



Australasian bryophytes introduced to South Kerry with tree ferns

Woodland gardens in south-western Ireland have the only populations known in Europe of three Australasian bryophytes, each hitherto known from a single locality. **David Holyoak** and **Neil Lockhart** review their records and current status. Both of the mosses *Calomnion complanatum* and *Leptotheca gaudichaudii* are reported from a second locality on Garinish Island, which also has *Dicranoloma menziesii* well established, a moss new to the Northern Hemisphere.

In December 1998, Willem Labeij, a botanist resident in Co. Cork, found two unusual mosses that were established on 'trunks' (erect rhizomes) of *Dicksonia antarctica* Labill. tree ferns at Derreen Garden near Lauragh in South Kerry (v.-c. H1; V7659). Identification of the specimens he collected (DBN, registered as 3: 1999) was confirmed as *Calomnion complanatum* (Hook.f. & Wilson) Lindb. (Calomniaceae) and *Leptotheca gaudichaudii* Schwägr. (Rhizogoniaceae) by Alan Fife in 1999.

During August 2000, A.R. Perry and P.E. Stanley visited Co. Kerry and recorded *C. complanatum* and *L. gaudichaudii* on tree ferns again, presumably at Derreen Gardens although no locality was reported. Their observations form the basis of the published reports of the species in Europe (Fox *et al.*, 2001; Holyoak, 2003; Smith, 2004; Hill *et al.*, 2006, 2007). DTH visited Derreen Garden on 29 May 2006 and 27 April 2008, finding *L. gaudichaudii* on about six old *Dicksonia* 'trunks' along the eastern part of King's Oozy (Fig. 1), mainly at 0.5–1.5 m above the ground, with several strong patches up to 40 cm long. Despite searching almost every large *Dicksonia* on both visits, no trace was

△ Fig. 1. *Leptotheca gaudichaudii* on *Dicksonia* 'trunk' at Derreen Garden. David Holyoak



found of *C. complanatum* which is feared extinct.

Numerous small patches of *Daltonia* were found nearby on vertical bark of the north-east side of the trunk of a large *Eucalyptus* tree, about 1.5–4 m above the ground. Microscopic study of the specimen (DTH 06-81, DBN) revealed the presence of foliar gemmae. Similar gemmae are known in the antipodean *Daltonia angustifolia* Dozy et Molk. var. *gemmaephylla* M.Fleisch., but that taxon is now synonymized with *D. splachnoides* (Streimann, 2000). Foliar gemmae have not been reported in the literature for European *D. splachnoides* (Sm.) Hook. & Taylor, but N.G. Hodgetts (pers. comm.) found them on a specimen he collected on the Isle of Skye in 2004 (BBSUK). Hence it seems likely that 'native' *D. splachnoides* is established on the *Eucalyptus* at Derreen Gardens rather than another Australasian adventive.

In July 1999, D.G. Long collected the leafy liverwort *Heteroscyphus fissistipus* (Hook.f. &

△ Fig. 2 (top). *Heteroscyphus fissistipus* with capsules at Garinish Island. David Holyoak

△ Fig. 3 (middle). *Leptotheca gaudichaudii* with pale green shoots and a few young capsules, growing amongst scattered shoots of *Dicranoloma menziesii* (note subulate leaves with broken-off leaf tips) on *Dicksonia* 'trunk' at Garinish Island. David Holyoak

◁ Fig. 4 (bottom). *Calomnion complanatum* (centre) growing with gemmiferous and non-gemmiferous shoots of *Leptotheca gaudichaudii* on *Dicksonia* 'trunk' at Garinish Island. David Holyoak



△ Fig. 5. *Dicranoloma menziesii* at Garinish Island. David Holyoak

Taylor) Schiffn. (Geocalyceaceae) on Garinish Island (v.-c. H1; V6963) (Blackstock & Long, 2002). A visit to Garinish Island on 28 April 2008 by DTH revealed that *H. fissistipus* was plentiful over large areas in and around the extensive woodland garden, growing on acidic peaty soil, thin soil over rock and on 'trunks' of *Dicksonia* up to about 1.5 m above the ground. Blackstock & Long (2002) deduced that its plants produce sporophytes in spring, and this was confirmed by their extensive occurrence in material seen and collected (e.g. DTH 08-173, DBN) (Fig. 2). New records were obtained for two mosses. *Leptotheca gaudichaudii* var. *gaudichaudii* was plentiful on at least ten *Dicksonia* 'trunks' (e.g. DTH 08-175, DBN), immature capsules being found on one of them (DTH 08-177; Fig. 3), giving the first European record of it bearing sporophytes. *Calomnion complanatum* was also found on at least ten 'trunks' at 0.4–1 m above the ground, locally as pure patches up to 30 cm across. *C. complanatum* sometimes grew mixed with *L. gaudichaudii* (Fig. 4), but it appeared to prefer more shaded places. The Australasian filmy fern *Hymenophyllum flabellatum* Labill. (reported here by Nelson, 1988) also formed strong patches on several 'trunks', one pure patch being about 50 cm long.

An attractive but unfamiliar, large, dicranaceous moss was present in several places on *Dicksonia*

antarctica 'trunks', appearing distinctive because of its bright-green colour, with leaves having a long and very slender subula that is often caducous (Figs 3 & 5). Specimens of this (DTH 08-176, BBSUK, DBN) were later identified as *Dicranoloma menziesii* (Taylor) Renaud, a moss native to New Zealand and Australia that is new to the Northern Hemisphere. Scott & Stone (1976) give a detailed description of the species. The largest population formed much of the horizontal top and steep sides of an old prostrate 'trunk', but smaller plants occurred mixed with *L. gaudichaudii* on other steep 'trunks' up to about 1.5 m above the ground.

Bryophytes at several other large gardens in Co. Kerry (v.-c. H1) with old tree ferns have been studied in recent years, but without any finds of epiphytic Australasian species. Glanleam Garden on Valencia Island (V4077) was visited on 13 May 2006, when a patch of the filmy fern *Hymenophyllum flabellatum* was discovered on a large, shaded, fallen tree trunk, but no other Australasian epiphytes were detected. The garden on Rossdohan Island (V7162) was visited on 29 April 2008 and it initially looked promising because there were many large, old tree ferns and masses of the fern *Phymatosorus diversifolius* (Willd.) Pic. Serm. self-sown as epiphytes on trees close by, but there were no Australasian epiphytic bryophytes. However, some consolation was afforded by *Daltonia splachnoides* and *Sematophyllum substrumulosum*

(Hampe) E. Britton growing intermixed on the same block of sandstone, and *Telaranea europaea* Engel & Merr. on the bases of some tree ferns.

The old tree ferns in these gardens in Co. Kerry are mainly *Dicksonia antarctica* (Fig. 6), which is native in south and east Australia and Tasmania (being replaced in New Zealand by different species; cf. Page & Bennell, 1986), although a few other tree ferns are present (different *Dicksonia* spp.; *Cyathea* spp.). The alien bryophytes and ferns associated with these tree ferns include species that occur in both Australia and New Zealand (*Calomnion complanatum*, *Dicranoloma menziesii*, *Heteroscyphus fisisstipus*, *Hymenophyllum flabellatum* and *Phymatosorus diversifolius*). *Leptotheca gaudichaudii* has a wider range, occurring in New Zealand, eastern Australia, Tasmania, southern Africa and southern South America. Although it is rather

▽ Fig. 6. Old *Dicksonia antarctica* tree ferns with rich epiphytic floras on their 'trunks' in woodland garden at Garinish Island. David Holyoak



misleadingly described as 'a New Zealand species' in Hill *et al.* (2007, note 318), Australia seems the most likely provenance of the Irish plants (see below); the taxon involved corresponds to var. *gaudichaudii* (cf. Gilmore, 2006).

Several fine woodland gardens were developed in Co. Kerry by the end of the 19th century (George & Bowe, 1986). Derreen Garden was largely created by Lord Lansdowne between 1866 and the 1920s, whereas the garden at Garinish Island was developed around 1900 (Browne, 1986; Nelson, 1988). The history of tree ferns in these gardens does not appear to have been documented, but there is a long-standing local tradition that the oldest tree ferns in these and other Co. Kerry gardens arrived directly from Australia in a ship that visited the Kenmare River in the first decade of the 20th century (Seamus Galvin, pers. comm.; Lady Mersey, pers. comm; cf. Nelson, 1988). If correct, this would account for the occurrence of old *Dicksonia antarctica* with similar epiphytic species at Derreen Garden, Garinish Island and perhaps Glanleam.

It is noteworthy that the epiphyte species involved in Co. Kerry are all different to the antipodean bryophyte adventives established in large gardens in the Isles of Scilly (Paton & Holyoak, 2005) and Cornwall (e.g. Rumsey *et al.*, 1993; Rumsey, 2001), even though Rumsey *et al.* (1993) note that the majority of tree ferns entering Britain in the last century came from Australia.

'Self-sown' *Dicksonia antarctica* is increasing in abundance in several of the woodland gardens in Co. Kerry, with some encouragement from those who manage the gardens. Hence the amount of habitat available on *Dicksonia* 'trunks' for epiphytic bryophytes is gradually increasing. However, populations of all of them are relatively small and thoughtless collection of specimens should be avoided. *Calomnion complanatum* is listed as Endangered in Australia (Scott *et al.*, 1997: 100) so that its Irish populations merit protection.

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References

- Blackstock, T.H. & Long, D.G. (2002). *Heteroscyphus fisisstipus* (Hook.f. & Taylor) Schiffn. established in south-west Ireland, new to the Northern Hemisphere. *Journal of Bryology* 24, 147–150.
- Browne, S. (1986). Garinish Island. County Kerry. In *In an Irish Garden*, pp. 30–33. Edited by S. Connolly & H. Dillon. London: Weidenfeld & Nicolson.
- Fox, H., Blockeel, T. & Perry, R. (2001). Summer Field Meeting, Dungarvan and New Ross, Ireland 1999. *Bulletin of the British Bryological Society* 76, 3–10.
- George, M. & Bowe, P. (1986). *The Gardens of Ireland*. London: Hutchinson.
- Gilmore, S.R. (2006). Rhizogoniaceae. In *Flora of Australia 51 (Mosses 1)*, pp. 354–366. Edited by P. McCarthy. Canberra & Melbourne: ABRIS and CSIRO Publishing.
- Hill, M.O., Bell, N., Bruggeman-Nannenga, M.A. & other authors (2006). An annotated checklist of the mosses of Europe and Macaronesia. *Journal of Bryology* 28, 198–267.
- Hill, M.O., Preston, C.D., Bosanquet, S.D.S. & Roy, D.B. (2007). *BRYOATT. Attributes of British and Irish mosses, liverworts and hornworts*. NERC Centre for Ecology and Hydrology & Countryside Council for Wales.
- Holyoak, D.T. (2003). *The Distribution of Bryophytes in Ireland*. Vale of Glamorgan: Broadleaf Books.
- Nelson, E.C. (1988). Some Australasian ferns in Irish gardens. *Kew Magazine* 5, 129–136.
- Page, C.N. & Bennell, E.M. (1986). *Dicksonia* L'Héritier. In *The European Garden Flora*, Vol. 1, p. 37. Edited by S.M. Walters *et al.* Cambridge: Cambridge University Press.
- Paton, J.A. & Holyoak, D.T. (2005). *The Bryophyte Flora of the Isles of Scilly*. Truro: Environmental Records Centre for Cornwall and the Isles of Scilly.
- Rumsey, F.J. (2001). *Achrophyllum dentatum* (Hook.f. & Wils.) Vitt & Crosby (Hookeriaceae) naturalized in Britain. *Journal of Bryology* 23, 341–344.
- Rumsey, F.J., Caine, C.A. & Sheffield, E. (1993). *Trichomanes venosum* R. Br. (Hymenophyllaceae) in a Cornish garden – with a key to the filmy ferns established in Britain and Ireland. *Fern Gazette* 14, 155–160.
- Scott, G.A.M., Entwistle, T.J., May, T.W. & Stevens, G.N. (1997). *A Conservation Overview of Australian Non-marine Lichens, Bryophytes, Algae and Fungi*. Environment Australia.
- Scott, G.A.M. & Stone, I.G. (1976). *The Mosses of Southern Australia*. London, New York & San Francisco: Academic Press.
- Smith, A.J.E. (2004). *The Moss Flora of Britain and Ireland*, 2nd edn. Cambridge: Cambridge University Press.
- Streimann, H. (2000). Taxonomic studies on Australian Hookeriaceae (Musci). 3. The genera *Calypstrochaeta*, *Daltonia*, *Hookeriopsis* and *Sauloma*. *Journal of the Hattori Botanical Laboratory* 88, 101–138.