IDENTIFICATION OF *LEPIDIUM* IN CANTERBURY

PHIL GARNOCK-JONES

One of the largest genera of the family Cruciferae in New Zealand is *Lepidium*, with 7 native and 12 naturalised species. Many of the native species are uncommon (e.g. *L. kirkii*, *L. oleraceum*) or endangered (*L. banksii*), and one species (*L. obtusatum*) is presumed to be extinct. The naturalised species, which come from many parts of the world, are common weeds of waste places, pastures, and sometimes of cultivated land. For those reasons the correct identification of both native and naturalised species is important.

Recent work on the Australian species of *Lepidium* has shown that plants previously treated as *L. ruderale* should be assigned among four different species, *L. africanum*, *L. desvauxii*, *L. hyssopifolium* and *L. pseudotasmanicum*. *L. ruderale* itself, an annual species from Europe, is not known from New Zealand.

Lepidium is a very distinctive genus within the Cruciferae because its short rounded fruits are flattened so that the internal partition (septum) crosses the narrowest diameter, and each half of the fruit contains only one seed. Only 3 genera of Cruciferae in New Zealand have such a fruit; these are *Cardaria* (hoary cress), *Iberis* (candytuft), and *Lepidium*. In *Cardaria draba*, however, the fruit is more often 1-seeded as one half fails to develop. Also the fruits of *Cardaria* do not dehisce to release the seed. *Lepidium* and *Iberis* are easily distinguished. *Lepidium* has all four petals equal-sized or absent, and the fruiting stem elongates as the fruits mature, whereas in *Iberis* the outer petals are longer than the inner and the fruiting stem remains compact after flowering.

The identification of species of *Lepidium* requires a good hand lens as the flowers may be minute, and the hairs on the stem can be so tiny that they are invisible individually to the unaided eye, and merely impart a dull greyish appearance to the plant.

CHARACTERS FOR IDENTIFICATION

Stem and leaves: The stem (fig. 1) may be glabrous, pubescent (with hairs about 0.25 mm long) or puberulent (with dense stubbly hairs 0.1 mm long, giving a dull or greyish appearance). The basal leaves often wither before fruiting, and may be simple with marginal teeth or deeply pinnatifid to bipinnatifid. Higher on the stem, leaves usually become simple and entire or toothed. The uppermost are often linear, sometimes with a few teeth at the apex. In *L. bonariense*, however, even the highest stem leaves are pinnatifid. Stem leaves may taper evenly to the base, or be abruptly narrowed to a very short stalk, or have quite prominent deflexed stem-clasping basal lobes. In some species the stem leaves have small tooth-like hairs (denticles) on their margins.

Flowers: *Lepidium* flowers are always quite small, but some are downright tiny! The largest (e.g. in *L. campestre*, *L. sativum*, and *L. oleraceum*) are 2-5 mm across with petals about twice as long as the sepals and usually 6 stamens. The smallest flowers (e.g. in *L. africanum*, *L. hyssopifolium*, and *L. pseudotasmanicum*) are barely 1 mm across, have petals reduced to tiny strap-like lobes which are shorter than the sepals, or absent altogether, and only two stamens. It may then require a good eye even to tell if the plant is in flower, and a good lens to see the details of the flower.

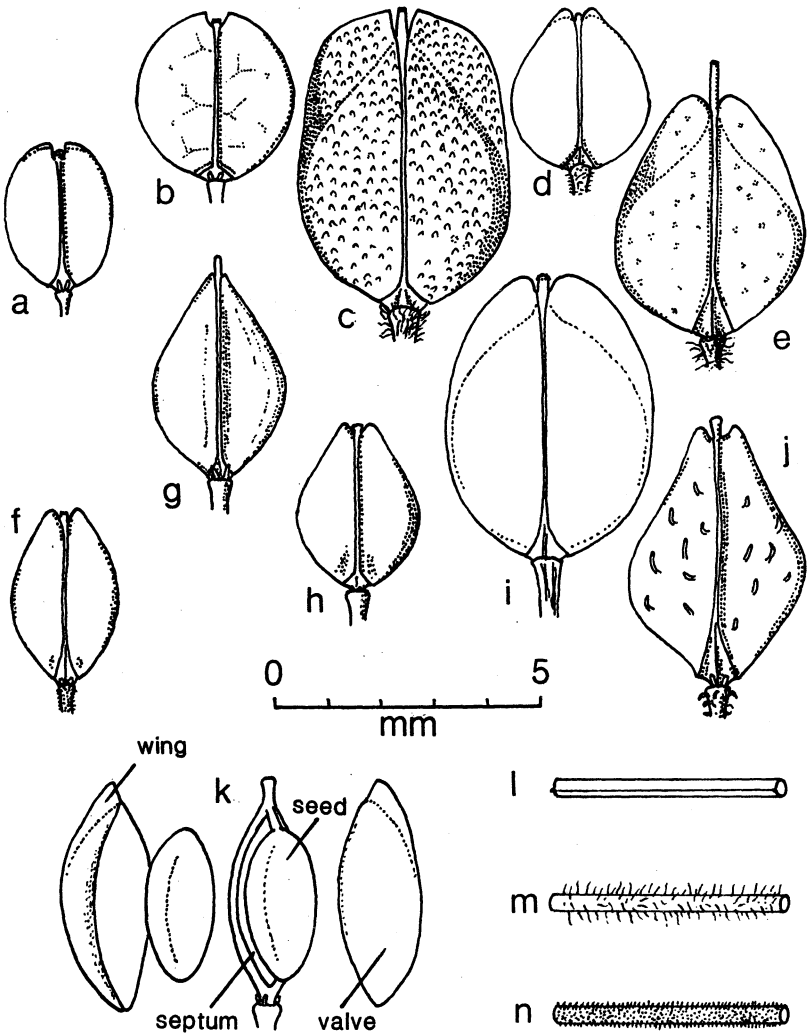

Fig 1: *Lepidium* silicles (a-k) and stems (l-n). a *L. africanum*; b *L. bonariense*; c *L. campestre*; d *L. desvauxii*; e *L. heterophyllum*; f *L. hyssopifolium*; g *L. oleraceum*; h *L. pseudotasmanicum*; i *L. sativum*; j *L. sisymbrioides*; k structure of a *Lepidium* silicle; l *L. pseudotasmanicum*, glabrous and ridged; m *L. bonariense*, pubescent; n *L. desvauxii*, puberulent.

Fruits: The distinctive fruits of the Cruciferae are called siliques, but when they are short as in *Lepidium* they are usually called silicles. The sizes and shapes of *Lepidium* silicles are quite characteristic of species but difficult to describe in words; they are illustrated in fig. 1. The silicle consists of a central portion, including the septum, and two valves which fall to release a seed each. The valves may be winged at the tip to form a notch in the silicle from which the style may protrude or not. Sometimes these two wings are joined to the lower part of the style to make a flattened extension to the fruit, as in *L. campestre* and *L. heterophyllum*. The surfaces of the valves may be smooth or weakly veined, but may be papillate (e.g. *L. campestre*) or have a few sparse hairs (e.g. *L. sisymbrioides*). Measurements of silicles are traditionally taken from those at the middle of the fruiting stem.

Seeds: The seeds are quite uniform in shape and surface features but differ a little in size and colour. Some species (e.g. *L. bonariense*) have a narrow wing around the edge of the seed.

KEY

The key and notes which follow apply only to those species of *Lepidium* growing wild in Canterbury. Most of the native species are not known from Canterbury (*L. banksii, L. flexicaule, L. kirkii, L. obtusatum,* and *L. tenuicaule*) and are therefore not included here. Of the naturalised species, *L. virginicum* is so far known only from the North Island, and *L. densiflorum* only from Central Otago; both have circular fruits like *L. bonariense*. Two other species, *L.*

divaricatum and *L. pseudohyssopifolium* are known in New Zealand only from single collections, and not at all from Canterbury.

1 Petals longer than sepals; stamens usually 6, sometimes 4 ..... *2*

Petals shorter than sepals; stamens usually 2 ..... *6*

2 Silicle with a prominent wing joined to the base of the style; upper leaves with deflexed stem-clasping basal lobes; seeds very dark brown *3*

Silicle with a narrow wing free from the base of the style; upper leaves shortly stalked or tapered to base, not stem-clasping; seeds light to dark brown *4*

3 Silicle densely papillate; style not, or hardly, protruding beyond apical notch of silicle; anthers yellow ..... *L. campestre*

Silicle not, or sparsely, papillate; style protruding beyond apical notch of silicle; anthers red or violet ..... *L. heterophyllum*

4 Stem and silicle hairy; plants with either male or female flowers only; rosette leaves persisting at fruiting ..... *L. sisymbrioides*

Stem and silicle glabrous; plants with all flowers hermaphrodite; rosette leaves withering before fruiting *5*

5 Annual; basal leaves bipinnatifid; stem leaves pinnatifid; silicle elliptic, winged and notched ..... *L. sativum*

Perennial; basal and stem leaves simple, toothed; silicle ovate, not winged, acute ..... *L. oleraceum*

6 Rosette leaves persisting at fruiting; plants with either male or female flowers only .. *L. sisymbrioides*

Rosette leaves withering before fruiting; plants with all flowers hermaphrodite 7

7 Stem glabrous, at least below, sometimes sparsely puberulent above, especially near bases of branchlets; pedicel hairs in one longitudinal row 8

Stem pubescent or densely puberulent; pedicel evenly covered with hairs 9

8 Stem ridged or grooved; basal and lower stem leaves deeply pinnatifid; silicle ovate, with bluntly triangular wings ..... *L. pseudotasmanicum*

Stem smooth; basal and stem leaves simple, toothed; silicle elliptic, with rounded wings ..... *L. africanum*

9 Uppermost leaves pinnatifid; stem pubescent (hairs 0.2-0.25 mm long); silicle circular, at least 2.5 mm wide; seed winged ..... *L. bonariense*

Uppermost leaves simple, entire or 3-fid at apex;
stem puberulent (hairs up to 0.1 mm long);
silicle ovate or narrowly rhomboid, less than
2.3 mm wide; seed not winged *10*

10 Silicle ovate, 2.7-3 X 2-2.3 mm; uppermost leaves
with minute triangular cartilaginous denticles
often paired from a common base ..... *L. desvauxii*
Silicle narrowly rhomboid, 2.7-3 X 1.8-2 mm;
uppermost leaves without denticles, but
sometimes with short stiff hairs ..... *L. hyssopifolium*

NOTES

1. *L. africanum.* Peppercress is a tall perennial, dying back to a stout rootstock after fruiting. The leaves are all simple with serrate margins. The fruits are elliptic and often reddish in colour. There is a puberulent form naturalised in many North Island localities but all plants seen from Canterbury are glabrous.

Peppercress is found on waste land, roadsides, pastures, and sand dunes, especially near the coast. It is native to Africa.

2. *L. bonariense.* Argentine cress is annual and dies after fruiting. Its pinnatifid uppermost leaves, spreading stem hairs and broad circular silicles 2.5-3.5 mm in diameter are diagnostic.

Argentine cress is found on waste land, roadsides and in railway yards. It is native to south-eastern South America.

3. *L. campestre.* Field cress. Stem-clasping upper leaves, spreading silicles with their broad terminal wing joined to the lower part of the style, and very dark brown seeds distinguish *L. campestre* and *L. heterophyllum* from all other species of *Lepidium* in New Zealand. *L. campestre* has a densely papillate silicle, a short style, and yellow anthers, which distinguish it from *L. heterophyllum.* It is an annual or biennial, dying after fruiting.

Field cress is found on roadsides, waste land, stream beds, arable land, and pasture. It is native to Europe.

4. *L. desvauxii.* Bushy peppercress is a perennial which dies back to a rootstock after fruiting. It has a distinctive open, almost divaricating, branching habit. Its ovate silicles and minute triangular, sometimes paired, cartilaginous denticles on leaf margins distinguish it from *L. hyssopifolium* which is the only other species in Canterbury with densely puberulent (stubbly) stems.

Bushy peppercress is native to Australia. In New Zealand it is known from only the South Island, Chatham Islands, and Stewart Island. In Canterbury it is commonest near the coast, especially on Banks Peninsula, and it grows on sandy sites, beaches, and roadsides.

5. *L. heterophyllum.* Smith's cress. This species is most similar to *L. campestre* and is distinguished by its smooth or sparsely papillate silicles, longer style, and red or violet anthers. Unlike *L. campestre, L. heterophyllum* is perennial.

In New Zealand, Smith's cress is confined to Canterbury, where it grows on roadsides, waste land and pastures. It is native to Western Europe.

6. *L. hyssopifolium.* This species is perennial; the plants die back to a rootstock after fruiting. It has densely puberulent stems and may be distinguished from *L. desvauxii* by its narrow rhomboid silicles and lack of triangular marginal denticles.

L. hyssopifolium occurs on waste land, roadsides, sand dunes, and stony places. It is native to Australia.

7. *L. oleraceum.* Cook's scurvy grass is a large glabrous perennial with fleshy, bright green, toothed leaves. It doesn't die back to its rootstock after fruiting. The silicles are quite large (3-5 X 2.5-3.5-(5) mm), ovate and acute.

Cook's scurvy grass is now rare on mainland New Zealand. It is a plant of coastal cliffs and rocky places, and is endemic to New Zealand. The only Canterbury specimen in the Botany Division herbarium was collected from a sea cliff at Paua Bay, Banks' Peninsula, in 1921.

8. *L. pseudotasmanicum.* Narrow-leaved cress is a perennial plant which often develops a large springy bushy habit with age, but dies back to a stout woody rootstock each year after flowering. Its deeply pinnatisect basal leaves, grooved glabrous stems, and ovate silicles distinguish it from other species.

Narrow-leaved cress is probably the commonest species of *Lepidium* in Canterbury, and is found in gardens, roadsides, waste land, and pastures. Like many of the other perennial species (e.g. *L. africanum, L. hyssopifolium*) it is tolerant of summer drought, and can grow well in sandy or stony well-drained sites on the hills and plains. It is native to Australia.

9. *L. sativum.* Garden cress. The soft annual habit and large elliptic silicles 5-6 X 3-5 mm are distinctive for garden cress. Its 3-lobed cotyledons are unique in the family.

Garden cress is commonly grown mixed with Indian mustard, *Brassica juncea*, as "mustard and cress". It is only a casual in Canterbury, as a garden escape, although it has been reported as a weed in linen flax crops. It is native to West Asia and Egypt.

10. *L. sisymbrioides* subsp. *sisymbrioides.* *L. sisymbrioides* is the only member of the Cruciferae known to be dioecious. The other two subspecies, *L. sisymbrioides* subsp. *matau* and subsp. *kawarau*, were treated as distinct species by Allan ("Flora of New Zealand", Vol. I, 1961); they are not known from Canterbury. *L. sisymbrioides* is a perennial with a persistent rosette of pinnate greyish leaves and a stout, deeply descending taproot. In subsp. *sisymbrioides* the flowering stems are slender and flexuous.

L. sisymbrioides grows on river terraces, in stony grassland, and also among the limestone rubble of Castle Hill basin. It is endemic to eastern South Island.