced weed which occurs in tightly packed soils of footpaths, dirt roads, and at the edge of sidewalks and paved roads. It can be found at elevations of 15-500 m.

Lepidium virginicum L.

Descr: J (p 85); A (p 261); R (p 233); MK (p 228)

Illus: A (f 1979); R (p 136)

Distr: L. virginicum has occasionally been collected in Butte County in the Feather River canyon, along Highway 70 near the Butte/Plumas County line. It is quite common at higher elevations in the State, and periodic reintroductions are to be expected at this locality.
Lobularia maritima (L.) Desv.

Descri: J (p 91, as Alyssum m.); A (p 319, as Koniga m.); R (p 205, as A. m.); MK (p 270)
Illus: A (f 2148); R (f 112); NR (p 27)
Distr: L. maritima is a drought tolerant species commonly grown as a garden ornamental in California. It occasionally escapes from cultivation in the County, but does not appear to have formed any persistent populations.

Lunaria annua L.

Descri: MK (p 241)
Illus: (none available)
Distr: L. annua is a popular ornamental grown both for its large purple flowers and for its large oval silicles. The membranous partitions of the fruits make the plants popular for dried floral arrangements. L. annua has established persistent populations at two localities along Big Chico Creek, on the C.S.U.C. campus near the golf green, and in Lower Bidwell Park near the Freeway overpass. Another small population has also been reported near Lovelock, not far from Sterling City.

Nasturtium officinale R. Br.

Descri: J (p 52, as Radicula nasturtium-aquaticum); A (p 276, as Rorippa n.-a.); MK (p 240)
Illus: A (f 2022); NR (p 31, as Rorippa n.-a.)
Distr: N. officinale (Map 23) is an introduced aquatic perennial occasionally found in springs and slow-moving water at the margin of streams. It occurs primarily in Riparian Woodland or Montane Meadows, at elevations of 45-1030 m.
N. officinale is often placed in the genus Rorippa. Two recent treatments of Rorippa, however, have found N. officinale to be sufficiently distinct warranting placement in its own genus (Jonsell, 1968; Stuckey, 1972).

Raphanus raphanistrum L.

Descr: A (p 275); R (p 273); MK (p 238)
Illus: A (f 2020)
Distr: R. raphanistrum (Map 24) is an introduced weed common along roadsides, in cultivated fields, and in pastures, at elevations of 20-400 m. Flower color is polymorphic in California populations of R. raphanistrum, and individuals with white, yellow, purple, or bronze (a combination of yellow and purple) petals occur in the same population. This is quite different from European populations of R. raphanistrum, which, although also polymorphic, have only white- or yellow-petaled individuals. Panetsos and Baker (1967) have interpreted the California complex as a series of hybrid swarms between R. raphanistrum and purple-flowered R. sativus. They further suggest that selection has favored the characteristics of R. raphanistrum in the hotter, drier inland areas and the characteristics of R. sativus in the cooler, moister coastal areas. Thus, the plants occurring in Butte County have more characteristics of typical R. raphanistrum, but also have introgressed genes for purple petal color.

Raphanus sativus L.

Descr: J (p 48); A (p 275); R (p 233); MK (p 238)
Illus: A (f 2019); R (f 234); NR (pp 29, 267)
Distr: *R. sativus*, the cultivated radish, is occasionally collected in Butte County, probably as an escape from cultivation, although I would not expect populations to successfully become established (see above comments for *R. raphanistrum*).

*Rorippa curvisiliqua* (Hook.) Bessey ex Britton var. *orientalis* Stucky  
*Rorippa curvisiliqua* var. *occidentalis* (Greene) Stucky

Descr: J (p 52, as *Radicula c.*); A (p 278); MK (p 239)  
Illus: A (f 2025); NR (p 145)

Distr: Var. *orientalis* (Map 25) is the more common of the two varieties occurring in the County and can be found primarily at the margin of lakes and streams, in Montane Forest and Montane Meadow, at elevations of 1020-1950 m. Var. *occidentalis* has been collected on the banks of irrigation ditches near Honcut. Var. *occidentalis* has apparently been able to adapt from river and stream margins to more disturbed habitats of irrigation ditches.

*Rorippa palustris* (L.) Bess. subsp. *occidentalis* (Wats.) Abrams

Descr: J (p 53, as *Radicula p.*); A (p 278); R (p 235); MK (p 240, as *Rorippa islandica*)  
Illus: A (f 278)

Distr: *R. palustris* subsp. *occidentalis* (Map 26) grows on banks of irrigation ditches in the southwest quarter of Butte County, at elevations of 25-35 m. This appears to be another species which has been able to adapt from river and stream banks to a more disturbed habitat.

*Sinapis arvensis* L.

Descr: J (p 49, as *Brassica a.*); A (p 271); R (p 208, as *B. a.*); MK (p 237, as *B. kaber*)
Illus: A (f 2012); R (f 116)

Distr: *S. arvensis* (Map 27) is a common introduced weed of orchards and cultivated fields, although it also occurs along roadsides. It is found at elevations of 20-490 m. There has been some nomenclatural confusion with this species which is usually treated as a member of the genus *Brassica* in American floras (see comments above for *Hirschfeldia incana*).

**Sisymbrium altissimum** L.

Descr: J (p 43); A (p 267); R (p 236); MK (p 231)

Illus: A (f 1996); R (f 139); NR (p 145)

Distr: *S. altissimum* is an introduced weed better adapted to the Great Basin desert. However, it occurs in a small meadow at the site of Merrimac, about 35 km northeast of Oroville, in Montane Forest, at an elevation of 1173 m.

**Sisymbrium officinale** (L.) Scop.

Descr: J (p 43); A (p 266); R (p 239); MK (p 231)

Illus: A (f 1995); R (f 141); NR (p 145)

Distr: *S. officinale* (Map 28) is an introduced weed species which occurs along roadsides and also appears to have become naturalized in the Foot-hill Woodland, where it usually can be found growing beneath oak trees. It occurs at elevations of 45-475 m.

**Sisymbrium orientale** L.

Descr: A (p 267); R (p 239); MK (p 231)

Illus: A (f 1997)

Distr: *S. orientale* is an introduced weed found along roadsides and sidewalks. It is established in Chico and is possibly at other localities in the County.
Streptanthus cordatus Nutt.

Descr: J (p 29); A (p 247); MK (p 218)
Illus: A (f 1937); NR (pp 143, 267)
Distr: *S. cordatus* (Map 29) occurs on outcrops and roadcuts of volcanic mudflow, in Montane Forest, at elevations of 730-1295 m.

Streptanthus diversifolius Wats.

Descr: J (p 31); A (p 251); MK (p 221)
Illus: A (f 1954); NR (p 143)
Distr: *S. diversifolius* occurs at only one locality in Butte County, on open, level basalt outcrops of Table Mountain, 365 m elevation.

Streptanthus drepanoides Kruckeberg and Morrison

Descr: Kruckeberg and Morrison (1983, p 230)
Illus: Kruckeberg and Morrison (1983, p 232)
Distr: In Butte County, *S. drepanoides* is known only from one small population on a steep serpentine slope in Foothill Woodland, on the West Branch of the Feather River arm of Lake Oroville, about 7.2 km southeast of Paradise. This recently described species occurs mainly in the northern Coast Range of California. The Butte County population is the only known population outside of the Coast Range.

Streptanthus polygaloides Gray

Descr: J (p 32); A (p 251); MK (p 221)
Illus: A (f 1953); NR (p 143)
Distr: *S. polygaloides* (Map 30) occurs on serpentine outcrops within Foothill Woodland and Yellow Pine Forest, at elevations of 285-1220 m. It is found on nearly every serpentine outcrop occurring in the County.
**Streptanthus tortuosus** Kell.

Descr: J (p 30); A (p 248); MK (p 218)
Illus: A (f 1940); NR (pp 143, 267)

Distr: *S. tortuosus* (Map 31) is common on outcrops of granite, basalt, and serpentine, from Foothill Woodland to Montane Forest, at elevations of 300-1860 m. *S. tortuosus* exhibits a wide range of morphological variation, and current taxonomic treatments which rely on distribution and floral characters are in need of revision. My own field work suggests that there are only two or three valid varieties, as opposed to the seven or eight found in the above references. Until a satisfactory revision is produced, I will not recognize the present varieties. In general, plants from lower elevations tend to be more robust and bloom earlier in the year. However, it has not yet been determined if this elevational difference is due to genetic factors or is simply a physiological response to the habitat.

**Thysanocarpus curvipes** Hook. var. curvipes
**Thysanocarpus curvipes** var. elegans (F. & M.) Rob. in Gray

Descr: J (p 99); A (p 299); R (p 246); MK (p 254)
Illus: A (f 2089); R (f 146); NR (p 27)

Distr: *T. curvipes* is a common annual of early spring which occurs in grassy areas of Foothill Woodland to Montane Forest, at elevations of 45-670 m. Var. *curvipes* (Map 32) is much more delicate than var. *elegans* (Map 33), having smaller silicles (3 to 5 mm wide vs. 6 to 8 mm wide). The robustness of var. *elegans* suggests that it may be a polyploid derivative of var. *curvipes*, but the exact relationship between the two taxa will not be known until a more conclusive study of *T. curvipes* is conducted.
Map 31. *Streptanthus tortuosus*

Map 32. *Thysanocarpus curvipes var. curvipes*

Map 33. *Thysanocarpus curvipes var. elegans*

Map 34. *Thysanocarpus radians*

Map 35. *Tropidocarpum gracile*
Thysanocarpus radians Benth.

Descr: J (p 101); A (p 299); R (p 246); MK (p 254)

Illus: A (f 2092); NR (p 27)

Distr: T. radians (Map 34) occurs in grassy areas, from Valley Grassland to Foothill Woodland, at elevations of 45-420 m.

Tropidocarpum gracile Hook.

Descr: J (p 77); A (p 285); R (p 246); MK (p 244)

Illus: A (f 2045); R (f 147)

Distr: T. gracile (Map 35) is an uncommon species of the Valley Grassland, at elevations of 45-140 m.
REFERENCES CITED


