ULOTA

Helen P. Ramsay[1]

Ulota D.Mohr, *Ann. Bot.* 2: 540 (1806); from the Greek *oulos* (woolly or curly), in reference to the curled leaves of some species.

Type: *U. crispa* (Hedw.) Brid.

Autoicous, rarely dioicous. Plants in loose short cushions or tufts. Stems ascending to erect, rarely creeping and with upright branches, simple, sparsely branched. Leaves usually flexuose, sometimes twisted-contorted, crisped or little-altered when dry, spreading when moist, linear to linear-lanceolate from an expanded ovate obovate or oblong base, concave, acuminate; apex acute or subacute; margin plane, ±revolute in the middle; costa strong, sunken in a deep channel, prominent abaxially, ending below apex or percurrent; upper laminal cells small, isodiametric to short-rectangular, thick-walled, papillose; basal laminal cells elongate, thick-walled, with a conspicuous border of quadrate to short-rectangular hyaline cells with thickened transverse walls. Gemmae rarely present.

Perichaetial leaves ±differentiated. Calyptra mitrate, deeply lobed at base, pilose with long erect hairs. Setae long, twisted to the right. Capsules on main stem or branches, exserted, subcylindrical to oblong-ovoid, rarely urceolate, usually deeply 8-ribbed when dry, the base ±tapering to form a neck; stomata superficial, usually restricted to neck, rarely on rim; operculum conico-rostrate to rostellate; rim hyaline, sometimes yellow or red. Peristome double; prostome present in one species; exostome teeth 8 pairs, sometimes splitting, spreading or recurved when dry, minutely papillose, sometimes trabeculate or perforate; endostome segments 8 or 16, slender to filiform, rarely broad and irregular, shorter than teeth. Spores usually unicellular, isomorphic, globose.

A genus of about 50–60 species. These mosses are primarily epiphytes, common on the bark of trees mainly in temperate climates; rarely on rock. *Ulota* is represented in Australia by five species and two additional varieties; one species and two varieties are endemic. All are present in Tas., and three occur in Vic. mainly at high altitudes. None has been found in tropical, north-eastern Qld, although some species occur in Papua New Guinea (D.H.Vitt, *Acta Bot. Fenn*. 148: 5–25, 1995).

Some species of *Ulota* closely resemble *Orthotrichum* in growth form, peristome structure and capsule shape, while others resemble *Macromitrium* in growth form, cell structure of the vegetative leaves, habitat and leaf set. *Ulota* is distinguished by leaves that are often twisted or crisped when dry, the very thick-walled, papillose, upper laminal cells, the expanded leaf base with a well-differentiated border of a few to many rows of quadrate to rectangular hyaline cells, and the strongly 8-ribbed capsules. The distinctively bordered leaf base separates *Ulota* from other genera in the Orthotrichaceae.

The specimens on which Malta's (1933) revision was based were borrowed from Venturi's herbarium at Trento (TR) and Brotherus' herbarium at Helsinki (H-BR). The latter collections, borrowed by Malta in Riga in the 1920s, were thought to have been destroyed, but these were located and returned to H-BR in 1996. In addition, Australian collections of W.A.Weymouth at HO were examined, among which are a number of isotypes. Although not annotated as such nor apparently examined by Malta, these match both label data and actual specimens in BM and TR.

The identity of the species accepted here is confirmed by the fact that they can be readily separated in mixed populations. Species are difficult to name on leaf characters alone, but

[1] c/- National Herbarium of New South Wales, Royal Botanic Gardens and Domain, Mrs Macquaries Road, Sydney, New South Wales 2000, Australia.

Cite as: H.P.Ramsay, *Australian Mosses Online. 47. Orthotrichaceae: Ulota.*
http://www.anbg.gov.au/abrs/Mosses_online/Orthotrichaceae_Ulota.pdf (2012)

they can be recognised by a combination of leaf and sporophyte attributes. Capsules differ in shape, the presence or absence of a long neck, colour of the rim, location of stomata, and differences in the peristome, especially the endostome. Leaves on sterile shoots should be examined to avoid confusion with perichaetial leaves.

References

Dixon, H.N. (1926, 1929), Studies in the bryology of New Zealand, with special reference to the herbarium of Robert Brown, *Bull. New Zealand Inst.* 3(4): 180 (1926); 3(6): 365–366 (1929).

Jarman, S.J. & Fuhrer, B.A. (1995), *Mosses and Liverworts of Rainforest in south-eastern Australia* 50.

Malta, N. (1933), A survey of Australasian species of *Ulota*, *Acta Horti Bot. Univ. Latv.* 7: 1–24.

Mitten, W. (1860), Descriptions of some new species of Musci from New Zealand…, *J. Proc. Linn. Soc., Bot.* 4: 64–100.

Rodway, L. (1914), *Tasmanian Bryophyta* 113–116.

Sainsbury, G.O.K. (1955), Notes on Tasmanian mosses from Rodway's Herbarium: III, *Pap. & Proc. Roy. Soc. Tasmania* 89: 13–20.

Sainsbury, G.O.K. (1955), A handbook of New Zealand mosses, *Bull. Roy. Soc. New Zealand* 5: 1–490.

Venturi, G. (1893), *Ulota*, *in* V.F.Brotherus, *Oefvers. Finska Förh. Vetensk.-Soc.* 35: 42–44.

Vitt, D.H. (1982), The genera of Orthotrichaceae, *Beih. Nova Hedwigia* 71: 261–268.

Vitt, D.H., Koponen, T. & Norris, D.H. (1993), Bryophyte flora of the Huon Peninsula, Papua New Guinea. LIII. *Ulota* and *Schlotheimia* (Orthotrichaceae, Musci), *Acta Bot. Fenn.* 148: 5–25.

Weymouth, W.A. (1894), Some additions to the moss flora of Tasmania, *Pap. & Proc. Roy. Soc. Tasmania* 1893: 200–210.

1 Plants in tufts; leaves slightly twisted, not crisped when dry; capsules thick, almost pyriform; spores 70–90 µm diam., often multicellular ..... **4. U. membranata**

1: Plants in cushions or tufts, or creeping; leaves twisted or crisped when dry; capsules subcylindrical to oblong-ovoid; spores 20–35 µm diam., unicellular 2

2 Plants usually with creeping stems and erect branches; leaves 1.0–1.8 mm long, scarcely to slightly twisted when dry, upper leaves with projecting apices *(1:)* ..... **5. U. viridis**

2: Plants erect, without creeping stems; leaves at least 2 mm long, twisted or strongly crisped when dry; apices not projecting 3

3 Leaves strongly crisped when dry, usually indented by recurvature of the margins for a short distance immediately above the broad ovate base; capsules 8-ribbed from mouth to base of urn; neck long, tapering, smooth, often twisted with the seta when dry *(2:)* ..... **3. U. lutea**

3: Leaves twisted, rarely crisped when dry, lacking the indentation above the ovate or oblong base; capsules ribbed to base; neck absent or very short 4

4 Leaves with broad ovate bases; basal marginal hyaline border usually 4–6 rows wide; rim of operculum yellow; stomata in middle to upper parts of urn; endostome segments filiform, nodose *(3:)* ..... **1. U. cochleata**

4: Leaves with obovate-oblong bases; basal marginal hyaline border usually 6–12 rows wide; rim of operculum red; stomata in base of urn or neck; endostome segments broad, usually with a median zig-zag line..... **2. U. laticiliata**

1. Ulota cochleata Venturi ex Broth., *Oefvers Förh. Finska Vetensk.-Soc.* 35: 42 (1893)

T: Springs to Falls, Mt Wellington, Tas., 2. Mar. 1891, *W.A.Weymouth 898*; holo: TR; iso: HO.

Ulota membranacea D.H.Ashton & R.F.McCrea, *Victorian Naturalist* 87: 254 (1970), *nom. nud.*

Illustrations: N.Malta, *op. cit.* 2, fig. 1f; S.J.Jarman & B.A.Fuhrer, *op. cit.* 51, fig. 32.

Autoicous. Plants in yellowish brown tufts. Stems erect. Leaves strongly twisted but not crisped when dry, widely spreading and twisted when moist, linear-lanceolate, c. 2 mm long, narrowly acuminate with an acute apex; base expanding to asymmetrical, broadly ovate; costa ending below or in apex; upper laminal cells short-rectangular; mid-laminal cells irregularly rounded and thicker-walled; basal laminal cells very narrow, long, the basal marginal cells in 4–6 rows.

Perichaetial leaves sheathing at base. Setae 2.5–5.0 mm long, yellowish. Capsules oblong-ovoid to subcylindrical, 8-ribbed to base; operculum with a yellow rim; stomata in middle to upper part of urn. Peristome: exostome teeth lanceolate, densely papillose, perforate and trabeculate at apices, splitting, recurved when dry; endostome segments 8, filiform, nodose. Spores unicellular, 27–30 µm diam., finely papillose. Chromosome number not known.

A rare endemic in Vic. and Tas.; found at high altitudes in the canopy of, for example, *Nothofagus* and *Tasmannia*.

Vic.: Healesville, *I.G.Stone 779* (MEL); Cumberland, *I.G.Stone 9230* (MEL). Tas.: L. Lea, 16 May 1992, *S.J.Jarman s.n.* (HO).

Index Muscorum listed *U. cochleata* as a synonym of *U. viridis* and attributed this synonymy to Malta (*op. cit.* 13), a decision followed by Streimann & Curnow (*Catalogue of the Mosses of Australia and its External Territories* 388, 1989) and Streimann & Klazenga (*Catalogue of Australian Mosses* 181, 2002). This is an error, probably based on H.N.Dixon (*Bull. New Zealand Inst.* 3(6): 366, 1929) who examined a specimen (*Weymouth 1524*, named as *U. cochleata*, but not the type and not authenticated by Malta), and suggested that it was similar to *U. anceps* (now in synonymy with *U. viridis*). Dixon was correct in determining that *Weymouth 1524* is *U. viridis* (*U. anceps*). However, *U. cochleata* is a distinct species (Malta, 1933; Scott & Stone, 1976).

Ulota cochleata is difficult to identify on leaf structure alone, although the twisted (but not crisped) leaves, even when moist, are longer above the base than those of other species. The location of the stomata in the middle to upper parts of the urn rather than the base and neck of the capsule, and the filiform, nodose endostome segments are also distinctive.

The oblong-ovoid capsules differ from those of *U. lutea* in the absence of the long neck and the filiform endostome segments. Although the leaves have ovate, concave bases similar to *U. lutea*, they lack indentations above the base, and they also differ in the width of the hyaline borders. Moreover, the upper cells are more rectangular and less thick-walled.

2. Ulota laticiliata Malta, *Acta Horti Bot. Univ. Latv.* 7: 11 (1933)

T: Recherche Bay, Tas., 17 Jan. 1911, *W.A.Weymouth 2487*; lecto: H-BR, *fide* H.P.Ramsay, *Fl. Australia* 51: 411 (2006); isolecto: HO; Mt Wellington, Tas., 6 Mar. 1891, *W.A.Weymouth 227*; syn: H-BR; isosyn: HO.

Illustrations: N.Malta, *op. cit.* 12, fig. 5; G.O.K.Sainsbury, *Bull. Roy. Soc. New Zealand* 5: 221, pl. 35, fig. 3 (1955).

Autoicous. Plants 10–15 mm tall, in yellowish tufts, brown below. Stems erect. Leaves curled, twisted, not strongly crisped when dry, erecto-patent when moist, linear-lanceolate, 1.5–2.0 mm long, gradually widening to an obovate to oblong concave base; apex acuminate; costa ending below apex; upper laminal cells irregularly isodiametric, 8–10 µm wide; basal laminal cells very narrow; marginal cells quadrate, in 6–10 (–12) rows.

Perichaetial leaves longer than vegetative leaves. Setae 3.5–8.0 mm long. Capsules oblong-ovoid, short, 1.0–1.6 mm long, becoming subcylindrical when dry, not or slightly constricted below the mouth, 8-ribbed to base, urceolate when old; urn yellow, reddish at mouth; stomata on base of urn or neck. Peristome spreading, upright, not recurved when dry, slightly

striate above; endostome segments 8, broad, usually with a zig-zag median line, slightly striate. Spores unicellular, 24–34 µm diam., papillose. Chromosome number not known.

Uncommon in Tas., although recent collections have extended its range; also in New Zealand. Epiphytic on trees (e.g. *Nothofagus*) or shrubs (e.g. *Leptospermum*) above 800 m.

Tas.: Netherby Ck, Central Highlands, *A.Moscal 13694* (CANB, HO); Pencil Pine Lodge, 24 Dec. 1986, *A.V.Ratkowsky s.n.* (HO); Liffey R., *A.Moscal 17740* (HO).

Distinguished in the field by leaves that are curled and twisted but not strongly crisped when dry, the short, ovoid to oblong, ribbed capsules with red rims, the peristome teeth spreading and upright but not recurved when dry, and the broad endostome segments usually with a median zig-zag line. It differs from *U. lutea* by having leaves that are gradually, rather than abruptly, narrowed from the base, and a broader hyaline border.

In New Zealand, this species has been synonymised with *U. lutea* (A.J.Fife, *Bryologist* 98: 301–357, 1995).

3. **Ulota lutea** (Hook.f. & Wilson) Mitt., *J. Proc. Linn. Soc., Bot.* 4: 77 (1860)

Orthotrichum luteum Hook.f. & Wilson, *in* J.D.Hooker, *Fl. Tasman.* 1: 184 (1856). T: rivulet behind Cummings Head, Western Mountains, Tas., *W.Archer*; holo: H-BR; iso: HO.

Ulota weymouthii Burchard, *Pap. & Proc. Roy. Soc. Tasmania* 1893: 200 (1894). T: Falls Track, Mt Wellington, Tas., 1891, *W.A.Weymouth 615*; holo: H-BR; iso: HO.

Ulota lutea var. *glaucescens* Venturi ex Watts & Whitel., *Proc. Linn. Soc. New South Wales* 30 (Suppl.): 8 (1906). T: McRobies Gully, near Hobart, Tas., 13 Aug. 1892, *W.A.Weymouth 1532*; holo: TR; iso: HO.

Ulota crocea Watts & Whitel., *Proc. Linn. Soc. New South Wales* 30 (Suppl.): 96 (1906), *nom. nud.*

Autoicous. Plants forming cushions or tufts, 10–25 mm tall, bright green to yellow-green or brown above, brown below. Stems erect. Leaves strongly crisped, twisted and contorted when dry, imbricate, spreading when moist, long, linear-lanceolate, 1.5–2.3 mm long, c. 0.4 mm wide, abruptly widened to a concave, ovate or obovate base; apex short-acuminate; margin entire, recurved just above base, forming an indentation; costa ending just below apex; upper laminal cells irregularly isodiametric, 9–13 µm wide; basal laminal cells long, narrow, 36–60 × 6 µm, with sigmoid lumina, the margins with 2–5 rows of quadrate cells.

Perichaetial leaves broader and more obtuse at base than stem leaves. Setae 3–6 mm long, yellow. Capsules narrowly cylindrical, 1–2 mm long, rarely shorter, 8-ribbed from mouth to base of urn; neck long, smooth, tapering, often twisted with seta when dry; stomata in neck of capsule; rim of operculum not coloured. Peristome with exostome segments transversely barred in upper part of the ventral surface, recurved when dry, pale, papillose; endostome segments 8, rarely with 8 intermediate ones, filiform, smooth, finely papillose, hyaline. Spores unicellular, 22–30 (–34) µm diam., densely papillose. n = 11, *fide* H.P.Ramsay, *J. Hattori Bot. Lab.* 74: 189 (1993).

A southern-temperate species in Vic. and Tas.; widely distributed in New Zealand.

This is the most frequently collected species of *Ulota* in Australia. It is variable in leaf shape and size, and in the form of the capsules and peristome. The usually narrow, hyaline leaf border varies in width and is not always conspicuous. The abruptly recurved margin and indentation just above the widened base is distinct, and specimens are readily identified where this is combined with capsules having long, smooth, tapered necks. The necks often become twisted with the setae, but they are smooth and not ribbed as is the urn of the capsule.

Malta (*op. cit.* 5) based his description on a number of Weymouth collections from H-BR in addition to the type. Duplicates of some of these, *Weymouth 1535*, *1539* (as *U. lutea*) and *Weymouth 615* (as *U. weymouthii*) are present in HO.

A.J.Fife (pers. comm.) has a much broader concept of *Ulota lutea* based on studies of New Zealand material and places *U. laticiliata* into synonymy, a decision not followed here.

Two varieties, in addition to the type variety of *U. lutea*, were listed by Malta (*op. cit.* 5). After studying "very scanty material", he concluded that "*U. lutea* var. *glaucescens*" (Malta, *op. cit.* 8) does not belong to *U. lutea* but is possibly *U. viridis*. However, a good Weymouth

specimen (*1532*) labelled "n. sp." at HO is clearly a slightly glaucous form of *U. lutea* but not distinct enough to be considered a separate variety. A second variety, var. *robusta*, listed as a form by Malta (*op. cit.* 6), is here considered to be distinct from the type variety.

Plants forming medium-sized cushions, 10–15 mm tall, bright green to yellow-green above, brown below; leaves to 1.5–2.0 mm long; setae 3–6 mm long; capsules 1–2 mm long, with long exostome teeth .... **3a.** var. **lutea**

Plants robust, in large tufts, 15–25 mm tall, brown above; leaves 2.0–2.3 mm long; setae to 3 mm long; capsules to 1 mm long, with short exostome teeth .....**3b.** var. **robusta**

3a. Ulota lutea (Hook.f. & Wilson) Mitt. var. **lutea**

Illustrations: N.Malta, *Acta Horti Bot. Univ. Latv*. 7: 2, fig. 1a; 6, fig. 2; 8, fig. 3 (1933); S.J.Jarman & B.A.Fuhrer, *Mosses and Liverworts of Rainforest in Tasmania and South-eastern Australia* 51, fig. 33 (1995).

Plants forming cushions, 10–15 mm tall, bright green to yellow-green above, brown below. Leaves to 2 mm long; hyaline border 2–5 cells wide. Setae 3–6 mm long. Capsules 1–2 mm long, with a long tapering neck. Peristome with a long endostome.

Occurs in Vic and Tas.; also in New Zealand. Epiphytic on branches and twigs in humid forest.

Vic.: Errinundra Flora Reserve, S of Bendoc, *H.Streimann 36619* (CANB). Tas.: Bower Ck, Mt Wellington, *W.A.Weymouth 1535* (HO); Mount Field Natl Park, *J.R.Spence 4595* (NSW); Zig Zag Hill, SW of Mt Sedgwick, West Coast, *A.Moscal 20214* (HO).

3b. Ulota lutea var. **robusta** Dixon ex Malta, *Acta Horti Bot. Univ. Latv.* 7: 6 (1933)

T: L. Belcher, Tas., *L.Rodway*; holo: BM; iso: HO.

Plants in robust brown tufts, 15–25 mm tall. Leaves 2.0–2.3 mm long, with a narrow hyaline basal border 2–5 cells wide above the base. Setae to 3 mm long. Capsules less than 1 mm long, with short exostome teeth.

Endemic to Tas.

Tas.: Hartz Mtns, *L.Rodway s.n.* (HO); L. Belcher, *L.Rodway s.n.* (HO).

This is not just a large form of *Ulota lutea*, but a distinct variety that forms tufts rather than cushions and has a shorter seta, smaller capsules and shorter endostome teeth.

Dixon's notes on the isotype packet in HO state that "I have not seen this species so robust before but I have N.Z. & Tasmanian specimens quite approximating to it. H.N.Dixon 9 Aug. 1921." However, var. *robusta* is a Tasmanian endemic, and it does not occur in New Zealand.

4. Ulota membranata Malta, *Acta Horti Bot. Univ. Latv.* 7: 18 (1933)

T: Comet–Dundas road, West Coast, Tas., 17 Oct. 1893, *W.A.Weymouth 1652* (annotated 'W.A.W. 22'); holo: H-BR; iso: HO, TR.

Illustrations: N.Malta, *op. cit.* 18, fig. 9 (1933); G.O.K.Sainsbury, *op. cit.* pl. 35, fig. 2 (1955).

Autoicous. Plants tufted, 10–15 mm tall, yellow-brown to yellow-green, dark below. Stems erect. Leaves slightly twisted, not crisped when dry, spreading when moist, linear-lanceolate, 1.5–2.0 mm long, gradually narrowing from a concave obovate base; apex acuminate; margin plane, entire; costa ending below or in apex; upper laminal cells isodiametric, 8–10 µm wide, smooth; basal laminal cells yellow, the border 4–6 rows wide. Gemmae not seen.

Perichaetial leaves with a longer base, usually more obtuse than stem leaves. Setae gradually thickened above, 3–4 mm long, yellowish. Capsules subpyriform, 1.0–1.5 mm long, broad, narrowed at the mouth, strongly ribbed, little-altered when dry; stomata in lower part of urn. Peristome with prostome formed by somewhat irregular slightly striated membranes, sometimes reaching as high as the middle of the exostome; exostome teeth yellow, with distinct transverse bars, splitting when old; endostome segments 16, broad, irregular. Spores mostly multicellular, very large, to 70–90 µm diam., smooth, yellowish green. Chromosome number not known.

A rare epiphyte in Tas.; also in New Zealand.

Tas.: Cradle Mtn, Dec. 1915, *L.Rodway* (HO); Adamsons Peak, 2 Mar. 1980, *A.V.Ratkowsky s.n.* (HO).

The isotype in HO has the number *W.A.W. 22* on the inside packet as well as the published number *W.A.W. 1652*; it was originally incorrectly identified as *U. viridis*. An additional isotype, similarly misidentified, was located in TR.

The presence of a prostome, large multicellular spores and subpyriform, strongly ribbed capsules with a narrow mouth are distinguishing features. Pre-germinated spores with several radiating protonemata have been found in mature capsules.

5. Ulota viridis Venturi, *in* V.F.Brotherus, *Oefvers Förh. Finska Vetensk.-Soc.* 35: 43 (1893)

T: near springs, Mt Wellington, Tas., 15 Oct. 1890, *W.A.Weymouth 901*; holo: TR; iso: HO.

Ulota anceps Venturi, *in* V.F.Brotherus, *Oefvers Förh. Finska Vetensk.-Soc.* 35: 42 (1893). T: Springs to Ferntree, Mt Wellington, Tas., 7 Mar. 1891, *W.A.Weymouth 900*; holo: H-BR; iso: HO.

Ulota appressa Mitt. ex Watts & Whitel., *Proc. Linn. Soc. New South Wales* 30 (Suppl.): 96 (1906), *nom. inval.* (in synon.).

Autoicous. Plants spreading, 10–25 mm long, in flat yellowish green or greyish green tufts. Stems usually creeping, with dense erect branches. Leaves appressed and slightly twisted, with projecting apices when dry, linear-lanceolate or lanceolate, 1.0–2.1 mm long, expanding to an ovate or oblong base; apex narrowly acuminate to acute; margin plane or slightly recurved in middle mostly on one side; costa ending below apex; upper laminal cells irregularly isodiametric, 9–11 µm wide; basal laminal cells almost vermicular; basal marginal cells in 1–6 rows.

Perichaetial leaves variable, often with an obtuse apex, usually with a broader somewhat sheathing base. Setae 3.0–3.5 (–5.5) mm long. Capsules oblong or subcylindrical, less than 1.5 mm long, when empty contracted at mouth and finely ribbed to the top of the short neck; stomata in lower part of urn; operculum with a yellow rim. Peristome with exostome teeth recurved when dry, yellow; endostome segments 8, filiform, smooth, hyaline. Spores unicellular, 24–32 µm diam., finely papillose, brown or yellowish. Chromosome number not known for Australia; n = 11 (New Zealand), *fide* H.P.Ramsay, *J. Hattori Bot. Lab.* 74: 188 (1993).

This species is characterised by the usually creeping stems and the small branch leaves with comparatively broad bases, mostly appressed and little-altered when dry.

Malta (*op. cit.* 21–22) examined a number of Weymouth collections, some of which have isotypes in HO with earlier names, e.g. *U. anceps* (*W.A.Weymouth 900*) published simultaneous with *U. viridis*, and *U. appressa* (*W.A.Weymouth 1547*). Although Malta reported *U. anceps* as being a robust form of *U. viridis*, comparison of the types shows them to be very similar in size. No type specimen of *U. anceps* was located at TR.

One noteworthy specimen labelled *Ulota appressa* Mitt. "on wood Guy Fawkes Rivulet, near Hobart, Tasmania, 6/9/1890 *W.A.Weymouth 1547*" (HO) is annotated "BM, = *U. anceps* Venturi n. sp.". This may be part of the specimen named but never published by Mitten. It is not, however, the type specimen of *U. anceps*, described later in 1893. An additional annotation reads "Vent. in litt. 1896" indicating Venturi's opinion that it was a synonym of *Ulota anceps*. H.N.Dixon (*Bull. New Zealand Inst.* 3(6): 366, 1929) examined two New Zealand specimens collected by Bell and annotated by Mitten with the *nomen nudum U. appressa*, but with an incorrect reference to Tasmania.

There are two varieties of *U. viridis* in Australia, var. *viridis* and var. *dixonii*; the latter was previously recognised as a distinct species.

Leaves 1–2 mm long, linear-lanceolate; leaf base ovate with a border of 4–6 rows of hyaline cells; upper leaves appressed and slightly twisted, with projecting apices when dry ..... **5a.** var. **viridis**

Leaves 1.5–2.1 mm long, lanceolate; leaf base oblong with a border of 1–3 rows of hyaline cells; upper leaves appressed but slightly twisted; apices straight, not projecting when dry ..... **5b.** var. **dixonii**

5a. Ulota viridis Venturi var. **viridis**

Illustration: N.Malta, *op. cit.* 21, fig. 11.

Plants tufted to creeping, 10–15 mm long; branches short, 3–5 mm long. Branch leaves linear-lanceolate, 1–2 mm long, with an ovate base and a basal border of 4–6 rows of hyaline cells; upper branch leaves appressed and slightly twisted, with projecting apices when dry. Setae 3–5 mm long. Capsules oblong, with a short tapering neck, finely ribbed when dry. Spores with minute papillae.

Epiphytic in Vic. and Tas. at altitudes above 900 m; widespread in New Zealand.

Vic.: Mt Ellery, Errinundra Natl Park, 29 km SSW of Bendoc, *H.Streimann 47969, 47958* (CANB). Tas.: Springs Track, Mt Wellington, *W.A.Weymouth 537* (HO).

5b. Ulota viridis var. **dixonii** (Malta) H.P.Ramsay, *Fl. Australia* 51: 411 (2006)

Ulota dixonii Malta, *Acta Horti Bot. Univ. Latv.* 7: 19 (1933). T: Hartz Mtns, Tas., 7 Jan. 1908, *W.A.Weymouth s.n.* (annotated "WAW 2299"); holo: H-BR; iso: HO.

Illustration: N.Malta, *op. cit.* 20, fig. 10, as *Ulota dixonii*.

Plants tufted; stems creeping, 20–25 mm long, with erect branches 8–13 mm tall, branching towards apex. Branch leaves appressed, not twisted when dry, lanceolate, 1.5–2.1 mm long, with an oblong base; apices straight, not projecting when dry. Stem leaves 1.5–2.1 mm long; marginal basal cells hyaline, in 1–3 rows. Setae to 5.5 mm long. Capsules subcylindrical, scarcely ribbed when dry. Spores with large papillae.

Endemic to Tas. where it is epiphytic on the limbs of trees.

Tas.: Golden Staircase Track, L. Dobson, Mount Field Natl Park, 7 Dec. 1988, *B.Polly s.n.* (HO).

Included with one of the isotypes is a specimen of *U. lutea* which accounts for the original identification of it as *U. lutea* in the H-BR collection (Malta 1933, p. 20).

This variety is similar to var. *viridis* in the creeping stems, the slightly twisted dry leaves and the yellow-bordered capsule rim. However, it differs in being larger and more robust, paler above, and with larger, lanceolate stem leaves that taper gradually from oblong bases. The border of hyaline cells also narrower (1–3 rows wide; 4–6 rows in var. *viridis*). Malta (1933) considered the spores of *U. dixonii* to be distinctly verrucose compared with the papillose spores of *U. viridis*, this being the principal difference between the two. These should be regarded as varieties of *U. viridis* rather than as separate species.

G.O.K.Sainsbury (*Bull. Roy. Soc. New Zealand* 5: 223, 1955) described *U. novae-seelandiae* Sainsbury from New Zealand with affinities to "*U. dixonii*". The former also has a creeping habit, leaves that are appressed and scarcely twisted when dry, but the hyaline border is broader, the operculum has a red rather than yellow rim, and the spores are smaller. A.J.Fife (pers. comm.; *Bryologist* 98: 331, 1995) synonymised *U. novae-seelandiae* with *U. viridis*.

Excluded Names

Ulota glaucescens Watts & Whitel., *Proc. Linn. Soc. New South Wales* 30 (Suppl.): 96 (1906), *nom. nud.*

Ulota stellulata Hook. & Grev. ex Watts & Whitel., *Proc. Linn. Soc. New South Wales* 30 (Suppl.): 97 (1906), *nom. nud.*

Based on: Mt Ellery [Mt Elliot], Gippsland, Vic., *coll. unknown*; MEL.