

# An Atlas of Seeds and Fruits from Macquarie Island

DANA M. BERGSTROM

BERGSTROM, D. M. An atlas of seeds and fruits from Macquarie Island. *Proc. Linn. Soc. N.S.W.* 109 (2), 1986: 69-90.

Seeds and fruits of 30 members of the vascular flora from subantarctic Macquarie Island are described and illustrated. The atlas was constructed to aid in identification of fossils found in peat deposits on the island.

*Dana M. Bergstrom, School of Biological Sciences, Macquarie University, North Ryde, Australia 2113; manuscript received 18 December 1985, accepted for publication 23 April 1986.*

## INTRODUCTION

Macquarie Island, (158°57'E, 54°30'S) in the Southern Ocean, is one of a number of small isolated islands in the subantarctic zone. Like other subantarctic islands it has a small vascular flora (Greene and Walton, 1975). The island's flora consists of about 45 vascular plant species and 110 bryophyte species. Table 1 lists vascular species and includes all recent taxonomic revisions.

Climate during the Holocene has enabled extensive peat formations to develop on the island. Fossil evidence of past vegetation, in the form of pollen grains, spores, seeds, leaf and stem fragments, is preserved in these peat deposits. This atlas was constructed to aid in the identification of seeds and fruits found in peat samples. Analysis of the fossil record from peat deposits is providing valuable insight into vegetation dynamics and tectonic processes on the island (Selkirk *et al.*, 1983; Selkirk *et al.*, 1984; Bergstrom, 1985). The usefulness of macrofossil analysis, in association with microfossil analysis, in the reconstruction of past vegetation is becoming increasingly apparent (GreatRex, 1983; Griffin, 1977; Bergstrom, 1985; Huckerby and Oldfield, 1976; Campbell *et al.*, 1973). GreatRex (1983) reported that most seeds and fruit found in surface samples of mires in Britain came from within 1m of the sampling point. Seeds coming from greater distances were adapted for dispersal by wind or water. He suggested that reconstruction of past communities from assemblages in a single sample would apply only to the immediate vicinity of the sampling point.

There have been numerous comments in the literature on the stability of the morphology of seeds (Montgomery, 1977; Corner, 1976; Berggren, 1969), with the last two authors suggesting the value of the use of seed morphology as a tool in systematics.

## METHODS

### Collections

Seeds and fruits were collected from plants on Macquarie Island during the summers of 1979-80, 1983-84. The dry seeds and fruits are part of the Herbarium, School of Biological Sciences, Macquarie University, but will be lodged with the National Herbarium of New South Wales, Royal Botanic Gardens, Sydney, as voucher specimens. Of the 40 angiosperm species known from the island, 10 have not been collected with either seeds or fruits, or with mature seeds or fruit.

### Form of Descriptions

All descriptions are for identification of seeds and fruits under a dissecting micro-



scope. They are for the smallest dispersal unit, be it a seed or indehiscent fruit such as an achene. On occasions when it was hard to determine whether seeds or fruit were dispersed, descriptions for both seed and fruit are given.

The descriptions are divided into a number of sections.

a) **Dimensions**

The position of the hilum or basal scar is taken as the base of the seed or fruit. The

TABLE 1

*Extant Vascular Flora of Macquarie Island*

Nomenclature after Copson (1984) and Seppelt *et al.* (1984) except where indicated

Lycopodiaceae —	<i>Lycopodium</i> sp.
Blechnaceae —	<i>Blechnum penna-marina</i>
Grammitidaceae —	<i>Grammitis poeppigiana</i>
Hymenophyllaceae —	<i>Hymenophyllum peltatum</i>
Aspidiaceae —	<i>Polystichum vestitum</i>
Apiaceae —	<i>Azorella selago</i>
	<i>Hydrocotyle</i> sp.
Araliaceae —	<i>Stilbocarpa polaris</i>
Asteraceae —	<i>Cotula plumosa</i>
	<i>Pleurophyllum hookeri</i>
Brassicaceae —	<i>Cardamine corymbosa</i>
Callitrichaceae —	<i>Callitriche antarctica</i>
Caryophyllaceae —	<i>Cerastium fontanum</i>
	<i>Colobanthus muscoides</i>
	<i>C. quitensis</i>
	<i>Stellaria decipiens</i>
	<i>S. media</i>
Crassulaceae —	<i>Crassula moschata</i>
Cyperaceae —	<i>Carex trifida</i>
	<i>Isolepis aucklandicus</i> (1)
	* <i>Uncinia divaricata</i>
	* <i>U. hookeri</i>
Haloragaceae —	<i>Myriophyllum triphyllum</i>
Juncaceae —	<i>Juncus scheuchzerioides</i>
	<i>Luzula crinita</i> var. <i>crinita</i> (2)
Onagraceae —	<i>Epilobium brunnescens</i> var. <i>brunnescens</i> (3)
	<i>E. pedunculare</i> (4)
Orchidaceae —	<i>Corybas macranthus</i>
Poaceae —	<i>Agrostis magellanica</i>
	<i>Anthoxanthum odoratum</i>
	<i>Deschampsia chapmanii</i>
	<i>D. penicillata</i>
	<i>Festuca contracta</i>
	<i>Poa annua</i>
	<i>P. foliosa</i>
	<i>P. hamiltonii</i>
	<i>P. litorosa</i>
	<i>Puccinellia macquariensis</i>
Polygonaceae —	<i>Rumex crispus</i>
Portulacaceae —	<i>Montia fontana</i>
Ranunculaceae —	<i>Ranunculus biternatus</i>
Rosaceae —	<i>Acaena magellanica</i>
	<i>A. minor</i>
Rubiaceae —	<i>Coprosma pumila</i>
	<i>Galium antarcticum</i>

(1) = *Scirpus aucklandicus* (Wilson, 1981); (2) = *Luzula campestris* (Edgar, 1975); (3) = *Epilobium nerteroides* (Raven and Raven, 1976); (4) = *Epilobium linnaeoides* (Raven and Raven, 1976).

\* = specimens identified Karen Wilson (pers. comm., 1985).



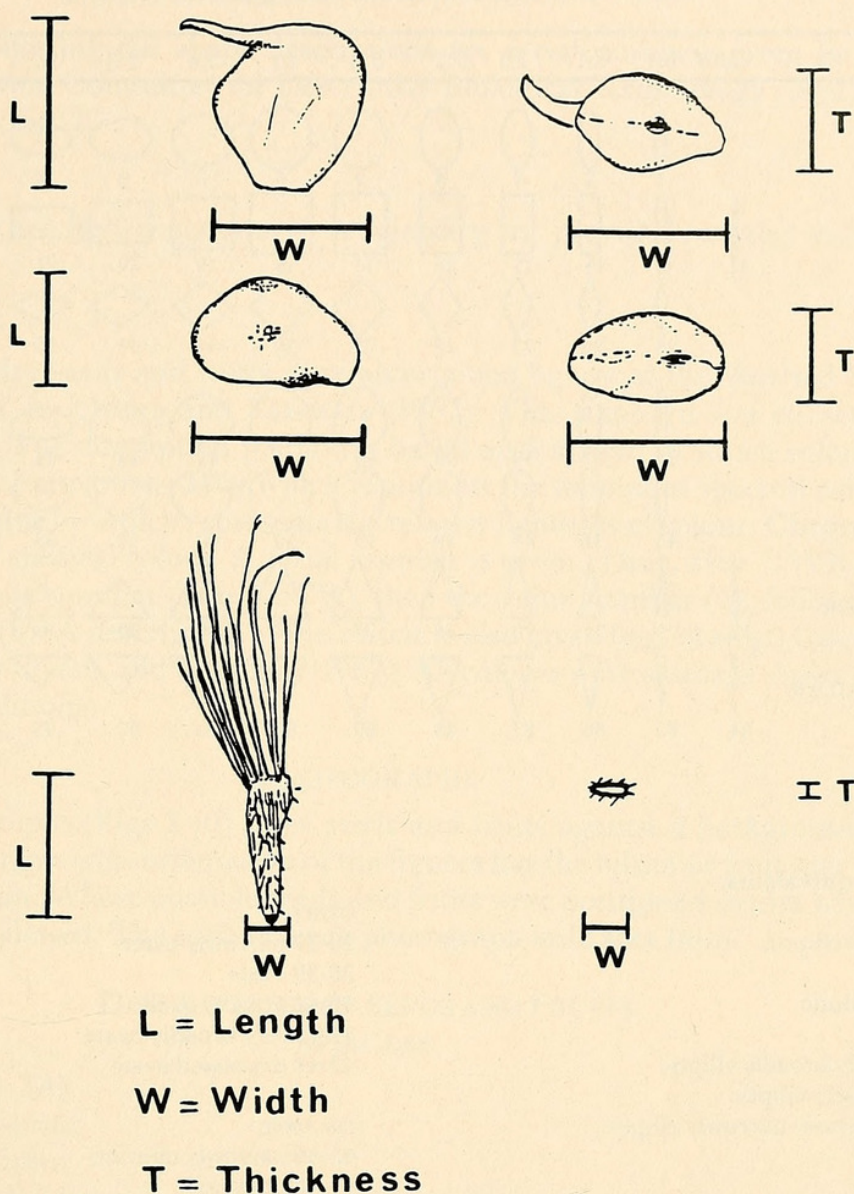


Fig. 1. Diagram illustrating how dimensions were determined. Three different seed/fruit types are shown.

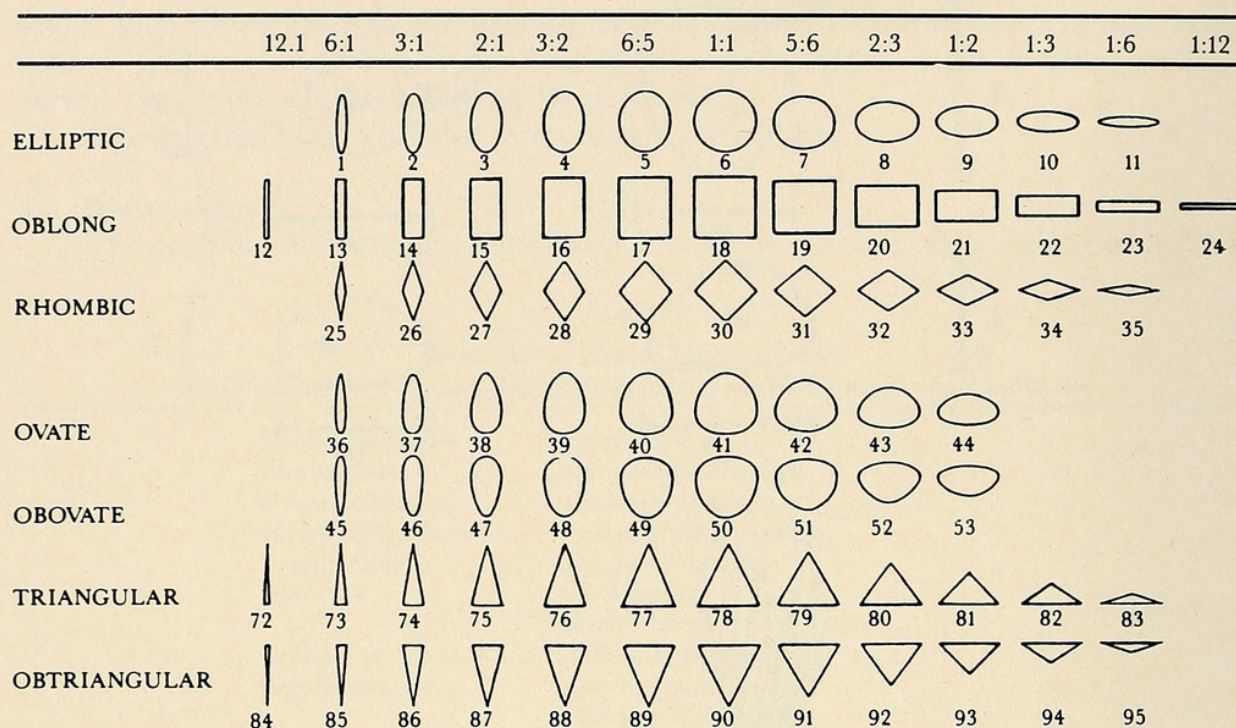
length is measured from the base to the apex or, where a style is present, to the base of the style. The width is perpendicular to this and the thickness, perpendicular to the 2 axes. All measurements are taken at the widest point of the seeds or fruits. Fig. 1 shows how length, width and thickness measurements on three types of seeds and fruits were determined. The measurements given are the means of measurements on 10 seeds + standard error. The standard error by no means gives the range within the species, but Montgomery (1977) suggests that although seeds may vary in size, depending on growth conditions, the ratio of the measurements is usually constant. When 10 seeds were not available the number of seeds measured is given in the form of  $n = x$ , where  $x$  is the number measured.

#### b) Shape

The shape has been given in terms of longitudinal section (l.s.) and cross section (c.s.). These sections have been considered as simple symmetrical plane shapes. The shapes are delimited mathematically as ratios:

- in the case of l.s., length : width
- in the case of c.s., thickness : width.



**Language equivalents:****ELLIPTIC**

1-2 narrowly elliptic  
 3-4 elliptic  
 5 broadly elliptic  
 6 circular  
 7 transversely broadly elliptic  
 8-9 transversely elliptic  
 10-11 transversely narrowly elliptic

**OBLONG**

12 linear  
 13-14 narrowly oblong  
 15-16 oblong  
 17 broadly oblong  
 18 square  
 19 transversely broadly oblong  
 20-21 transversely oblong  
 22-23 transversely narrowly oblong  
 24 transversely linear

**RHOMBIC**

25-26 narrowly rhombic  
 27-28 rhombic  
 29 broadly rhombic  
 30 quadrate rhombic  
 31 transversely broadly rhombic  
 32-33 transversely rhombic  
 34-35 transversely narrowly rhombic

**OVATE**

36-37 narrowly ovate  
 38-39 ovate  
 40-41 broadly ovate  
 41-42 very broadly ovate  
 43-44 depressed ovate

**OBOVATE**

45-46 narrowly obovate  
 47-48 obovate  
 49-50 broadly obovate  
 50-51 very broadly obovate  
 52-53 depressed obovate

**TRIANGULAR**

72 linear triangular  
 73-74 narrowly triangular  
 75-76 triangular  
 77-78 broadly triangular  
 78-79 very broadly triangular  
 80-81 shallowly triangular  
 82-83 very shallowly triangular

**OBTRIANGULAR**

84 linear-obtriangular  
 85-86 narrowly obtriangular  
 87-88 obtriangular  
 89-90 broadly obtriangular  
 90-91 very broadly obtriangular  
 92-93 shallowly obtriangular  
 94-95 very shallowly obtriangular

Fig. 2. Chart of plane shapes and descriptive terminology (after Montgomery, 1977, after Systematics Association, 1962).



The numbers following the shape descriptions are serial numbers given by the Systematics Association Committee for Descriptive Biological Terminology (1962) to plane shapes, shown in Fig. 2.

c) **Comments**

Comments are self-explanatory. A glossary is provided at the end of the descriptions.

d) **Colour**

Colours of dry seeds and fruits were ascertained by use of the 'Revised Standard Soil Color Chart' by Oyana and Takehara (1967). This standard was chosen as it is widely available. The description method is based on a system in which colour can be measured by three attributes: **Hue** which represents the dominant spectral colour such as red or blue; **Value** — which represents the relative lightness of colour; **Chroma** — the relative purity of spectral colour. A serial number is given. Thus, Hue 7.5YR 6/8 consists first of the hue number (Hue 7.5YR), then the value number (6), followed by the chroma number (8). A description of the colour is also given (e.g. orange) based on terminology used by Oyana and Takehara (1967). All colours were assessed under the same natural light conditions.

### PHOTOGRAPHS

The photographs (Figs 3-10) show seeds and fruits against a background of grey plasticine. The length-wise orientation of the figures has the hilum or fruit scar pointing towards the caption. Where possible seeds and fruits were positioned so that both the l.s. and c.s. could be viewed. The scale on each photograph indicates 1mm.

### DESCRIPTIONS OF SEEDS AND FRUITS

#### APIACEAE

*Azorella selago* (Fig. 3A)

Length:  $1.61 \pm 0.04$ mm

Width:  $0.91 \pm 0.05$ mm

Thickness:  $0.68 \pm 0.06$ mm

Shape: —

Longitudinal section: elliptic (3-4) or irregular.

Cross section: varied, due to distortion from other mericarps at the commissure.

Comments: Mericarps. Surface rough with 5 distinct irregular longitudinal ridges. Persistent style  $1.48 \pm 0.5$ mm long. Floral remnant may be present.

Colour: Hue 10YR 7/6 bright yellow brown.

#### ARALIACEAE

*Stilbocarpa polaris* (Fig. 3B,D)

Length:  $2.24 \pm 0.03$ mm

Width:  $0.92 \pm 0.05$ mm

Thickness:  $1.14 \pm 0.05$ mm

Shape: —

Longitudinal section: broadly ovate (41-42).

Cross section: transversely elliptic (8-9) or irregular.

Comments: Seeds borne in black, shiny, spherical fruit, centre of which is hollow. Seed surface coarse, often with fleshy endocarp still attached. No hilum. Cream, persistent Y-shaped vascular trace on one surface. In arms of 'Y' there is a hole.

Colour: Hue 7.5YR 4/6 brown.



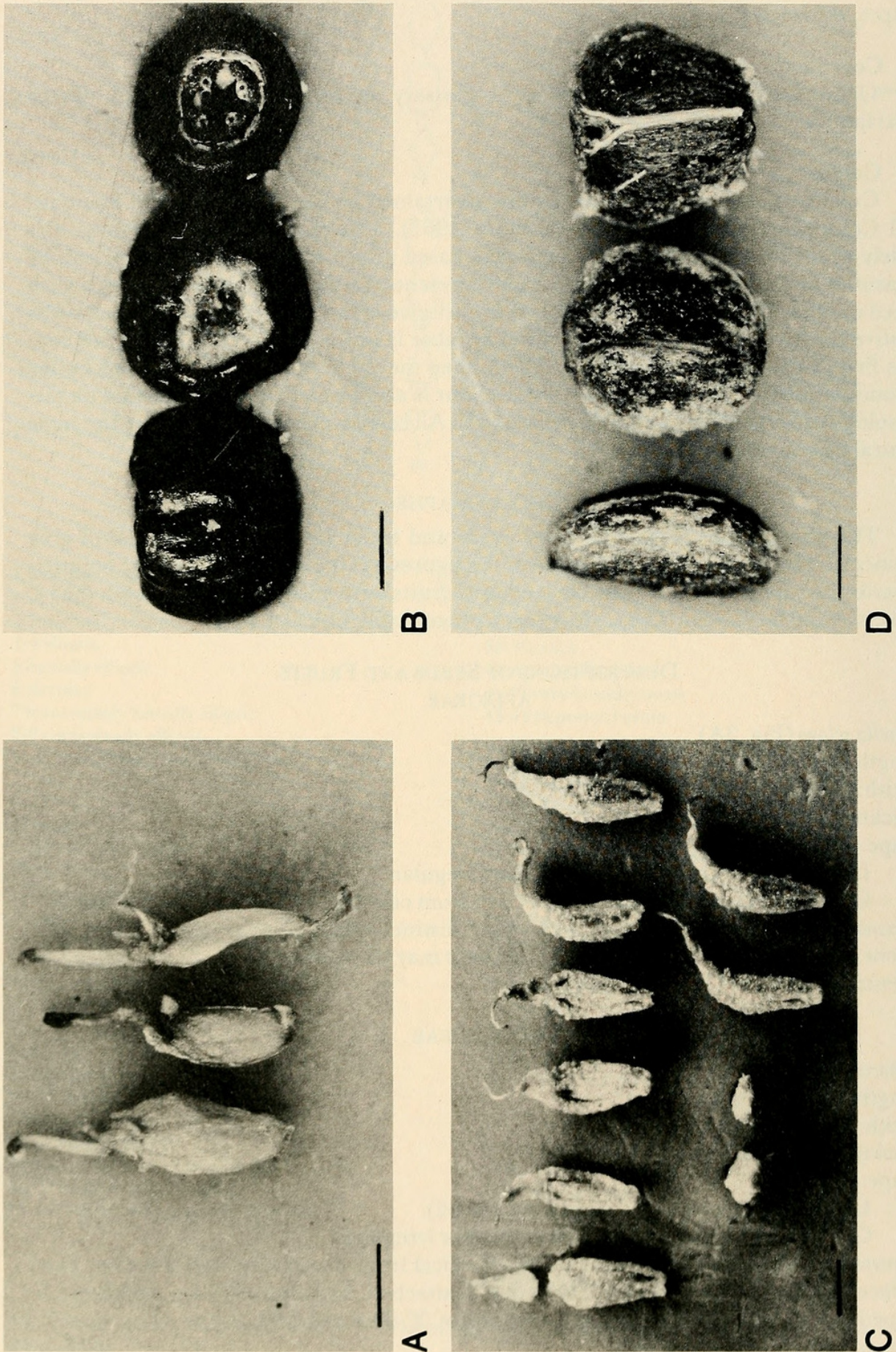


Fig. 3. A = *Azorella selago* mericarps. B & D = *Stilbocarpa polaris*, B = fruits, D = seeds. C = *Cotula plumosa* achenes. Imm scales.



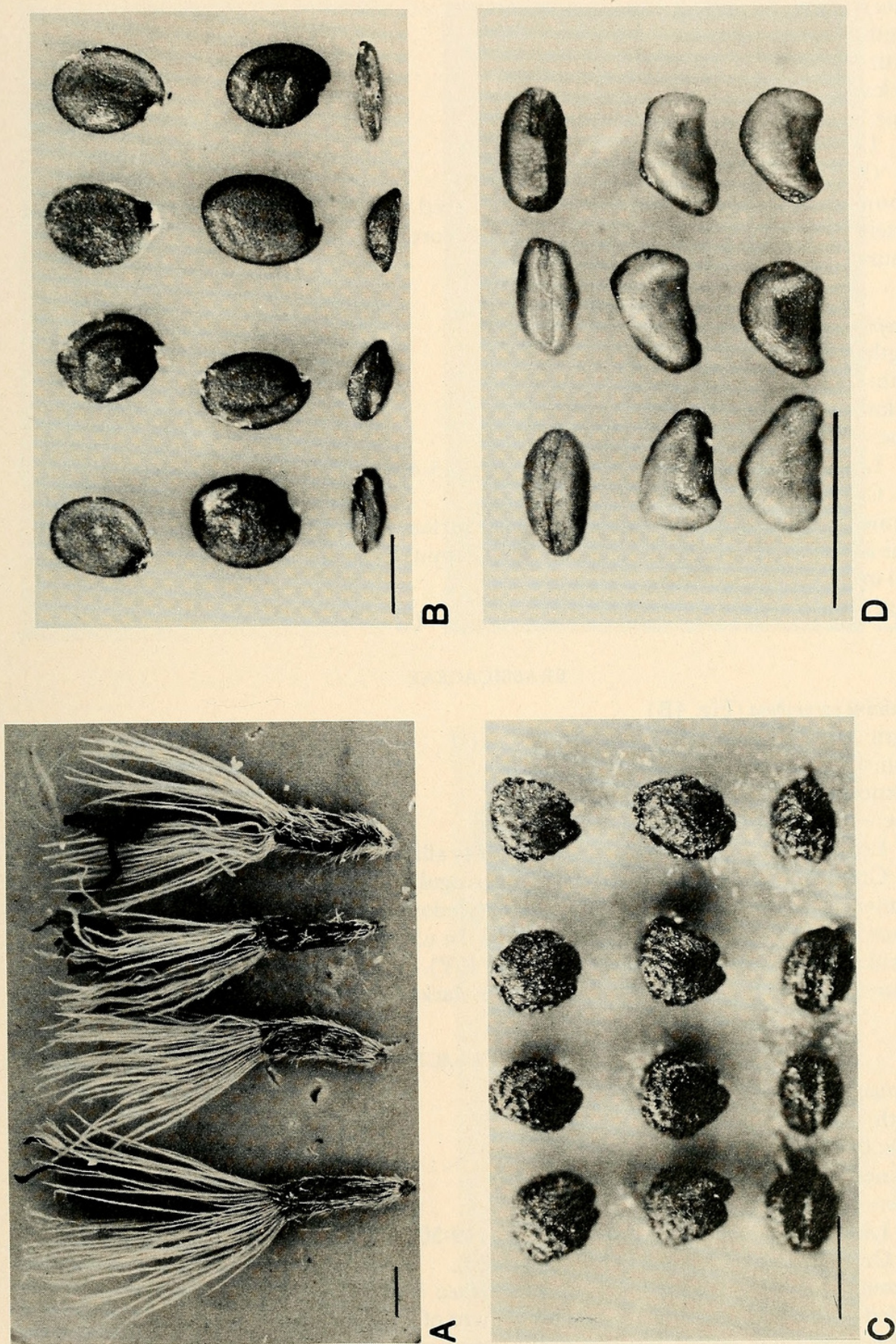


Fig. 4. A = *Pleurophyllum hookeri*, achenes. B = *Cardamine corymbosa*, seeds. C = *Cerastium fontanum* seeds. D = *Colobanthus muscoides* seeds. Imm scales.



## ASTERACEAE

*Cotula plumosa* (Fig. 3C)Length:  $2.04 \pm 0.04$ mmWidth:  $1.18 \pm 0.03$ mmThickness:  $0.94 \pm 0.03$ mm

Shape: —

Longitudinal section: obovate (47).

Cross section: transversely elliptic (8).

Comments: Achene. Longitudinal axis curved. Surface of achene reticulate and coarsely punctate. Persistent style and tubular corolla.

Colour: Hue 10YR 7/4 dull yellow orange.

*Pleurophyllum hookeri* (Fig. 4A)Length:  $3.0 \pm 0.14$ mmWidth:  $0.88 \pm 0.05$ mmThickness:  $0.54 \pm 0.02$ mm

Shape: —

Longitudinal section: narrowly obovate (45-46) to triangular (85-86).

Cross section: transversely oblong (21).

Comments: Achene with plumose pappus. Surface of achene velutinous, hairs white. Styler and perianth remnants often present. Pappus hairs approximately 6mm long, unequal in length and bristly.

Colour: Hue 2.5YR dull reddish brown.

## BRASSICACEAE

*Cardamine corymbosa* (Fig. 4B)Length:  $1.3 \pm 0.02$ mmWidth:  $1.0 \pm 0.02$ mmThickness:  $0.4 \pm 0.02$ mm

Shape: —

Longitudinal section: elliptical to broadly elliptic (4-5).

Cross section: depressed ovate (44) or irregular.

Comments: Cotyledons accumbent with cotyledons and radicle indicated by a sulcus. Surface undulating, punctulate and shiny. In c.s. the seeds compressed at margins. Funicular remnant light yellow orange (Hue 10Y).

Colour: Hue 10R 5/8 red, margins and hilum darker.

## CARYOPHYLLACEAE

*Cerastium fontanum* (Fig. 4C)Length:  $0.7 \pm 0.15$ mmWidth:  $0.68 \pm 0.01$ mmThickness:  $0.54 \pm 0.01$ mm

Shape: —

Longitudinal section: broadly obovate (49-50) or irregular.

Cross section: transversely oblong (19-20).

Comments: Hilum within deep notch. Surface coarsely papillate. Papillae low and rounded with ovoid stellate bases. Arrangement of papillae may be concentric, particularly along margins. Small, hyaline, protoxylem remnant attached to hilum.

Colour: Hue 5YR 5/8 bright reddish brown.



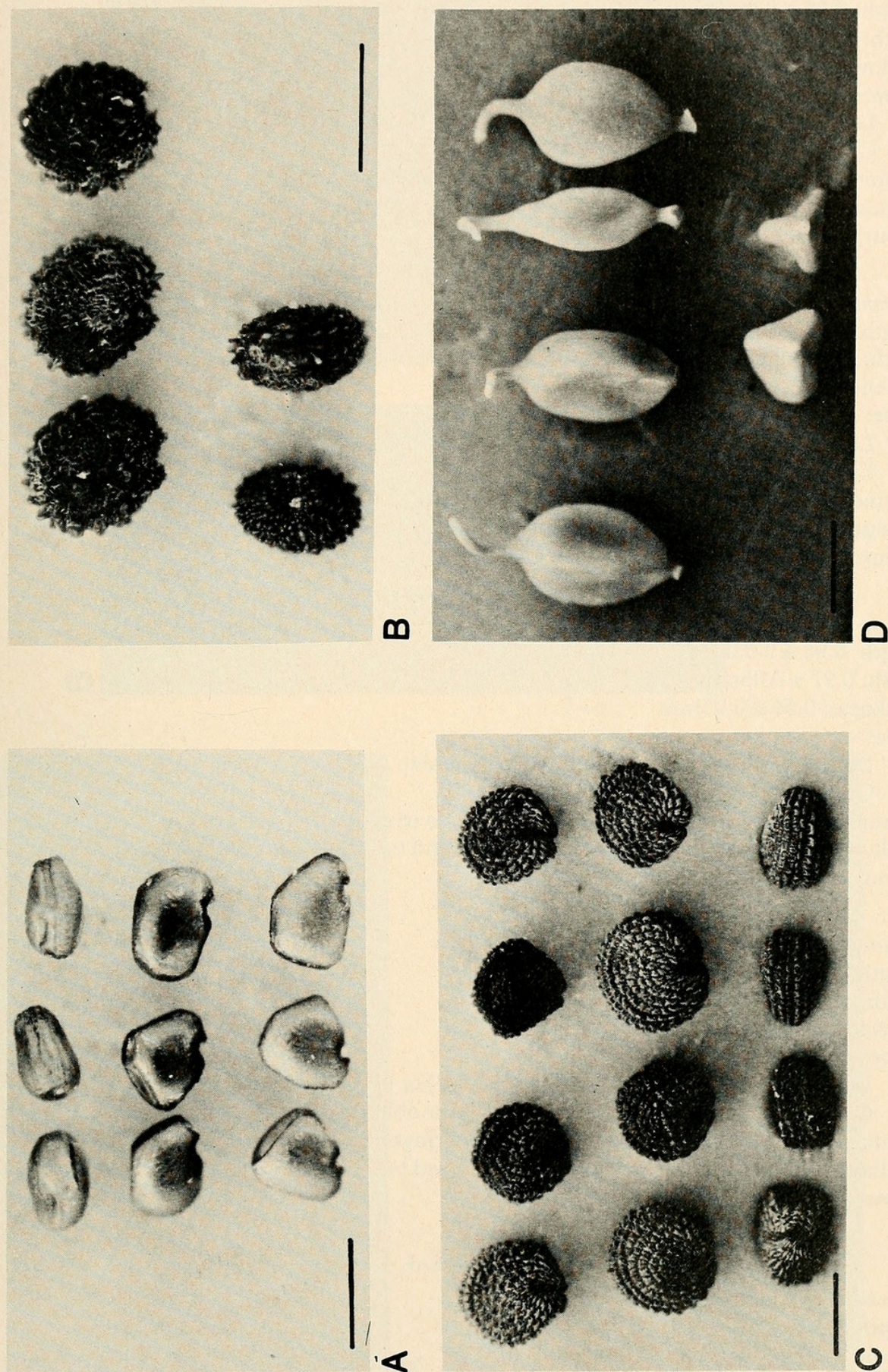


Fig. 5. A = *Colobanthus quitensis* seeds. B = *Stellaria media* seeds. C = *Stellaria decipiens* seeds. D = *Carex trifida* achenes. 1mm scales.



*Colobanthus muscoides* (Fig. 4D)Length:  $0.38 \pm 0.002$ mmWidth:  $0.65 \pm 0.002$ mmThickness:  $0.34 \pm 0.002$ mm

Shape: —

Longitudinal section: depressed ovate (43-44) or irregular.

Cross section: transversely elliptic (8-9) or irregular.

Comments: Seeds slightly reniform. Margins often depressed forming sulcus (hence irregular in l.s.). Surface faintly colliculate and translucent. Minute white caruncle.

Colour: Hue 7.5YR 5/8 bright brown.

*Colobanthus quitensis* (Fig. 5A)Length:  $0.55 \pm 0.02$ mmWidth:  $0.62 \pm 0.02$ mmThickness:  $0.38 \pm 0.01$ mm

Shape: —

Longitudinal section: depressed obovate (52-53), or irregular.

Cross section: transversely elliptic (8-9).

Comments: Margins often depressed forming sulcus (hence irregular in l.s.). Surface translucent and very faintly colliculate. Minute white caruncle.

Colour: Hue 5YR 5/8 bright reddish brown.

*Stellaria decipiens* (Fig. 5B)Length:  $0.98 \pm 0.05$ mm      n = 7Width:  $0.97 \pm 0.05$ mm      n = 7Thickness:  $0.64 \pm 0.05$ mm      n = 7

Shape: —

Longitudinal section: circular (6) to irregular.

Cross section: transversely elliptic (8-9).

Comments: Hilum in deep notch. Concentric to irregular papillose surface. Papillae irregular and elongate, especially along margin and towards the hilum/base.

Colour: Hue 7.5R 4/8, 3/4, 3/6 red to dark red.

*Stellaria media* (Fig. 5C)Length:  $1.25 \pm 0.04$ mmWidth:  $1.26 \pm 0.04$ mmThickness:  $0.8 \pm 0.01$ mm

Shape: —

Longitudinal section: broadly elliptic (5-7) or broadly obovate (48-51) or irregular.

Cross section: transversely elliptic (8-9), or oblong (20-21) or irregular.

Comments: Hilum in deep notch. Concentric rings of low rounded papillae on surface. Papillae arise from raised irregular or star-shaped bases.

Colour: Hue 7.5R 4/8 red.

## CYPERACEAE

*Carex trifida* (Fig. 5D)Length:  $1.79 \pm 0.02$ mm      n = 6Width:  $1.05 \pm 0.06$ mm      n = 6Thickness:  $0.85 \pm 0.06$ mm      n = 6



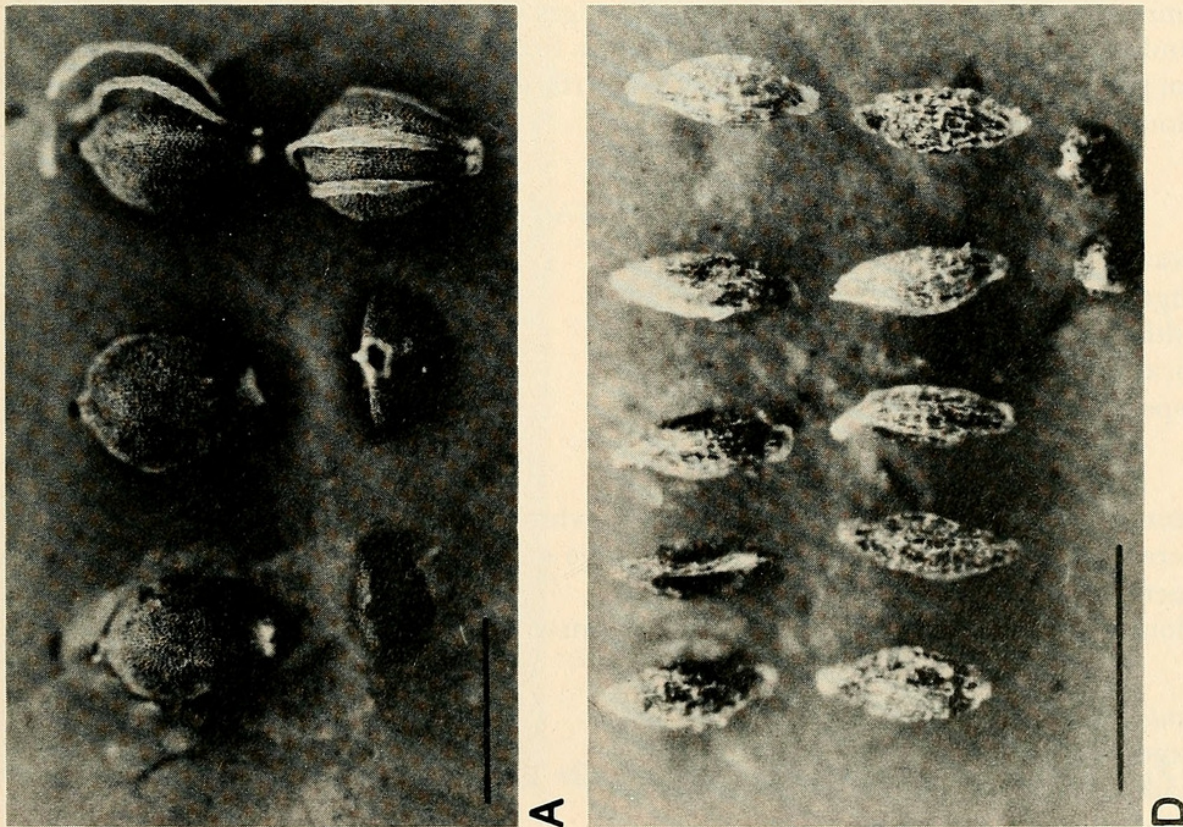


Fig. 6. A = *Isolepis aucklandicus* seeds. B & C = *Uncinia divaricata*, B = perigynium, C = achenes. D = *Juncus scheuchzerioides* seeds. Imm scales.



Shape: —

Longitudinal section: elliptic (3-4).

Cross section: triangular to shallowly triangular (80-82).

Comments: Achene. Longitudinal axis concave-convex. Surface punctulate and lustrous. Persistent, slender and contorted stylar remnant or just stylar base present. Fruit borne in papery perigynium which is ovate in l.s., transversely elliptic in c.s. (approximately 0.5mm long), somewhat fusiform with stipitate base.

Colour: Hue 10YR 8/6-8/8 yellow-orange.

*Isolepsis aucklandicus* (Fig. 6A)

Length:  $1.01 \pm 0.01$ mm

Width:  $0.73 \pm 0.01$ mm

Thickness:  $0.45 \pm 0.01$ mm

Shape: —

Longitudinal section: broadly obovate (49-50).

Cross section: shallowly triangular (81-82), tending to planoconvex.

Comments: Margins slightly ridged, base stipitate. Surface areolate. Stylar base obtuse. Three loose, ligulate bristles from base, approximately 2× longer than achene.

Colour: Hue 7.5YR 4/6 brown.

*Uncinia divaricata* (Fig. 6B,C)

Length:  $2.43 \pm 0.02$ mm

Width:  $1.21 \pm 0.04$ mm

Thickness:  $0.79 \pm 0.04$ mm

Shape: —

Longitudinal section: elliptic (3).

Cross section: shallowly triangular (80).

Comments: Achene. Sides slightly convex, edges rounded. Surface with profuse, low, rounded papillae. Achene borne in perigynium. Stylar remnant that, if intact, protrudes from perigynium and terminates in a hook. Surface of perigynium striated.

Colour: Hue 5YR 6/6-6/8 orange.

#### JUNCACEAE

*Juncus scheuchzerioides* (Fig. 6D)

Length:  $0.7 \pm 0.01$ mm

Width:  $0.25 \pm 0.01$ mm

Thickness:  $0.25 \pm 0.01$ mm

Shape: —

Longitudinal section: elliptic (3).

Cross section: circular (6) or irregular.

Comments: Seed fusiform. Coarsely striate, whitish membranous coating on surface. There is often a prominent longitudinal ridge of tissue. Base is usually nodulous or sometimes minutely pointed.

Colour: Hue 5YR 5/8-6/8 bright reddish-brown to orange.

*Luzula crinita* var. *crinita* (Fig. 7A)

Length:  $1.03 \pm 0.01$ mm

Width:  $0.53 \pm 0.01$ mm

Thickness:  $0.43 \pm 0.01$ mm



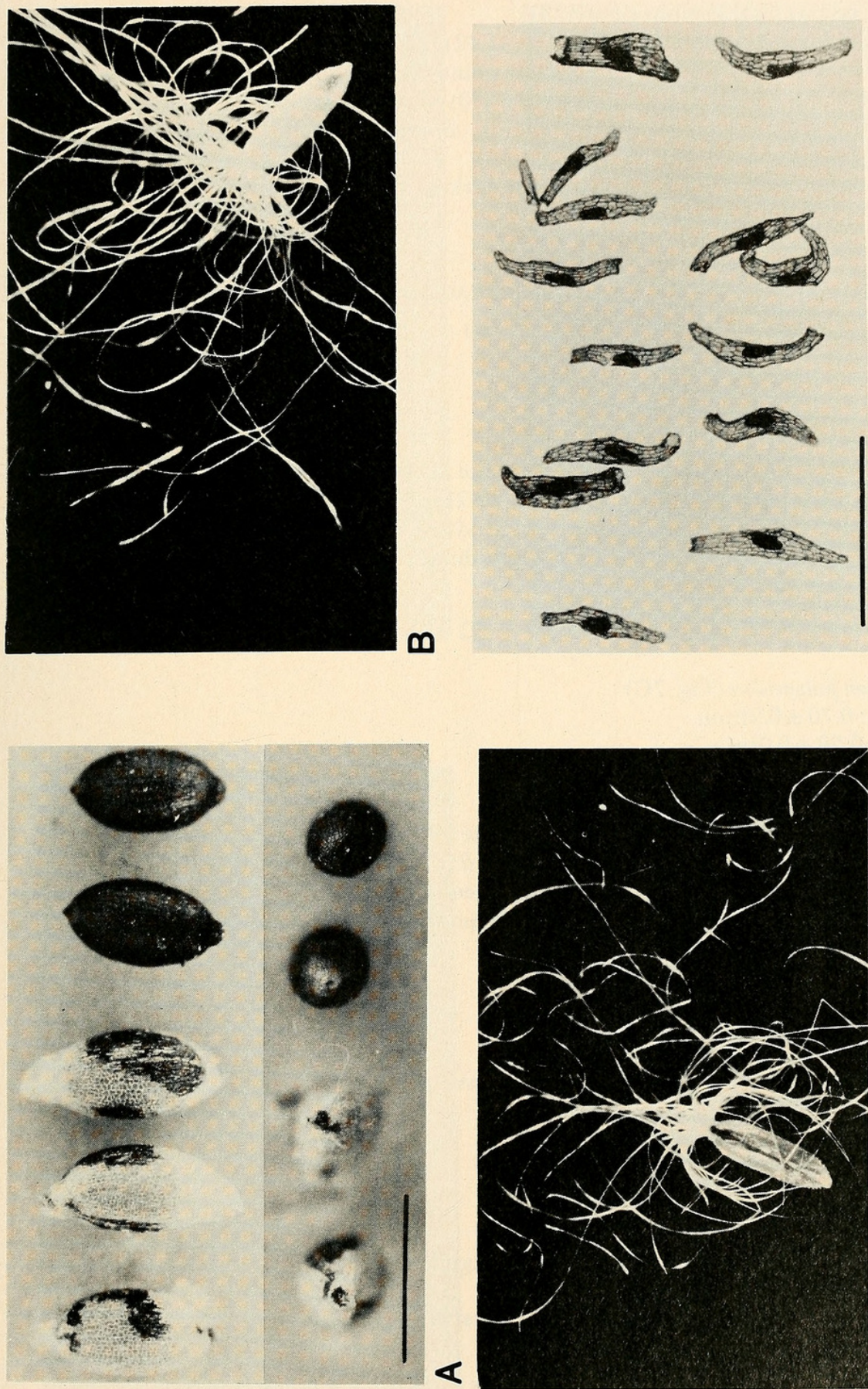


Fig. 7. A = *Luzula crinita* var. *crinita* seeds. B = *Epilobium brunnescens* var. *brunnescens* seeds. C = *Epilobium pedunculare* seeds. D = *Corybas macranthus* seeds. 1mm scales.



Shape: —

Longitudinal section: elliptic (3).

Cross section: very broadly ovate (41-42).

Comments: Seed fusiform with minutely pointed apex and obtuse nodulous base, hilum inconspicuous. A large ( $1.26 \pm 0.01\text{mm}$ ,  $n=10$ ) whitish aril completely envelops the seed. Surface of seed reticulate and glistening. Surface of caruncle faintly striated and areolate.

Colour: Hue 7.5R 3/4-3/6 dark red, base darker.

#### ONAGRACEAE

*Epilobium brunnescens* var. *brunnescens* (Fig. 7B)

Length:  $0.81 \pm 0.01\text{mm}$

Width:  $0.62 \pm 0.01\text{mm}$

Thickness:  $0.2 \pm 0.01\text{mm}$

Shape: —

Longitudinal section: narrowly obovate to obovate (46-47).

Cross section: transversely oblong (20-21).

Comments: Sides often depressed. Longitudinal sulcus, deepening towards apex, terminating with cream coma. Surface longitudinally papillose.

Colour: Hue 5YR 6/8 orange.

*Epilobium pedunculare* (Fig. 7C)

Length:  $0.70 \pm 0.01\text{mm}$

Width:  $0.29 \pm 0.01\text{mm}$

Thickness:  $0.21 \pm 0.04\text{mm}$

Shape: —

Longitudinal section: narrowly obovate (46-47).

Cross section: transversely oblong (20-21).

Comments: Sides often depressed. Surface longitudinally papillose. Longitudinal sulcus, deepening towards apex, and terminating with cream coma. Base minutely pointed.

Colour: Hue 5YR 6/8 orange.

#### ORCHIDACEAE

*Corybas macranthus* (Fig. 7D)

Length:  $0.67 \pm 0.03\text{mm}$

Width:  $0.12 \pm 0.01\text{mm}$

Thickness: approx.  $0.1\text{mm}$

Shape: —

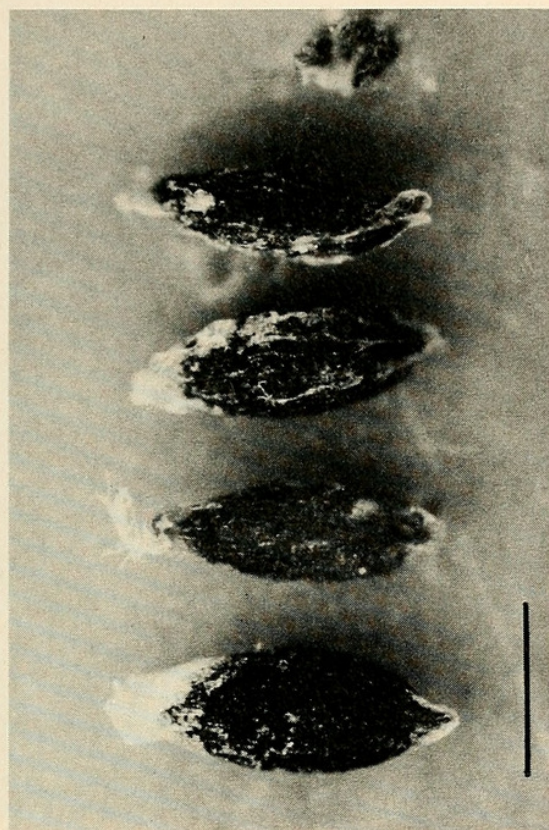
Longitudinal section: elliptic (1) or irregular (e.g. twisted).

Cross section: circular (6) or irregular.

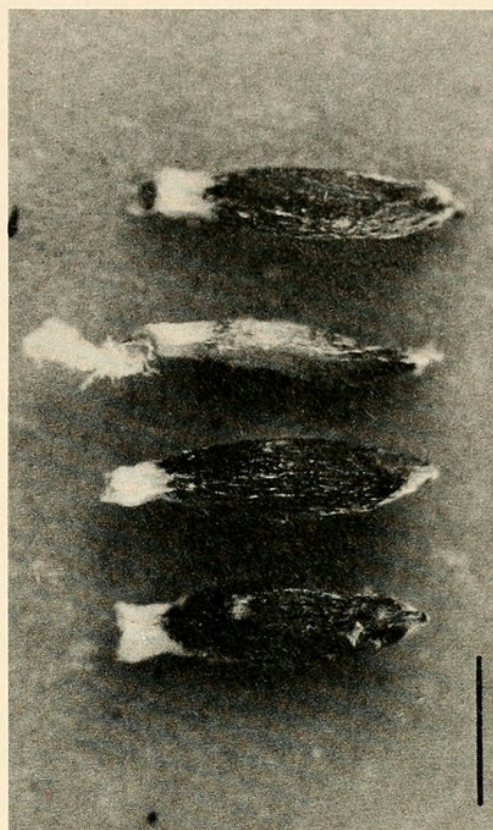
Comments: Small spherical embryo in transparent membranous reticulate seed coat. Base tapering or blunt.

Colour: Hue 10YR 8/3 light yellow-orange.

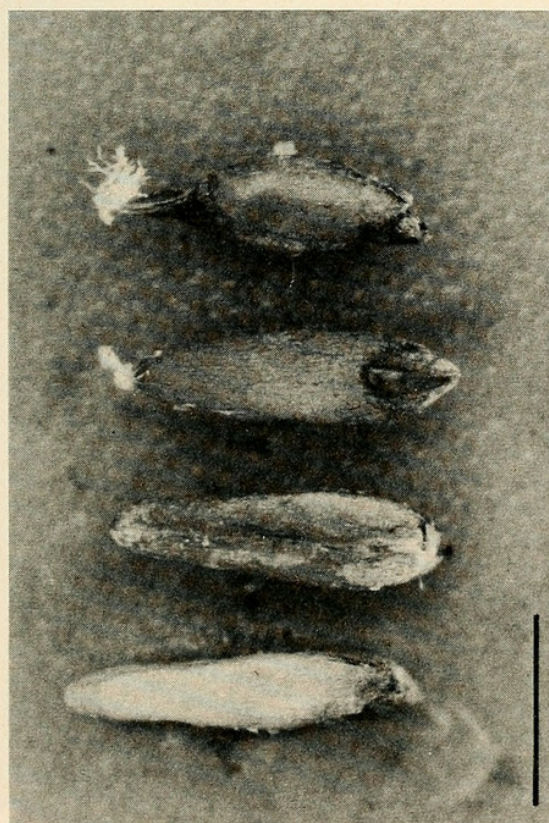




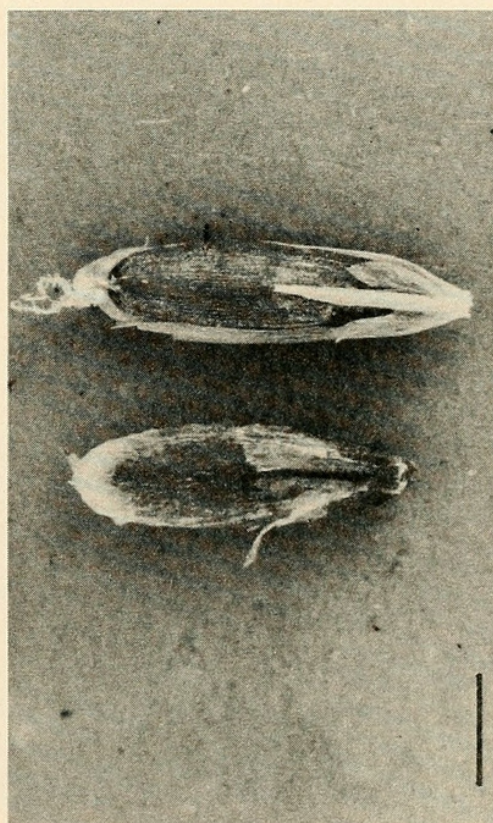
B



D



A



C

Fig. 8. A = *Agrostis magellanica* caryopsis. B = *Deschampsia chapmanii* caryopsis. C = *Festuca contracta* caryopsis. D = *Poa annua* caryopsis. Imm scales.



## POACEAE

*Agrostis magellanica* (Fig. 8A)Length:  $1.5 \pm 0.01\text{mm}$  n=7Width:  $0.52 \pm 0.03\text{mm}$  n=7Thickness:  $0.42 \pm 0.02\text{mm}$  n=7

Shape: —

Longitudinal section: narrowly elliptic (2-3).

Cross section: broadly elliptic (5).

Comments: Caryopsis. Apex minutely pointed. Small coma present. V-shaped groove near fruit scar. Surface sometimes concave.

Colour: Hue 7.5YR 7/8 yellow-orange.

*Deschampsia chapmanii* (Fig. 8B)Length:  $1.02 \pm 0.03\text{mm}$ Width:  $0.47 \pm 0.02\text{mm}$ Thickness:  $0.45 \pm 0.01\text{mm}$ 

Shape: —

Longitudinal section: obovate (47).

Cross section: circular (6).

Comments: Caryopsis fusiform. Nodulous apex terminating in small coma. Apiculate base with lacerate fruit scar. Surface rugose.

Colour: Hue 7.5YR 5/8.

*Festuca contracta* (Fig. 8C)Length:  $3.19 \pm 0.01\text{mm}$  n=2Width:  $1.16 \pm 0$  n=2Thickness:  $0.58 \pm 0.04\text{mm}$  n=2

Shape: —

Longitudinal section: narrowly obovate (46).

Cross section: depressed obovate (43).

Comments: Caryopsis. Base minutely pointed, oblique fruit scar. Apex obtuse with exocarpe extending into wing. Dark stripe on concave surface. Surface rugulose.

Colour: Hue 7.5YR 5/8 bright brown.

*Poa annua* (Fig. 8D)Length:  $1.48 \pm 0.06\text{mm}$  n=5Width:  $0.57 \pm 0.02\text{mm}$  n=5Thickness:  $0.38 \pm 0.02\text{mm}$  n=5

Shape: —

Longitudinal section: narrowly elliptic (2-3).

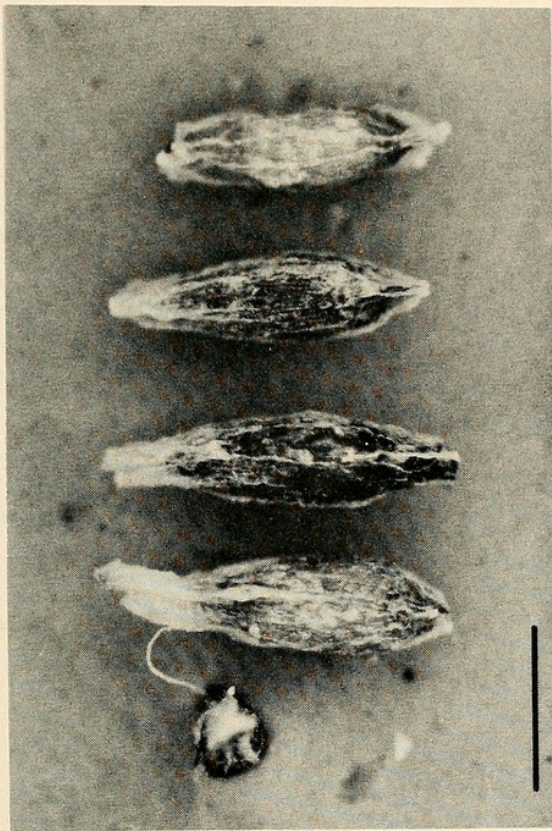
Cross section: irregular.

Comments: Caryopsis. Base blunt, apex terminating in a short white coma. Surface rugose.

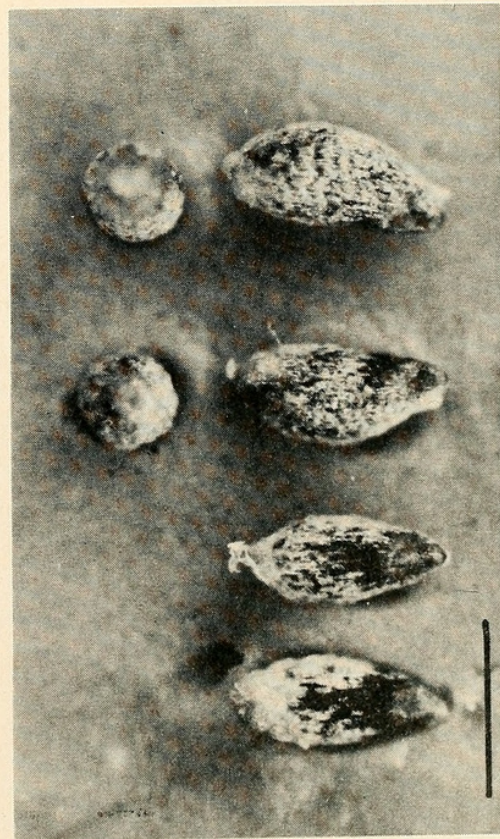
Colour: Hue 10YR 6/8.

*Poa foliosa* (Fig. 9A)Length:  $1.9 \pm 0.02\text{mm}$ Width:  $0.44 \pm 0.01\text{mm}$ Thickness:  $0.43 \pm 0.01\text{mm}$

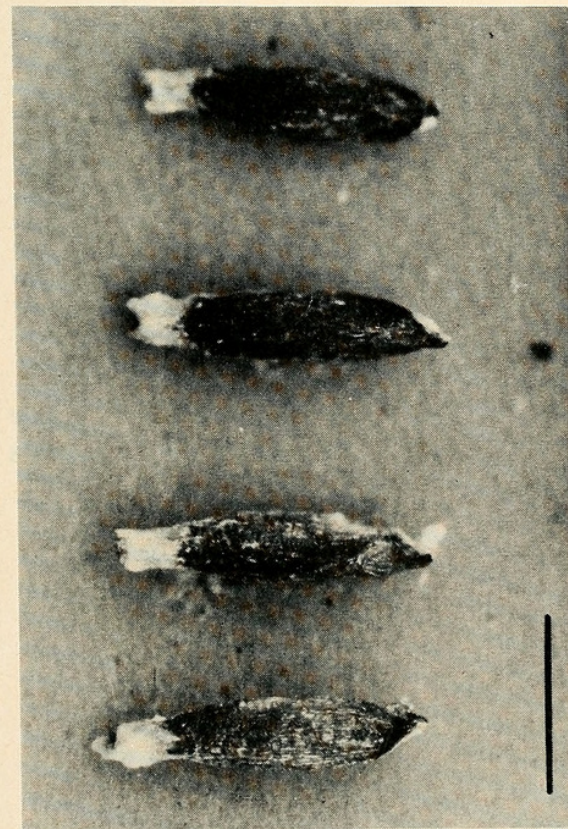




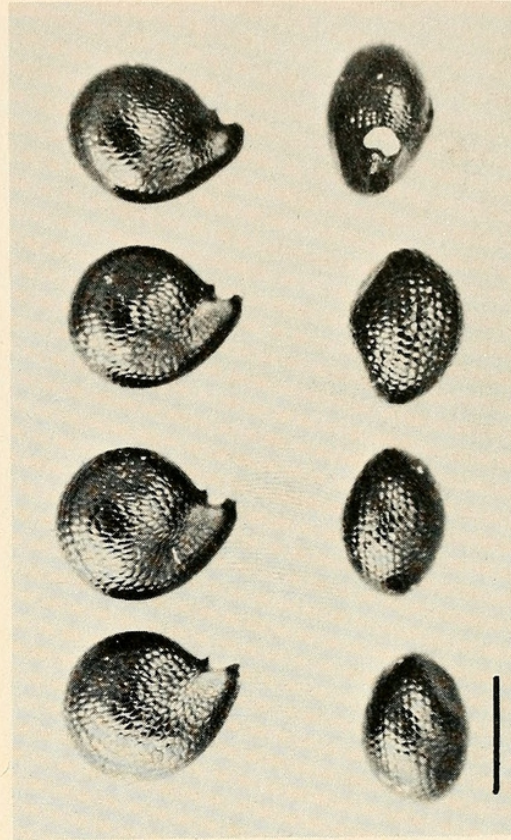
A



B



C



D

Fig. 9. A = *Poa foliosa* caryopsis. B = *Poa hamiltonii* caryopsis. C = *Puccinellia macquariensis* caryopsis. D = *Montia fontana* seeds. 1mm scales.



Shape: —

Longitudinal section: narrowly elliptic (1-2).

Cross section: broadly triangular (78).

Comments: Caryopsis. Sides often concave. Apex minutely pointed. Fruit-scar white, rough surfaced and blunt. Surface translucent and rugulose.

Colour: Hue 7.5YR 5/8 bright brown.

*Poa hamiltonii* (Fig. 9B)

Length:  $1.94 \pm 0.06$ mm

Width:  $0.56 \pm 0.01$ mm

Thickness:  $0.53 \pm 0.02$ mm

Shape: —

Longitudinal section: narrowly elliptic (1-2).

Cross section: circular (6) or irregular.

Comments: Caryopsis. Exocarp extending beyond rest of fruit by approximately 0.5mm and terminating in small white coma at apex.

Colour: Hue 7.5YR 5/8 bright brown.

*Puccinellia macquariensis* (Fig. 9C)

Length:  $1.67 \pm 0.04$ mm

Width:  $0.56 \pm 0.02$ mm

Thickness:  $0.47 \pm 0.02$ mm

Shape: —

Longitudinal section: narrowly elliptic to elliptic (2-3).

Cross section: broadly elliptic to circular (4-6).

Comments: Caryopsis fusiform, apex minutely pointed. Seed coat forming cream fruit-scar at base. Surface rugose.

Colour: Hue 2.5YR 4/8 reddish brown.

#### PORTULACACEAE

*Montia fontana* (Fig. 9D)

Length:  $1.5 \pm 0.22$ mm

Width:  $1.2 \pm 0.01$ mm

Thickness:  $0.9 \pm 0.01$ mm

Shape: —

Longitudinal section: obovate to broadly obovate (48-49).

Cross section: transversely elliptic (8).

Comments: Embryo coiled. Compressed, keeled edge ascending from hilum. Surface colliculose with regular, tending to concentric pattern. Very shiny (lustrous). Obvious pale yellow caruncle (Hue 2.5Y 8/4) with areolate surface.

Colour: Hue 5RP 1.7/1 purplish black.

#### RANUNCULACEAE

*Ranunculus bitermatus* (Fig. 10A)

Length:  $1.9 \pm 0.03$ mm

Width:  $1.8 \pm 0.04$ mm

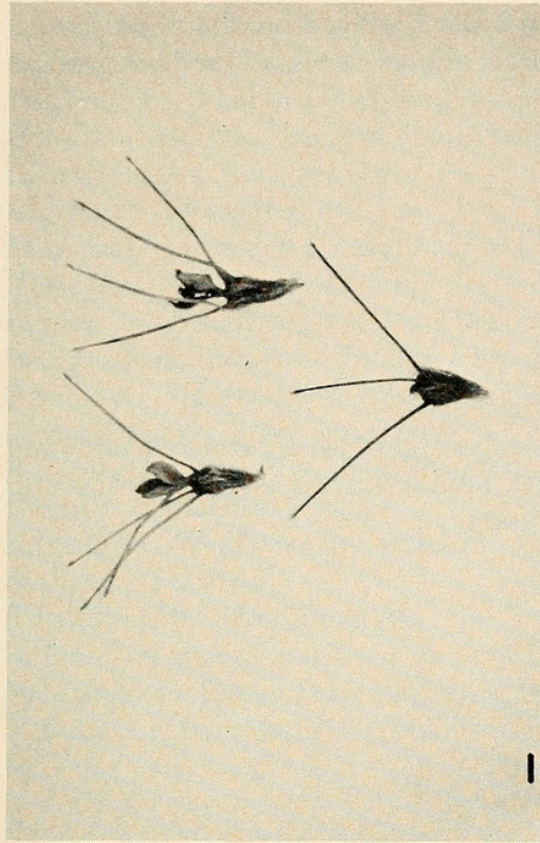
Thickness:  $1.3 \pm 0.02$ mm

Shape: —

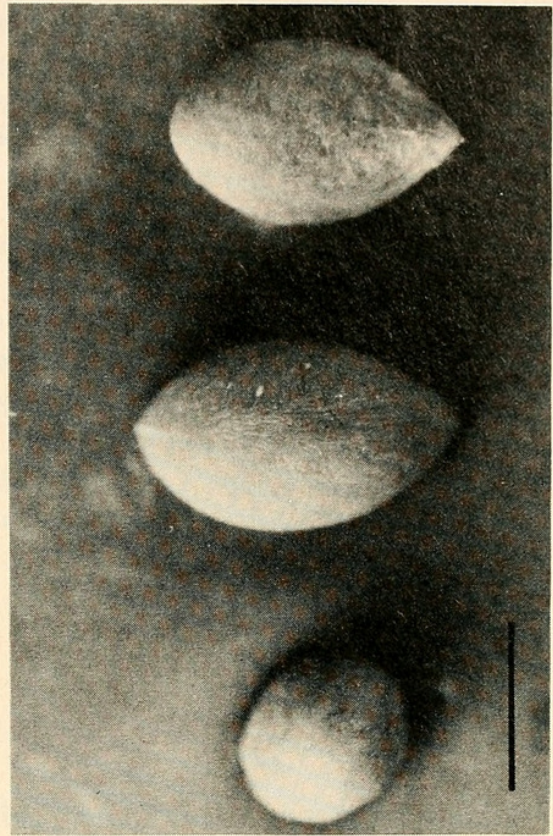
Longitudinal section: very broadly ovate (41-42).

Cross section: broadly ovate (40-41).

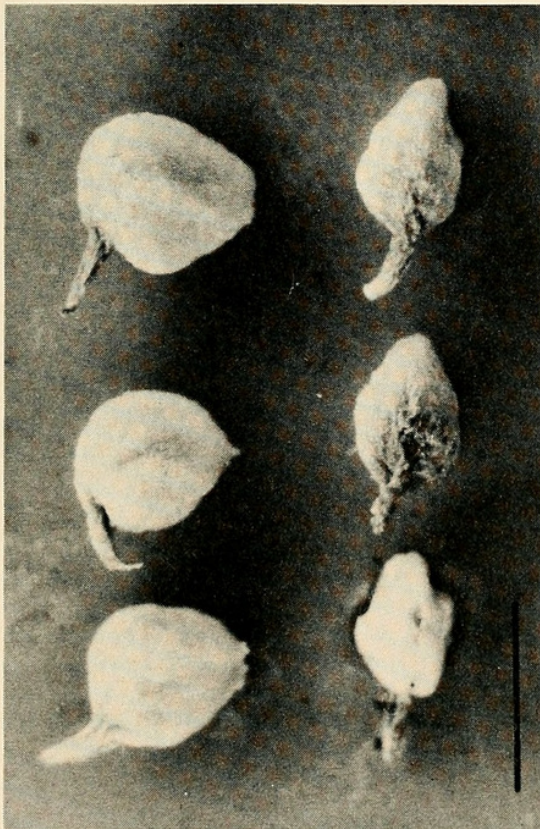




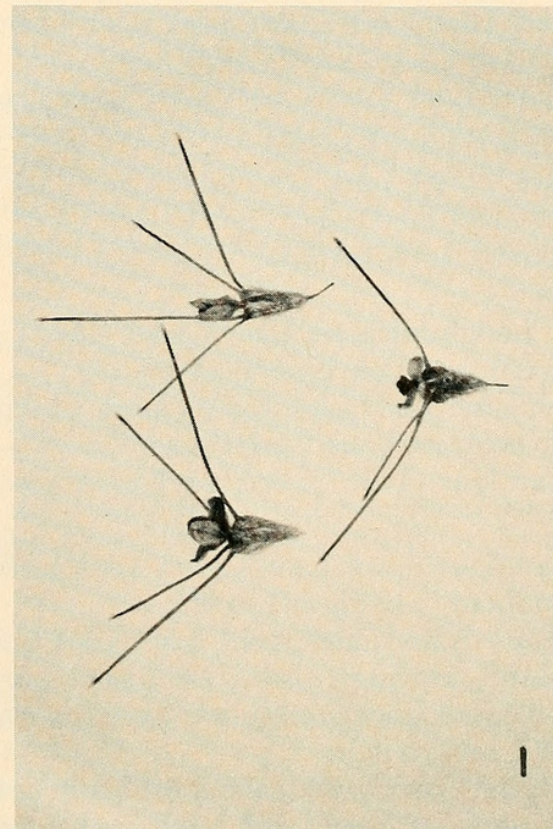
B



D



A



C

Fig 10. A = *Ranunculus bitematus* achene. B = *Acaena magellanica* achenes. C = *Acaena minor* achenes. D = *Coprosma pumila* seeds. 1mm scales.



Comments: Achene. Deep sulcus ascending from hilum and fruit scar to base of lateral persistent style. Style often recurved with terminal hook. Surface irregular and rugose. Colour: Hue 10YR 8/1.2-8/4 light grey to light yellow-orange. Apex and style darker.

## ROSACEAE

*Acaena magellanica* (Fig. 10B)

Length:  $3.1 \pm 0.06$  mm

Width:  $1.11 \pm 0.03$  mm

Thickness:  $1.11 \pm 0.03$  mm

Shape: —

Longitudinal section: obtriangular (87).

Cross section: broadly oblong to square (17-18).

Comments: Achene enclosed in hardened villous calyx (hairs white) which is endowed with 4 subulate spines approximately 8 mm long. Spines barbed at tip. Corolla and stylar remnant, or at least persistent stylar base, present.

Colour: 2.5Y 7/6 bright yellowish brown.

*Acaena minor* (Fig. 10C)

Length:  $3.16 \pm 0.1$  mm

Width:  $1.1 \pm 0.03$  mm

Thickness:  $1.0 \pm 0.03$  mm

Shape: —

Longitudinal section: obtriangular (87).

Cross section: broadly oblong to square (17-18).

Comments: Achene enclosed in hardened villous calyx (hairs white) which is endowed with 4 subulate spines approximately 6 mm long. Spines barbed at tip. Corolla and stylar remnant, or at least persistent stylar base, present.

Colour: Hue 7.5YR 6/8 orange.

## RUBIACEAE

*Coprosma pumila* (Fig. 10D)

Length:  $2.5 \pm 0.1$  mm

Width:  $1.58 \pm 0.03$  mm

Thickness:  $1.3 \pm 0.01$  mm

Shape: —

Longitudinal section: obovate (48).

Cross section: broadly elliptic (5).

Comments: Seed fusiform. Longitudinal axis curved. The base is minutely pointed with hilum inconspicuous. Surface rugulose.

Colour: Hue 10YR 7/6 bright yellow brown.

## GLOSSARY

**Accumbent** Lying face to face

**Achene** A dry, indehiscent, one-seeded fruit

**Areolate** Having a distinct but fine network of spaces

**Aril** An appendage or outer covering of a seed, growing from hilum or funiculus

**Bristle** A stiff hair

**Caruncle** An aril at or about the hilum or funiculus

**Colliculate** Covered with small, rounded elevations, or hillocks

**Coma** A tuft of hairs covering apex



- Commissure** A junction or seam  
**Fruit Scar** Scar on fruit indicating point of attachment to parent plant  
**Fusiform** Swollen in the middle and tapering towards the ends  
**Funiculus** Stalk by which a seed is attached to ovary wall or placenta  
**Hilum** Scar on a seed indicating point of attachment to funiculus  
**Indehiscent** Not opening  
**Ligulate** Strap-shaped  
**Mericaip** 1-seeded portion of fruit which may/may not split at maturity  
**Nodulous** With small knobs  
**Papillate** Small, nipple-shaped projections  
**Perigynium** Sheath which envelops achenes belonging to the Cyperaceae  
**Punctate** Marked with dots or depressions  
**Puncticulate** Finely punctate  
**Reticulate** Netted, more distinct than areolate  
**Rugose** Coarsely wrinkled  
**Rugulose** With very fine wrinkles  
**Stellate** Star-like  
**Stipitate** With a short stalk  
**Sulcus** A groove or furrow  
**Velutinous** Having fine straight hairs  
**Villous** Having long silky hairs

#### ACKNOWLEDGEMENTS

Permission to visit Macquarie Island, granted by the Macquarie Island Advisory Committee, and logistic support from the Antarctic Division, Australian Department of Science, for visits in 1983 and 1984 are gratefully acknowledged.

Dr Patricia Selkirk (Macquarie University) and Geof Copson (Tasmanian National Parks and Wildlife Service) helped with plant identification and collected many plant specimens in fruit for the atlas. Ms Karen Wilson (National Herbarium of New South Wales, Royal Botanic Gardens, Sydney) identified certain specimens. Dr Tony Orchard (Director, Tasmanian Herbarium, Department of Botany, University of Tasmania) allowed access to Macquarie Island herbarium material. Thanks are due to Dr Patricia Selkirk and Dr Bob Selkirk for constructive comments on the manuscript.

Photographs were taken by Mr Ron Oldfield and printed by Ms Jenny Norman.

#### References

- BERGGREN, G., 1969. — *Atlas of seeds and small fruits of North West European plant species with morphological descriptions*. Part II *Cyperaceae*. Stockholm: Swedish Natural Science Research Council.  
 BERGSTROM, D. M., 1985. — The Holocene vegetation history of Green Gorge, Macquarie Island. North Ryde: Macquarie University, M.Sc. thesis, unpubl.  
 CAMPBELL, E. O., HEINE, J. C., and PULLAR, W. A., 1973. — Identification of plant fragments and pollen from peat deposits in Rangitaiki Plains and Maketu Basins. *N.Z. J. Botany*, 11: 317-310.  
 COPSON, G. R., 1984. — An annotated atlas of the vascular flora of Macquarie Island. *Australian national Antarctic research Expeditions, Research Notes*, 18: 1-70.  
 CORNER, E. J. H., — 1976. — *The Seeds of Dicotyledons*. First edition, 2 vols. Cambridge, London, New York: Cambridge University Press.  
 EDGAR, E., 1975. — Australasian *Luzula*. *N.Z. J. Botany*, 13: 781-802.  
 GREATREX, P. A., 1983. — Interpretation of macrofossil assemblages from surface sampling of macroscopic plant remains in mire communities. *J. Ecology*, 71: 773-791.  
 GREENE, S. W., and WALTON, D. W., 1975. — An annotated checklist of the sub-antarctic and antarctic vascular flora. *Polar Record*, 17(110): 473-484.  
 GRIFFIN, K. O., 1977. — Paleoecological aspects of the Red Lake Peatland, Northern Minnesota. *Canadian J. Botany* 55(2): 172-192.



- HUCKERBY, E., and OLDFIELD, F., 1976. — The Quaternary vegetation history of the French Pays Basque. II. Plant macrofossils and additional pollen analytical data. *New Phytologist* 77: 499-526.
- MONTGOMERY, F. H., 1977. — *Seeds and fruits of plants of Eastern Canada and North-Eastern United States*. Toronto and Buffalo: University of Toronto Press.
- OYANA, M., and TAKEHARA, H., 1967. — Revised standard soil color charts.
- RAVEN, P. H., and RAVEN, T. E., 1976. — The genus *Epilobium* (Onagraceae) in Australasia: a systematic and evolutionary study. Christchurch: New Zealand Department of Scientific and Industrial Research Bulletin 216.
- SELKIRK, D. R., SELKIRK, P. M., and GRIFFIN, K., 1983. — Palynological evidence for Holocene environmental change and uplift on Wireless Hill, Macquarie Island. *Proc. Linn. Soc. N.S.W.* 107: 1-17.
- SELKIRK, P. M., SELKIRK, D. R., and BERGSTROM, D. M., 1984. — Holocene vegetation history of Macquarie Island. *Tasmanian Naturalist* 78: 21-23.
- SEPPELT, R. D., COPSON, G. R., and BROWN, M. J., 1984. — Vascular flora and vegetation of Macquarie Island. *Tasmanian Naturalist* 78: 7-12.
- SYSTEMATICS ASSOCIATION COMMITTEE FOR DESCRIPTIVE BIOLOGICAL TERMINOLOGY, 1962. — II. Terminology of simple symmetrical plane shapes (Chart 1). *Taxon*, 11(5): 145-156.
- TAYLOR, B. W., 1955. — The flora, vegetation and soils of Macquarie Island. Australian National Antarctic Research Expeditions, Reports, series B, vol. 2, Botany. Publication No. 19. 192 pp.
- WILSON, K. L., 1981. — A synopsis of the genus *Scirpus sens. lat.* (Cyperaceae) in Australia. *Telopea* 2(2): 153-172.





Bergstrom, Dana M. 1986. "An atlas of seeds and fruits from Macquarie Island." *Proceedings of the Linnean Society of New South Wales* 109, 69–90.

**View This Item Online:** <https://www.biodiversitylibrary.org/item/109166>

**Permalink:** <https://www.biodiversitylibrary.org/partpdf/287850>

**Holding Institution**

MBLWHOI Library

**Sponsored by**

Boston Library Consortium Member Libraries

**Copyright & Reuse**

Copyright Status: In copyright. Digitized with the permission of the rights holder.

License: <http://creativecommons.org/licenses/by-nc-sa/3.0/>

Rights: <https://biodiversitylibrary.org/permissions>

This document was created from content at the **Biodiversity Heritage Library**, the world's largest open access digital library for biodiversity literature and archives. Visit BHL at <https://www.biodiversitylibrary.org>.