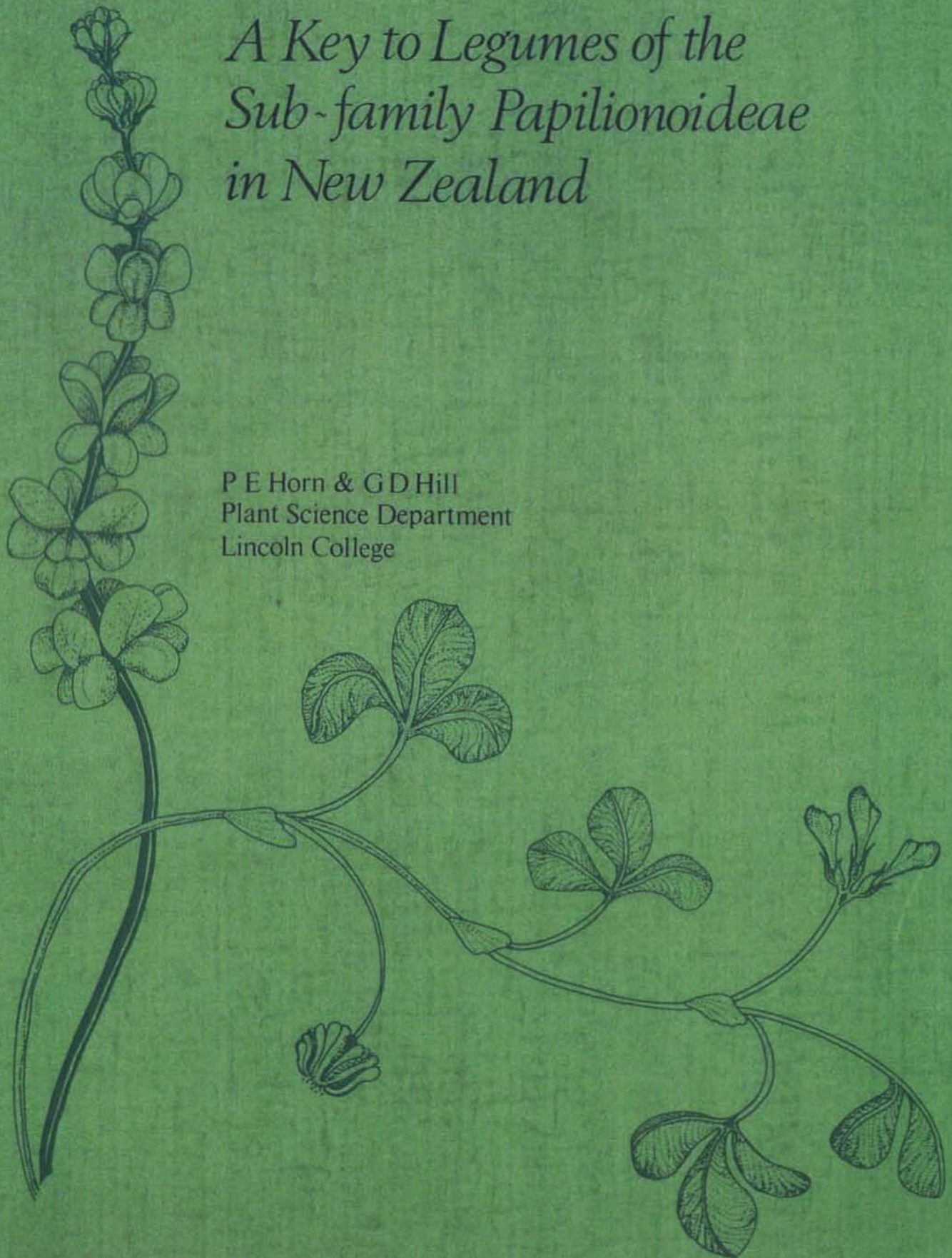


*A Key to Legumes of the
Sub-family Papilionoideae
in New Zealand*

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A key to legumes of the sub-family Papilionoideae in New Zealand

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Illustrations by Miss S. F. Cape

A course requirement for most undergraduate students at Lincoln College is a basic plant collection. When undertaking such a task the lack of suitable, simple keys for the non-botanist rapidly becomes apparent.

Allan (1961) contains a key to the native legumes. Healy and Mason (1976) also contains a key for a limited number of small herbaceous legumes normally found in pastures.

There is at present no New Zealand key available which enables the identification of common pasture, crop, ornamental or weed legumes, whether native or exotic. This key endeavours to fill this gap for the common papilionate genera. As it does not require specialised botanical knowledge, it should also be suitable for use by farmers and amateur botanists. Trifolium species keyed by Healy and Mason (1976) which were said to be rare, and have not been reported for many years, have been omitted.

The key has been tested over four years by large classes of undergraduate students at Lincoln College, and is intended as the first of a continuing series.

The authors would be pleased to hear from users, particularly with suggested improvements.

Introduction

The family Leguminosae is one of the largest families of flowering plants with members widely distributed throughout the world. The characteristic feature of the family is the fruit which is a pod. The family is divided into three sub-families (Mimosoideae, Caesalpinoideae and Papilionoideae) according to the form of the flower.

This key deals with the sub-family Papilionoideae which has pea-like flowers

with five sepals, five petals, ten stamens and one carpel (see diagrams P.2) In many genera flowers are gathered together into groups or inflorescences. For example clover "flowers" consist of many individual papilionate flowers.

Common plants of the Papilionoideae in New Zealand include clovers, medics, peas, beans, gorse, broom, lupins and the native Kowhai.

Key Use

The key comprises a description of leaf type and five groups.

To identify a legume examine the leaf type of the plant and decide to which of the five groups it belongs. If the plant has trifoliate leaves (Group 3) it must be allocated, in a similar way, to one of 4 sub-groups.

Each group (or sub-group) is arranged in paired statements (except group 3 which has four sub-groups). In each case start at the first pair of statements (1a and 1b) and decide which best describes the plant. A number in the right hand margin will direct the user to another pair of statements. A series

of such steps will enable the user to reach a point where the plant can be identified with reasonable certainty.

N.B. Some plants vary considerably, especially in leaf form. Such plants will key in more than one group.

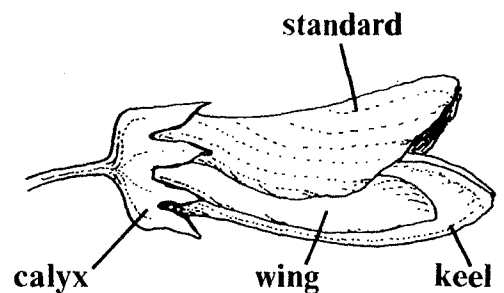
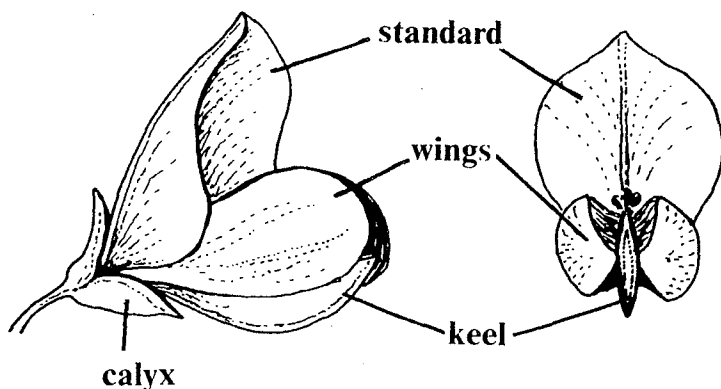
Terms used in the key

Most of the terms used in the key are illustrated either at the point of use or in the diagrams on pages 2–4.

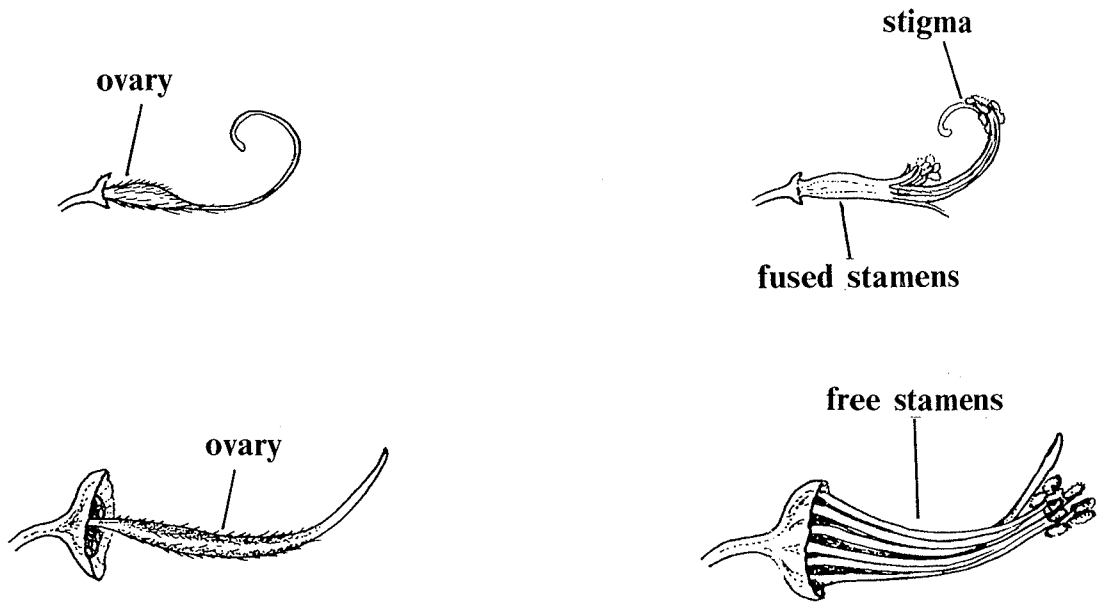
Family features

Flowers are pea-like (papilionate) and consist of five petals, one standard, two wings, two keels, ten stamens, one carpel. Seeds are formed in a pod. The leaves are variable as illustrated in the following diagrams

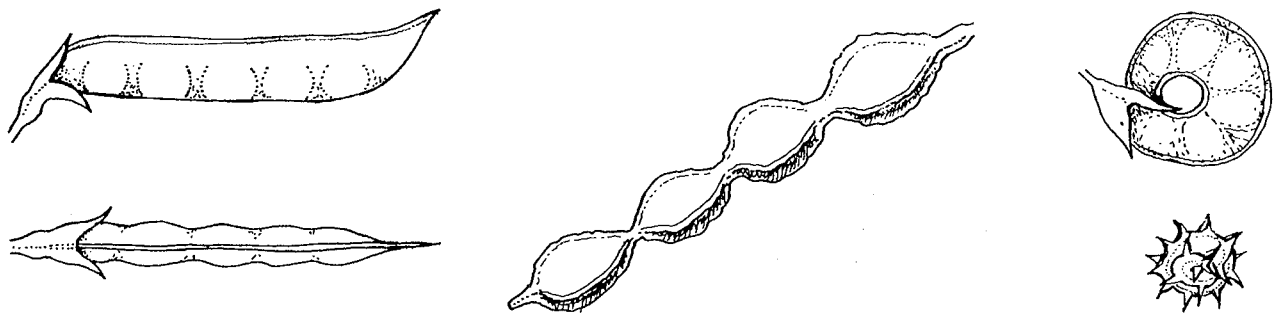
Flowers



Essential organs and pods

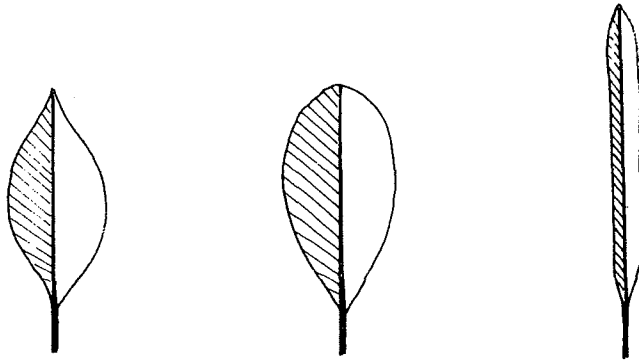


Above & right—Flowers with petals removed
left—Petals and stamens removed

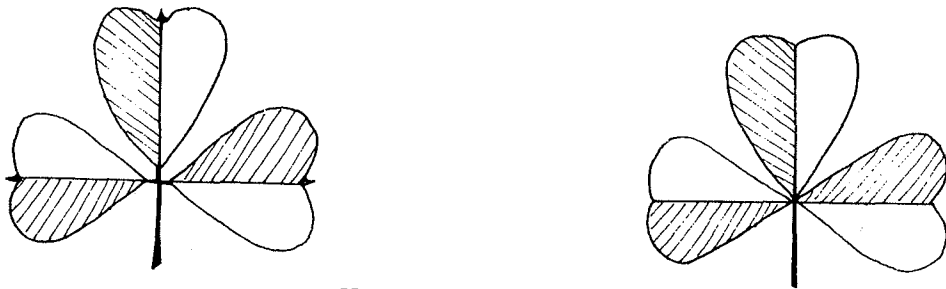


Above—Pods

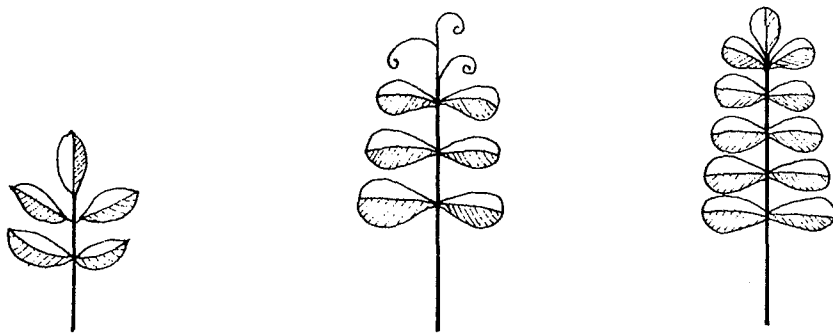
Leaves



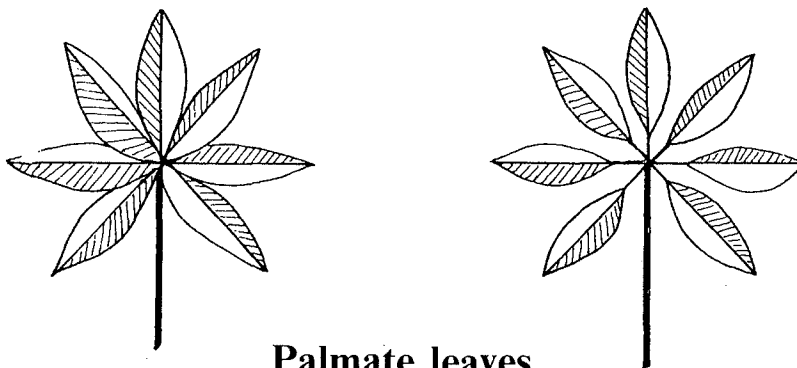
Simple leaves



Trifoliate leaves



Pinnate leaves



Palmate leaves

KEY

Leaves absent or much reduced, less than
1 cm in length. **GROUP I**

Leaves simple, greater than 1 cm in length.
GROUP II

Leaves trifoliolate **GROUP III**

Leaves pinnate with 2-many leaflets. Some
leaflets may be modified as tendrils
GROUP IV

Leaves palmate **GROUP V**

GROUP I

LEAVES ABSENT OR MUCH REDUCED –LESS THAN ONE CENTIMETRE IN LENGTH

1a. Stems bearing spines *Ulex europaeus*
(gorse) a common weed

1b. Stems without spines 2

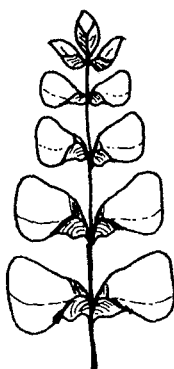
2a. Stems cylindrical. 3

2b. Stems flattened or 'square'

4

3a. Flowers yellow, 2–3 cm long, in racemes (see diagram) of 5–20 flowers. Pods 2–6 cm long, containing up to 8 flattened, heart-shaped, brown seeds. A shrub to 3 m.

Spartium junceum
(Spanish broom).
A garden ornamental.



3b. Flowers smaller than above, cream, pink, blue, mauve or yellow.

6

4a. Stems flattened. Flowers cream, pink, blue, mauve or yellow.

6

4b. Stems 'square', ribbed. Flowers 1–4 cm long. Small leaves may be present.

5

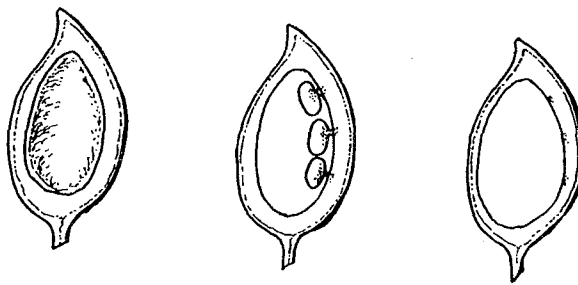
5a. Flowers white, 1.5 cm long. Pods 1–3 cm × 0.3–0.5 cm. 3–8 seeds per pod, occasionally more. A shrub to 2 m.

Cytisus multiflorus
(white broom).

5b. Flowers 1–3 cm long, yellow, or a mixture of yellow, red or brown. Formed singly in the axils of upper 'leaves'. Pods 2–6 cm × 0.5–1 cm, each with 5–10 brown seeds when mature. Small leaves may be present, those subtending the flowers frequently more rounded than the others. A shrub to 2 m.


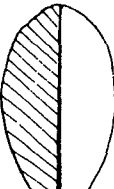
Cytisus scoparius.
(broom)—yellow flowers, a weed: variegated flowers—
garden ornamentals.

- 6a.** Stems rigid, erect with deep vertical grooves. Plants up to 1 m tall, greyish-green in colour. Flowers cream to very pale pink. Calyces and pods furry. *Corallospartium crassicaule* (coral broom).
- 6b.** Stems weeping or erect. If erect without deep vertical grooves. 7
- 7a.** Weeping shrub or small tree with cylindrical branches. Young branches marked with vertical lines or shallow grooves. Flowers mauve to pink in elongated heads (racemes) up to 9 cm long. *Chordospartium stevensonii* (weeping broom).
- 7b.** Branches and flowers not as above. 8
- 8a.** Branches compressed or flattened. Flowers pink in elongated heads (racemes) up to 5 cm long. Pods contain 2–3 seeds. Pods not opening to release seeds (indishiscent). *Notospartium* spp. (N.Z. broom).
- 8b.** Flowers pink, mauve or yellow. Pods contain 2–5 seeds. Sides of pods drop off when seeds mature leaving an open structure (see diagram). *Carmichaelia* spp. (N.Z. broom).



GROUP II

LEAVES SIMPLE, GREATER THAN ONE CENTIMETRE IN LENGTH

- | | | |
|---|---|---|
| 1a. | Plants bearing spines at end of lateral branches. Leaves 1–1.5 cm long with winged petioles. Leaf margin serrated. Flowers solitary, 1 cm long, purple with cream markings. | <i>Ononis spinosa</i> |
| 1b. | Plants without spines. | 2 |
| 2a. | Leaves small, 1–1.5 cm × 0.2–0.5 cm. Occasionally mixed with small trifoliate leaves. Stems 'square' ribbed. Flowers formed singly in axils of upper leaves. Flowers yellow, or a mixture of yellow, red, brown. Pods 2–6 cm × 0.5–1 cm, with 5–10 brown seeds when mature. | <i>Cytisus scoparius</i>
(See 5b, Group I) |
| 2b. | Leaves larger than above. | 3 |
| 3a. | Flowers yellow 2–3 cm. Flowers borne in racemes of 5–20 flowers. Stems green (same colour as the leaves) cylindrical, smooth. Leaves, few, linear 2–5 × 0.5–1 cm, short (0.3 cm) petioles. Pods 2–6 cm long, bearing up to 8 flattened, heart shaped brown seeds. A shrub to 3 m. | <i>Spartium junceum</i>
(See 3a, Group I). |
| 3b. | Flowers not yellow. Stems not usually the same green as leaves. Leaves many. | 4 |
| 4a. | Plant climbing or scrambling. Flowers mauve, pink or white in elongated heads (racemes). | <i>Hardenbergia</i> spp.
An ornamental climber |
|  | | |
| 4b. | Flowers pink, white or mauve, 2–4 cm long. Leaves many, obovate 1.5–4 × 1–2 cm, petioles 0.5 cm. Leaves arranged alternately. A tree to 3 m. | <i>Podylaria</i> sp.
An ornamental tree. |
|  | | |

GROUP III

LEAVES TRIFOLIATE

Plants with climbing or scrambling stems.

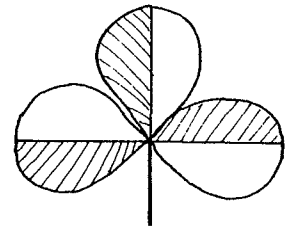
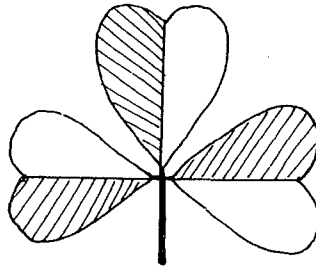
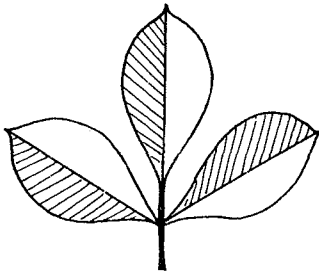
Sub-group A

Plants, woody trees, or shrubs greater than 1 m in height.

Sub-group B

Plants not woody, usually less than 1 m in height. Stalk (petiolule) of central leaflet distinctly longer than stalks or two lateral leaflets. (See diagram below left).

Sub-group C



Plants not woody, usually less than 1 m in height. Stalk (petiolule) of central and two lateral leaflets approx. equal or absent (see diagram above right).

Sub-group D

Sub-group A

Plants with climbing or scrambling stems.

- | | | | |
|------------|--|----------|---|
| 1a. | Flowers in distinct racemes (elongated flower heads). | 2 | |
| 1b. | Flowers not arranged in elongated flower heads. | 3 | |
| 2a. | Flowers scarlet, up to 2 cm in length. Pods up to 30 cm in length. | | <i>Phaseolus coccineus</i>
(runner bean) |
| 2b. | Flowers mauve, white or pink, smaller than above. | | <i>Hardenbergia</i> spp.
An ornamental climber |
| 3a. | Flowers red | | <i>Kennedia rubicunda</i>
(coral pea) |
| 3b. | Flowers black | | <i>Kennedia nigra</i>
(black coral pea) |

Sub-group B

Plants woody. Greater than 1 m in height. (rarely 0.8 m).

- | | | | |
|------------|---|----------|--|
| 1a. | Stalk (petiolule) of central leaflet distinctly longer than stalks of the two lateral leaflets. | 2 | |
| 1b. | Stalks (petiolules) of central and two lateral leaflets approx. equal or absent. | 4 | |

2a. Leaflets 3–6 cm long \times 2–4 cm wide, oval with acute tips. Petioles frequently bear spines. Flowers large, scarlet, 3–8 cm long. Prominent standard, wings much reduced. Stamens diadelphous (i.e. 9 fused, 1 free) Sepals scarlet. Plant a tree up to 6 m in Auckland, smaller (to 3 m) in Canterbury.

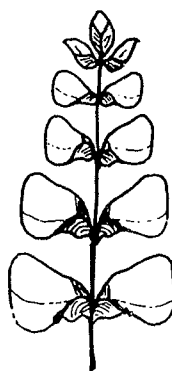
Erythrina sp.
(flame tree)

2b. Leaflets smaller than above. Plants without spines. Flowers not scarlet.

3

3a. Plant hairless, stiffly erect, up to 2.5 m in height. Flowers white in elongated heads 7–21 cm long.

Melilotus alba
(sweet clover).



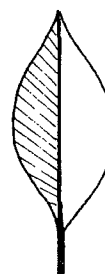
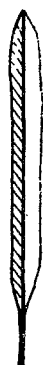
elongated flower head

3b. Plant hairy. Hairs vary from short velvety hairs to long silky hairs. Flowers golden-yellow, 1–1.5 cm long. Seed pods smooth, coiled.

Medicago arborea
(tree medic)

4a. Flowers white, 1.5–2 cm long. Flowers prolific, nearly always present. Pods 3–6 cm long, hairy. Leaves 3–5 cm long. Leaflets linear to oval, (see diagram), tips mucronate or acute. A shrub to 4 m.

Chamaecytisus palmensis
(tree lucerne)

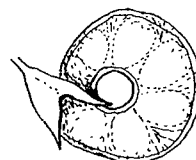


- 4b.** Flowers not white 5
- 5a.** Flowers large, yellow-green, to 6 cm long. Pods seldom formed in South Island. Leaves 6–12 cm long; petioles 4–7 cm long; leaflets oval to orbicular (i.e. 'circular'). A shrub to 2 m. *Crotolaria* sp.
(canary bird bush)
A garden ornamental.
- 5b.** Flowers smaller than above, bright yellow. 6
- 6a.** Plants with spines at end of lateral branches. *Calycotome spinosa*
(spiny broom)
- 6b.** Plants without spines 7
- 7a.** Flowers in long (8–20 cm) racemes. Flowers 1–2 cm long. Pods 3–6 cm with 2–8 seeds. Leaves 3–10 cm; leaflets oval, 1–6 cm × 0.5–3 cm. Stipules small, hairy. A shrub or tree to 3 m. *Laburnum* sp.
(laburnum).
A garden ornamental.
- 7b.** Flowers in groups of 1–5, usually in axils of leaves, not in distinct heads or inflorescences. 8
- 8a.** Flowers 1–2 cm long, yellow. Pods 1–2.5 cm × 0.5 cm with 4–6 seeds. Seeds small, 2 mm diameter, heart shaped, dark brown to black. Leaves 1–2 cm long. Leaflets oval to obovate, hairy. A shrub to 2 m. *Teline monspessulanus*
(Montpellier broom)
- 8b.** Flowers 1.5–3 cm long. Pods 2–7 cm × 0.5–1 cm with 8–15 seeds. Seeds pale, brown to black, oval 4 × 2 mm. Leaves on long (1 cm) petioles, or where flowers are formed in the axils, often sessile (i.e. without stalks). Leaves often sparse. Leaflets oval 0.5–1 cm × 0.2 cm. *Cytisus scoparius*
(See 5b, Group I)

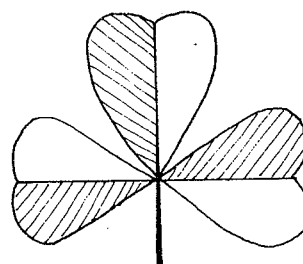
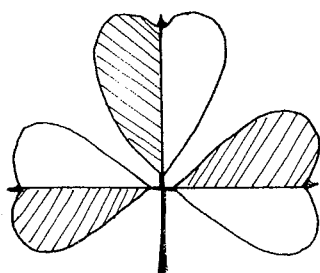
Sub-group C

Plants not woody, usually less than 1 m in height. Stalk (petiolule) of central leaflet distinctly longer than stalks of two lateral leaflets.

- | | | |
|-----|---|--|
| 1a. | Leaflets 5–10 cm × 4–8 cm.. Flowers 1–2 cm long. | 2 |
| 1b. | Leaflets and flowers smaller than above. | 3 |
| 2a. | Plant covered in short white hairs. Flowers scarlet, pink, mauve, or white. Pods 12–30 cm long, seeds kidney-shaped, 1–1.5 cm long. Plants small (0.5 m tall) or climbers. | <i>Phaseolus vulgaris</i>
(French bean) |
| 2b. | Plant covered in brown hairs. Pods 6–10 cm long, hairy. Seeds spherical—egg-shaped. Plant 0.4–2 m tall. | <i>Glycine max.</i>
(soya bean) |
| 3a. | Stipules leaf like, similar in shape to leaflets, giving appearance of a pinnate leaf with 5 leaflets. Flowers yellow, or yellow tinged red in umbellate heads. (See diagram page 22).
<i>Lotus</i> spp. for further identification refer to Group IV step 5, page 22. | |
| 3b. | Stipules not similar to leaflets. | 4 |
| 4a. | Plants distinctly hairy. | 5 |
| 4b. | Plants hairless, or occasionally plants may have a few inconspicuous localised hairs. | 10 |
| 5a. | Leaflets with conspicuous dark blotch; pod burr-like, stipules with evident teeth on margins (see diagram). | <i>Medicago arabica</i>
(spotted burr medic) |
| 5b. | Leaflets lacking dark blotch. | 6 |
| 6a. | Flowers purple, blue or bluish-white, plant perennial with stout crown; pods spirally coiled or sickle-shaped, not spiny (see diagram). | <i>Medicago sativa</i> or
<i>Medicago</i> × <i>varia</i>
(lucerne) |



- 6b. Flowers yellow or white. 7
- 7a. Stipules toothed or lobed on margins. Pods large, spirally coiled, smooth, snail like. (see diagrams P.15) *Medicago scutellata.* (snail medic)
- 7b. Stipules entire or with inconspicuous teeth on margins. (see diagrams P.15) 8
- 8a. Plant upright, up to 0.8 m high, shrub-like in appearance. Hairs vary from short velvety hairs to long silky hairs. Upper surface of leaves hairless. Flowers golden yellow 1–1.5 cm long. Seed pods smooth, coiled. *Medicago arborea.* (tree medic)
- 8b. Plants prostrate, not shrub-like. Upper and lower surfaces of leaves hairy. Flowers small, up to 0.5 cm long. 9
- 9a. Flowers 1 to 8 per head; pod spirally coiled, burr-like. *Medicago minima.* (woolly burr medic)
- 9b. Flowers many, in compact heads on long stalks, pods small, kidney-shaped, smooth, black when ripe. *Medicago lupulina.* (black medic)
- 10a. Notch at top of leaflet without mucronate; pod small, concealed in brownish withered flower (see diagram below right). 11

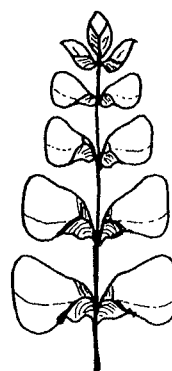


10b. Notch at top of leaflet with mucronate, pod not concealed in withered flower (see diagram above left). **12**

11a. Flowers 25 to 50 per head, usually yellow. *Trifolium campestre.*
(hop trefoil)

11b. Flowers 5 to 20 per head, usually yellow. *Trifolium dubium*
(suckling clover)

12a. Leaflets thick and more or less fleshy, with strong odour when crushed, margins toothed nearly to base; flowers yellow or white, in elongated heads (racemes 1.5–21 cm long pods small, egg-shaped, strongly wrinkled or veined; see diagram). **13**



12b. Leaflets thin, not fleshy, lacking strong odour when crushed, margins toothed, often in upper half only; flowers purple, blue, lilac, yellow or bluish-white; pods small and more or less kidney-shaped, or sickle-shaped, or spirally-coiled and smooth, or spirally coiled and spiny (burr-like). **15**

13a. Flowers white; in elongated heads (7–21 cm long) plants 0.75–3 m tall. *Melilotus alba*
(sweet clover)

13b. Flowers yellow; plants smaller. **14**

14a. Flowers 0.4 cm long or less; pods strongly veined, stems simple or sparingly branched to 0.6 m tall. *Melilotus indica*
(King Island melilot)

14b. Flowers 0.4 cm long; pods with distinct cross-wrinkles, stem branching low down, giving a bushy plant, 0.6–1 m tall.

Melilotus officinalis
(yellow sweet clover)

15a. Flowers purple, blue or bluish-white, plant perennial, with stout crown; pods spirally coiled or sickle-shaped, not spiny.

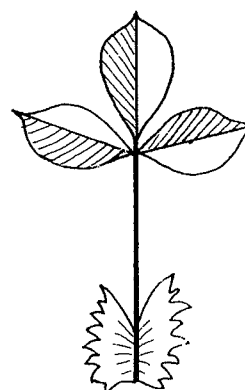
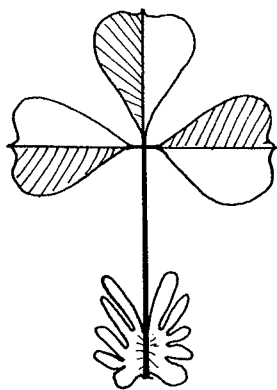
Medicago sativa or
Medicago × *varia*.
(lucerne)

15b. Flowers yellow or yellowish white; plant annual or perennial; pods of various shapes.

16

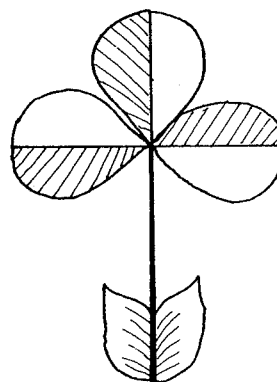
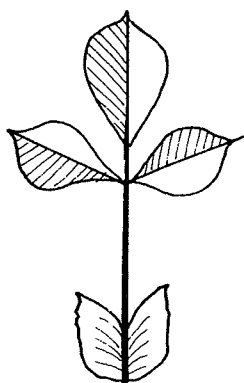
16a. Leaflets with conspicuous dark blotch; pod burr-like, stipules with evident teeth on margins (see diagram below).

Medicago arabica
(spotted burr medic)



16b. Leaflets lacking conspicuous dark blotch; fruits various, stipules toothed or almost entire (see diagram below).

17



17a. Pod sickle-shaped or nearly straight; perennial.

Medicago falcata or
Medicago × *varia*
(lucerne)

- 17b. Stipules deeply cut into narrow segments.
Pod spirally coiled, burr-like.

Medicago polymorpha
(burr medic)

Sub-group D

Stalk (petiolule) of central and two lateral leaflets approx. equal or absent.

- 1a. Stipules leaf like, similar in shape to leaflets, giving appearance of a pinnate leaf with 5 leaflets. Flowers yellow or yellow tinged red in umbellate heads. (See diagram page 22).

Lotus spp. for further identification refer to
Group IV
Step 5 page 22

- 1b. Stipules not similar to leaflets. 2

- 2a. Plants with rhizomes—leaflets long, narrow linear-oval. Leaflet margin serrated.

Trifolium ambiguum
(Caucasian clover)

- 2b. Plants without rhizomes. 3

- 3a. Stems, rooting at the nodes (stolons). 4

- 3b. Stems not rooting at the nodes. 6

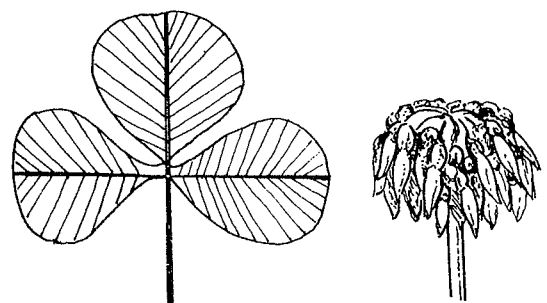
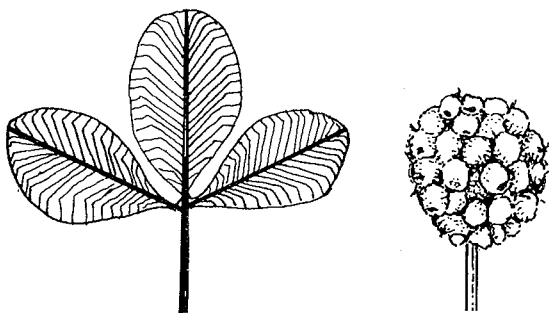
- 4a. Leaflets with light crescent-shaped mark in lower half, and with dark flecks; flowers cobalt-blue, 1–1.5 cm long, pea-like in form, 1–2 per head.

Parochetus communis
(shamrock pea)

- 4b. Flowers not blue 5

- 5a. Veins of leaflets curving towards margins, close spaced; fruiting heads inflated, strawberry-like in aspect (see diagram below left).

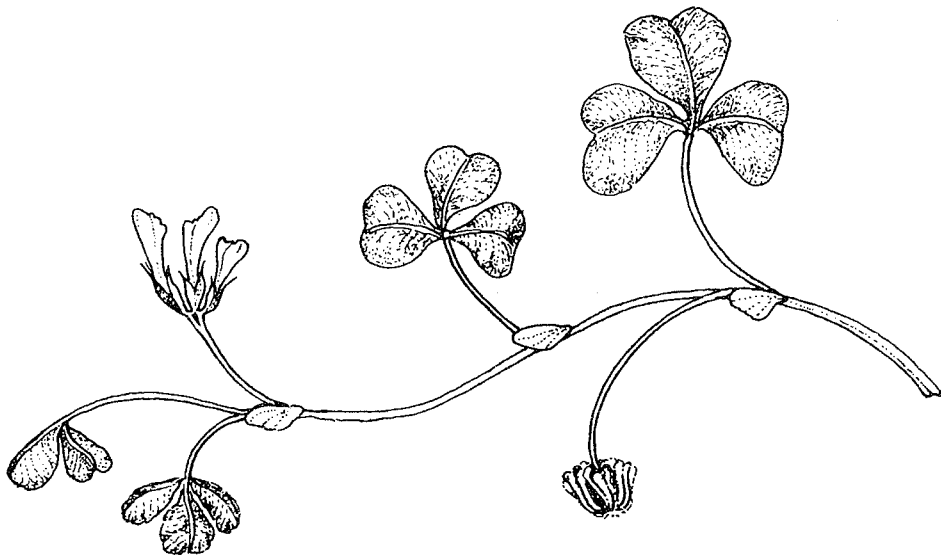
Trifolium fragiferum
(strawberry clover)



- 5b. Veins of leaflets straight towards margins, wide-spaced; fruiting heads not inflated (see diagram above right).

Trifolium repens
(white clover)

- 6a. Leaflets distinctly hairy. 7
- 6b. Leaflets hairless or sparingly hairy. 10
- 7a. Leaflets grey, hairy, narrow, seldom more than 5 mm broad, at least 3 times as long as broad, notched at the tip. Fruiting heads cylindrical, 2–3 cm long, soft, hairy. *Trifolium arvense* (haresfoot trefoil).
- 7b. Leaflets wider than 5 mm, seldom more than twice as long as broad. 8
- 8a. Flower heads 2–6 flowered. Flowers white–pinkish up to 1.5 cm long. Leaflets triangular, with distinct notch. Stems prostrate; fruiting heads curved downwards, pods forming burr and anchoring in the soil (see diagram). *Trifolium subterraneum* (sub clover).



8b. Flower heads with more than 10 flowers.
Leaflets oval to obovate to diamond shaped.

9

9a. Flower heads not stalked, cylindrical to egg-shaped to 2 cm in length. Flowers pink. Leaflets pale green, obovate to diamond shaped, densely hairy.

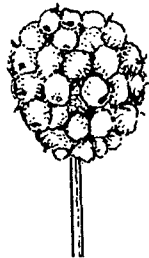
Trifolium striatum
(striated clover)

9b. Flower heads stalked, globe shaped, 1–2.5 cm in diameter. Flowers pink–purple (rarely cream). Leaflets oval, often with a pale green–white crescent-shaped marking in the lower half. Stipules with a spreading tuft of hairs at the free end.

Trifolium patrense
(red clover)

10a. Calyces hairy. Pods almost totally enclosed in swollen calyces (see diagram below left).

11



10b. Calyces not hairy. Calyces not swollen (see diagram above right).

12

11a. Fruiting heads pink to brown, woolly, flower stalks shorter than leaves; nerves of fruiting calyces indistinct, teeth at tip concealed or nearly so in wool; not burr-like.

Trifolium tomentosum
(woolly clover)

11b. Fruiting heads not woolly, flower stalks (except those of uppermost heads) longer than leaves; nerves of fruiting calyces distinct; teeth at tip clearly visible and projecting; head burr-like.

Trifolium resupinatum
(Persian clover)

- 12a.** Flowers bright yellow. **13**
- 12b.** Flowers not yellow. **14**
- 13a.** Heads large, dense with 40 or more flowers; standard grooved with age. Plant erect, strong-growing. *Trifolium aureum*
(yellow clover)
- 13b.** Heads small, 1–6 flowers, minute. Plant small, prostrate. *Trifolium micranthum*
(lesser suckling clover)
- 14a.** Flower heads not stalked, or stalks less than 4 mm. **15**
- 14b.** Flower heads distinctly stalked. **16**
- 15a.** Corolla pink, distinctly longer than calyx, flower head small, globe-shaped sessile (i.e. not stalked) in leaf axil; upper leaves short-stalked; plants prostrate, stems radiating to give a circular mat-like form without raised centre, size variable, depending on location. *Trifolium glomeratum*
(clustered clover)
- 15b.** Corolla whitish, approx. same length as calyx; heads in leaf axils, with or without short stalks; if stems elongate, upper leaves long-stalked; plants small, prostrate, stems many and radiating to give a circular form, with raised centre. *Trifolium suffocatum.*
(suffocated clover)
- 16a.** Flower heads small, to 0.7 cm diameter, stalks of heads slender to long; plants usually small, spreading, or prostrate. *Trifolium cernuum.*
(drooping flowered clover)

16b. Flower heads at least 1 cm in diameter, usually larger.

17

17a. Leaflets oval—linear, at least twice as long as broad. Leaflet margins serrated; lateral veins extended to form teeth. Free part of stipule less than half the length of leaflets.

Trifolium ambiguum
(Caucasian clover)

17b. Leaflets oval, usually less than 1.5 times as long as broad. Leaflet margins distinctly serrated in lower half only. Stipule extended in a long, tapering point. Free part of stipule at least half the length of leaflets, often longer. Flowers white.

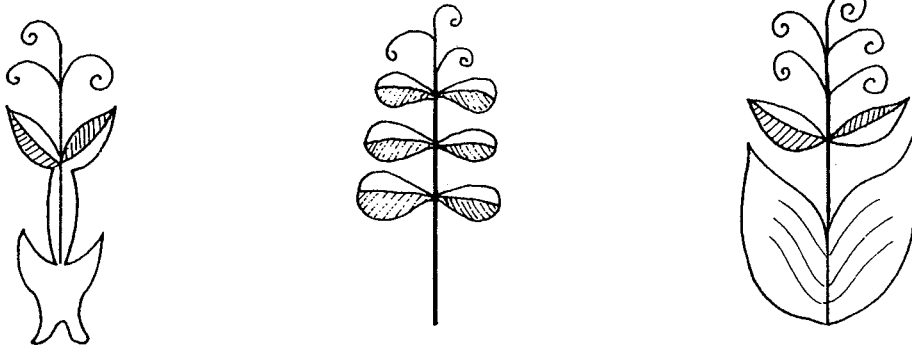
Trifolium hybridum
(alsike clover)

GROUP IV

LEAVES PINNATE, SOME LEAFLETS MAY BE REPLACED BY TENDRILS

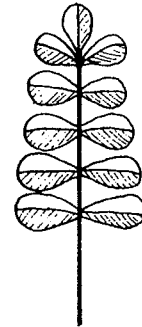
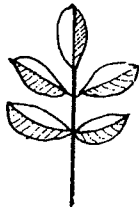
- 1a.** Some leaflets replaced by tendrils (see diagram below).

2



- 1b.** No leaflets replaced by tendrils (see diagram below).

4



- 2a.** Stipules large and conspicuous (see diagram). Leaflets (not tendrils), 2–6 per leaf. Leaflets usually longer than 2 cm—frequently 3–8 cm.

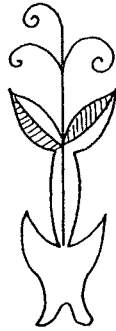
3

- 2b.** Stipules inconspicuous, leaflets (not tendrils) 10–14 per leaf. Leaflets usually 0.5–2 cm × 0.2–5 cm, each with a conspicuous mucronate tip. Flowers purple, dark red, pale blue.

Vicia spp.
(vetch)

- 3a.** Leaflets (not tendrils) usually two per leaf. Leaflets linear to oval. 3–8 cm × 0.8–2 cm. Stipules conspicuous. Petiole winged (see diagram below left). Flowers 1.5–4 cm long.

Lathyrus spp.
(wild & sweet peas)



- 3b. Leaflets oval—ovate often four per leaf (occasionally 2–6). Stipules almost completely surrounding stem at petiole base (see diagram above right). Flowers 1.5–3 cm long. White or blue.

Pisum sp.
(peas)

- 4a. Five leaflets per leaf. (Rarely 3–4).

5

- 4b. Leaflets 2—many frequently more than five.

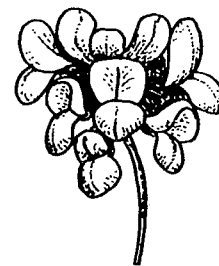
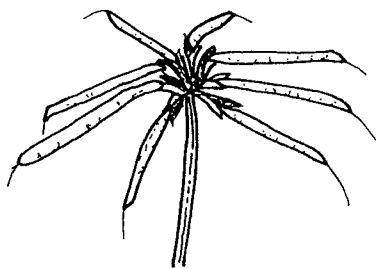
10

- 5a. Stems flattened, smooth, green. Flowers pale blue to mauve or yellow approx 0.5 cm long. Leaves approx 0.5 cm long. Leaflets 1–2 mm × 2–3 mm notched. Seed pods 0.5 × 0.3 cm, 2–4 seeds per pod. Sides of pod drop off at maturity leaving an open structure.

Carmichaelia spp.
(N.Z. broom)

- 5b. Flowers yellow, or yellow tinged red 1–12 flowers (and pods) in umbellate heads (see diagram below). Pods straight, protruding from the fruiting calyces.

6



- 6a. Perennial, with stout crown with or without stolons; hairless or sparingly hairy; flowers 1 cm or more long. 7
- 6b. Annual; conspicuously hairy to shaggy-hairy; flowers up to 0.8 cm long. 9
- 7a. Stem hollow, plant often with stolons; flowers 5 to 12 per head; calyx teeth spreading and not pressed close against corolla in bud stage. *Lotus pedunculatus*
(lotus major)
- 7b. Stems solid or nearly so; plant without stolons; flowers 2 to 6 per head; calyx teeth spreading and not pressed close against corolla in bud stage. 8
- 8a. Leaflets narrow, drawn out into long point, flowers approx 4 per head; pods slender. *Lotus tenuis.*
(lotus tenuis)
- 8b. Leaflets broad; flowers 2 to 6 per head; pods stouter. *Lotus corniculatus*
(lotus corniculatus)
- 9a. Heads 1 to 2-flowered, on stalks often shorter than leaves; flowers turning greenish with age; pods long and slender, 4 to 7 times longer than fruiting calyces. *Lotus angustissimus*
(lotus angustissimus)
- 9b. Heads 3–4 flowered, on stalks often longer than leaves; flowers not turning greenish with age; pods shorter and stouter, 1.5 to 3 times longer than fruiting calyces. *Lotus subbiflorus*
(lotus hispidus)

10a. Stems flattened, green. Flowers pale blue-mauve or yellow approx. 0.5 cm long. Leaves less than 1 cm long, with up to 7 leaflets. 1–2 mm × 2–3 mm notched. Seed pods 5 × 3 mm, 2–4 seeds per pod. Sides of pod drop off at maturity, leaving an open structure.

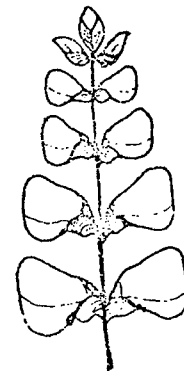
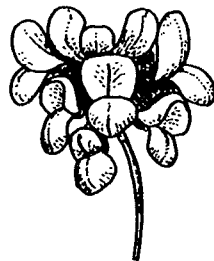
Carmichaelia spp.
(N.Z. broom)

10b. Leaves, leaflets and flowers larger than above. Stems seldom flattened.

11

11a. Flowers yellow, pink or blue in umbellate heads (see diagram below left) of 2–20 flowers.

12



11b. Flowers in racemes (see diagram above right) or singly, or in small numbers in the axil of leaves. Not in umbellate heads. Leaves frequently longer than above.

13

12a. Pods 1–2.5 cm × 1.5–3 mm, constricted between seeds. Flowers yellow. Plants herbaceous.

Ornithopus spp.
(serradella)

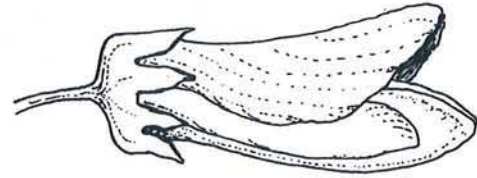
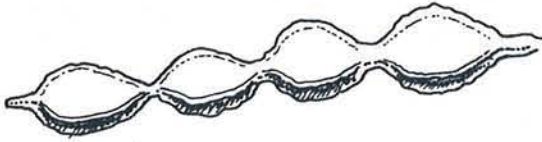
12b. Pods 2–5 cm long, straight, not constricted between seeds. Yellow flowered types usually shrubs to 2 m. Pink and blue flowered types usually scrambling herbs.

Coronilla spp.
(crown vetch)

13a. Stipules prominent, triangular with a distinctive black or pale green marking towards the centre. Leaves 8–20 cm long with 2, 4 or 6 (rarely 8) leaflets. Leaflets 3–9 cm × 1.5–5 cm, oval. Flowers white or blue with (frequently) black markings on the keel. 1–3 flowers in leaf axils; flowers 2–3 cm long. Pods large, 8–25 cm × 1–3 cm. Inside pods white, woolly. Stems 'square' ribbed. A plant up to 1.5 m.

Vicia faba.
(broad or field bean)

- 13b.** Stipules inconspicuous or absent. Leaves with usually more than 9 leaflets. **14**
- 14a.** Flowers 1–2.5 cm long, mauve, pink or white. **15**
- 14b.** Flowers 3–7 cm long, yellow, red or white. **20**
- 15a.** Woody plants, either trees or woody climbers.
- 15b.** Plants not woody. **16**
18
- 16a.** Plant with woody, climbing stems. Flowers mauve or white in long racemes, 10–30 flowers in each inflorescence. Leaves 10–30 cm with 9–11 oval leaflets each 3–7 cm × 2–4 cm. Petioles markedly swollen at base. *Wistaria* spp.
A garden ornamental
- 16b.** Plants without climbing stem. **17**
- 17a.** Stems bearing spines or thorns. *Robinia pseudoacacia*
(robinia)
- 17b.** Stems without spines or thorns. *Virgilia* sp.
- 18a.** Flowers deep red (occasionally white). *Hedysarum coronarium*
(French honeysuckle)
- 18b.** Flowers pink or blue. **19**
- 19a.** Flowers blue. *Galega officinalis*
(goat's rue)
- 19b.** Flowers pink. *Onobrychis* spp.
(sainfoin)
- 20a.** Flowers yellow, up to 5 cm in length. Petals and stamens not usually fused. Pods (5–15 cm long) swollen round each seed, giving appearance of a string of beads. Pods non-shattering and persist on the trees for 12–18 months (see diagram below). Leaves 5–15 cm long with up to 45 oval leaflets. *Sophora* sp.
(Kowhai native tree)
garden ornamental.



20b. Flowers white or red, 4–7 cm long. Prominent standard and keel; wings reduced; stamens diadelphous (i.e. 9 fused, 1 free). Pods 5–12 cm, white, woolly on the inside, with many (up to 30) seeds in each pod. Leaves 5–15 cm long, distinct stipules. Leaflets 15–25 per leaf, linear to oval.

Clianthus sp.
(Kaka beak)
Native shrub and garden
ornamental.



Kowhai – *Sophora* sp.

GROUP V

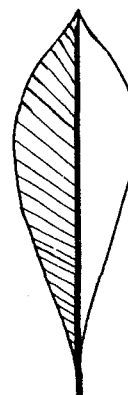
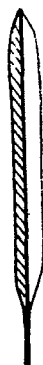
LEAVES PALMATE

- 1a. Leaflets with equal (or absent) stalks (petiolules). Flowers blue, yellow, pink, red, white, cream, or mixtures of these, arranged in racemes or spikes. 2

- 1b. Leaflets usually 5 per leaf, one leaflet having a distinctly longer stalk (petiolule) than the others. Leaflets linear to oval, 5–10 cm long. Flowers purple, white, or pink. 0.5–1 cm long in racemes. Seed seldom set in Canterbury and areas further south. A climber:

Hardenbergia sp.
A garden ornamental.

- 2a. Leaflets linear (below left). 3



- 2b. Leaflets obovate (above right). 4

- 3a. A woody shrub to 2 m tall. Stems frequently red in colour. Leaflets linear, leaflet apices acute. Flowers 1 to 1.5 cm long, pale yellow, cream, occasionally white, in racemes 10–20 cm in length. Perennial of river beds, sand dunes and waste areas.

Lupinus arboreus
(tree lupin)

- | | | |
|-----|---|--|
| 3b. | Plants smaller than above, 0.4–1.5 m tall. Stems not usually red. Leaflet apices obtuse. Flowers 1–1.5 cm long, normally blue, new cultivated varieties often white. | <i>Lupinus angustifolius</i>
(blue lupin) |
| 4a. | A woody shrub to 2 m tall. Stems frequently red in colour. Flowers 1–1.5 cm long pale yellow, cream, occasionally white in racemes 10–20 cm in length. | <i>Lupinus arboreus</i>
(tree lupin) |
| 4b. | Plants not woody, usually less than 1.5 m in height. Stems not red. | 5 |
| 5a. | Plant 0.2–1 m tall. Leaflets hairy on both surfaces. Flowers 1 to 1.6 cm long, golden yellow, scented. Seeds smooth, 6–8 mm × 5–7 mm. | <i>Lupinus luteus</i>
(yellow lupin) |
| 5b. | Leaflets not hairy on both surfaces. | 6 |
| 6a. | Leaflets 5–7 or 7–9 per leaf. Flowers blue and white mixed. Pods large 8–12 cm long. Seeds 0.9–1.5 cm long, more or less square and flattened. | <i>Lupinus albus</i>
(white lupin) |
| 6b. | Leaflets usually more than 7 per leaf, up to 10 cm long. Leaflets crowded on petiole, often overlapping. Flowers usually multi-coloured, in long (10–30 cm) inflorescences. Stems not obvious in vegetative plant. Plants perennial, dying back to stout crown in winter. | <i>Lupinus arboreus</i> ×
<i>L. polyphyllus</i> .
(Russell lupin.) |

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