ANDREAEACEAE

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Andreaeaceae Dumort., *Ann. Fam. Pl.* 68 (1829).

Type: *Andreaea* Hedw.

Autoicous or dioicous. Plants perennial, acrocarpous, forming dark-pigmented (often black) cushions or turfs on acidic rock. Protonemata persistent and regenerate, complex, including a globose phase and ±terete rhizomatous axes bearing uniseriate or biseriate rhizoids and dorsiventral protonematal appendages. Stems lacking a central strand. Mucilage structures axillary. Juvenile leaves strongly differentiated, persistent. Mature leaves mostly concave abaxially, variable in shape and stance; costate leaves usually tapering from an abruptly formed shoulder of the sheathing base; ecostate leaves often ±panduriform due to a ±strongly contracted sinus separating blade from base; margin entire or not. Laminal cells variable, usually heterogeneous, distally often strongly collenchymatous, often papillose, usually unistratose, proximally often with thick pitted vertical walls.

Perigonia gemmiform. Perichaetia usually strongly differentiated, with inner bracts convolute. Pseudopodium present. Calyptra apical, consisting largely of an unmodified archegonial neck with a delicate mitrate base, often falling early. Setae undeveloped. Capsules 3 emergent to exserted, elliptic or ovate, dehiscing by 4 or more dark-pigmented valves that reach neither apex nor base of capsule and which bulge outward, contracting and opening the capsule when dry. Spores small to large, often with a large percentage aborted and shrivelled.

This monotypic family comprises 50–75 species that are most common in cool-temperate regions; it is represented in Australia by 15 species. *Andreaea* species are often common, usually forming cushions that are black or blends of black and other dark hues (purple, brown, bronze, green or orange); growing on acidic rocks at high elevations in south-eastern Australia. The genus is most diverse in Tasmania.

Andreaea species with sheathing and convolute perichaetial bracts are traditionally placed in sect. *Nerviae* Cardot if they are costate and in sect. *Andreaea* if they are ecostate. This division is not tenable since some of the costate species appear to be more closely related to certain ecostate species than they are to each other (Murray, 1987). However, pending a revision of the entire family, it is premature to present a revised infrageneric classification of the Australian species.

In Australia, the taxonomically isolated *A. australis* (sect. *Chasmocalyx* Lindb. ex Braithw.) and *A. nitida* (placed in the monotypic sect. *Nitida* by Schultze-Motel, 1970) have not been troublesome and, for the most part, *A. subulata* and *A. alpina* have also been treated appropriately. Vitt (1980) clarified the taxonomy of *A. mutabilis* and suggested that *A. rupestris* Hedw. is not present in the Southern Hemisphere.

Many species are poorly known, and the 11 remaining taxa treated here have previously either not been recognised or have been misunderstood. As a result, in Australia, there has been no frame on which to build an understanding of the genus, and most literature pertinent to Australia has an almost entirely different context from that of the present treatment. Six species treated here are new to Australia: *A. flabellata*, *A. flexuosa*, *A. gainii*, *A. heinemannii*, *A. huttonii* and *A.* sp. Two others, *A. amblyophylla* and *A. microvaginata*, have not been recognised in Australia, or elsewhere, for over 80 years. On the other hand, *A. alpina*, *A. acuminata* and *A. acutifolia* have been accepted but almost completely misunderstood. Confusion in Australia and elsewhere has been caused by ignoring a stable and reliable

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Cite as: B.M.Murray, *Australian Mosses Online. 55. Andreaeaceae.*
http://www.anbg.gov.au/abrs/Mosses_online/Andreaeaceae.pdf (2012)

character, spore size, and by relying on leaf characters that vary within species, e.g. the degree of crenation or toothing of basal margins, cell shape and wall thickenings.

Measurements, except for those of stem length, are from material on slides mounted in Hoyer's solution. Descriptions apply to Australian material and, therefore, shoot length, leaf size, leaf papillosity and spore size may not reflect the full range of variation found elsewhere. Leaves refer to mature leaves that are not directly adjacent to juvenile or apical leaves. For leaves the term 'distal' refers to the region well above the shoulder or sinus, 'mid-leaf' refers to the vicinity of the sinus or shoulder, i.e. the area of transition from base to blade, and 'proximal' refers to the leaf base which is usually differentiated. Information on world distribution is based on specimens examined.

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ANDREAEA

Andreaea Hedw., *Sp. Musc. Frond.* 47 (1801); named for J.G.R.Andreae, an 18th century German apothecary.

Type: *A. rupestris* Hedw.

Description as for the family.

1 Leaves costate 2

1: Leaves lacking a costa 6

2 Costa rarely extending much distal to mid-leaf; leaves broadly oval to oblong ..... **13. A. nitida**

2: Costa reaching or almost reaching leaf apex; leaves lanceolate or blade tapering from shoulder of oblong base 3

3 Leaves lanceolate; costa well defined and not filling blade; perichaetial bracts not convolute, not or slightly sheathing *(2:)* ..... **5. A. australis**

3: Leaves tapering from oblong base; costa often indistinct and filling much of blade; perichaetial bracts distinctly convolute and sheathing 4

4 Margins of leaf base at least partly crenate to toothed from projecting ends of cells *(3:)* ..... **11. A. microvaginata**

4: Margins of leaf base entire (rarely with a hint of crenation) 5

5 Marginal cells in leaf base mostly isodiametric; base of capsule shorter than valves; costa mostly conspicuous in leaf base *(4:)* ..... **14. A. subulata**

5: Marginal cells in leaf base mostly rectangular; base of capsule equal to or longer than valves; costa often weak or disappearing in leaf base ..... **9. A. heinemannii**

6 Margins of leaf base at least partly crenate to toothed from projecting ends of cells *(1:)* 7

6: Margins of leaf base entire 11

7 Turgid spores mostly more than 35 µm diam. *(6)*.....8

7: Turgid spores mostly less than 30 µm diam. 10

8 Leaves mostly 3–4 times as long as wide; leaf blade often falcate and secund; leaf apex unistratose; perigonial paraphyses absent *(7)* ..... **2. A. acutifolia**

8: Leaves less than 3 times as long as wide; leaf blade straight, not or rarely secund; leaf apex locally bistratose distally; perigonial paraphyses present 9

9 Proximal marginal cells oblique and crenate or toothed almost to insertion (occasionally the 1 or 2 most proximal marginal cells entire and erect); ±abrupt triangular area always present at apex, occupying a quarter or more the length of the leaf; distal laminal cells smooth or bulging *(8:)*..... **3. A. alpina**

9: Proximal marginal cells oblique and crenate or toothed mostly only near sinus, 4–16 most proximal cells entire and erect; ±abrupt triangular area, when present at apex, occupying less than one-fifth of the length of leaf; distal laminal cells usually indistinctly papillose ..... **8. A. gainii**

10 Leaves ±panduriform, 2–3 times as long as wide; sinus strongly contracted; base distinctly sheathing *(7:)* . .....**1. A. acuminata**

10: Leaves linear- to oblong-lanceolate, (4–) 5–6 (–7) times as long as wide; sinus not or barely contracted; base only slightly sheathing..... **6. A. flabellata**

11 Marginal cells in leaf base all isodiametric; leaf base not sheathing; sinus absent *(6:)* ... **12. A. mutabilis**

11: At least some marginal cells in leaf base rectangular; leaf base sheathing (very indistinctly in *A. flexuosa* and *A. flabellata*); sinus well defined.....12

12 Leaf apex not cucullate (sometimes rounded) *(11:)*.....13

12: Leaf apex (in at least some leaves) clearly cucullate 14

13 Leaf apex narrowly acute or acuminate, not rounded; margin incurved (blade appearing channelled to extreme apex); distal laminal cells locally (sometimes indistinctly) papillose, unistratose *(12)* .... **6. A. flabellata**

13: Leaf apex acute, often rounded; margin plane at and near apex; distal laminal cells smooth or bulging, often locally bistratose ..... **7. A. flexuosa**

14 Leaf lamina with distinct often extensive bistratose patches; capsule base as long as valves; perigonial paraphyses present *(12:)* ..... **14. Andreaea sp.**

14: Leaf lamina unistratose, very rarely with a minute (1 cell wide and long) bistratose layer; capsule base shorter than valves; perigonial paraphyses absent.....15

15 Turgid spores mostly 44–50 µm diam.; leaves widest proximal and distal to sinus *(14:)*..... .....**4. A. amblyophylla**

15: Turgid spores mostly 16–29 µm diam.; leaves widest in base.....**10. A. huttonii**

1. Andreaea acuminata Mitt., *in* J.D.Hooker, *Fl. Tasman.* 2: 161, t. 171, fig. 2 (1859)

Andreaea acutifolia Hook.f. & Wilson subsp. *acuminata* (Mitt.) Vitt, *New Zealand J. Bot.* 18: 374 (1980). T: [Cheshunt], Tas., date unknown, *Archer s.n.*; holo: NY-Mitten; iso: BM-Hooker, HO 72251, 74076, 113025.

Andreaea erubescens Müll.Hal., *Hedwigia* 37: 79 (1898). T: Mt Wellington, Tas., Jan. 1889, *W.A.Weymouth s.n.*; lecto: H-BR ex Herb. C.Müller, *fide* B.M.Murray, *Fl. Australia* 51: 406 (2006).

Andreaea erubescens Müll.Hal. var. *nigrita* Müll.Hal., *Hedwigia* 37: 79 (1898). T: Mt Wellington, Tas., Jan. 1889, *W.A.Weymouth s.n.*; lecto: H-BR ex Herb. C.Müller, *fide* B.M.Murray, *Fl. Australia* 51: 407 (2006).

Stems 10–20 mm long. Leaves ±panduriform, 0.25–0.40 mm wide, equally wide in base and mid-leaf, 2–3 times as long as wide; blade rarely falcate, usually not secund, not flexuose; apex mostly slightly reflexed, narrowly acute or acuminate, not rounded, often with a ±abrupt terminal triangular area occupying a quarter (rarely more) of the length of the leaf; sinus strongly contracted; margin incurved, usually proximally crenate or toothed; base distinctly sheathing; costa absent; laminal cells heterogeneous, distally papillose and unistratose, proximally marginally mostly rectangular, often mostly oblique.

Perigonial paraphyses absent. Perichaetial bracts convolute and sheathing. Capsule base shorter than valves. Turgid spores 16–25 µm diam.; shrivelled spores (14–) 16–21 µm diam.

Occurs in Tas.; also in New Zealand and apparently an Australasian endemic. Found primarily in rocky alpine summits at altitudes of 975–1561 m; grows on rock.

Tas.: Ironstone Mtn, Dec. 1912, *L.Rodway s.n.* (HO); Mt Field, Dec. 1910, *L.Rodway s.n.* (HO); Mt Wellington, *W.W.Watts 261* (NSW, S); *loc. id.*, *W.A.Weymouth 261* (BM, HO, NSW); *loc. id.*, *W.A.Weymouth 1632* (NSW).

Andreaea acuminata is a rare plant known only from Tasmania and New Zealand. Reports by Mitten (*Philos. Trans. Roy. Soc. London* 168: 39, 1879) and others from other regions are based on misidentified specimens. Indeed, much of what has been named and reported from Australia as *A. acuminata* (especially crenate-denticulate, falcate-leaved material) is *A. acutifolia*. The two species can be readily distinguished when sporophytes are present; *A. acuminata* has turgid spores of c. 16–25 µm, while *A. acutifolia* has turgid spores that are mostly at least 32–50 µm. In the absence of capsules identification can be uncertain since leaf characters can vary within species. Typical *A. acuminata* has straight, panduriform leaves 2–3 times as long as wide and often widest above or at the sinus; apices are ±abruptly formed, occupy c. a quarter of the length of the leaf, and distal cells are often triangular and wider than long from near the sinus to the apex. *Andreaea acutifolia* often has falcate and secund, indistinctly to obviously panduriform leaves that are clearly broadest near the insertion. The leaves tend to taper distally from the sinus, but when abruptly narrowed that distal portion tends to occupy about a third of the length of the leaf. The leaves of *A. acutifolia* have distal laminal cells that are usually (but not always) longer than wide.

Features that distinguish *A. acuminata* from *A. alpina* are discussed under the latter taxon. Moreover, the slightly reflexed, short leaf apices of *A. acuminata*, especially at the shoot tips, produce a characteristically spiky look that contrasts with *A. alpina* which usually has incurved leaf apices.

2. Andreaea acutifolia Hook.f. & Wilson, *London J. Bot.* 3: 535 (1844)

T: Hermite Is., Cape Horn [Chile], *J.D.Hooker 106B*; lecto: BM-Wilson, *fide* D.H.Vitt, *New Zealand J. Bot.* 18: 370 (1980); isolecto: BM-Hooker, BM-Wilson, NY-Mitten as *Wilson 107b*; Falkland Is., 1839–43, *J.D.Hooker*; syn: BM, FH; Auckland Is., 1839–43, *J.D.Hooker*; syn: *n.v.*; Campbell Is., 1839–43, *J.D.Hooker*; syn: BM, FH, NY.

Andreaea attenuata Müll.Hal., *Hedwigia* 37: 84 (1898); *A. amblyophylla* var. *attenuata* (Müll.Hal.) Rodway, *Pap. & Proc. Roy. Soc. Tasmania* 1913: 151 (1914). T: Mt Wellington, Tas., 1 Sept. 1891, *W.A.Weymouth 764 p.p.*; lecto: H-BR, *fide* B.M.Murray, *Fl. Australia* 51: 407 (2006); isolecto: HO 72278 *p.p.*

Illustration: R.D.Seppelt, *The Moss Flora of Macquarie Island* 47, fig. 18 (2004).

Stems 10–15 mm long. Leaves ±panduriform, 0.2–0.4 mm wide, widest in base or equally wide at base and in mid-leaf, 3–4 times as long as wide; blade often falcate, usually secund, not flexuose; apex often reflexed, narrowly acute or acuminate, not rounded; acumen (when present) ±abrupt, usually occupying one-third or more the length of the leaf); sinus ±strongly contracted; margin incurved, usually proximally crenate or toothed; base distinctly sheathing; costa absent; laminal cells heterogeneous, distally papillose and unistratose, proximally marginally mostly rectangular, often mostly oblique.

Perigonial paraphyses absent. Perichaetial bracts convolute and sheathing. Capsule base shorter than valves. Turgid spores 32–50 (–60) µm diam.; shrivelled spores 20–38 µm diam.

Occurs in Vic. and Tas.; also in New Zealand, Macquarie Is., Auckland Is., Campbell Is. and southern South America. Found in alpine and subalpine heaths, open forest and woodland, on usually moist to wet rocks (granite, siltstone, sandstone) at altitudes of 700–1250 m.

Vic.: Mt William, *I.G.Stone 7633* (MEL). Tas.: L. Dove, *R.D.Seppelt* 5697 (ADT); Mt Mawson, *I.G.Stone 3624* (MEL); Mt Rufus, 11 Dec. 1975, *C.Hone & G.Hone* (CANB); Mt Wellington, *W.A.Weymouth 1630* (BM, H-BR, HO, S).

Among type material no specimens were seen from the Auckland Islands. BM specimens with "Auckland Islands" printed on the label have that locality crossed out. Some type material from the Falkland Islands is *A. flexuosa*.

Most specimens examined were misidentified as *A. acuminata*, *A. rupestris* or *A. mutabilis*. *Andreaea acutifolia* is characterised by its large spores, usually panduriform and basally crenate-margined leaves and long, narrowly acute to acuminate apex. Differentiation from *A. acuminata* and *A. flabellata* is discussed under those species.

Problems remain with regard to *A. flabellata*, the type specimen examined being a rather poor specimen. The lectotype of *A. acutifolia* represents deficient material at an extreme of variation approaching *A. flabellata*. Further study is underway to permit better characterisation and delimitation of these taxa.

3. Andreaea alpina Hedw., *Sp. Musc. Frond.* 49, t. 7, fig. 2p (1801)

T: Britain, Sweden, Bructeri, Germany, *coll. unknown*; syn: *n.v.*

Andreaea montana Mitt., *in* J.D.Hooker, *Fl. Tasman.* 2: 161, t. 171, fig. 1 (1859). T: near Cummings Head, Western Mtns, Tas., *A.C.Archer s.n.*; holo: NY-Mitten; iso: BM-Hooker, HO 74488.

Illustrations: B.M.Murray, *Meddel. Grønland, Biosci.* 23: 14, fig. 6 (1987); B.M.Murray, *J. Bryol.* 15: 58, fig. 15a–k (1988); R.D.Seppelt, *The Moss Flora of Macquarie Island* 49, fig. 19 (2004).

Stems 1–6 (–8) cm long. Leaves panduriform, mostly 0.4–0.5 mm wide, widest in mid-leaf, 2–2.5 times as long as wide; blade straight, usually not secund, sometimes flexuose; apex usually inflexed or plane, acute, not rounded, with a ±abrupt broad terminal triangular area occupying 25–33 (–50)% of the length of the leaf; sinus strongly contracted; margin incurved to plane, proximally crenate or toothed (1 or 2 most proximal cells sometimes entire); base distinctly sheathing; costa absent; laminal cells heterogeneous, distally smooth (or slightly bulging), locally bistratose or unistratose, proximally marginally mostly rectangular, mostly oblique.

Perigonial paraphyses present. Perichaetial bracts convolute and sheathing. Capsule base shorter than valves. Turgid spores 26–58 µm diam.; shrivelled spores 17–48 µm diam.

Occurs in Tas., usually in alpine heaths, tussock grassland and shrubland, also in subalpine shrub communities, on wet cliff faces and flushed rocks at altitudes of 700–1590 m. Widely distributed in the Southern Hemisphere: New Zealand, Macquarie Is., Auckland Is., Kerguelen Is., Gough Is., Marion Is., Tristan da Cunha, South Georgia, Falkland Is. and South America; also in north-western Europe and Greenland.

Tas.: Hartz Mtns, 8 Jan. 1908, *E.J.Mitchell s.n.* (HO); Mt Barrow, *D.H.Norris 33770* (ALTA, CANB, HO, MICH); Mt Laperouse, *A.F.Oldfield s.n.* (BM, HO 74089, S); Falls, Mt Wellington, *R.A.Bastow 339* (FH, HO, MEL); between Naturalist Peak and Mt Field West, 12 Dec. 1952, *J.H.Willis s.n.* (MEL).

Andreaea alpina, along with *A. acuminata* and *A. gainii*, are rare species that are known in Australia only from Tasmania. They can grow in similar habitats and all have leaf base margins that are crenate or toothed; *A. acuminata* and *A. gainii* also tend to have leaves with abruptly formed, triangular apices similar to those of *A. alpina*. Most collections of *A. alpina* have been misidentified as *A. acuminata*, but *A. alpina* differs by its usually stiffer, more symmetrical leaves with a more sharply formed, characteristically incurved, triangular apex. It also has much larger spores, and male plants have numerous paraphyses. *Andreaea alpina* differs from the very rare *A. gainii* by its leaves with basal marginal cells oblique and crenate or toothed almost to the insertion. It also tends to have leaves with basal median cell lumina clearly narrower than the walls and with a more abruptly formed apex.

Until an analysis of the significance of the considerable variability, worldwide, of *A. alpina* is completed, *A. montana* is best treated as a synonym. It differs from *A. alpina s. str.* by its larger range of spore size and leaves that can sometimes be less stiff with longer, more secund apices.

4. Andreaea amblyophylla Müll.Hal. ex Broth., *Oefvers. Förh. Finska Vetensk.-Soc.* 37: 149 (1895)

T: Knocklofty, N of Salvator Rosa Glen, near Hobart, Tas., 19 Aug. 1893, *W.A.Weymouth 1618*: lecto: H-BR, *fide* B.M.Murray, *Fl. Australia* 51: 407 (2006); isolecto: BM, NSW 211189, NSW M11165, NY; Blue Mtns, N.S.W., *T.Whitelegge 302*; syn: H-BR, MEL, NSW; Knocklofty, near Hobart, Tas., *W.A.Weymouth 262*; syn: BM, H-BR, HO; *loc. id., W.A.Weymouth 475*; syn: BM, CANB, H-BR, HO; *loc. id., W.A.Weymouth 476*; syn: H-BR, HO; *loc. id., W.A.Weymouth 477*; syn: CANB, H-BR, HO; *loc. id., W.A.Weymouth 1618(a)*; syn: H-BR; Mt Wellington, Tas., *W.A.Weymouth 1634*; syn: H-BR; *loc. id., W.A.Weymouth 1635*; syn: BM, H-BR, HO; *loc. id., W.A.Weymouth 1643*; syn: H-BR, HO.

Stems 5–10 mm long. Leaves lanceolate or oblong-lanceolate (indistinctly panduriform), 0.2–0.4 mm wide, equally wide in base and mid-leaf, mostly 2.5–3.5 times as long as wide; blade straight, sometimes flexuose; apex usually cucullate, sometimes acute, rounded or not, not abruptly formed; sinus barely contracted; margin incurved, entire; base ±distinctly sheathing; costa absent; laminal cells heterogeneous, distally papillose and unistratose, proximally marginally isodiametric and rectangular, erect.

Perigonial paraphyses absent. Perichaetial bracts convolute and sheathing. Capsule base shorter than valves. Turgid spores 44–50 µm diam.; shrivelled spores c. 32 µm diam.

Occurs in W.A., N.S.W., A.C.T., Vic. and Tas.; also in New Zealand. Found in alpine heaths and scrub and subalpine and lower *Eucalyptus*-dominated grassland, woodland and open to closed forest; on rocks (granite, dolerite, rhyolite and sandstone) at altitudes of 305–1600 m.

W.A.: track to Toolbrunup Peak [40 km SW of Borden], *H.Streimann 54520* (CANB). N.S.W.: Point Lookout, *I.G.Stone* 14076 (MEL). A.C.T.: Mt Clear, *H.Streimann 10590* (CANB). Vic.: Mt William, *B.M.Murray 93-9* (ALA). Tas.: Hartz Mtns, *W.A.Weymouth 2297* (BM, CANB, HO, NY).

Among ecostate taxa, this is second only to *A. mutabilis* in terms of number of specimens seen and the breadth of habitat range. The record from W.A. is the first for the genus from that State.

Large spores separate *A. amblyophylla* from other species with cucullate leaf apices, e.g. *Andreaea* sp. and *A. huttonii*. Some specimens have many leaves that are not cucullate, and this, together with its primarily isodiametric proximal leaf cells, can cause confusion with *A. mutabilis*. However, close examination always shows some rectangular proximal cells, usually some cucullate apices and, of course, large spores in *A. amblyophylla*. Ongoing research indicates that *A. amblyophylla* may occur outside Australasia.

5. Andreaea australis Mitt., *Hooker's J. Bot. Kew Gard. Misc.* 8: 257 (1856)

T: Munyang Mtns, Vic., *F.Mueller 23*; syn: MEL; syn: FH, K, NSW, NY, UPS *n.v.*, *fide* W.Schultze-Motel, *Willdenowia* 6: 90 (1970); *F.Mueller 85*; syn: MEL; Australian Alps, Vic., *F.Mueller 16*; syn: MEL.

Illustrations: W.Schultze-Motel, *Willdenowia* 6: 43–45, figs 3–5 (1970).

Stems 1–12 cm long. Leaves lanceolate, 0.4–1.5 mm wide, widest in base, 2–3 times as long as wide; blade usually slightly curved, usually not secund, often somewhat flexuose; apex variably flexed, acute, rounded or not, sometimes mucronate; sinus absent; margin usually partially reflexed or revolute, entire; base not distinctly sheathing; costa conspicuous from leaf apex to base, not filling blade; laminal cells ±homogeneous, distally smooth or papillose and unistratose or rarely locally bistratose, proximally marginally isodiametric, not oblique.

Perigonial paraphyses usually absent. Perichaetial bracts not convolute, not or slightly sheathing. Capsule base shorter than valves. Turgid spores 28–30 (–36) µm diam.; shrivelled spores 20–24 µm diam.

Occurs in N.S.W., A.C.T., Vic., Tas.; also in New Zealand, Macquarie Is., Auckland Is. and South Georgia. Found in alpine and subalpine grassland, heath and herbfield and in stunted *Eucalyptus* woodland at altitudes of 1160–2180 m; on wet or shaded rock surfaces, very rarely on the ground.

N.S.W.: Blue L. [7 km NE of Mt Kosciuszko], *H.Streimann 9597* (ALTA, CANB, CHR, FH, HO); Mt Kelly, *H.Streimann 49150* (CANB). A.C.T.: Sentry Box, *J.A.Curnow, H.Lepp & M.Brenan 582* (CANB, FH). Vic.: "Ruined Castle", 16.5 km SSE of Mt Beauty, *I.G.Stone 2146* (MEL). Tas.: Whymper Crag, *A.V.Ratkowsky H753* (CANB, HO).

Like *A. nitida*, *A. australis* is a taxonomically isolated species. Locally common in suitable habitats in mainland Australia but rare in Tasmania, it is readily distinguished by its lanceolate leaves and the long costa that is strongly delineated and not filling the blade.

6. **Andreaea flabellata** Müll.Hal., *Bot. Jahrb. Syst.* 5: 76 (1883)

T: Kerguelen Is., Dec. 1874, *F.C.Naumann*; iso: BM.

Illustration: R.D.Seppelt, *The Moss Flora of Macquarie Island* 51, fig. 20 (2004).

Stems 5–10 (–15) mm long. Leaves linear- to oblong-lanceolate, 0.20–0.25 mm wide, widest in base, (4–) 5–6 (–7) times as long as wide; blade usually straight, usually not secund, flexuose; apex variably flexed, narrowly acute or acuminate, not rounded, not abruptly formed; sinus not or barely contracted; margin incurved, proximally entire or rarely crenate; base not or slightly sheathing; costa absent; laminal cells heterogeneous, distally papillose (sometimes inconspicuously or irregularly so) and unistratose, proximally marginally mostly rectangular, if oblique usually indistinctly so.

Perigonial paraphyses absent. Perichaetial bracts convolute and sheathing. Capsule base shorter than valves. Turgid spores 21–35 µm diam.; shrivelled spores 15–24 µm diam.

Occurs in N.S.W., A.C.T., Vic., Tas.; also in Macquarie Is., Campbell Is., New Zealand, Kerguelen Is., Heard Is., Tristan da Cunha and southern South America. Grows in alpine and subalpine heath and *Eucalyptus*-dominated grassland, on cliffs and rocks (granite and dolerite) at 900–1875 m.

N.S.W.: Charlotte Pass, *B.M.Murray 92-186* (ALA). A.C.T.: Mt Gingera, *H.Streimann 3492* (CANB, NY). Vic.: The Peak, near Wulgulmerang, Wombargo Ra., 4 Dec. 1962, *J.H.Willis s.n.* (MEL). Tas.: Mt Wellington, Nov. 1947, *N.A.Burges s.n.* (LIV); *loc. id.*, *B.M.Murray 93-31* (ALA).

Andreaea flabellata is rare and is reported here for the first time from Australia, specimens having been previously misidentified as *A. rupestris*, *A. mutabilis* or *A. acutifolia*. This taxon differs from *A. acutifolia* by having leaves that are usually entire, narrow and 4–7 times as long as wide, with a weakly or non-contracted sinus and a very inconspicuously sheathing leaf base. *Andreaea flabellata* also has smaller spores, usually less than 30 µm diam. It can be distinguished from *A. flexuosa* by leaves that are at least partly papillose, concave or channelled abaxially to near the apex, and narrowly acuminate and less twisted toward the apex.

7. **Andreaea flexuosa** R.Br.bis, *Trans. Proc. New Zealand. Inst.* 25: 279, pl. 23 (1893)

T: Moa Creek, New Zealand, June 1885, *R.Brown*; lecto: BM-Dixon, *fide* B.M.Murray, *Fl. Australia* 51: 407 (2006); Arthur's Pass, New Zealand, June 1884, *R.Brown*; syn: *n.v.*

Stems 2.5–5.0 (–9.0) mm long. Leaves linear-lanceolate, 0.20–0.25 mm wide, widest in base, 5–8 times as long as wide; blade straight, strikingly flexuose-twisted (especially when moist); apex plane (sometimes broken off), acute, often rounded, not abruptly formed; sinus not or barely contracted; margin distally plane, proximally incurved, entire; base not distinctly sheathing; costa absent; laminal cells heterogeneous, distally bulging or smooth and unistratose or locally bistratose, proximally marginally mostly rectangular, erect.

Perigonial paraphyses absent. Perichaetial bracts convolute and sheathing. Capsule base shorter than or equal to valves. Turgid spores 22–32 µm diam.; shrivelled spores 18–22 µm diam.

Occurs in N.S.W., A.C.T., Vic. and Tas.; also in New Zealand, New Guinea, Madagascar, southern Africa, Gough Is., Tristan da Cunha, Falkland Is., southern South America, Hawai'i and Madeira. Found in alpine and subalpine heath, grassland, shrubland and herbfield, more rarely in open forest; on exposed, or more rarely shaded cliff faces and boulders (basalt, granite and dolerite) at altitudes of 900–1790 m.

N.S.W.: Rocky Plains Ck, [23 km NW of Adaminaby], *H.Streimann 45311* (CANB). A.C.T.: Mt Aggie [38 km SW of Canberra], *B.M.Murray 92-179* (ALA). Vic.: Mt William, *I.G.Stone 26035* (MEL). Tas.: Mt Wellington, *W.W.Watts 169* (H-BR, NSW).

It is surprising that *A. flexuosa* has not been recognised in Australasia since its description more than a century ago, because it is unvarying, distinctive, widespread and locally common. Specimens examined were misidentified as *A. rupestris*, *A. acutifolia* or *A. mutabilis*. However, *A. flexuosa* is characterised by its growth form (characteristically very low, scarcely branched stems forming velvety black turfs) and the combination of narrow, scarcely sheathing, epapillose leaves with plane, ribbon-like, flexuose-twisted leaf blades and rather broad, often rounded (but not cucullate) apices. Features that distinguish *A. flexuosa* from *A. flabellata* are discussed under the latter species. Some specimens of *A. flexuosa* have very thick, locally bistratose distal blades.

While *A. flexuosa*, *A. acutifolia* and *A. flabellata* are all widespread in the Southern Hemisphere, past misidentifications and inadequate study preclude a thorough understanding of their distribution.

8. Andreaea gainii Cardot, *Compt. Rend. Hebd. Séances Acad. Sci.* 153: 602 (1911)

T: Cap Tuxen, Terre de Graham [Graham Land], Antarctica, 8 Jan. 1909, *Gain 209*; iso: BM, H-BR, NY, S.

Illustration: R.D.Seppelt, *The Moss Flora of Macquarie Island* 53, fig. 21 (2004).

Stems 7–15 mm long. Leaves panduriform, 0.25–0.40 mm wide, widest in mid-leaf or equally wide in base and mid-leaf, to twice as long as wide; blade straight, not flexuose; apex inflexed, broadly acute, not rounded, a ±abrupt broad triangular area, when present, rarely occupying more than 20% of the length of leaf; sinus strongly contracted; margin incurved to plane, proximally mostly entire, crenate or toothed only near sinus; base distinctly sheathing; costa absent; laminal cells heterogeneous; distally usually inconspicuously papillose and unistratose or locally bistratose, proximally marginally mostly rectangular; 4–16 most proximal cells not oblique, those near sinus often oblique.

Perigonial paraphyses present. Perichaetial bracts convolute and sheathing. Capsule base shorter than valves. Turgid spores 32–50 (–60) µm diam.; shrivelled spores 22–32 (–50) µm diam.

Occurs in Tas.; also in Macquarie Is., Marion Is., Prince Edward Is., Bouvet Is., South Georgia, South Orkney Is., South Shetland Is., South Sandwich Is., Antarctica and southern South America. Collected at elevations of 850–1225 m from mountain summit and tall heath communities and from submerged rock at a lake margin.

Tas.: Hartz Mtns, *B.M.Murray 93-65* (ALA); Mt Wellington, Nov. 1910, *L.Rodway s.n.* (HO).

Andreaea gainii is reported here for the first time from Australia; it is extremely rare, being found at only two localities and associated with *A. subulata* at both. Differences between it and *A. alpina* are discussed under that species. Further study of the *A. alpina* complex, including *A. gainii* and closely related taxa found outside Australia, is necessary.

9. Andreaea heinemannii Hampe & Müll.Hal., *Bot. Zeitung (Berlin)* 4: 324, t. 2, figs 1–18 (1846), as *heinemanni*

T: Grimsel, Switzerland, 8 Sept. 1844, *Heinemann*; holo: BM-Hampe; iso: BM.

Illustration: B.M.Murray, *Meddel. Grønland, Biosci.* 23: 12, fig. 5 (1987).

Stems rarely more than 2.5 mm long. Leaves with blade tapering from an oblong base, 0.3–0.4 mm wide, widest in base, 3–7 times as long as wide; blade straight to falcate, sometimes secund, often slightly flexuose; apex variably flexed, narrowly acute or acuminate, not rounded, not abruptly formed; sinus absent; margin plane, entire; base distinctly sheathing; costa present, conspicuous from leaf apex to base or weak in base, filling distal half of blade or more; laminal cells heterogeneous, distally smooth or bulging, bistratose (at margin usually unistratose), proximally marginally rectangular to isodiametric, not oblique.

Perigonial paraphyses very rare. Perichaetial bracts convolute and sheathing. Capsule base equal to or longer than valves. Turgid spores 23–32 (–36) µm diam.; shrivelled spores 22–27µm diam.

Occurs in N.S.W. and Vic.; also in New Zealand and Kerguelen Is., but primarily a Northern Hemisphere species in southern Europe, Caucasus, Macaronesia, Greenland, western North America. Grows on exposed basalt in subalpine heath at altitudes of 1660–1750 m.

N.S.W.: Round Mtn [28 km NE of Khancoban], *H.Streimann & J.A.Curnow 35166* (CANB). Vic.: Alpine Rd, 34 km WNW of Omeo, *B.M.Murray 92-208* (ALA); Basalt Hill, between heads of Middle Ck and Rocky Valley, *J.H.Willis 40* (LIV, MEL, WELT); "Ruined Castle", 16.5 km SSE of Mt Beauty, *I.G.Stone 2155* (MEL); Weeping Rock, 4.2 km E of Hotham on Omeo–Hotham road, *I.G.Stone 2288* (MEL).

Andreaea heinemannii does not appear to be closely related to other Australian species. It was only recently recognised as occurring outside southern Europe (B.M.Murray, *Meddel. Grønland, Biosci.* 23: 6–24, 1987) and is new to Australia and the Southern Hemisphere. Its distribution is limited, but it can be locally abundant in its primary habitat (exposed basalt at high elevations). The association with basalt also occurs outside Australia. Collections have been misidentified as *A. subulata* from which *A. heinemannii* is easily distinguished by its specialised habitat, very short, black turfs and leaves with longer blades and mostly rectangular cells at the proximal margins. The capsules stand out against the black leaves, and have pale bases as long as or longer than the valves.

10. Andreaea huttonii R.Br.bis, *Trans. & Proc. New Zealand Inst.* 25: 279, t. 23 *p.p.* (1893), as *huttoni*

T: Moa Ck, New Zealand, June 1885, *R.Brown*; lecto: BM-Dixon, *fide* B.M.Murray, *Fl. Australia* 51: 408 (2006); isolecto: BM-Dixon, BM ex Cardot, CHR 335634 transferred to CANB, H-BR.

Stems 5–12 mm long. Leaves linear-lanceolate, 0.2–0.4 mm wide, widest in base, 3–5 times as long as wide; blade straight, not flexuose; apex cucullate, broadly acute, rounded, not abruptly formed; sinus barely contracted; margin incurved, entire; base ±distinctly sheathing; costa absent; laminal cells heterogeneous, distally papillose and unistratose, proximally marginally mostly rectangular, erect.

Perigonial paraphyses absent. Perichaetial bracts convolute and sheathing. Capsule base shorter than valves. Turgid spores 16–29 µm diam.; shrivelled spores 13–18 µm diam.

One collection is known from an unspecified habitat in Tas.; also in New Zealand where it occurs in alpine heath and subalpine heath grassland, scrub and *Nothofagus* rainforest communities, usually on exposed rock (granite and greywacke) at 680–1150 m.

Tas.: Cradle Mtn, Dec. 1916, *L.Rodway s.n.* (HO).

This moss is known from a single collection made over 90 years ago. It is striking because of its cucullate leaf apices and, therefore, it has possibly been confused with *A. amblyophylla* and *Andreaea* sp. *Andreaea huttonii* has much smaller spores and glossier leaves, attributable to smaller, less dense papillae than in *A. amblyophylla*. It differs from *A.* sp. by its unistratose leaves and exposed habitat. Here treated as an Australasian endemic, it appears to be related to *A. laxifolia* Hook.f. & Wilson from southern South America.

11. Andreaea microvaginata Müll.Hal., *Hedwigia* 37: 80 (1898)

T: Kelly's Ra., Westland, South Is., New Zealand, 10 May 1889, *T.W.N.Beckett s.n.*; lecto: H-BR ex Herb. C.Müller, *fide* B.M.Murray, *Fl. Australia* 51: 408 (2006); isolecto: S.

Andreaea tasmanica Rodway, *Pap. & Proc. Roy. Soc. Tasmania* 1915: 95 (1916). T: Cradle Mtn, Tas., Dec. 1915, *L.Rodway s.n.*; lecto: HO 74062, *fide* B.M.Murray, *Fl. Australia* 51: 408 (2006); isolecto: HO 522113.

Stems (5–) 10–20 mm long. Leaves with blade tapering from an oblong base, 0.2–0.3 mm wide, widest in base or equally in base and mid-leaf, 3–4 times as long as wide; blade usually falcate, secund, often flexuose; apex variably flexed, acute, not rounded, not abruptly formed; sinus barely contracted; margin plane to incurved, proximally crenate or toothed; base distinctly sheathing; costa ±conspicuous from leaf apex to base or weak in base, ±filling distal quarter of blade; laminal cells heterogeneous, distally usually smooth and mainly bistratose, proximally marginally rectangular to isodiametric, mostly oblique.

Perigonial paraphyses present. Perichaetial bracts convolute and sheathing. Capsule base shorter than valves. Turgid spores 20–35 µm diam.; shrivelled spores c. 18 µm diam.

Occurs in N.S.W., A.C.T., Vic. and Tas.; also in New Zealand, and apparently an Australasian endemic. Most common in alpine heaths, shrubland and grassland, also in wet subalpine and sclerophyll forest, on shaded to exposed, wet to moist, or occasionally dry, acidic rock surfaces and rocky or peaty soil, at altitudes of 750–1820 m.

N.S.W.: Cambewarra Mtn, above Baldys, *W.W.Watts 9959* (H, NSW). A.C.T.: Mt Kelly, *H.Streimann 49128* [*Musci Australas. Exsicc.* 167] (CANB). Vic.: "Ruined Castle", 16.5 km SSE of Mt Beauty, *I.G.Stone 7952* (MEL). Tas.: Arve Falls, *D.H.Norris 29778* (ALTA, CANB, HO, MICH, MO); Land of Little Sticks, *M.G.Noble 28571* (CANB, HO).

Andreaea microvaginata is a distinctive and rather common costate species (notwithstanding the original descriptions by Müller and Rodway as being ecostate). However, it has been overlooked in Australia since the early 1900s. Its leaves, with crenate-denticulate proximal margins, an often indistinct costa, falcate and secund stance and its robust cushion habit are no doubt responsible for misidentifications as the ecostate *A. acutifolia* and, more rarely, *A. acuminata*, both of which sometimes form mixed colonies with it. Its proximal leaf margins with projecting cell ends forming crenations and teeth and the development of a sinus relate *A. microvaginata* to ecostate taxa in Australia with similar features, viz. *A. acuminata*, *A. acutifolia*, *A. alpina*, *A. gainii* and possibly *A. flabellata*.

12. **Andreaea mutabilis** Hook.f. & Wilson, *London J. Bot.* 3: 536 (1844)

T: Auckland Is., *J.D.Hooker*; lecto: BM-Wilson, *fide* D.H.Vitt, *New Zealand J. Bot.* 18: 370 (1980); isolecto: BM, FH; Campbell Is., *J.D.Hooker*; syn: BM, FH.

Andreaea asperula Mitt., *J. Proc. Linn. Soc., Bot.* 4: 65 (1860). T: Australian Alps, 1855, *F.Mueller 14 p.p.*; holo: NY-Mitten; iso: BM-Hooker, MEL 1033454, NY? (probable isotype, but *in sched.* as *A. mulleri* and lacking number), UPS; *synon. nov.*

Andreaea julicaulis Müll.Hal., *Hedwigia* 37: 79 (1898). T: Mt Wellington, Tas., 1 Sept. 1891, *W.A.Weymouth 263 p.p.*; lecto: H-BR, *fide* B.M.Murray, *Fl. Australia* 51: 408 (2006); *synon. nov*.

Andreaea tenera Müll.Hal., *Hedwigia* 37: 84 (1898). T: Nellies Glen, Katoomba, Blue Mtns, N.S.W., 5 Oct. 1891, *T.Whitelegge 430*; lecto: H-BR, *fide* B.M.Murray, *Fl. Australia* 51: 409 (2006); isolecto: NSW M11168, S; *synon. nov*.

Andreaea amblyophylla var. *bullata* Rodway, *Pap. & Proc. Roy. Soc. Tasmania* 1913: 151 (1914). T: Mt Wellington, Tas., Dec. 1913, *L.Rodway s.n.*; lecto: HO 72280 *p.p., fide* B.M.Murray, *Fl. Australia* 51: 409 (2006); *synon. nov*.

Illustrations: D.H.Vitt, *New Zealand J. Bot.* 18: 373, figs 17–22 (1980); B.M.Murray, *J. Bryol*. 15: 66, fig. 19a–k (1988); R.D.Seppelt, *The Moss Flora of Macquarie Island* 55, fig. 22 (2004).

Stems (2–) 6–9 (–30) mm long. Leaves lanceolate, c. 0.35 mm wide, widest in base, 2–3 times as long as wide; blade straight to falcate, secund or not, not flexuose; apex incurved (plane only at extreme apex), narrowly acute or acuminate, not rounded, not abruptly formed; sinus absent; margin incurved (plane only at extreme apex), entire (rarely appearing slightly crenate proximally from projecting papillae); base not distinctly sheathing; costa absent; laminal cells heterogeneous, distally papillose and usually unistratose, proximally marginally isodiametric, erect.

Perigonial paraphyses usually absent. Perichaetial bracts convolute and sheathing. Capsule base shorter than valves. Turgid spores 12–24 (–32) µm diam.; shrivelled spores rare, 12–20 µm diam.

Occurs in Qld, N.S.W., A.C.T., Vic. and Tas.; also in New Zealand, Macquarie Is., Auckland Is., Campbell Is., New Guinea, Indonesia, Taiwan, Kerguelen Is., southern Africa, Tristan da Cunha, Falkland Is., South America, north-western North America, Faeroes and western Europe. Found in alpine and subalpine heath, grassland, shrubland, woodland and forest, often *Eucalyptus*-dominated; on wet to dry outcrops and boulders (granite, granodiorite, basalt, sandstone and shale) at altitudes of 150–2150 m.

Qld: South Bald Rock, *I.G.Stone 13509* (MEL). N.S.W.: Big Badja Mtn, *H.Streimann 5575* (ALTA, BM, CANB, CHR, H, L, NY). A.C.T.: Mt Bimberi, *H.Streimann 4397* (CANB, H, L, NY). Vic.: Double-headed Mtn, Black Ra., *A.C.Beauglehole 9380* (MEL). Tas.: Molly Yorks Night Cap, *A.Moscal 19017* (HO).

Andreaea mutabilis is the most common *Andreaea* species in Australia and the only one known from Queensland. It is unmistakable due to its ecostate leaves that diverge from the insertion (lacking a sheathing base and sinus development), have isodiametric, proximal marginal cells, an apex that is never cucullate and small spores. Leaf size and stance in *A. mutabilis* vary from very small and straight to long, falcate and secund. *Andreaea amblyophylla*, which can have leaves with most, but never all, proximal marginal cells isodiametric, differs from *A. mutabilis* by having straight leaves with a sheathing base, a developed sinus, apices usually cucullate (at least in some leaves) and large spores.

13. **Andreaea nitida** Hook.f. & Wilson, *London J. Bot.* 3: 535 (1844)

T: Auckland Is., 1839–43, *J.D.Hooker 52*; lecto: BM-Wilson, *fide* B.M.Murray, *Fl. Australia* 51: 409 (2006); isolecto: BM, FH; isolecto: BR, E *n.v.*, *fide* W.Schultze-Motel, *Willdenowia* 6: 90 (1970).

Illustrations: W.Schultze-Motel, *op. cit.* 90, fig. 10; 91, fig. 11; R.E.Magill, *Flora of Southern Africa. Bryophyta. Part 1: Mosses: Fascicle 1 Sphagnaceae–Grimmiaceae* 34, fig. 6, 13–21 (1981); R.D.Seppelt, *The Moss Flora of Macquarie Island* 57, fig. 23 (2004).

Stems 15–20 (–30) mm long. Leaves oblong, obovate, orbicular or lingulate, 0.7–2.0 mm wide, widest in mid-leaf or equally wide in base and mid-leaf, 1.5–2 times as long as wide; blade usually straight, rarely secund, not flexuose; apex variably flexed, broadly acute or obtuse, rounded or not, sometimes mucronate; sinus absent; margin usually partially broadly reflexed, entire; base distinctly sheathing; costa present, conspicuous only from mid-leaf to base; laminal cells ±homogeneous, distally smooth or bulging, unistratose, proximally marginally isodiametric, not oblique.

Perigonial paraphyses present. Perichaetial bracts not convolute, sheathing. Capsule base shorter than valves. Turgid spores 30–35 (–45) µm diam.; shrivelled spores 25–30 (–32) µm diam.

Occurs in N.S.W., A.C.T., Vic. and Tas.; also in New Zealand, Macquarie Is., Campbell Is., Auckland Is., Tristan da Cunha, South Georgia, New Guinea, southern Africa and western South America. Found in forested and subalpine landscapes, on moist to dripping, often deeply shaded outcrops and rocks (basalt, granite, rhyolite) at altitudes of 1050–2100 m.

N.S.W.: Seamans Hut, [2 km ENE of Mt Kosciuszko], *H.Streimann 7674* (CANB, MO). A.C.T.: Mt Kelly, *H.Streimann 49128 p.p.* (CANB). Vic.: Mt Buffalo, *I.G.Stone 1146* (MEL); Mt Buller, along the S escarpment of "Baldy", *J.H.Willis 125* (WELT). Tas.: head of Meander R., *L.Rodway 2523* (HO, NSW).

An isolated taxon in the genus, *A. nitida* is rare and easily recognised by its large, usually oblong to ovate, occasionally almost orbicular, sometimes mucronate leaves and its weak, often fan-shaped and spurred costa that ends before or little distal to mid-leaf.

14. **Andreaea subulata** Harv., *in* W.J.Hooker, *Icon. Pl.* 3: 201 (1840)

T: "the Port", near Table Mtn, Cape of Good Hope, South Africa, 21 Mar. 1837, *W.H.Harvey*; BM, FH, NY, E *n.v.*, *fide* W.Schultze-Motel, *Willdenowia* 6: 78 (1970).

Andreaea subulata Harv. var. ß *rigida* Hook.f. & Wilson, *London J. Bot.* 3: 536 (1844). T: Hermite Is., Cape Horn [Chile], 1839–43, *J.D.Hooker*; syn: BM, FH, NY; Falkland Is., 1839–43, *J.D.Hooker*; syn: BM, FH, NY.

Andreaea pseudosubulata Müll.Hal., *Bot. Zeitung (Berlin)* 22: 373 (1864). T: Hermite Is., Cape Horn, [Chile], 1839–43, *J.D.Hooker*; *n.v.*; synonymy *fide* W.Schultze-Motel, *Willdenowia* 6: 77 (1970).

Andreaea subulatissima Müll.Hal., *Hedwigia* 37: 82 (1898). T: Recherche Bay, Tas., date unknown, *A.F.Oldfield s.n.*; BM, H, HO 74133, S.

Illustrations: R.E.Magill, *Flora of Southern Africa. Bryophyta. Part 1: Mosses: Fascicle 1 Sphagnaceae–Grimmiaceae* 34, fig. 6 (1981); R.D.Seppelt, *The Moss Flora of Macquarie Island* 59, fig. 24 (2004).

Stems 5–20 mm long. Leaves with blade tapering from an oblong base, 0.3–0.4 mm wide, widest in base, 3–5 times as long as wide; blade straight to falcate, secund or not, usually not flexuose; apex variably flexed, narrowly acute or acuminate, not rounded, not abruptly formed; sinus absent; margin incurved, entire; base distinctly sheathing; costa conspicuous from leaf apex to base, filling distal half of blade (or more); laminal cells ±homogeneous,

distally smooth and bistratose or locally bistratose, proximally marginally mostly isodiametric, not oblique.

Perigonial paraphyses present. Perichaetial bracts convolute and sheathing. Capsule base shorter than valves. Turgid spores 29–42 µm diam.; shrivelled spores 20–38 µm diam.

Occurs in N.S.W., Vic., Tas.; also in Macquarie Is., Auckland Is., Campbell Is., Falkland Is., Borneo, Madagascar, central and southern Africa and South America. Mainly found in forest and woodland dominated by *Eucalyptus* and *Nothofagus*, also grassland with heathy patches, often at the edge of watercourses; grows on rock (granite, sandstone and siltstone) at 300–1840 m.

N.S.W.: Tinderry Peak [12 km E of Michelago], *H.Streimann 5197* (CANB); Weeping Rocks, *H.Streimann 47732* (CANB). Vic.: Mt Ellery, 29 Dec. 1951, *J.H.Willis s.n.* (MEL). Tas.: L. Perry, *W.A.Weymouth 2295* (CANB, HO, NY); Falls, Mt Wellington, *R.A.Bastow 338* (HO, MEL, NSW).

Andreaea subulata is one of the most widely distributed members of the genus, with a range similar to that of *A. amblyophylla*. Like the latter, it often occurs at lower elevations than other species (except *A. mutabilis*). It is characterised, as are *A. heinemannii* and *A. microvaginata*, by leaves with the blade tapering from the shoulder of an oblong base and a costa that reaches the apex and ±fills the blade. It is easily distinguished from *A. heinemannii* by its forest habitat, larger size, mostly isodiametric marginal cells in the leaf base and a capsule with the base shorter than the valves. *Andreaea subulata* and *A. heinemannii* are readily separated from *A. microvaginata* by their entire leaf margins and lack of a sinus.

15. Andreaea sp.

Stems 5–12 mm long. Leaves linear-lanceolate (only slightly panduriform), 0.25–0.30 mm wide, equally wide in base and mid-leaf, 3.5 times as long as wide; blade straight to slightly curved, not secund, not flexuose; apex cucullate or inflexed, broadly acute, rounded, not abruptly formed; sinus barely contracted; margin incurved, entire; base distinctly sheathing; costa absent; laminal cells heterogeneous, distally papillose and locally bistratose (in rather extensive patches and streaks that tend to be near margins proximally), proximally marginally isodiametric and rectangular, erect. Perigonial paraphyses present. Perichaetial bracts convolute and sheathing. Capsule base as long as valves. Turgid spores 18–30 (–37) µm diam.; shrivelled spores 16–30 µm diam.

Known from single localities in A.C.T. and Vic.; occurs in subalpine herbfield and *Eucalyptus* grassland; growing on semi-exposed surfaces of rock outcrops and under rock ledges.

A.C.T.: Mt Gingera, *B.M.Murray 92-176* (ALA), *H.Streimann 3478* (CANB, H, NY). Vic.: Mt Buller, *H.Streimann 50714* (CANB).

The material cited appears to represent a new species, and its habit of growing upside down and well-shaded on the undersurfaces of rock ledges is striking and unusual. That and, especially, its locally bistratose leaves easily differentiate it from other Australian species with cucullate leaf apices (*A. amblyophylla* and *A. huttonii*). It is most closely related to the southern African species *A. bistratosa* Magill and the western South American species *A. peruviana* Broth., both of which have leaves that are more consistently bistratose. Study is underway to assess distinctness of the Australian material as well as unnamed western North American material that may be conspecific.

Doubtful and Excluded Names

Andreaea eximia Müll.Hal., *Hedwigia* 37: 84 (1898)

T: Mt Wellington, Tas., Jan. 1888, *W.A.Weymouth*; H-BR, HO.

Specimens of original material contain several taxa, the two main ones being *A. flexuosa* and *A. mutabilis*. The original description and diagnosis are too general for an unambiguous

assignment of the name to either *A. flexuosa* or *A. mutabilis*. At present *A. eximia* is a candidate for *nomen confusum* status. However, study of pertinent correspondence and handwriting may help to determine if lectotypification is possible.

Andreaea rupestris Hedw., *Sp. Musc. Frond.* 47, t. 7, fig. 2g–o (1801)

T: Sweden, Britain, Bructeri, Saxony: Bielberg Annaemontani(?); lecto: G-Hedw. *n.v.*, *fide* D.H.Vitt, *New Zealand J. Bot.* 18: 368 (1980).

The name *A. rupestris* has been used in Australian literature and in herbaria as a catch-all for ecostate species of *Andreaea*. Vitt (1980) has suggested that *A. rupestris* is not present in the Southern Hemisphere, and this seems likely. Several small or depauperate specimens have characters similar to *A. rupestris*, but they probably represent immature *A. amblyophylla* or some other species. Therefore, at least for the present, *A. rupestris* is excluded from the Australian flora.