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Supplementary Material

There's gold in them thar hills! Morphology and molecules delimit species in *Xerochrysum* (Asteraceae; Gnaphalieae) and reveal many new taxa

Timothy L. Collins[A], *Alexander N. Schmidt-Lebuhn*[B,*], *Rose L. Andrew*[A], *Ian R. H. Telford*[A] and *Jeremy J. Bruhl*[A]

[A]School of Environmental and Rural Science, University of New England, Trevenna Road, Armidale, NSW 2351, Australia

[B]CSIRO, Centre for Australian National Biodiversity Research, Clunies Ross Street, Canberra, ACT 2601, Australia

*Correspondence to: Email: alexander.s-l@csiro.au

Table S1. Comprehensive list of gatherings of *Xerochrysum* ordered by entity name.

Entity	Collector number	OTU code	Analysis M	GBS	Latitude	Longitude
X. aff. *palustre*	T.L. Collins 1036			✓	-41.2618	148.1903
X. aff. *palustre*	R.L. Johnstone 2906			✓	-35.9728	150.0563
X. aff. *palustre*	G.P. Phillips 90			✓	-36.7523	149.435
X. alpinum	T.L. Collins 1024			✓	-41.5523	145.8999
X. alpinum	T.L. Collins 1030				-41.6752	145.9596
X. bicolor	T.L. Collins 1016	bic1016	✓		-42.9585	147.3429
X. bicolor	T.L. Collins 1033	bic1033	✓	✓	-40.9443	144.6168
X. bicolor	T.L. Collins 1034	bic1044	✓	✓	-41.2428	144.6875
X. boreale	T.L. Collins 1088	bor1088	✓	✓	-12.7604	130.3535
X. boreale	T.L. Collins 1089	bor1089	✓	✓	-14.1499	129.4968
X. boreale	T.L. Collins 1091	bor1091	✓	✓	-12.6395	135.3684
X. boreale	T.L. Collins 1092	bor1092	✓	✓	-12.6451	135.2051
X. boreale	T.L. Collins 1093	bor1093	✓	✓	-12.5966	136.5165
X. bracteatum sens. lat.	T.L. Collins 1023			✓	-42.1581	145.5613
X. bracteatum sens. lat.	T.L. Collins 1129			✓	-23.1913	150.6641
X. bracteatum sens. lat.	Y.E. Fouracre 1	vis1	✓	✓	-30.2667	150.0333
X. bracteatum sens. lat.	A.S. Lebuhn 1745			✓	-26.6158	149.9872
X. bracteatum sens. str.	T.L. Collins 1005	bra1055	✓	✓	-34.0705	150.5733
X. bracteatum sens. str.	T.L. Collins 1168	bra1168	✓	✓	-34.3033	150.9086
X. bracteatum sens. str.	T.L. Collins 1169	bra1169	✓	✓	-34.3909	150.841
X. bracteatum sens. str.	T.L. Collins 1177	bra1177	✓	✓	-36.2904	150.0354
X. bracteatum sens. str.	T.L. Collins 1181	bra1181	✓	✓	-36.9855	149.8231
X. bracteatum sens. str.	A.J. Dutton 1			✓	-15.9537	-5.660611
X. bracteatum sens. str.	A.J. Dutton 2			✓	-15.9498	-5.681167
X. bracteatum sens. str.	A.J. Dutton 3			✓	-15.9605	-5.709528
X. collierianum	T.L. Collins 1032				-41.6736	145.9581
X. cultivar Dwarf Mixed	T.L. Collins 1182			✓	ANBG	
X. cultivar Purple-Red	T.L. Collins 1183			✓	ANBG	
X. halmaturorum	T.L. Collins 973	hal973	✓	✓	-35.8104	138.1231
X. halmaturorum	T.L. Collins 975	hal975	✓	✓	-35.8325	138.1227
X. halmaturorum	T.L. Collins 981	hal981	✓	✓	-35.6093	138.5627
X. interiore	T.L. Collins 713	int713	✓		-23.7422	133.9123
X. interiore	J.J. Bruhl 3472	int3472	✓	✓	-30.3766	153.1021
X. interiore	TERNNTAFIN0009			✓	-24.1276	133.3914
X. interiore	TERNNTAFIN0014			✓	-24.5304	133.17
X. interiore	TERNNTAFIN0020			✓	-24.6681	133.4022
X. interiore	TERNNTAMAC0001			✓	-23.965	133.3723
X. interiore	TERNNTAMAC0003			✓	-23.9586	133.409
X. macranthum	T.L. Collins 1148	macr1148	✓	✓	-31.1652	116.059
X. macranthum	T.L. Collins 1150	macr1150	✓	✓	-31.8199	116.3189
X. macranthum	T.L. Collins 1153	macr1153	✓	✓	-31.9793	116.552
X. macranthum	T.L. Collins 1164	macr1164	✓	✓	-33.4241	116.3872
X. macranthum	T.L. Collins 1165	macr1165	✓	✓	-32.4209	116.3103
X. milliganii	T.L. Collins 1029			✓	-41.6758	145.9504
X. palustre	T.L. Collins 1019			✓	-42.1811	146.4904
X. palustre	T.L. Collins 1038			✓	-41.8104	147.4234
X. papillosum	T.L. Collins 1018	pap1018	✓	✓	-43.0105	147.9298
X. papillosum	T.L. Collins 1037	pap1037	✓	✓	-41.5723	148.2362
X. sp. Barrington Tops	T.L. Collins 1041	BT1041	✓	✓	-32.0897	151.5908
X. sp. Barrington Tops	T.L. Collins 1043	BT1043	✓	✓	-31.9576	151.4248
X. sp. Barrington Tops	T.L. Collins 1046	BT1046	✓	✓	-31.9627	151.3936

Entity	Collector number	OTU code	Analysis M	GBS	Latitude	Longitude
X. sp. Barrington Tops	T.L. Collins 1047	BT1047	✓	✓	-31.951	151.4349
X. sp. Barrington Tops	T.L. Collins 1048	BT1048	✓	✓	-31.9577	151.4256
X. sp. Blackfellows Gap	J.J. Bruhl 2596			✓	-35.6753	148.8328
X. sp. Cox Peninsula	T.L. Collins 1087	Cox1087	✓	✓	-12.706	130.8572
X. sp. Cox Peninsula	T.L. Collins 1094	Cox1094	✓	✓	-12.7264	130.8181
X. sp. Flinders Ranges	K.H. Brewer 461	Flin461	✓	✓	-30.6864	139.225
X. sp. Flinders Ranges	TERNNSAMDD0021			✓	-33.2004	145.7177
X. sp. Forests	T.L. Collins 1162	macr1162	✓	✓	-35.0016	116.673
X. sp. Fly Point	T.L. Collins 1061	FP1061	✓	✓	-10.7517	142.6065
X. sp. Glencoe	T.L. Collins 1044	Glen1044	✓	✓	-31.9577	151.4256
X. sp. Glencoe	T.L. Collins 1146	Glen1146	✓	✓	-29.8912	151.9151
X. sp. Glencoe	J.R. Hosking 2586	Glen2586	✓		-32.0269	151.4364
X. sp. Glencoe	I.R. Telford 12574	Glen12574	✓		-31.1333	152.2917
X. sp. Glencoe	I.R. Telford 12917	Glen12917	✓		-30.3861	152.3639
X. sp. Glencoe	I.R. Telford 13333	Glen13333	✓		-28.8597	152.1481
X. sp. Limestone	T.L. Collins 1161	macr1161	✓	✓	-35.0478	116.849
X. sp. Lofty Ranges	T.L. Collins 982	Lofty982	✓	✓	-35.4422	138.5841
X. sp. Lofty Ranges	T.L. Collins 985	Lofty985	✓	✓	-33.9696	138.9634
X. sp. Lofty Ranges	T.L. Collins 988	Lofty988	✓	✓	-33.962	138.9557
X. sp. Mt Elliott	T.L. Collins 1070	ME1070	✓	✓	-19.4567	146.94
X. sp. Mt Kaputar	R.L. Palsson 235	Kap235	✓	✓	-30.2761	150.0839
X. sp. Mt Kaputar	R.L. Palsson 238	Kap238	✓	✓	-30.283	150.1779
X. sp. Mt Kaputar	R.L. Palsson 239	Kap239	✓	✓	-30.2867	150.14
X. sp. Mt Merino	R.L. Johnstone 3146			✓	-28.4056	153.1298
X. sp. Mt Merino	I.R. Telford 12886	Mer12886	✓		-28.2533	153.1944
X. sp. Mt Merino	L.M. Copeland 3904	Mer3904	✓		-28.0444	152.3917
X. sp. Mt Merino	I.R. Telford 12115	Mer12115	✓		-28.4083	153.125
X. sp. N Kennedy	T.L. Collins 1051	NK1051	✓	✓	-17.2685	145.4364
X. sp. N Kennedy	T.L. Collins 1058	NK1058	✓	✓	-17.3867	145.3459
X. sp. N Kennedy	T.L. Collins 1063	NK1063	✓	✓	-17.4217	145.3915
X. sp. N Kennedy	T.L. Collins 1067	NK1067	✓	✓	-19.5535	144.1548
X. sp. N Kennedy	I.R. Telford 13489	NK13489	✓	✓	-21.0856	148.4486
X. sp. N Kennedy	J.J. Bruhl 2473	NK2473	✓	✓	-19.0125	146.1194
X. sp. N Kennedy	J.J. Bruhl 2477	NK2477	✓	✓	-19.0656	146.1064
X. sp. N Kennedy	J.J. Bruhl 3218	NK3218	✓	✓	-25.296	149.1705
X. sp. New England	T.L. Collins 969	NE969	✓	✓	-29.8471	152.0156
X. sp. New England	T.L. Collins 1013	NE1013	✓	✓	-30.1198	152.0803
X. sp. New England	J.J. Bruhl 1840	NE1840	✓		-30.5847	151.9128
X. sp. New England	J.J. Bruhl 2649	NE2649	✓	✓	-30.5881	152.1647
X. sp. New England	L.M. Copeland 4059	NE4059	✓		-30.5153	151.9903
X. sp. New England	L.M. Copeland 3731	NE3731	✓		-30.6056	151.8153
X. sp. North Stradbroke Island	T.L. Collins 1104	NS1104	✓	✓	-27.0928	153.4446
X. sp. North Stradbroke Island	T.L. Collins 1105	NS1105	✓	✓	-27.0928	153.4446
X. sp. North Stradbroke Island	T.L. Collins 1113	NS1113	✓	✓	-26.3913	153.1187
X. sp. North Stradbroke Island	T.L. Collins 1123	NS1123	✓	✓	-25.2481	153.2466
X. sp. North Stradbroke Island	T.L. Collins 1128	NS1128	✓	✓	-24.1523	151.8864
X. sp. North Stradbroke Island	T.L. Collins 1131	NS1131	✓	✓	-22.8156	150.8083
X. sp. North Stradbroke Island	T.L. Collins 1167	NS1167	✓	✓	-29.3987	153.371
X. sp. Northern Tablelands	T.L. Collins 1015	NT1015	✓	✓	-31.0522	151.7619
X. sp. Northern Tablelands	T.L. Collins 1039	NT1039	✓	✓	-28.2377	152.4794
X. sp. Northern Tablelands	T.L. Collins 1042	NT1042	✓	✓	-32.0496	151.6253
X. sp. Northern Tablelands	T.L. Collins 1049	NT1049	✓	✓	-30.3828	152.3632

Entity	Collector number	OTU code	Analysis M	Analysis GBS	Latitude	Longitude
X. sp. Northern Tablelands	T.L. Collins 1141	NT1141	✓	✓	-26.8661	151.5875
X. sp. Northern Tablelands	T.L. Collins 1147	NT1147	✓	✓	-29.8912	151.9151
X. sp. Pilbara	T.L. Collins 1073	int1073	✓	✓	-23.2105	119.2026
X. sp. Pilbara	T.L. Collins 1080			✓	-23.2513	119.1398
X. sp. Point Lookout	T.L. Collins 958	PL958	✓	✓	-30.4881	152.4107
X. sp. Point Lookout	J.P. Duley 69	PL69	✓		-30.4875	152.4108
X. sp. Point Lookout	I.R. Telford 12830	PL12830	✓		-30.4917	152.4097
X. sp. Porongurup	T.L. Collins 1157	Por1157	✓	✓	-34.3747	118.2557
X. sp. Porongurup	T.L. Collins 1158	Por1158	✓	✓	-34.3838	118.0489
X. sp. Porongurup	T.L. Collins 1159	Por1159	✓	✓	-34.3856	118.0488
X. sp. Porongurup	T.L. Collins 1160	Por1160	✓	✓	-34.6745	117.8505
X. sp. Walker Point	A.J. Saunders 1	WP1	✓	✓	-15.5708	145.3204
X. subundulatum	T.L. Collins 994			✓	-36.5245	148.2608
X. subundulatum	T.L. Collins 1000			✓	-35.8829	148.6089
X. subundulatum	T.L. Collins 1001			✓	-35.9129	148.5687
X. subundulatum	T.L. Collins 1022			✓	-41.8683	146.5196
X. subundulatum	T.L. Collins 1025			✓	-41.5523	145.8999
X. subundulatum	T.L. Collins 1031			✓	-41.6752	145.9596
X. subundulatum	T.L. Collins 1035			✓	-41.5138	147.6605
X. subundulatum	J.J. Bruhl2595			✓	-35.6747	148.8333
X. subundulatum	TERNVCAAUA0004			✓	-36.9073	147.2907
X. subundulatum	TERNVCAAUA0015			✓	-37.3884	146.7651
X. viscosum	T.L. Collins 991	vis991	✓	✓	-35.2639	149.1105
X. viscosum	T.L. Collins 1007	vis1007	✓	✓	-33.426	150.1045
X. viscosum	T.L. Collins 1008	vis1008	✓	✓	-32.3734	149.7185
X. viscosum	T.L. Collins 1014	vis1014	✓	✓	-31.0522	151.7623
X. viscosum	T.L. Collins 1017	vis1017	✓	✓	-42.9288	147.306
X. viscosum	I.R. Telford 13281			✓	-28.8667	151.8747
X. viscosum	J.R. Hosking 4060	vis4060	✓	✓	-36.2986	146.1706
X. viscosum	J.R. Nevin 164	vis164	✓	✓	-36.6251	143.2406
X. viscosum	C.E. Nano 48	vis48	✓		-29.2772	151.5672
X. viscosum	P.J. Clarke s.n.	visPJC	✓		-29.1833	151.65
X. viscosum	R.L. Johnstone 1336			✓	-29.3408	151.6981

Voucher number, type of analysis, entity, latitude and longitude for all gatherings used in this study. Analyses: M, morphology; GBS, genotyping by sequencing.

Rationale for sample selection in molecular analyses

Xerochrysum bracteatum sens. lat. samples from Nombinnie Nature Reserve (NR) in western New South Wales (*X*. sp. Flinders Range), Chinchilla in south-western Queensland, Narrabri in northern New South Wales, and a putative weedy population near Queenstown Tasmania, were included for comparison with *X. bracteatum sens. strict.* in the Sydney Basin at The Oaks, Mount Keira and Bulli Lookout, and from Gulaga National Park (NP) and Nethercote Falls on the New South Wales south coast. Samples of *X. bracteatum sens. lat.* from Nombinnie Nature Reserve were supplied by TERN, and from Kaputar Road near Narrabri by the N.C.W. Beadle Herbarium (NE). Two *X. bracteatum* cultivars, *X*. 'Dwarf Mixed', and *X*. 'Purple Red' (Nindethana Seed Company, Albany, Australia) were sampled from the Australian National Botanic Gardens, Australian Capital Territory.

Sympatric populations of *X*. sp. Glencoe and *X*. sp. Northern Tablelands near the New South Wales town of Ebor were sampled, close to the only known population of *X*. sp. Point Lookout in New England NP. Sympatric and allopatric populations from Barrington Tops and Gloucester Tops of *X*. sp. Glencoe, *X*. sp. Northern Tablelands, and *X*. sp. Barrington Tops were included to determine species limits and look for evidence of recent gene flow. Further sampling of *X*. sp. Northern Tablelands covered most of this entity's distribution and included the sampling locations of *X*. sp. New England from Styx River, Round Waterhole Creek and Henry River Falls.

The widespread and morphologically variable *X*. sp. North Stradbroke Island was sampled from grassy coastal headlands at Iluka in New South Wales, as well as from Noosa NP, the town of 1770, Byfield National Park (NP) in Queensland, and compared with *Xerochrysum bracteatum sens. lat.* from grassy coastal headlands near Cooktown at Annan River NP, and near the tip of Cape York Peninsula at Fly Point. We sampled *Xerochrysum* plants growing on coastal foredunes and inter-dune swales from both east and west coasts of Moreton Island and Fraser Island. Grassy headlands on Cape Moreton, with similar habitat and geology to those visited on the mainland, were searched but no *Xerochrysum* plants were found.

Samples of *X*. sp. North Kennedy from open forest and woodland on the Atherton Tableland at Baldy Mountain Forest Reserve, Herberton, Eungella NP, Expedition Range NP, Paluma Range and Wondecla, and from savannah woodland south-west of Atherton Tableland at Blackbraes NP, were compared with morphologically similar *X*. sp. Mount Elliott samples from Bowling Green Bay NP, south of Townsville.

Populations of the putative entity *X*. sp. Mount Kaputar, occurring on or near the summits of Mount Kaputar, Lindsay Rock Tops, Coryah Gap and The Governor in the Nandewar Ranges, were included with *X. viscosum* populations from mid and lower slopes. The widespread species *X. viscosum* was also sampled from a putative weedy population in Hobart, Tasmania; endemic populations from Warby-Ovens NP and St Arnaud in Victoria; Black Mountain, Australian Capital Territory; Lithgow, Mudgee, Wellington and Torrington Conservation Reserve in New South Wales; Wallangarra, and Coomba Falls in Queensland.

Xerochrysum interiore was sampled from Owen Springs NP (collected by TERN) and Mereenie Loop Road in the Northern Territory and from a widely disjunct population in the Pilbara region of Western Australia. *Xerochrysum halmaturorum* was sampled from Cape St Albans, Pink Bay and Lesueur Conservation Park (CP) on Kangaroo Island South Australia as well as at Newland Head CP on mainland South Australia, close to a population of *X*. sp. Lofty Ranges at Hindmarsh Falls which was also collected north of Adelaide in the Tothill Ranges. Samples of cultivated plants of *X. bracteatum sens. lat.* (K.H.Brewer 461; *X*. sp. Flinders Range) originating in the Flinders Ranges at Nantawarrinna Indigenous Protected Lands were obtained from the South Australian Seed Conservation Centre.

In Western Australia, *X. macranthum* was sampled from the hills east and south of Perth to compare with populations with yellow phyllaries (*X*. sp. Golden) to the north. Further sampling included broad leaved plants on the summits of the Stirling and Porungurup Ranges (*X*. sp. Porongurup) in the South West of Western Australia, as well as far southern coast (*X*. sp. Limestone) and southern Karri forests (*X*. sp. Forests).

Xerochrysum subundulatum samples were included from populations in Namadgi NP (including one sample with morphology matching *X*. sp. Blackfellows Gap), Kosciusko NP, and Alpine NP (TERN) on the Australian mainland, and Cradle Mountain NP, Ben Lommand NP and Central Plateau Conservation Area in Tasmania. *Xerochrysum palustre* was included from populations in central Tasmania, and *X*. aff. *palustre* from eastern Tasmania, the South East Forests NP and Kanangra-Boyd NP in New South Wales.

Xerochrysum bicolor was included from Alum Cliffs in southern Hobart, and the Arthur-Pieman Conservation Area and a population with white phyllaries near the village of Temma in north-western Tasmania. *Xerochrysum papillosum* was included from two sites on the eastern coast of Tasmania, at Tessellated Pavement State Reserve and St Patrick's Head.

DArTseq genotyping

High quality DNA was extracted from dried leaf samples and digested using at least one methylation-sensitive restriction enzyme (*PstI*) before ligation of sequencing adapters. Hypomethylated restriction sites are associated with low-copy, relatively conserved chromosomal regions closely linked to coding regions, and targeting these regions ensures sequence data is largely depleted of paralog sequences. DArT proprietary analytical pipelines filtered and removed poor quality sequence reads prior to single-nucleotide polymorphism (SNP) calling. Nearly identical sequences were collapsed to correct low quality bases and singleton sites. SNP discovery from filtered sequences was made using a secondary proprietary pipeline. DArT proprietary pipelines have been validated in controlled tests where validity of markers can be rigorously tested. Reproducibility indices using technical replicates ensured consistency of allele calls, with an average read depth of greater than 30 reads per sample per locus. A BLAST search of all loci was used to detect and remove contaminant DNA sequences.

The resultant sequence data partition was read into to a *genlight* object using the *dartR* package *gl.read.dart* function (ver. xxx, xxx; Gruber *et al.* 2018) in *R* (ver. 3.6.1, R Foundation for Statistical Computing, Vienna, Austria) through *RStudio* (ver. 1.0.153, xxx). Loci were filtered using the *dartR* package (Gruber *et al.* 2018). Loci and individuals with low call rate were excluded using the function *gl.filter.callrate* (Gruber *et al.* 2018) removing loci with >20% missing data and samples with >30% missing data. DArTseq metadata allowed filtering on genotyping reproducibility at each locus using the function *gl.filter.repavg* (Gruber *et al.* 2018), with the threshold set to 99%. To exclude the potential influence of linkage sequenced fragments with more than one SNP were thinned retaining the best allele based on the DArT repeatability measure, then by average polymorphic information content, using the function *gl.filter.secondaries* (Gruber *et al.* 2018) to reduce the effects of linkage disequilibrium. Finally, locus metrics were recalculated for the filtered data using the function *gl.recalc.metrics* (Gruber *et al.* 2018). Filtering based on Hardy–Weinberg equilibrium was not conducted, as the samples represented several distinct species.

Table S2. Principal Component Correlation (PCC) of characters and ordination vectors from semi-strong hybrid multidimensional scaling ordination of 16 morphological characters from 97 specimens of *Xerochrysum*.

Number	Character	X	Y	Z	r^2
12	glandular trichome density abaxial cauline leaf midvein (mm^{-1})	0.302	0.953	0.005	0.799
9	glandular trichome density adaxial cauline leaf (0.25 mm^{-2})	0.329	0.866	-0.377	0.76
11	multicellular trichome density adaxial cauline leaf (0.25 mm^{-2})	0.218	0.904	-0.368	0.701
16	phyllary white, or yellow	-0.878	0.436	0.198	0.64
15	idioblast contrasted (darkened), or uncontrasted	0.165	0.299	0.94	0.613
7	multicellular trichomes on cauline leaf margin (mm^{-1})	0.579	0.807	-0.116	0.558
10	multicellular trichome density abaxial cauline leaf (0.25 mm^{-2})	0.344	0.9	-0.269	0.493
14	abaxial glandular trichome apical cell diameter (μm)	-0.302	-0.915	-0.269	0.484
1	length of fruit (mm)	0.446	-0.302	0.843	0.311
2	width of fruit (mm)	0.852	-0.368	0.374	0.307
3	leaf width (mm)	-0.02	0.12	-0.993	0.261
8	glandular trichome density abaxial cauline leaf (0.25 mm^{-2})	0.733	0.199	-0.65	0.259
13	multicellular trichome density abaxial cauline leaf midvein (mm^{-1})	0.631	-0.616	-0.472	0.195
5	mean apical angle of longest phyllaries (degrees)	0.864	-0.447	-0.233	0.162
4	ratio of female floret length to hermaphroditic floret length	-0.649	0.098	0.754	0.059
6	length of cauline leaf mucro (μm)	-0.192	-0.269	0.944	0.056

Characters are sorted by r^2; shaded rows are $r^2 > 0.7$.

Table S3. Northern subset: Principal Component Correlation (PCC) of characters and ordination vectors from semi-strong hybrid multidimensional scaling ordination of 16 morphological characters of *Xerochrysum* naturally occurring in the north of Australia.

Number	Character	X	Y	Z	r^2
9	glandular trichome density adaxial cauline leaf (0.25 mm^{-2})	-0.764	-0.325	-0.557	0.777
8	glandular trichome density abaxial cauline leaf (0.25 mm^{-2})	-0.536	0.838	0.104	0.741
11	multicellular trichome density adaxial cauline leaf (0.25 mm^{-2})	-0.877	-0.452	0.164	0.688
1	length of fruit (mm)	-0.395	0.885	0.245	0.636
12	glandular trichome density abaxial cauline leaf midvein (mm^{-2})	-0.711	0.088	-0.697	0.583
10	multicellular trichome density abaxial cauline leaf (0.25 mm^{-2})	-0.774	0.621	-0.125	0.557
2	width of fruit (mm)	0.003	0.988	-0.152	0.501
15	idioblast contrasted (darkened), or uncontrasted	-0.096	0.991	0.095	0.469
3	mean leaf width (mm)	0.782	-0.027	-0.623	0.446
5	phyllary apical angle (degrees)	0.984	0.023	0.177	0.412
7	multicellular trichomes cauline leaf margin (mm^{-1})	-0.318	-0.077	-0.945	0.404
6	length of cauline leaf mucro (μm)	-0.513	0.842	0.166	0.38
4	ratio of female floret length to hermaphroditic floret length	-0.061	-0.227	0.972	0.319
14	glandular trichome apical cell diameter abaxial cauline leaf (μm)	0.99	0.042	-0.136	0.291
13	multicellular trichome density abaxial cauline leaf midvein mm^{-1}	0.808	0.139	-0.572	0.171

Characters are sorted by r^2; shaded rows are $r^2 > 0.7$.

Table S4. Southern subset: Principal Component Correlation (PCC) of characters and ordination vectors from semi-strong hybrid multidimensional scaling ordination of 16 morphological characters of *Xerochrysum* naturally occurring in the south of Australia.

Number	Character	X	Y	Z	r^2
9	glandular trichome density adaxial cauline leaf (0.25 mm^{-2})	0.462	0.718	-0.52	0.79
7	multicellular trichomes cauline leaf margin (mm^{-1})	-0.588	0.633	-0.504	0.787
10	multicellular trichome density abaxial cauline leaf (0.25 mm^{-2})	-0.043	0.978	0.203	0.785
15	idioblast contrasted (darkened), or uncontrasted	-0.327	0.282	0.902	0.72
2	width of fruit (mm)	-0.946	0.077	-0.314	0.712
14	glandular trichome apical cell diameter abaxial cauline leaf (μm)	-0.582	-0.528	0.618	0.679
12	glandular trichome density abaxial cauline leaf midvein (mm^{-2})	0.15	0.724	-0.674	0.676
1	length of fruit (mm)	-0.947	-0.237	-0.215	0.655
11	multicellular trichome density adaxial cauline leaf (0.25 mm^{-2})	0.218	-0.464	-0.858	0.495
5	phyllary apical angle (degrees)	-0.963	0.015	-0.268	0.374
8	glandular trichome density abaxial cauline leaf (0.25 mm^{-2})	-0.466	0.811	0.355	0.303
3	mean leaf width (mm)	0.707	0.541	0.455	0.253
4	ratio of female floret length to hermaphroditic floret length	-0.099	-0.57	-0.816	0.202
6	length of cauline leaf mucro (μm)	-0.722	-0.582	0.374	0.147
13	multicellular trichome density abaxial cauline leaf midvein mm^{-1}	0.817	-0.569	0.089	0.107

Characters are sorted by r^2; shaded rows are $r^2 > 0.7$.

Table S5. Eastern subset: Principal Component Correlation (PCC) of characters and ordination vectors from semi-strong hybrid multidimensional scaling ordination of 16 morphological characters of *Xerochrysum* naturally occurring in the east of Australia.

Number	Character	X	Y	Z	r^2
9	glandular trichome density adaxial cauline leaf (0.25 mm^{-2})	-0.833	-0.293	0.47	0.886
12	glandular trichome density abaxial cauline leaf midvein (mm^{-2})	-0.613	-0.63	0.478	0.821
11	multicellular trichome density adaxial cauline leaf (0.25 mm^{-2})	-0.877	-0.335	0.344	0.814
10	multicellular trichome density abaxial cauline leaf (0.25 mm^{-2})	-0.355	0.058	0.933	0.721
13	multicellular trichome density abaxial cauline leaf midvein mm^{-1}	0.304	0.841	0.449	0.655
8	glandular trichome density abaxial cauline leaf (0.25 mm^{-2})	-0.646	0.621	0.444	0.654
7	multicellular trichomes cauline leaf margin (mm^{-1})	-0.535	-0.843	0.053	0.634
5	phyllary apical angle (degrees)	-0.377	-0.565	-0.734	0.584
15	idioblast contrasted (darkened), or uncontrasted	0.604	-0.694	0.391	0.57
14	glandular trichome apical cell diameter abaxial cauline leaf (μm)	0	0.512	-0.859	0.378
2	width of fruit (mm)	-0.325	-0.309	-0.894	0.308
6	length of cauline leaf mucro (μm)	-0.491	0.361	-0.793	0.285
16	phyllary white, or yellow	0.253	-0.003	0.968	0.248
1	length of fruit (mm)	-0.556	0.158	-0.816	0.135
4	ratio of female floret length to hermaphroditic floret length	0.745	-0.171	0.645	0.089
3	mean leaf width (mm)	-0.681	0.733	0.009	0.027

Characters are sorted by r^2; shaded rows are $r^2 > 0.7$.

Table S6. Western subset: Principal Component Correlation (PCC) of characters and ordination vectors from semi-strong hybrid multidimensional scaling ordination of 16 morphological characters of *Xerochrysum* naturally occurring in the west of Australia.

Number	Character	X	Y	Z	r^2
9	glandular trichome density adaxial cauline leaf (0.25 mm^{-2})	-0.479	-0.77	-0.421	0.78
15	idioblast contrasted (darkened), or uncontrasted	0.717	0.065	0.694	0.763
5	phyllary apical angle (degrees)	0.745	-0.646	-0.168	0.584
8	glandular trichome density abaxial cauline leaf (0.25 mm^{-2})	-0.26	-0.836	-0.484	0.583
2	width of fruit (mm)	0.813	-0.424	-0.399	0.531
13	multicellular trichome density abaxial cauline leaf midvein mm^{-1}	-0.129	-0.925	-0.357	0.472
11	multicellular trichome density adaxial cauline leaf (0.25 mm^{-2})	-0.523	0.214	-0.825	0.464
7	multicellular trichomes cauline leaf margin (mm^{-1})	-0.334	-0.711	-0.618	0.425
1	length of fruit (mm)	0.91	0.307	0.279	0.385
12	glandular trichome density abaxial cauline leaf midvein (mm^{-2})	-0.937	0.291	-0.193	0.377
14	glandular trichome apical cell diameter abaxial cauline leaf (μm)	0.575	-0.505	0.644	0.363
3	mean leaf width (mm)	0.252	-0.213	-0.944	0.357
6	length of cauline leaf mucro (μm)	-0.165	0.075	0.983	0.35
4	ratio of female floret length to hermaphroditic floret length	-0.565	-0.114	-0.817	0.272
10	multicellular trichome density abaxial cauline leaf (0.25 mm^{-2})	-0.774	-0.63	-0.067	0.187

Characters are sorted by r^2; shaded rows are $r^2 > 0.7$.

Table S7. Principal Component Correlation (PCC) of characters and ordination vectors from semi-strong hybrid multidimensional scaling ordination of 16 morphological characters of *Xerochrysum* naturally occurring in the New England Tableland Bioregion.

Number	Character	X	Y	Z	r^2
8	glandular trichome density on abaxial cauline leaf (0.25 mm^{-2})	0.044	0.85	-0.525	0.875
13	multicellular trichome density on abaxial cauline leaf midvein mm^{-1}	-0.24	0.968	-0.076	0.871
16	phyllary white, or yellow	-0.958	-0.033	-0.285	0.836
11	multicellular trichome density on adaxial cauline leaf (0.25 mm^{-2})	0.099	0.978	-0.182	0.833
7	multicellular trichomes on cauline leaf margin (mm^{-1})	-0.476	0.77	0.426	0.754
9	glandular trichome density on adaxial cauline leaf (0.25 mm^{-2})	0.487	0.2	-0.85	0.734
12	glandular trichome density on abaxial cauline leaf midvein (mm^{-2})	0.243	-0.487	-0.839	0.726
10	multicellular trichome density on abaxial cauline leaf (0.25 mm^{-2})	0.135	0.986	-0.096	0.723
3	mean leaf width (mm)	-0.369	0.275	0.888	0.716
5	phyllary apical angle (degrees)	0.546	0.591	0.593	0.624
2	width of fruit (mm)	-0.129	-0.163	0.978	0.601
14	glandular trichome apical cell diameter on abaxial cauline leaf (μm)	0.58	-0.785	0.219	0.431
1	length of fruit (mm)	-0.56	-0.776	0.292	0.339
15	idioblast contrasted (darkened), or uncontrasted	-0.295	0.133	-0.946	0.335
6	length of cauline leaf mucro (μm)	0.6	-0.314	0.736	0.213
4	ratio of female floret length to hermaphroditic floret length	0.972	0.207	0.113	0.041

Characters are sorted by r^2; shaded rows are $r^2 > 0.7$.

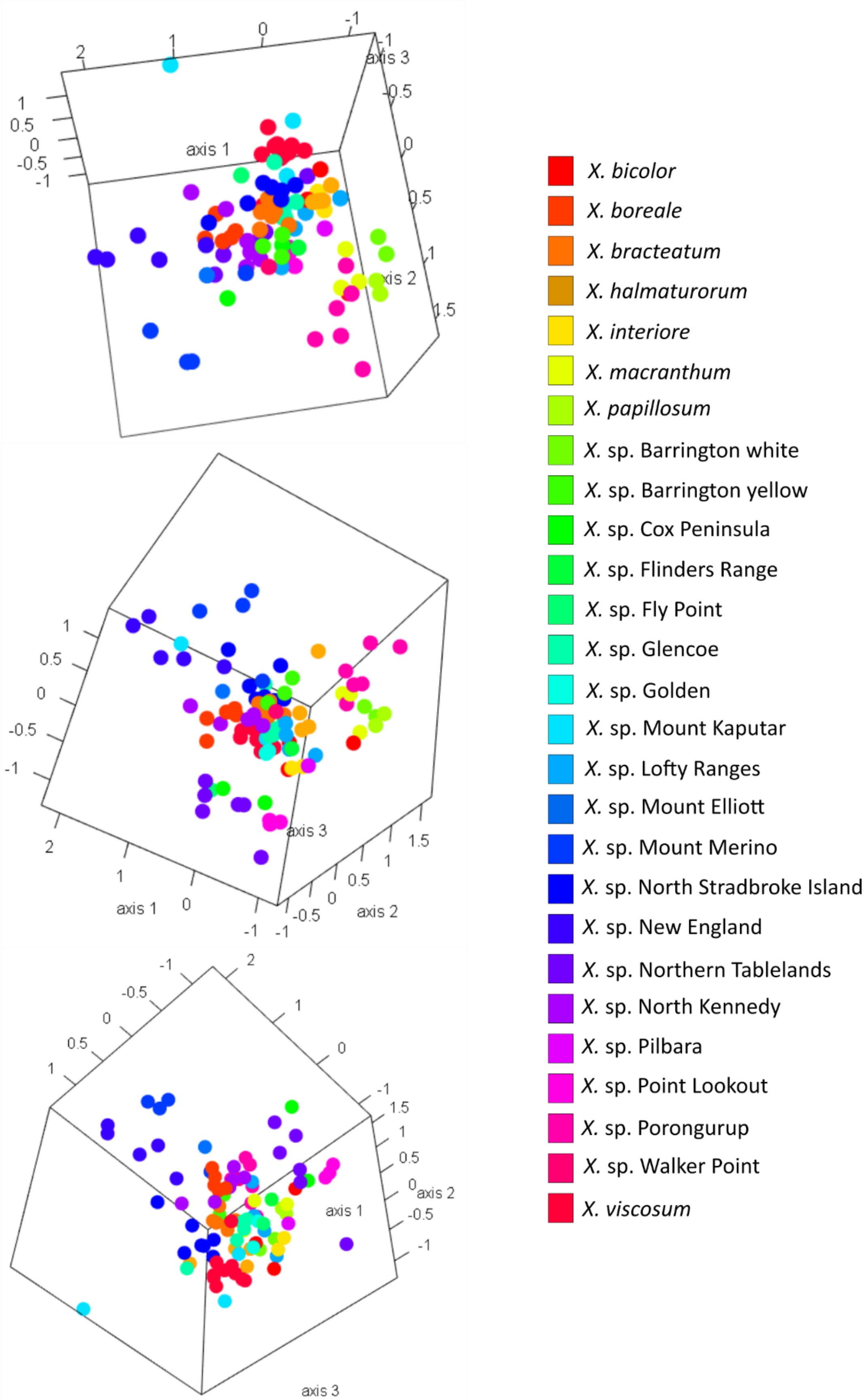

Fig. S1. Semi-strong hybrid multidimensional scaling ordination of 16 morphological characters from 97 specimens of *Xerochrysum*. Each ball represents an individual sample, whereas ball size and shading reflect proximity to viewer in 3-dimensional space.

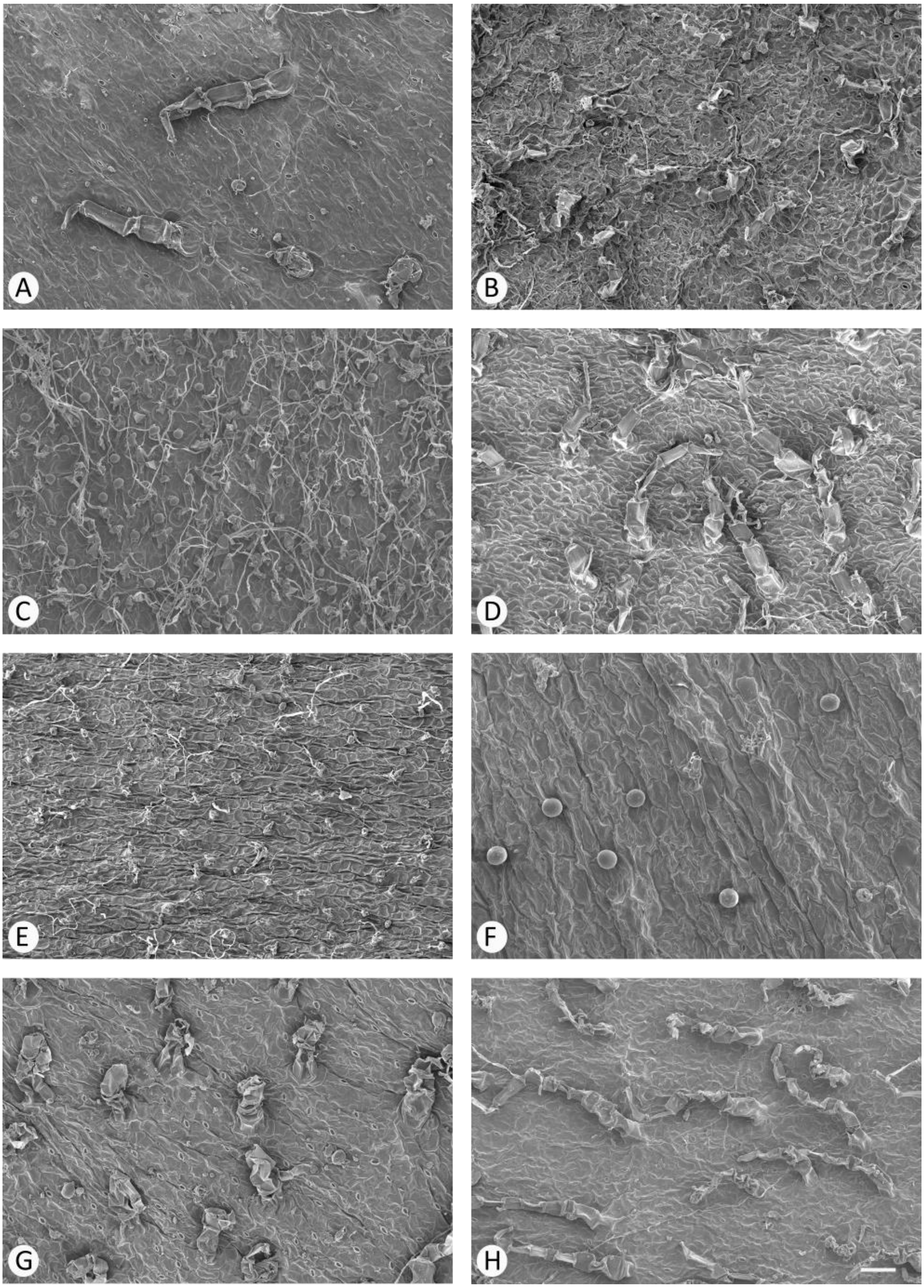

Fig. S2. Scanning electron micrographs of abaxial leaf indumentum from entities of *Xerochrysum*. A: *X*. sp. Barrington Tops, white phyllaries (*T.L. Collins 1043*); B: *X*. sp. Barrington Tops, yellow phyllaries (*T.L. Collins 1046*); C: *X*. sp. Mount Merino, from Tweed Pinnacle with filamentous trichomes (*I.R. Telford 12115*); D: *X*. sp. Mount Merino, from Mount Merino with large scattered septate trichomes (*I.R. Telford 12886*); E: *X*. sp. New England, from Round Waterhole Creek (*T.L. Collins 1013*); F: *X*. sp. New England from Henry River Falls (*T.L. Collins 969*); G: *X*. sp. Glencoe (*T.L. Collins 1146*); H: *X*. sp. Point Lookout (*T.L. Collins 958*). Scale bar: 100 μm.

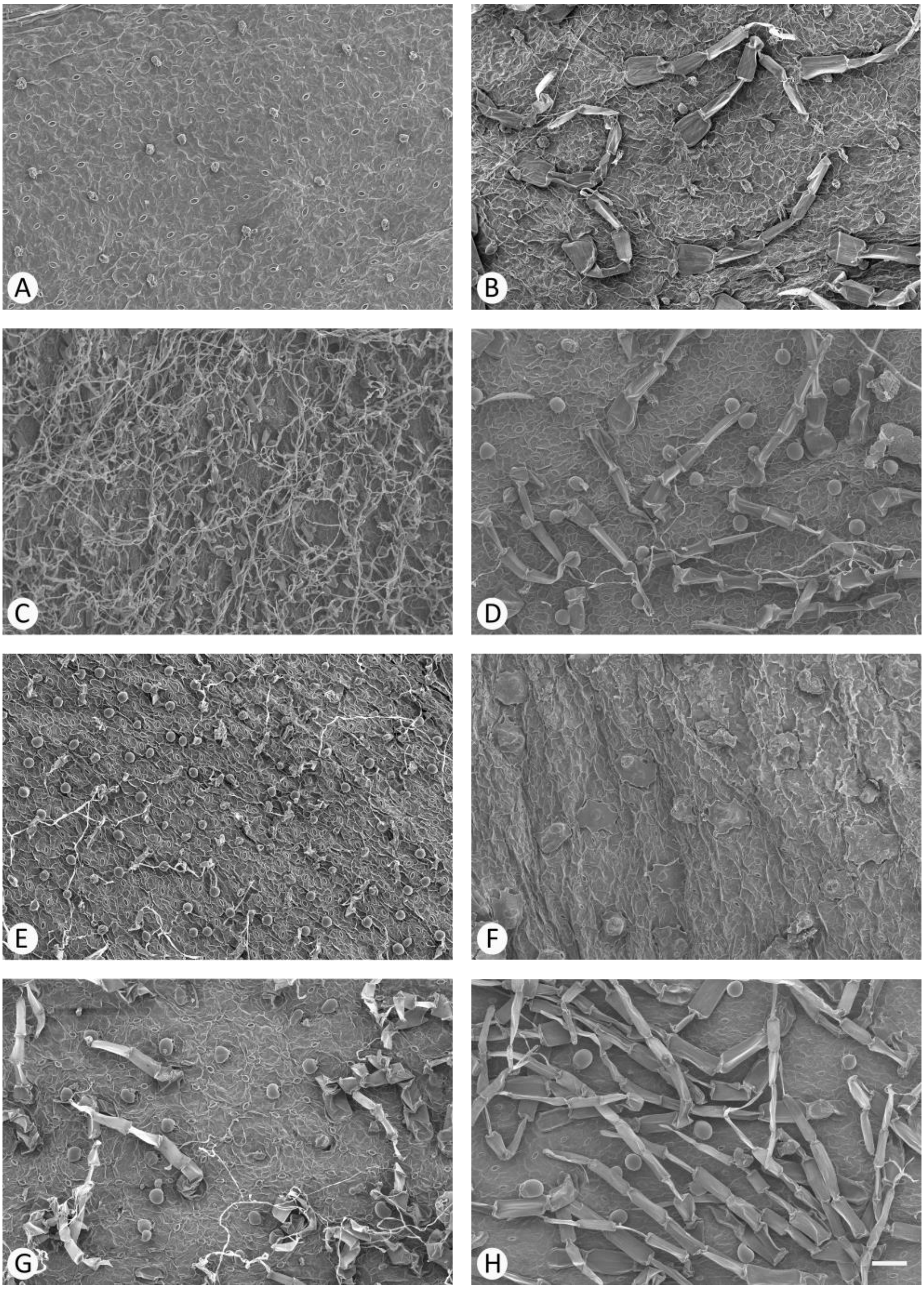

Fig. S3. Scanning electron micrographs of abaxial leaf indumentum from entities of *Xerochrysum*. A: *X*. sp. Barrington Tops, white phyllaries (*T.L. Collins 1043*); B: *X*. sp. Barrington Tops, yellow phyllaries (*T.L. Collins 1046*); C: *X*. sp. Mount Merino, from Tweed Pinnacle with filamentous trichomes (*I.R. Telford 12115*); D: *X*. sp. Mount Merino, from Mount Merino with large scattered septate trichomes (*I.R. Telford 12886*); E: *X*. sp. New England, from Round Waterhole Creek (*T.L. Collins 1013*); F: *X*. sp. New England from Henry River Falls (*T.L. Collins 969*); G: *X*. sp. Glencoe (*T.L. Collins 1146*); H: *X*. sp. Point Lookout (*T.L. Collins 958*). Scale bar: 100 µm.

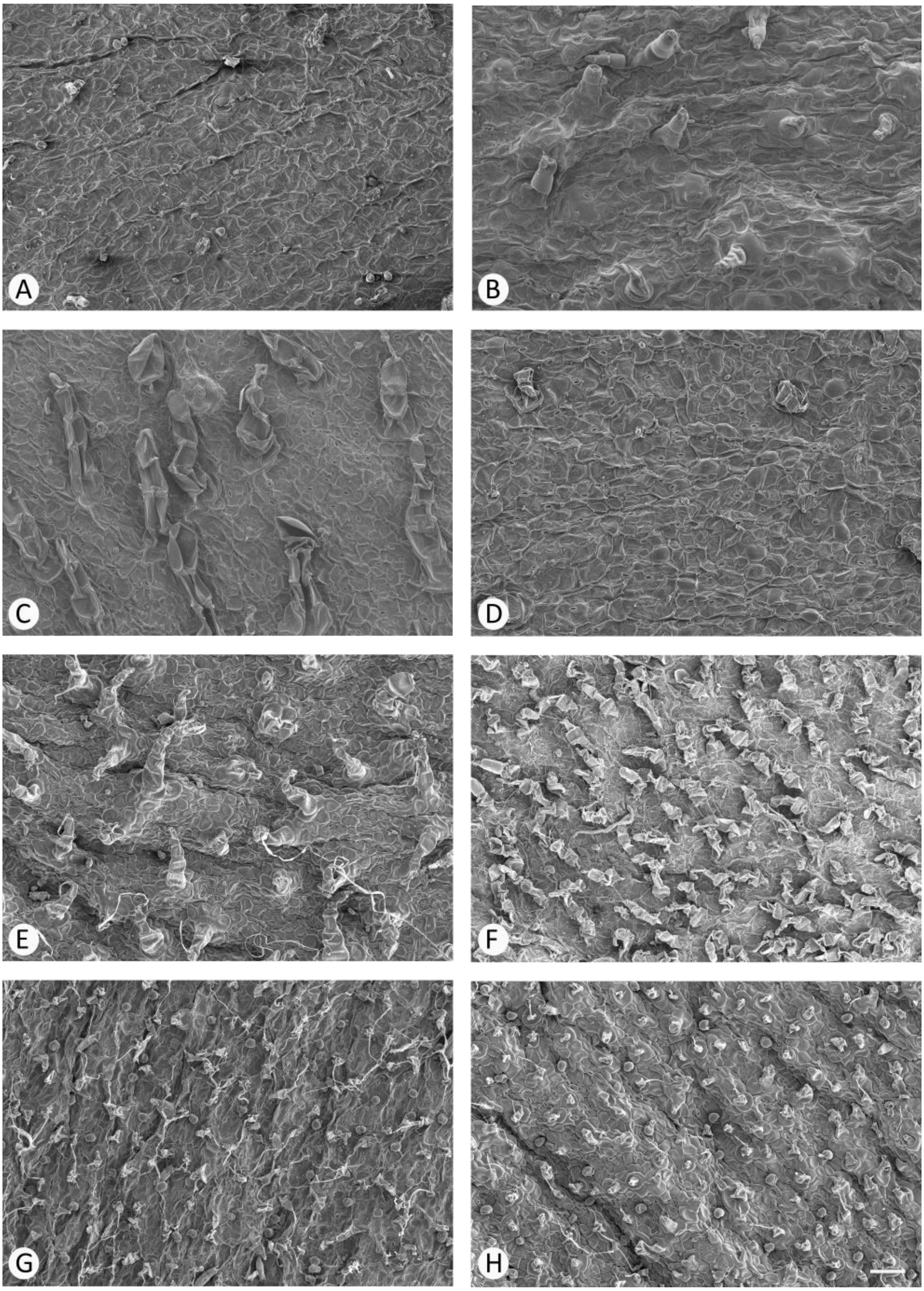

Fig. S4. Scanning electron micrographs of adaxial leaf indumentum from entities of *Xerochrysum*. A–F: *X*. sp. North Stradbroke Island. A: Moreton National Park (*T.L. Collins 1104*); B: Noosa National Park (*T.L. Collins 1113*); C: Fraser National Park (*T.L. Collins 1123*); D: Town of 1770 (*T.L. Collins 1128*); E: Byfield National Park (*T.L. Collins 1131*); F: Iluka (*T.L. Collins 1167*); G–H: *X*. sp. Northern Tablelands. G: Thunderbolt's Way, Nowendoc (*T.L. Collins 1009*); H: Bunya Mountains National Park (*T.L. Collins 1141*). Scale bar: 100 μm.

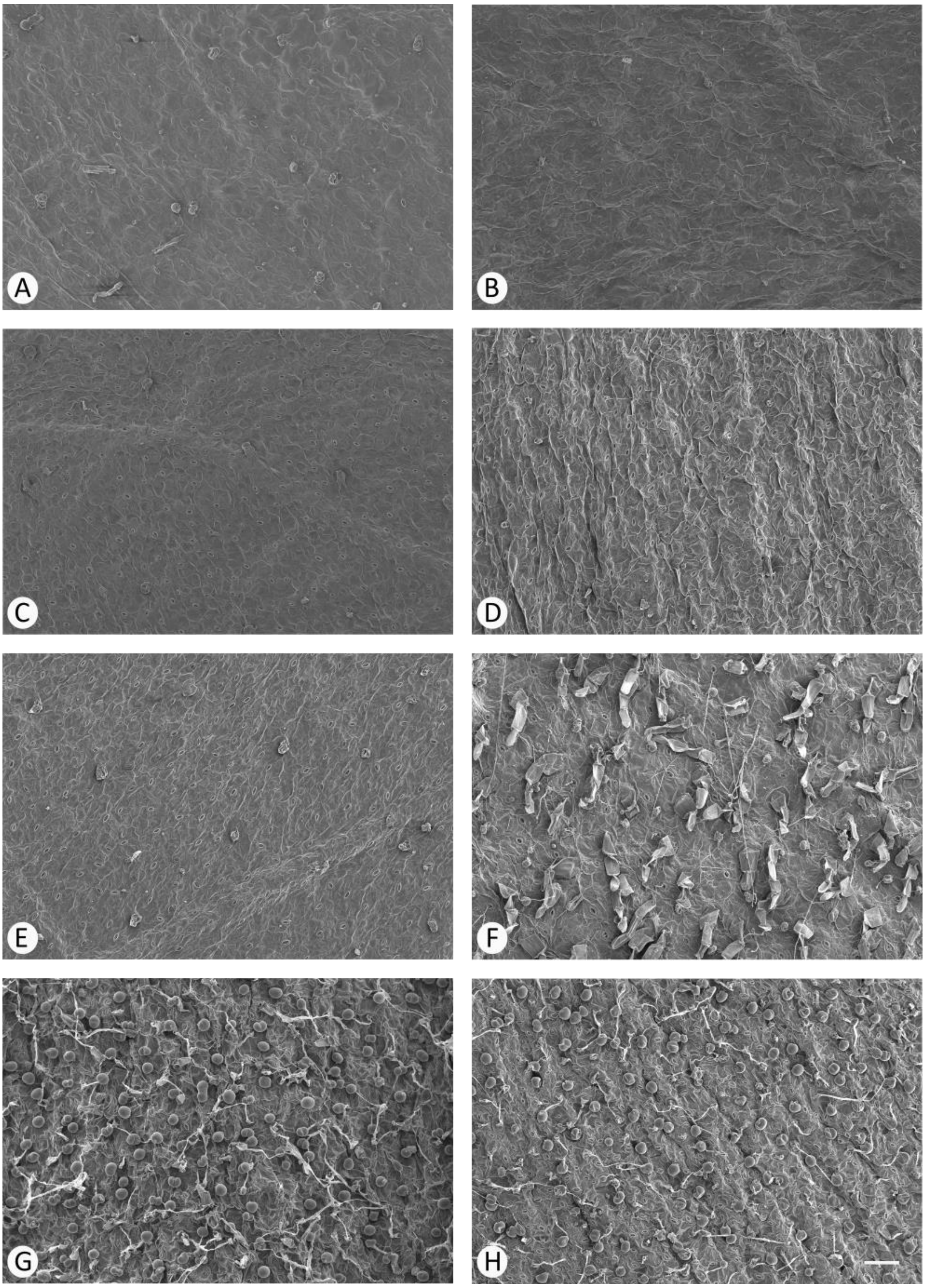

Fig. S5. Scanning electron micrographs of abaxial leaf indumentum from entities of *Xerochrysum*. A–F: *X*. sp. North Stradbroke Island. A: Moreton National Park (*T.L. Collins 1104*); B: Noosa National Park (*T.L. Collins 1113*); C: Fraser National Park (*T.L. Collins 1123*); D: Town of 1770 (*T.L. Collins 1128*); E: Byfield National Park (*T.L. Collins 1131*); F: Iluka (*T.L. Collins 1167*); G–H: *X*. sp. Northern Tablelands. G: Thunderbolt's Way, Nowendoc (*T.L. Collins 1009*); H: Bunya Mountains National Park (*T.L. Collins 1141*). Scale bar: 100 µm.

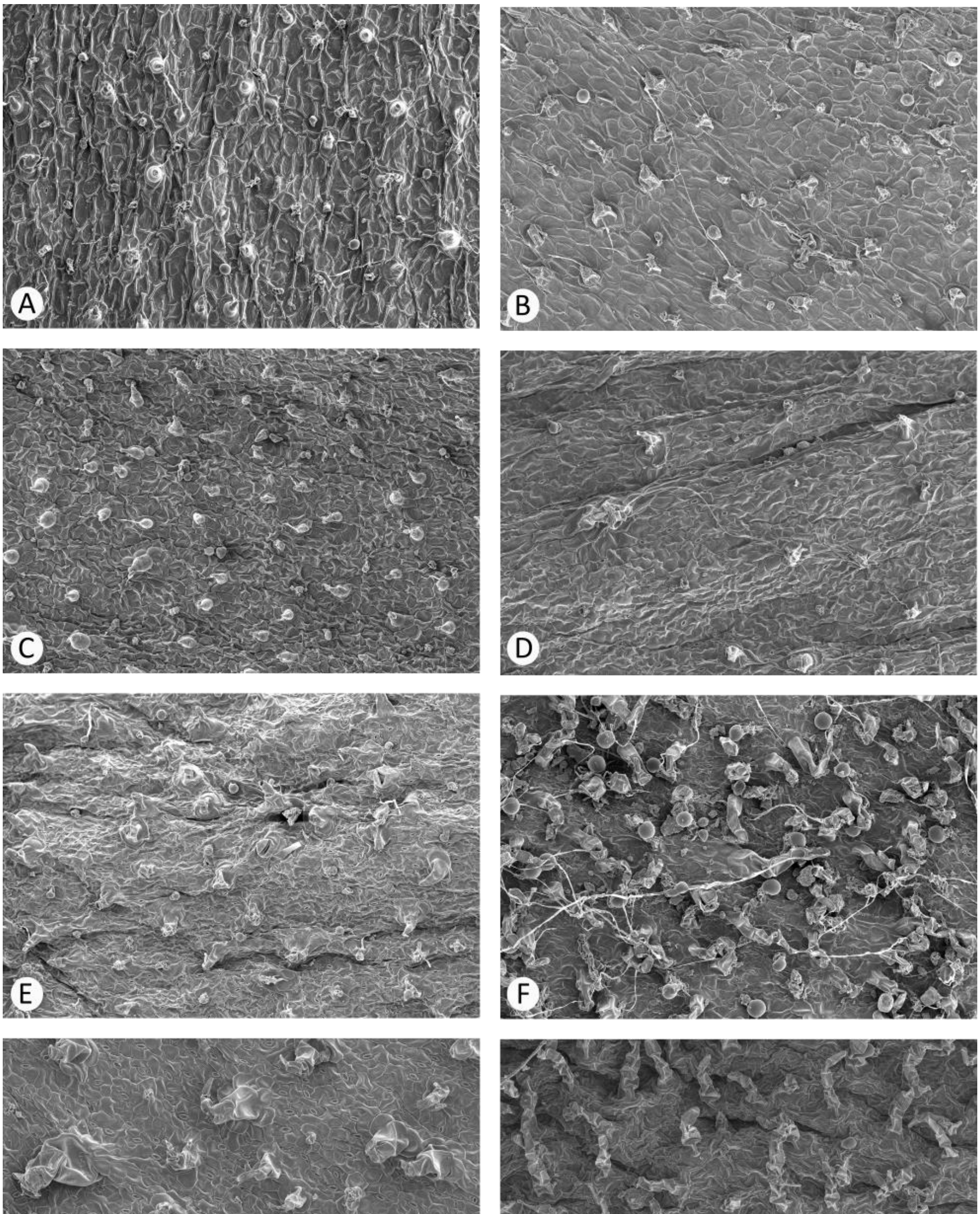

Fig. S6. Scanning electron micrographs of adaxial leaf indumentum from entities of *Xerochrysum*. A–C: *X*. *bracteatum sens. str*. A: Mount Keira, Sydney (*T.L. Collins 1169*); B: Gulaga National Park, south-coast New South Wales (*T.L. Collins 1177*): C: Saint Helena, South Atlantic Ocean (*A.J. Dutton 3*); D: *X*. sp. Flinders Range, Nantawarrinna Indigenous Protected Lands, South Australia (*K.H. Brewer 461*); E: *X*. sp. Chinchilla, Kaputar Road, Narrabri, New South Wales (*Y.E. Fouracre 1*); F: *X*. sp. North Kennedy, Baldy Mountain Forest Reserve, Queensland (*T.L. Collins 1051*); G: *X*. sp. Fly Point, Somerset Lookout, Cape York Peninsula (*T.L. Collins 1061*); H: *X*. sp. Walker Point, Annan River National Park, Queensland (*A.J. Saunders 1*). Scale bar: 100 μm.

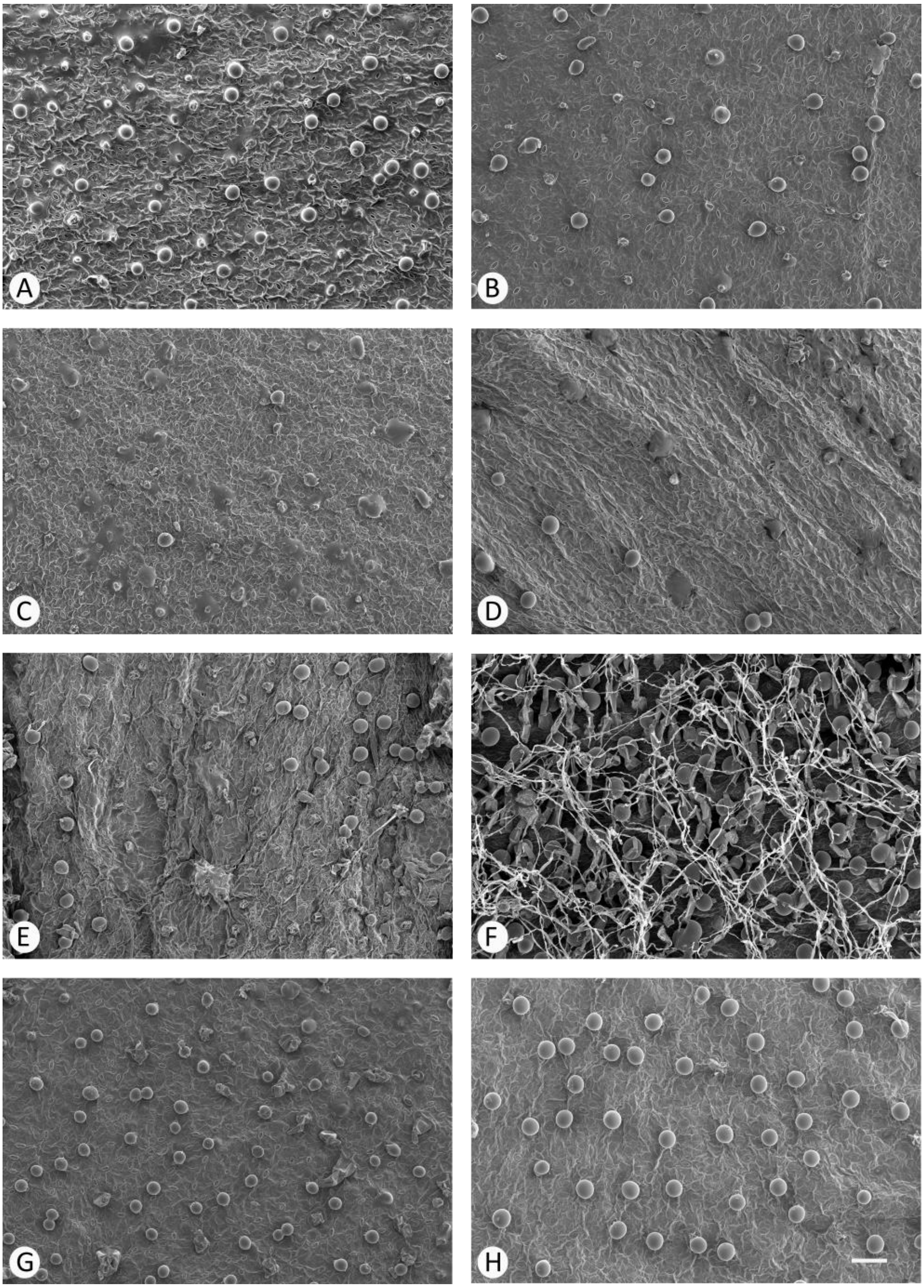

Fig. S7. Scanning electron micrographs of abaxial leaf indumentum from entities of *Xerochrysum*. A–C: *X*. *bracteatum s. str*. A: Mount Keira, Sydney (*T.L. Collins 1169*); B: Gulaga National Park, south-coast New South Wales (*T.L. Collins 1177*): C: Saint Helena, South Atlantic Ocean (*A.J. Dutton 3*); D: *X*. sp. Flinders Range, Nantawarrinna Indigenous Protected Lands, South Australia (*K.H. Brewer 461*); E: *X*. sp. Chinchilla, Kaputar Road, Narrabri, New South Wales (*Y.E. Fouracre 1*); F: *X*. sp. North Kennedy, Baldy Mountain Forest Reserve, Queensland (*T.L. Collins 1051*); G: *X*. sp. Fly Point, Somerset Lookout, Cape York Peninsula (*T.L. Collins 1061*); H: *X*. sp. Walker Point, Annan River National Park, Queensland (*A.J. Saunders 1*). Scale bar: 100 µm.

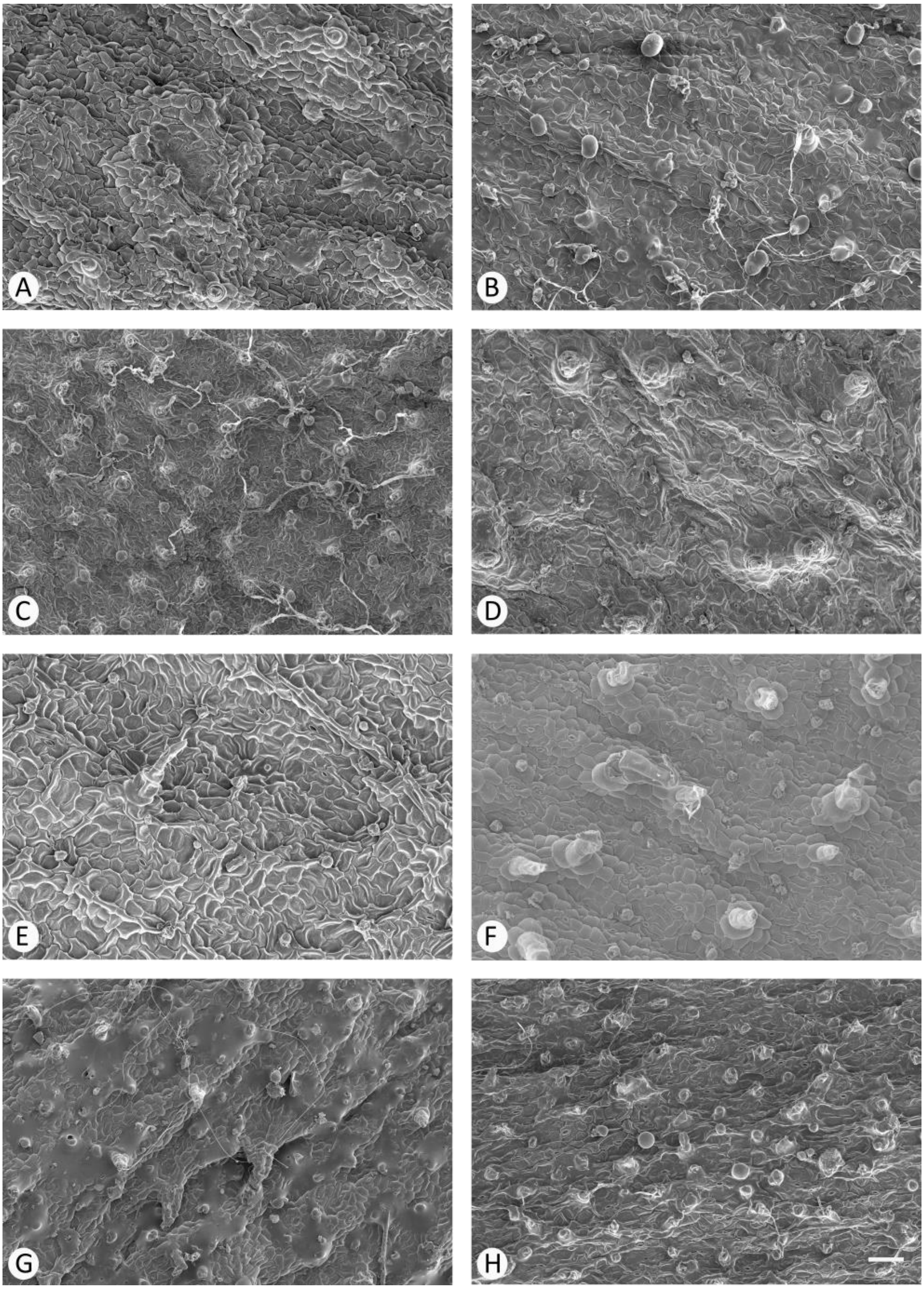

Fig. S8. Scanning electron micrographs of adaxial leaf indumentum from entities of *Xerochrysum*. A–B: *X. interiore*. A: Mereenie Loop, Northern Territory (*J.J. Bruhl 3446*); B: Pilbara, Western Australia (*T.L. Collins 1073*); C: *X. boreale*, Dundee Beach, Northern Territory (*T.L. Collins 1088*); D: *X. bicolor*, Alum Cliffs, Tasmania (*T.L. Collins 1016*); E: *X. halmaturorum*, Pink Bay, South Australia (*T.L. Collins 975*); F: *X*. sp. Lofty Ranges, Tothill Range, South Australia (*T.L. Collins 985*); G: *X. macranthum*, Chidlow, Western Australia (*T.L. Collins 1150*); H: *X*. sp. Porongurup, Stirling Range National Park, Western Australia (*T.L. Collins 1158*). Scale bar: 100 μm.

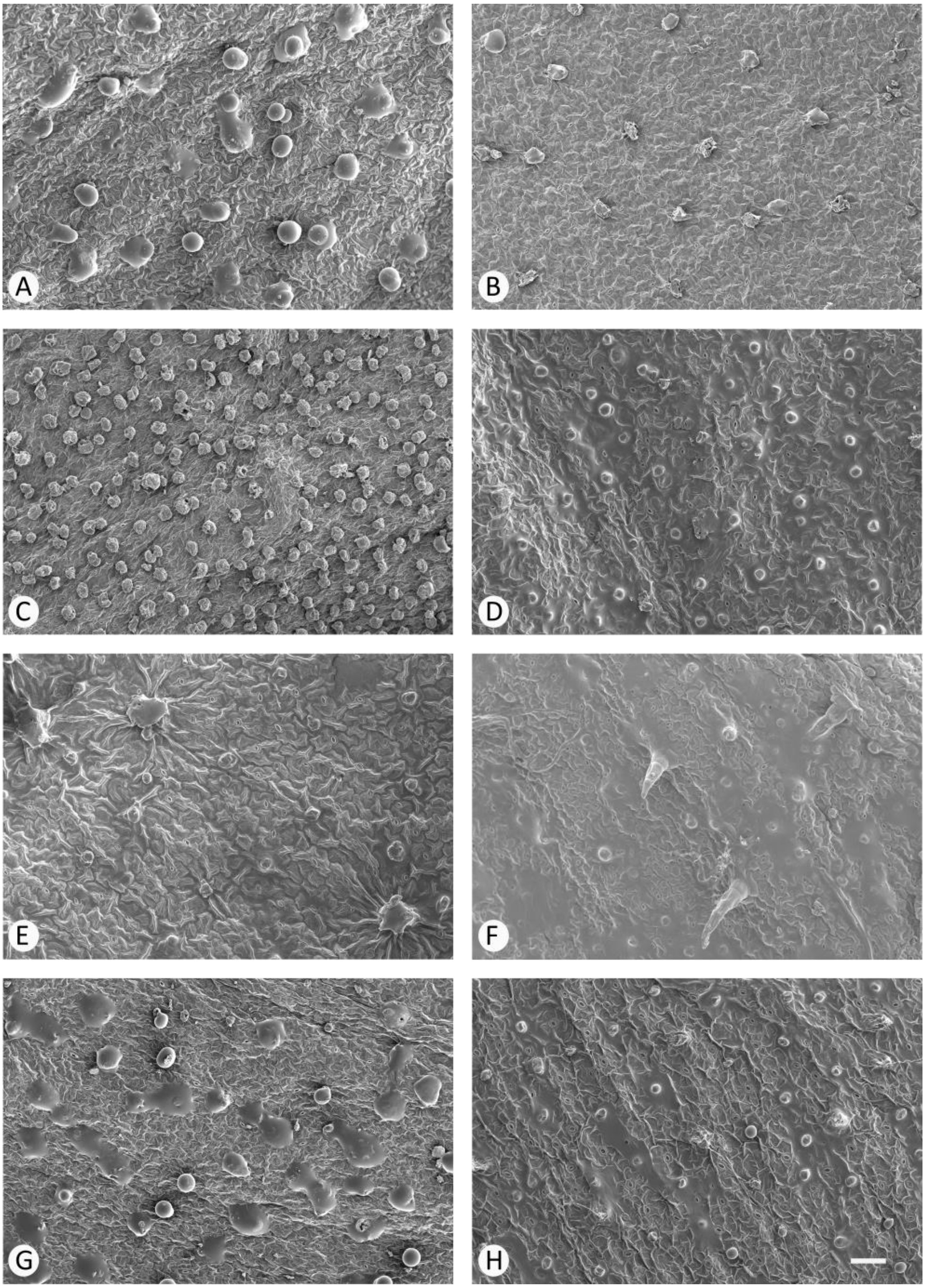

Fig. S9. Scanning electron micrographs of abaxial leaf indumentum from entities of *Xerochrysum*. A–B: *X. interiore*. A: Mereenie Loop, Northern Territory (*J.J. Bruhl 3446*); B: Pilbara, Western Australia (*T.L. Collins 1073*); C: *X. boreale*, Dundee Beach, Northern Territory (*T.L. Collins 1088*); D: *X. bicolor,* Alum Cliffs, Tasmania (*T.L. Collins 1016*); E: *X. halmaturorum*, Pink Bay, South Australia (*T.L. Collins 975*); F: *X*. sp. Lofty Ranges, Tothill Range, South Australia (*T.L. Collins 985*); G: *X. macranthum*, Chidlow, Western Australia (*T.L. Collins 1150*); H: *X*. sp. Porongurup, Stirling Range National Park, Western Australia (*T.L. Collins 1158*). Scale bar: 100 µm.

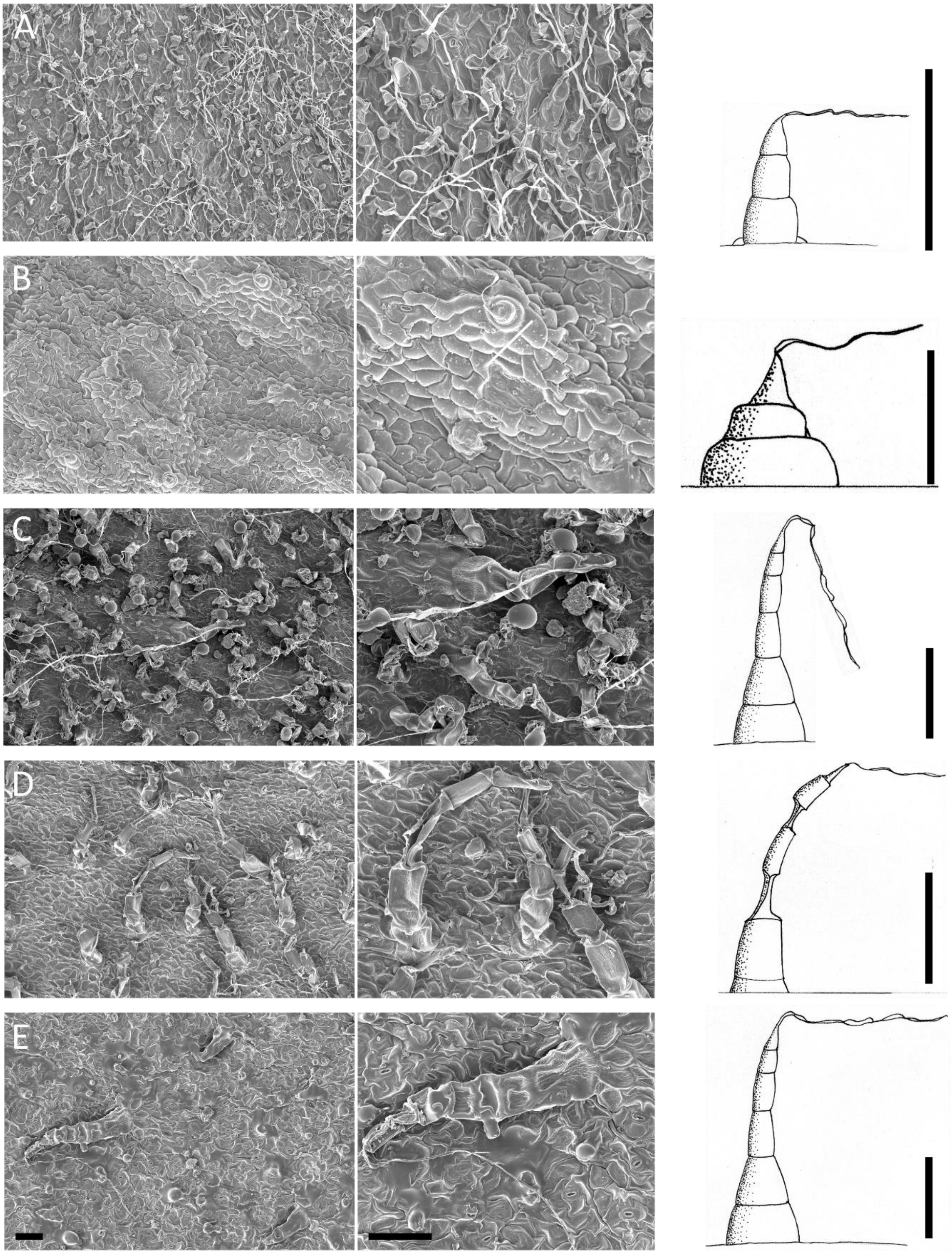

Fig. S10. Leaf lamina adaxial indumentum, detail of trichomes, and trichome morphology for some species of *Xerochrysum*. A: *X. frutescens, I.R. Telford 12115*; B: *X. interiore, J.J. Bruhl 3472*; C: *X. strictum, T.L. Collins 1051*; D: *X. frutescens*, *I.R. Telford 12886*; E: *X. macranthum, T.L. Collins 1153*. All scale bars 100 μm.

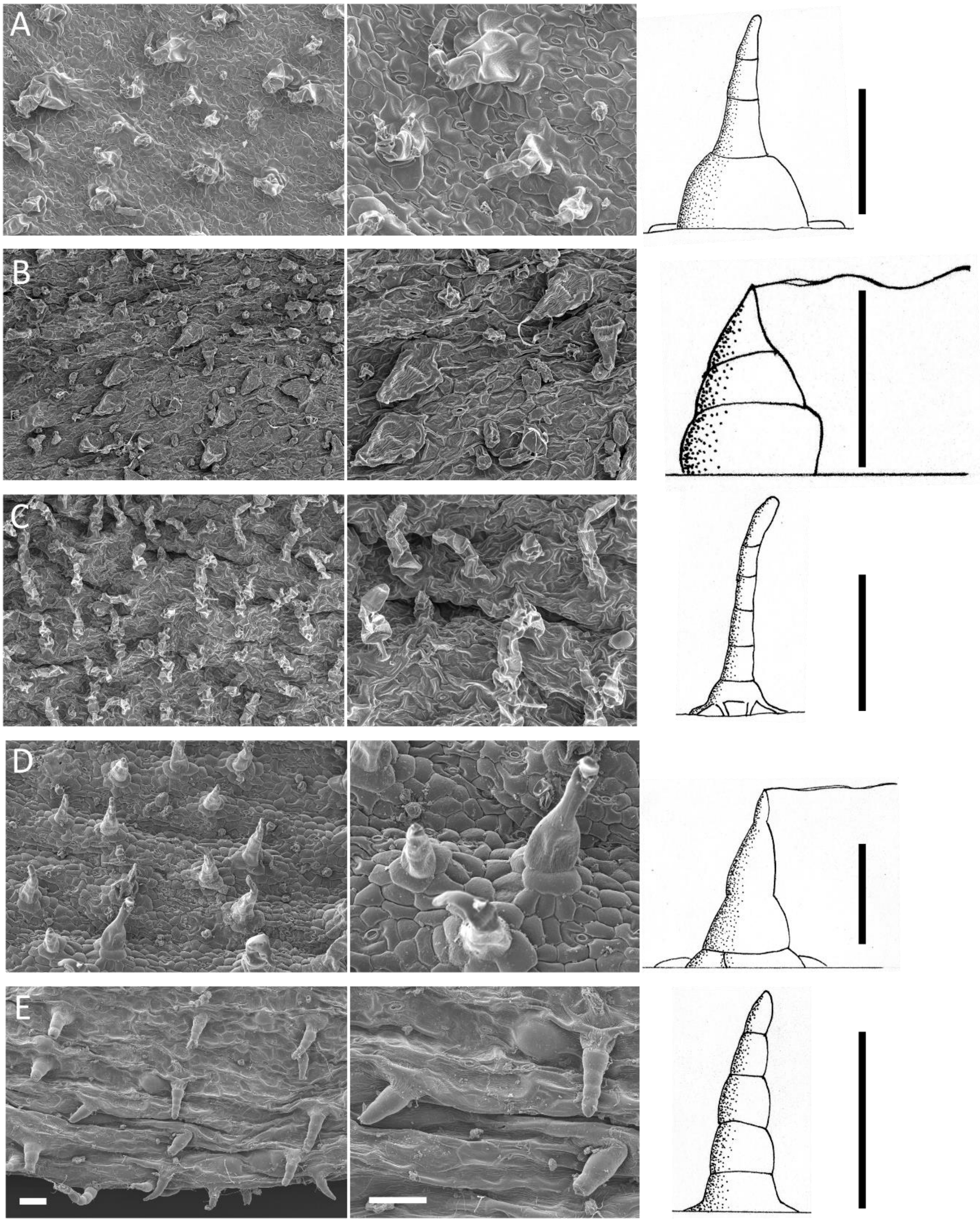

Fig. S11. Leaf lamina adaxial indumentum, detail of trichomes, and trichome morphology for some species of *Xerochrysum*. A: *X. gudang*, *T.L. Collins 1061*; B: *X. wilsonii*, *T.L. Collins 1157*; C: *X. banksii*, *A.J. Saunders 1*; D: *X. bicolor*, *T.L. Collins 985*; E: *X.* sp. North Stradbroke Island, *T.L. Collins 1013*. All scale bars 100 µm.

Table S8. Mean values of fruit dimensions, phyllary apex angle, leaf width and trichome density, as well as root system type and phyllary colour, for species and putative entities of *Xerochrysum*.

	Character codes													
Entity	1	2	3	4	5	6	7	8	9	10	11	12	13	14
X. bicolor	2.5	0.8	51.5	0.54	19.5	183	8.5	3.9	3.6	7.8	0	6.5	2.5	
X. bracteatum s. str.	2.2	0.7	88.0	0.55	14	302	8.9	2.7	5.5	12	0	8.3	4.1	35.7
X. boreale	2.3	0.7	75.5	0.60	6	485	21.2	3.4	10.3	19.5	8.8	18.6	0	39.5
X. halmaturorum	2.6	0.9	75.2	0.54	29	402	5.4	5.7	1.5	7.0	0.2	1.8	3.9	64.9
X. interiore	3.5	0.9	62.4	0.63	18	568	10.0	3.0	1.7	5.9	0	6.0	3.8	56.3
X. macranthum	2.6	0.8	70.7	0.58	10	500	6.7	6.0	2.0	10.0	0	6.1	5.2	54.7
X. papillosum	2.8	1.0	55.6	0.79	12	344	6.5	7.0	7.8	5.3	0.7	5.2	13.8	
X. viscosum	2.3	0.7	73.7	0.55	2	580	2.6	7.0	1.4	8.2	0	0.8	10.3	92.0
X. sp. Porongurup	1.9	0.9	77.5	0.69	14.5	256	14.1	10.3	6.5	9.2	2.7	11.5	11.4	53.7
X. sp. Barrington Tops white phyllaries	2.7	1.1	84.8	0.55	20.0	980	8.6	1.3	1.2	2.6	0	3.7	1.0	
X. sp. Barrington Tops yellow phyllaries	2.1	1.0	86.9	0.54	18.0	400	17.2	2.6	4.7	6.2	1.9	12.2	2.9	36.1
X. sp. Chinchilla (*Y.E. Fouracre 1*)			76.2	0.53		336	15	7.2	5.5	14.7	0	13.7	4.0	41.7
X. sp. Cox Peninsula	2.7	0.8	71.3	0.64	8.0	980	11	6.9	7.1	17.2	0.6	19.7	1.2	40.4
X. sp. Flinders Range (*K.H. Brewer 461*)	3.3	1.0	75.4	0.45	13.5	480	14.7	1.5	2.7	3.7	0	14.0	0	48.5
X. sp. Fly Point (*T.L. Collins 1061*)	2.7	0.7	60.7	49.50	10	280	16	0.8	4.5	12.8	3.7	11.3	0	32.8
X. sp. Glencoe	2.2	1.0	84.0	0.60	7	440	13.4	1.9	2.6	4.8	1.5	5.8	2.0	46.7
X. sp. Lofty Ranges	2.7	0.9	69.7	0.53	15.5	723	9.9	7.1	3.0	11.5	0.2	5.3	5.4	43.8
X. sp. Mount Kaputar	2.3	0.8	59.4	0.64	4.2	372	3.3	7.6	1.2	6.5	0	1.0	9.5	
X. sp. Mount Merino	2.5	0.9	51.9	0.57	14.5	456	36.9	9.1	23.5	12.0	24.0	30.5	0	37.7
X. sp. New England	2.3	0.8	68.2	0.52	8.5	363	17.5	3.8	8.7	16.1	5.2	19.2	4.2	27.9
X. sp. New England, Henry River (*T.L. Collins 969*)							3	1.8	0.8	3.5	0	1.5	2.5	
X. sp. North Stradbroke Is. dunes	2.0	0.7	87.5	0.62	28.5	435	10	1.9	2.1	5.4	0	4.7	1.8	58.3
X. sp. North Stradbroke Is. headlands	1.8	0.7	84.9	0.61	12.5	376	17.2	0.6	6.9	3.5	2.8	14.5	0.8	
X. sp. Northern Tablelands	2.0	0.7	97.1	0.61	8.5	600	18.5	8.4	25.8	28.2	19.5	29.0	4.0	31.5
X. sp. North Kennedy	2.2	0.7	72.9	0.67	12.8		11.9	3.4	9.5	15.0	13.3	10.6	0.5	42.4
X. sp. Mount Elliott			68.0	0.67	11.5	776	24	4.0	14.8	10.6	15.0	33.7	5.0	39.6
X. sp. Point Lookout	2.7	0.9	65.4	0.59	22		18	1.1	3.1	3.4	3.2	13.2	1.7	50.0
X. sp. Walker Point	2.5	0.9	75.8	0.65	10.8	280	34	0.8	10.2	9.8	0.7	10.0	0	46.0

Character codes conform to Table 3 in Methods. Characters 15 and 16 not shown.

Table S9. Summary statistics of population genetics in species and putative entities of *Xerochrysum*.

Taxon	Number of populations	Sample size	H_S	H_o	F_{IS}	F_{ST}
X. alpinum	2	8	0.201	0.229	0.010	0.097
X. bicolor	3	14	0.151	0.131	0.280	0.498
X. boreale	5	23	0.137	0.117	0.210	0.406
X. bracteatum	5	25	0.146	0.116	0.382	0.305
X. bracteatum St Helena	1	15	0.269	0.214	0.322	0.132*
X. halmaturorum	4	26	0.126	0.127	0.120	0.467
X. interiore	3	14	0.179	0.159	0.243	0.371
cultivars	1	10	0.279	0.200	0.338	0.196*
X. macranthum	5	24	0.128	0.107	0.364	0.165
X. milliganii	1	2	0.417	0.542	0.163	na
X. palustre	2	9	0.198	0.229	0.024	0.439
X. papillosum	2	10	0.100	0.070	0.324	0.808
X. sp. aff. *palustre*	3	13	0.126	0.156	0.071	0.562
X. sp. Barrington Tops	3	26	0.149	0.144	0.232	0.050
X. sp. Cox Peninsula	1	9	0.285	0.199	0.337	na
X. sp. Flinders Range	2	6	0.234	0.185	0.833	na
X. sp. Fly Point	1	5	0.331	0.302	0.093	na
X. sp. Forests	1	5	0.276	0.282	0.045	na
X. sp. Glencoe	3	11	0.178	0.127	0.298	0.237
X. sp. Limestone	1	5	0.338	0.288	0.242	na
X. sp. Lofty Ranges	2	11	0.202	0.221	0.537	0.401
X. sp. Mount Elliott	1	2	0.429	0.355	0.211	na
X. sp. Mount Kaputar	3	10	0.124	0.046	0.463	-0.155
X. sp. Mount Merino	1	2	0.413	0.458	6.174e-13	na
X. sp. New England	3	11	0.176	0.144	0.496	0.476
X. sp. North Kennedy	6	22	0.168	0.130	0.146	0.248
X. sp. Northern Tablelands	6	34	0.132	0.105	0.296	0.188
X. sp. Point Lookout	1	5	0.309	0.298	0.069	na
X. sp. Porongurup	3	20	0.132	0.122	0.127	0.382
X. sp. Walker Point	1	5	0.323	0.231	0.298	na
X. subundulatum	7	40	0.104	0.096	0.138	0.252
X. viscosum	12	49	0.097	0.065	0.179	0.235

H_S, expected heterozygosity; H_O, observed heterozygosity; F_{IS}, inbreeding estimation; F_{ST}, Nei's inbreeding coefficient. Asterisk denotes pairwise F_{ST} with The Oaks population of *X. bracteatum sens. str.*; na, not applicable due to only one population sample. Statistics were calculated at the population level within each taxon and averaged.

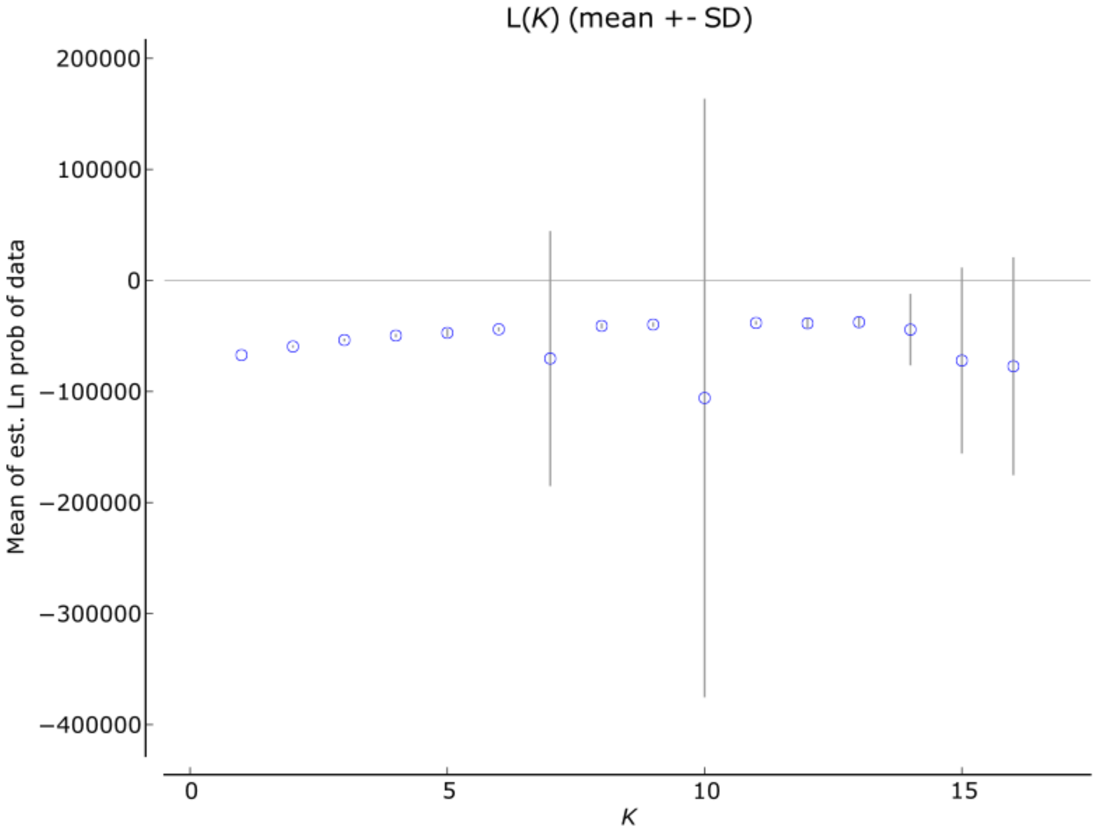

Fig. S12. Mean of estimated log probability of data *v. K* for species and putative entities of *Xerochrysum* in the ‘Bracteatum’ group. n = 246.

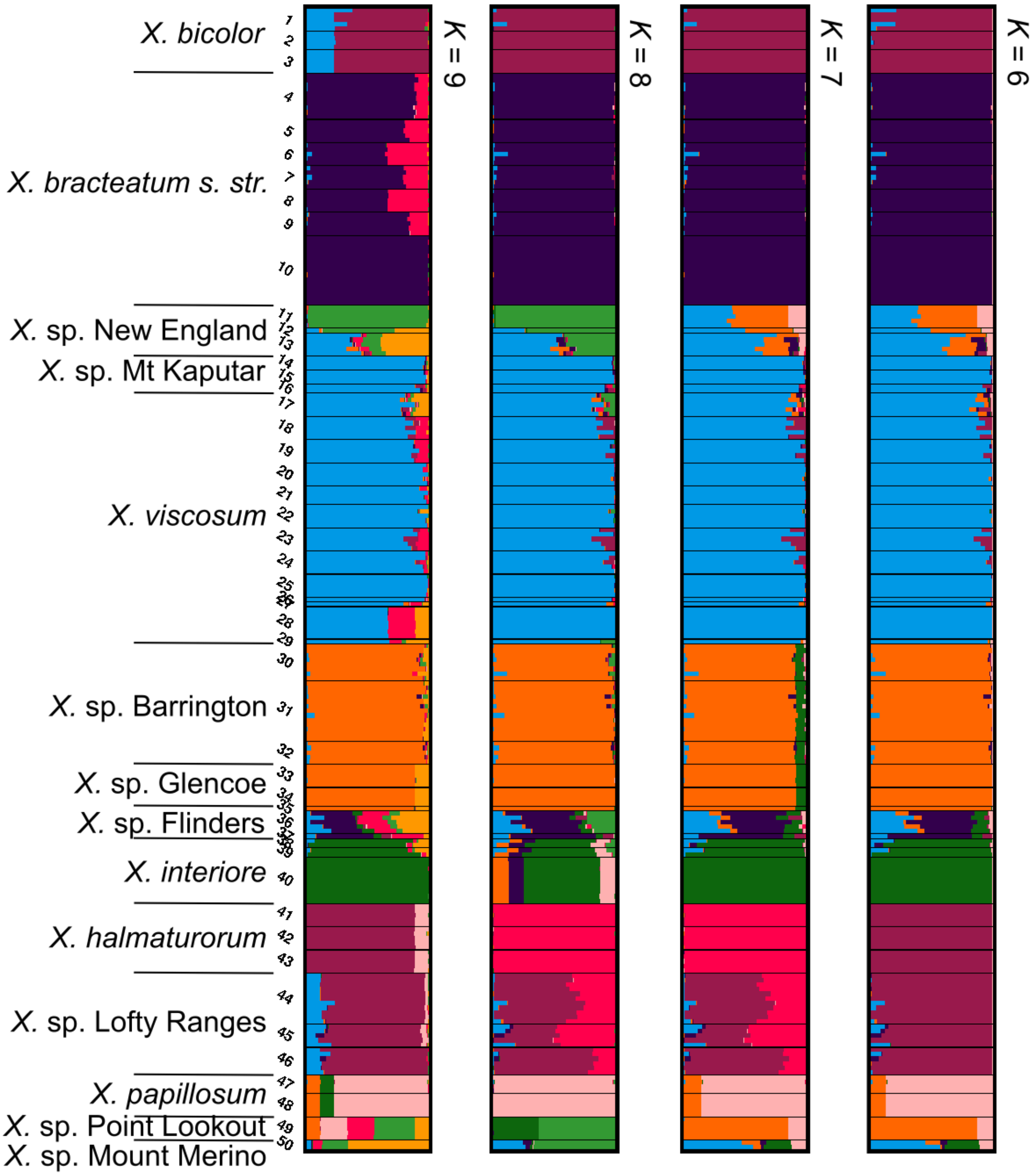

Fig. S13. STRUCTURE bar plots for 'Bracteatum' samples of *Xerochrysum*, major clustering modes K = 6–9. Bar plots show each individual as a horizontal bar divided into segments based on the proportion of ancestry suggested for 1–16 subpopulations across eight of the 16 runs; n = 246. Fine black lines delineate sampling locations, numbered in 10.

Table S10. ‘Bracteatum’ sample location and putative entity numbers used to identify bar plots in STRUCTURE major clustering modes *K* = 6–9.

Population number	Taxon	Location
1	*X. bicolor*	Alum Cliffs Hobart
2	*X. bicolor*	West Point
3	*X. bicolor*	Temma
4	*X. bracteatum*	cultivars
5	*X. bracteatum sens. strict.*	Bulli Lookout
6	*X. bracteatum sens. strict.*	Gulaga NP
7	*X. bracteatum sens. strict.*	Mt Keira
8	*X. bracteatum sens. strict.*	Nethercote Falls
9	*X. bracteatum sens. strict.*	The Oaks (Sydney)
10	*X. bracteatum sens. strict.*	St Helena
11	*X*. sp. NE Escarpment	Guyra
12	*X*. sp. NE Escarpment	Styx River
13	*X*. sp. NE Escarpment	Henry River Falls
14	*X*. sp. Mt Kaputar	Lindsay Rocktops
15	*X*. sp. Mt Kaputar	Coryah Gap
16	*X*. sp. Mt Kaputar	Kaputar summit
17	*X. viscosum*	Apsley Falls
18	*X. viscosum*	St Arnaud, Victoria
19	*X. viscosum*	Warby-Ovens National Park
20	*X. viscosum*	Black Mountain
21	*X. viscosum*	Coxs River
22	*X. viscosum*	Green Camp, Mount Kaputar
23	*X. viscosum*	Hobart
24	*X. viscosum*	Lithgow
25	*X. viscosum*	Mudgee
26	*X. viscosum*	Wellington
27	*X. viscosum*	Wallangarra
28	*X. viscosum*	Torrington State Recreation Area
29	*X. viscosum*	Coomba Falls
30	*X*. sp. Barrington Tops (white)	Barrington Tops
31	*X*. sp. Barrington Tops (yellow)	Barrington Tops
32	*X*. sp. Barrington Tops (yellow)	Gloucester Tops
33	*X*. sp. Glencoe	Costello Road, E of Glencoe
34	*X*. sp. Glencoe	Barrington Tops
35	*X*. sp. Glencoe	Boonoo Boonoo National Park
36	*X*. sp. Flinders Range	Flinders Range
37	*X*. sp. Flinders Range	Nombinnie Nature Reserve
38	*X. interiore*	Owen Springs National Park
39	*X. interiore*	Mereenie Loop
40	*X. interiore*	Wanna Munna
41	*X. halmaturorum*	Cape St Albans
42	*X. halmaturorum*	Lesueuer Conservation Park
43	*X. halmaturorum*	Pink Bay
44	*X. halmaturorum*	Newland Head Conservation Park
45	*X*. sp. Lofty Ranges	Hindmarsh Falls
46	*X*. sp. Lofty Ranges	Tothill Range
47	*X. papillosum*	St Patrick’s Head
48	*X. papillosum*	Tessellated Pavement
49	*X*. sp. Point Lookout	New England National Park
50	*X*. sp. Mount Merino	The Pinnacle

A detailed list of gatherings can be found in Table S1.

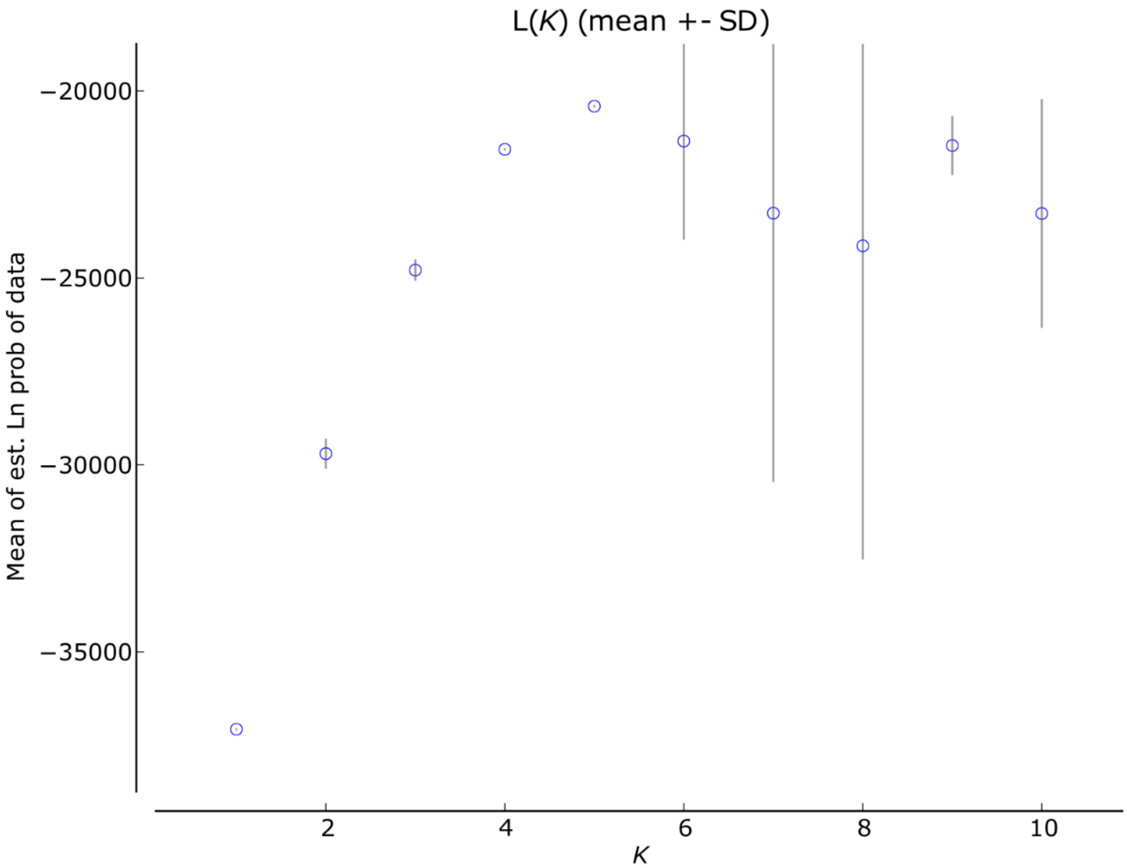

Fig. S14. Mean of estimated log probability of data *v. K* for putative entities of *Xerochrysum* sp. Barrington Tops, *X*. sp. Glencoe, *X*. sp. New England, and *X*. sp. Point Lookout. n = 52.

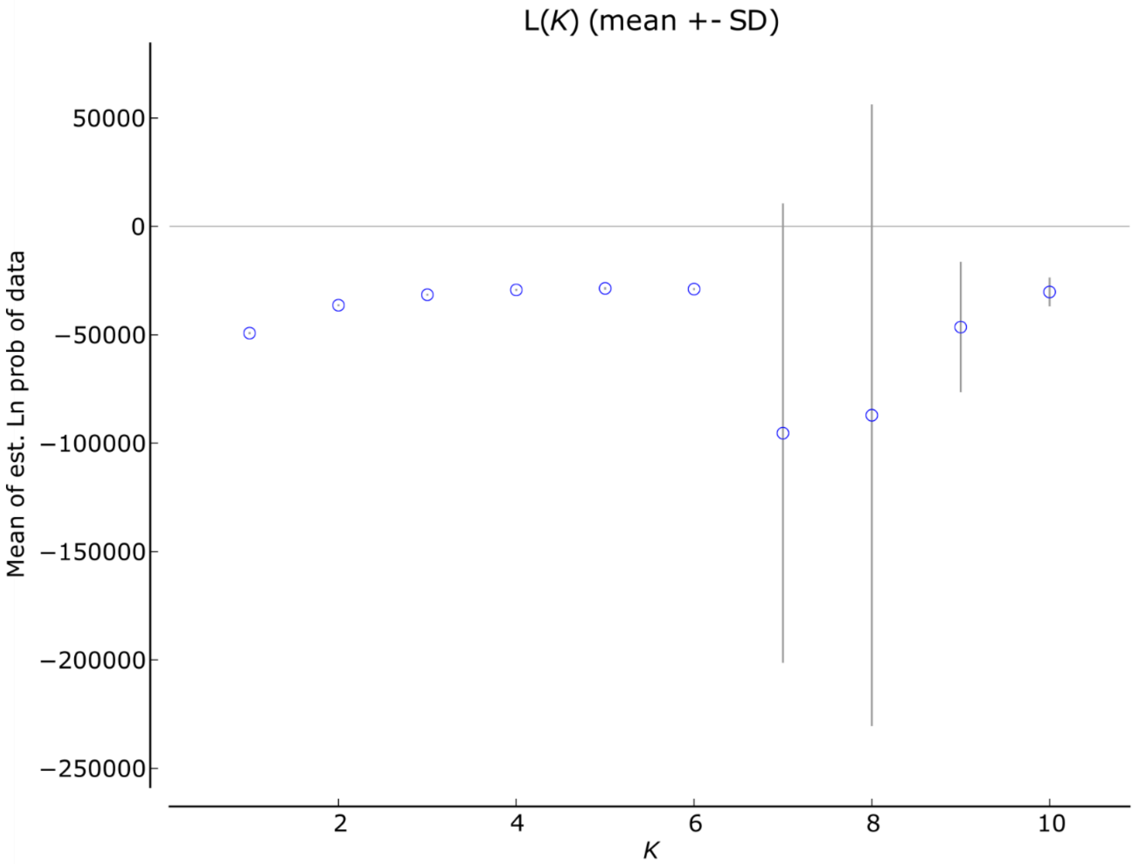

Fig. S15. Mean of estimated log probability of data *v*. *K* for *Xerochrysum bicolor*, *X. halmaturorum*, and the putative entity *X*. sp. Lofty Ranges. n = 51.

Table S11. Pairwise F_{ST} for populations of *Xerochrysum bicolor*, *X. halmaturorum* and *X*. sp. Lofty Ranges.

	bicAlu	bicWes	papTem	halNH	LRHin	LRTot	halCap	halLes	halPin
bicAlu	0.000	0.222	0.313	0.255	0.337	0.365	0.599	0.593	0.598
bicWes	0.222	0.000	0.143	0.219	0.317	0.341	0.592	0.581	0.584
papTem	0.313	0.143	0.000	0.275	0.366	0.411	0.642	0.629	0.635
halNH	0.255	0.219	0.275	0.000	0.120	0.176	0.296	0.298	0.293
LRHin	0.337	0.317	0.366	0.120	0.000	0.256	0.273	0.276	0.267
LRTot	0.365	0.341	0.411	0.176	0.256	0.000	0.519	0.514	0.514
halCap	0.599	0.592	0.642	0.296	0.273	0.519	0.000	0.183	0.088
halLes	0.593	0.581	0.629	0.298	0.276	0.514	0.183	0.000	0.146
halPin	0.598	0.584	0.635	0.293	0.267	0.514	0.088	0.146	0.000

Darker shading indicates greater genetic divergence in Nei’s pairwise comparisons.

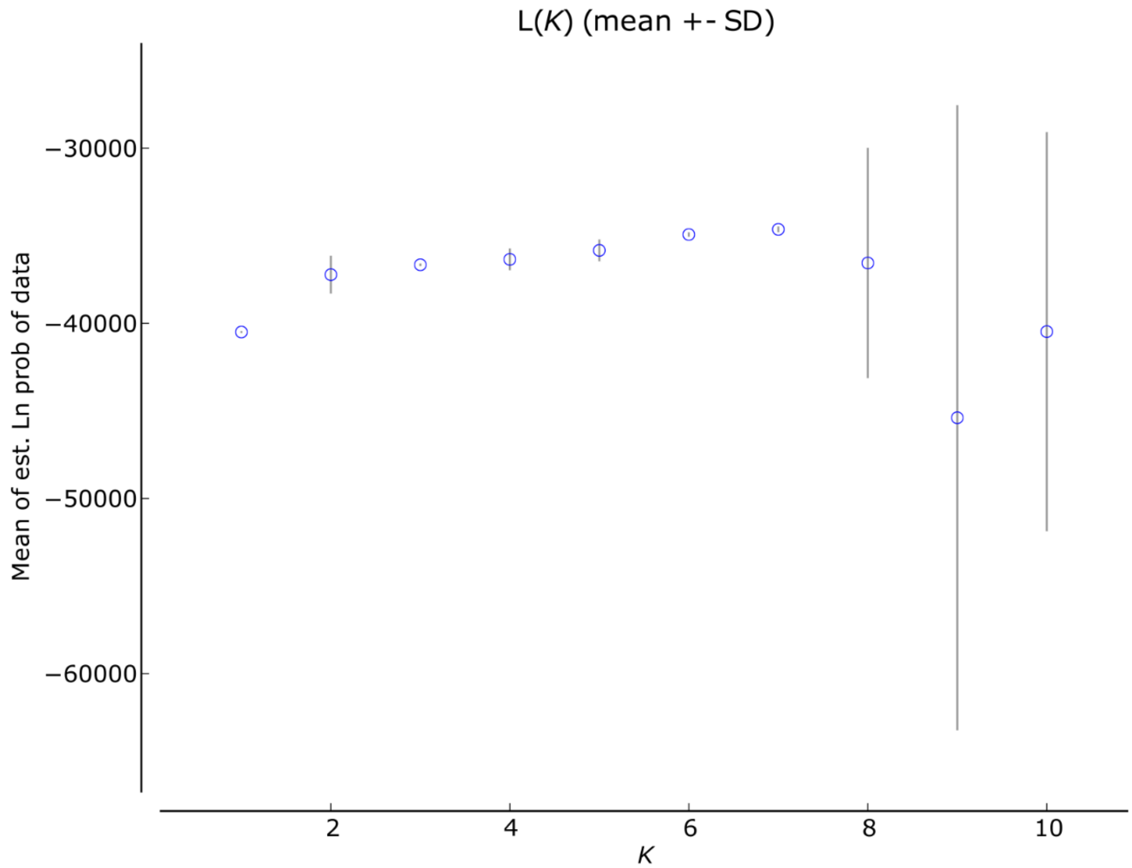

Fig. S16. Mean of estimated log probability of data *v. K* for populations of *Xerochrysum viscosum* and *X*. sp. Mount Kaputar. n = 62.

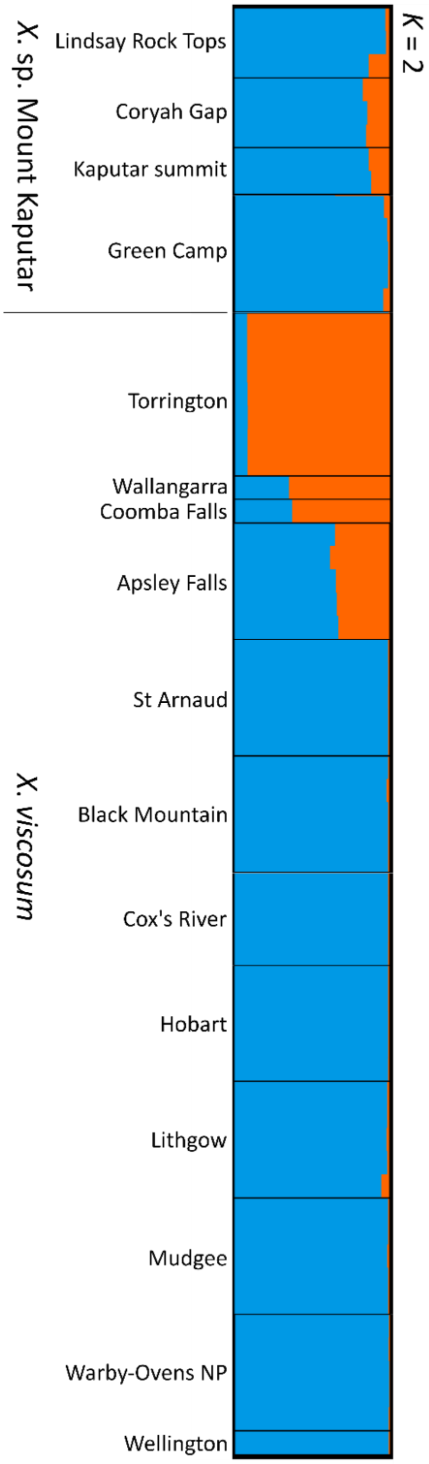

Fig. S17. STRUCTURE bar plots for populations of *Xerochrysum viscosum* and *X*. sp. Mount Kaputar, major clustering modes $K = 2$. Bar plots show each individual as a horizontal bar divided into segments based on the proportion of ancestry suggested for 2 subpopulations across all ten runs; n = 62. Fine black lines delineate sampling locations.

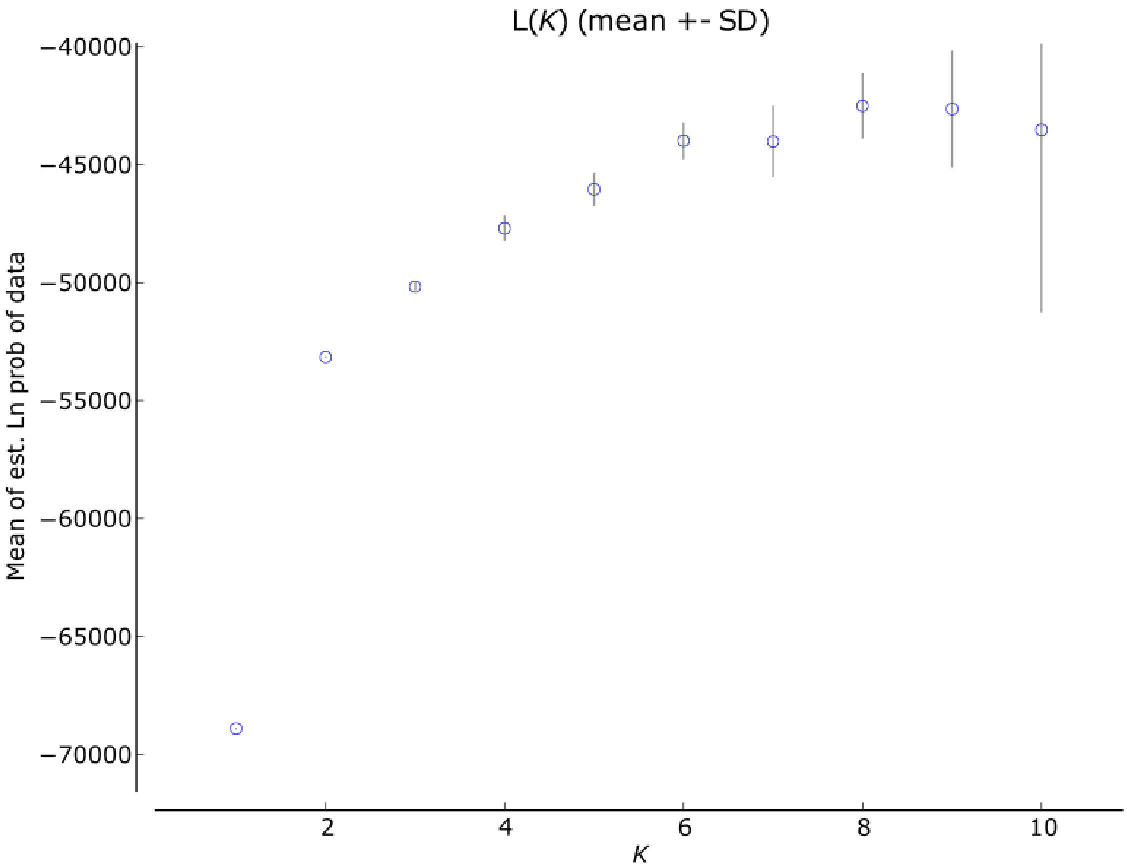

Fig. S18. Mean of estimated log probability of data *v. K* for species and putative entities of *Xerochrysum* in the 'Boreale' cluster. n = 148.

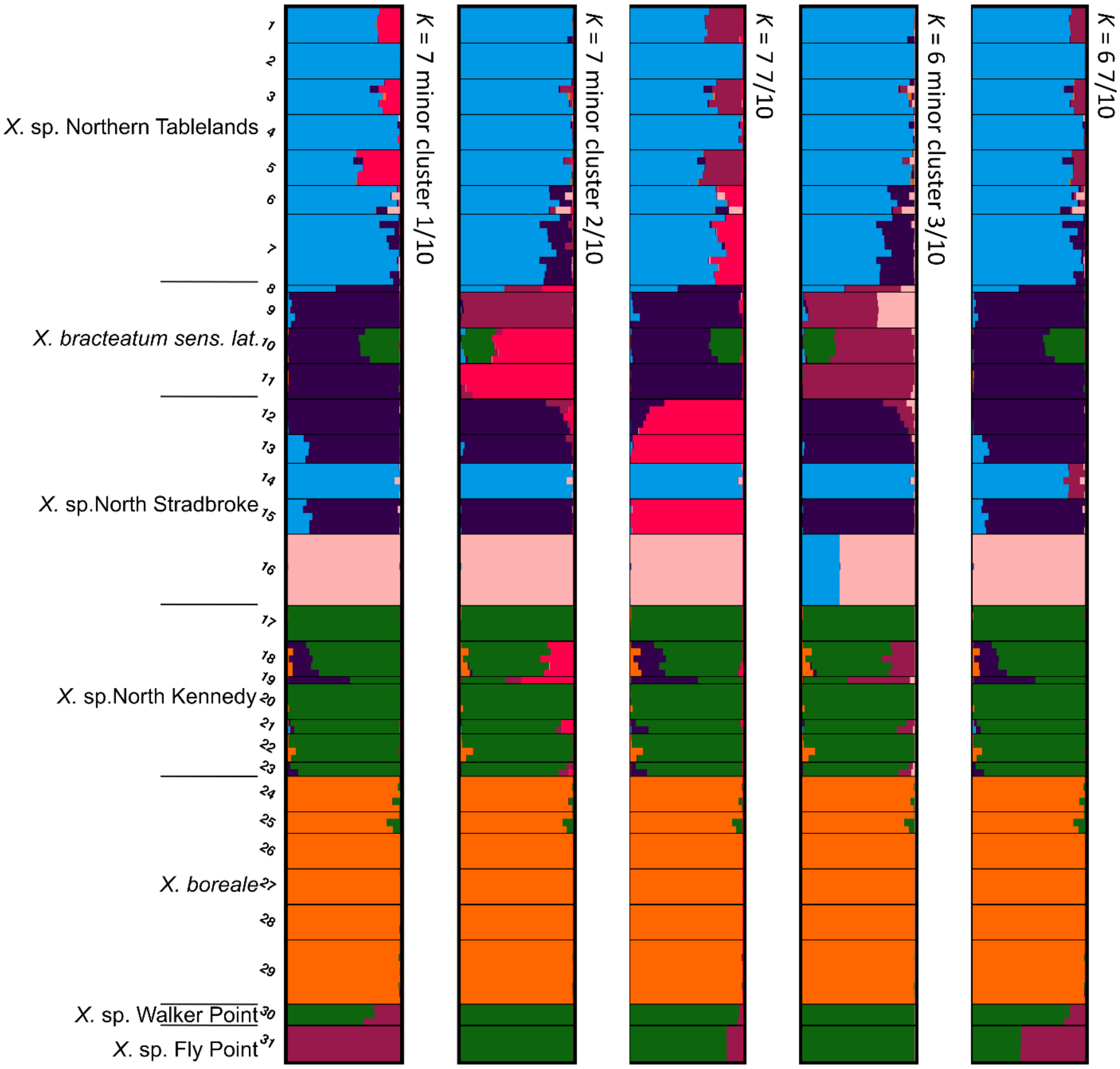

Fig. S19. STRUCTURE bar plots for 'Boreale' group species and putative entities of *Xerochrysum*, major and minor clustering modes *K* = 6. Bar plots show each individual as a horizontal bar divided into segments based on the proportion of ancestry suggested for 6 subpopulations across seven of the 10 runs; n = 148. Fine black lines delineate sampling locations, populations numbered as in Table S11.

Table S12. Location and putative entity numbers used to identify bar plots in STRUCTURE bar plots for 'Boreale' species and putative entities of *Xerochrysum* major clustering modes *K* = 6.

Number	Taxon	Location
1	*X. bracteatum sens. lat.*	Tasmania
2	*X*. sp. N Tablelands	Apsley Falls, OWR NP, NSW
3	*X*. sp. N Tablelands	Ebor, NSW
4	*X*. sp. N Tablelands	Costello Rd, Glencoe, NSW
5	*X*. sp. N Tablelands	Gloucester Tops, NSW
6	*X*. sp. N Tablelands	The Head, Qld
7	*X*. sp. N Tablelands	Bunya Mountain NP, Qld
8	*X. bracteatum sens. lat.*	Narrabri, NSW
9	*X. bracteatum sens. lat.*	Chinchilla, Qld
10	*X. bracteatum sens. lat.*	Yeppoon, Qld
11	*X*. sp. N Stradbroke Is.	Byfield NP, Qld
12	*X*. sp. N Stradbroke Is.	Town of 1770, Qld
13	*X*. sp. N Stradbroke Is.	Noosa NP, Qld
14	*X*. sp. N Stradbroke Is.	Iluka, NSW
15	*X*. sp. N Stradbroke Is.	Fraser Island NP, Qld
16	*X*. sp. N Stradbroke Is.	Moreton Island NP, Qld
17	*X*. sp. N Kennedy	Baldy Mountain FR, Qld
18	*X*. sp. N Kennedy	Blackbraes NP, Qld
19	*X*. sp. N Kennedy	Eungella NP, Qld
20	*X*. sp. N Kennedy	Herberton, Qld
21	*X*. sp. N Kennedy	Paluma Range, Qld
22	*X*. sp. N Kennedy	Wondecla, Qld
23	*X*. sp. Mount Elliott	Bowling Green Bay NP, Qld
24	*X. boreale*	Wadeye, NT
25	*X. boreale*	Dundee Beach, NT
26	*X. boreale*	Dhupuwamirri, NT
27	*X. boreale*	Mirrnatja, NT
28	*X. boreale*	Yunupingu Cattle Farm, NT
29	*X. boreale*	Cox Peninsula, NT
30	*X*. sp. Walker Point	Annan River NP, Qld
31	*X*. sp. Fly Point	Fly Point, Qld

A detailed list of gatherings can be found in Table S1. OWR, Oxley Wild Rivers; NP, National Park; NSW, New South Wales; Rd, Road; Qld, Queensland; NT, Northern Territory.

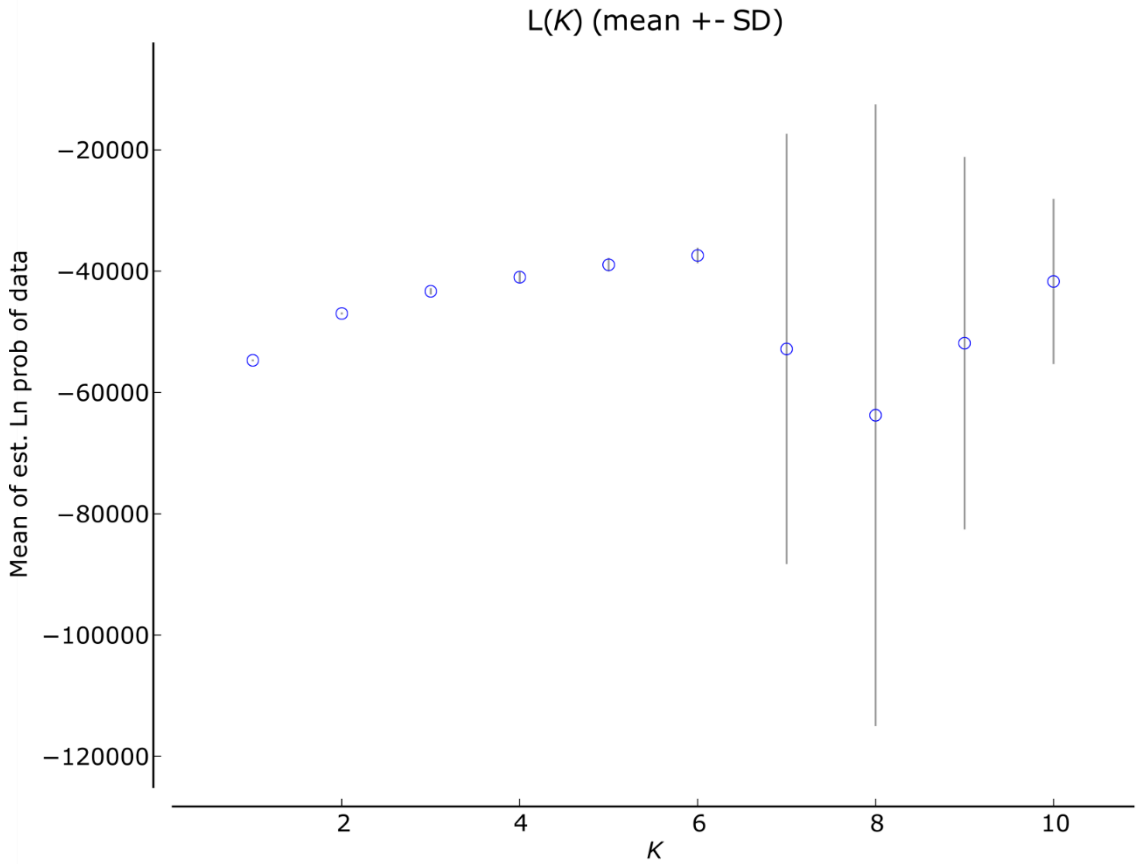

Fig. S20. Mean of estimated log probability of data *v*. *K* for *X*. *boreale*, *X*. sp. Fly Point, *X*. sp. Mount Elliott, *X*. sp. North Kennedy and *X*. sp. Walker Point samples. n = 63.

Table S13. Pairwise F_{ST} for populations of *Xerochrysum* sp. Mount Elliott, *X*. sp. weedy, and *X*. sp. North Stradbroke Island.

	NKBal	NKHer	NKWon	NKPal	NKBlac	MEBow	braRoc	NSh1770	NShNoo	NSdMor
NKBal	0.000	0.201	0.196	0.137	0.218	0.214	0.308	0.445	0.460	0.629
NKHer	0.201	0.000	0.182	0.109	0.202	0.191	0.297	0.447	0.452	0.629
NKWon	0.196	0.182	0.000	0.082	0.169	0.160	0.253	0.402	0.416	0.586
NKPal	0.137	0.109	0.082	0.000	0.074	-0.098	0.123	0.250	0.239	0.444
NKBlac	0.218	0.202	0.169	0.074	0.000	0.123	0.176	0.326	0.332	0.549
MEBow	0.214	0.191	0.160	-0.098	0.123	0.000	0.164	0.300	0.310	0.485
braRoc	0.308	0.297	0.253	0.123	0.176	0.164	0.000	0.251	0.251	0.500
NSh1770	0.445	0.447	0.402	0.250	0.326	0.300	0.251	0.000	0.216	0.510
NShNoo	0.460	0.452	0.416	0.239	0.332	0.310	0.251	0.216	0.000	0.471
NSdMor	0.629	0.629	0.586	0.444	0.549	0.485	0.500	0.510	0.471	0.000

Darker shading indicates greater genetic divergence in Nei's pairwise comparisons.

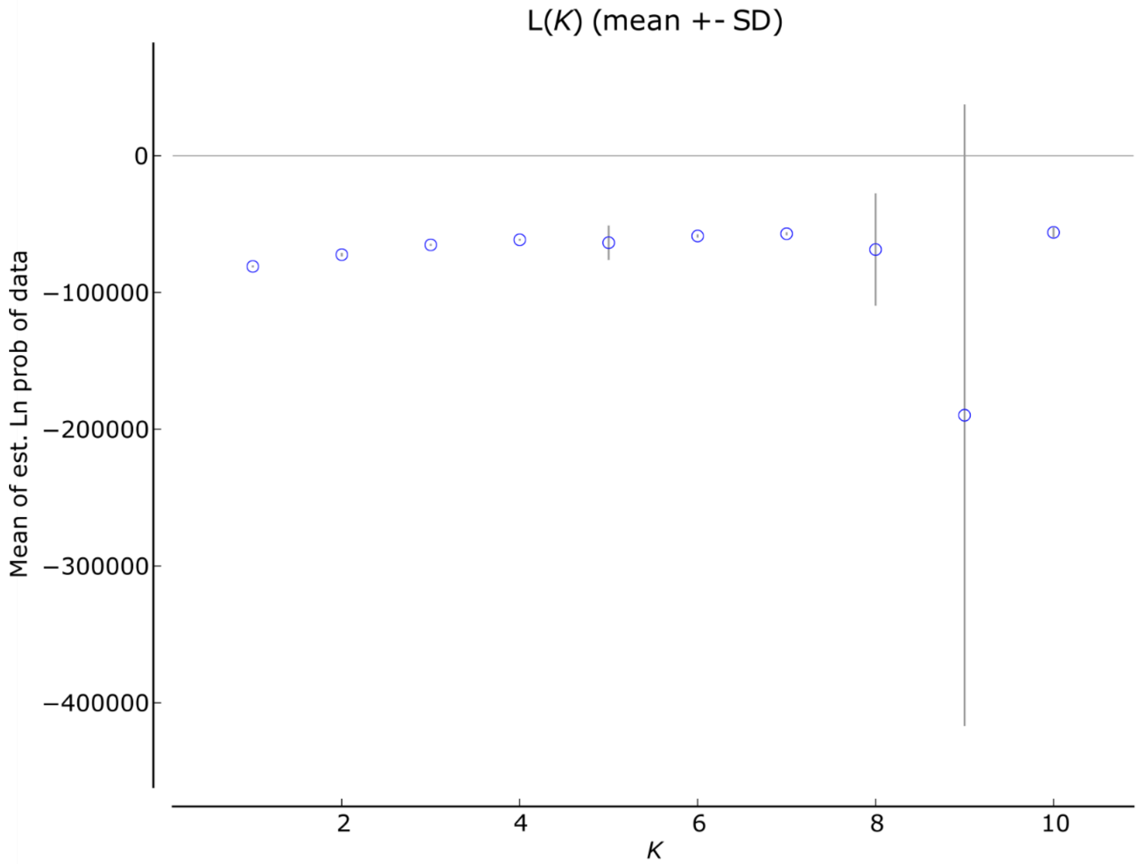

Fig. S21. Mean of estimated log probability of data *v. K* for some putative species of *Xerochrysum* genetically similar to *X*. sp. North Stradbroke Island and *X*. sp. Northern Tablelands. n = 79.

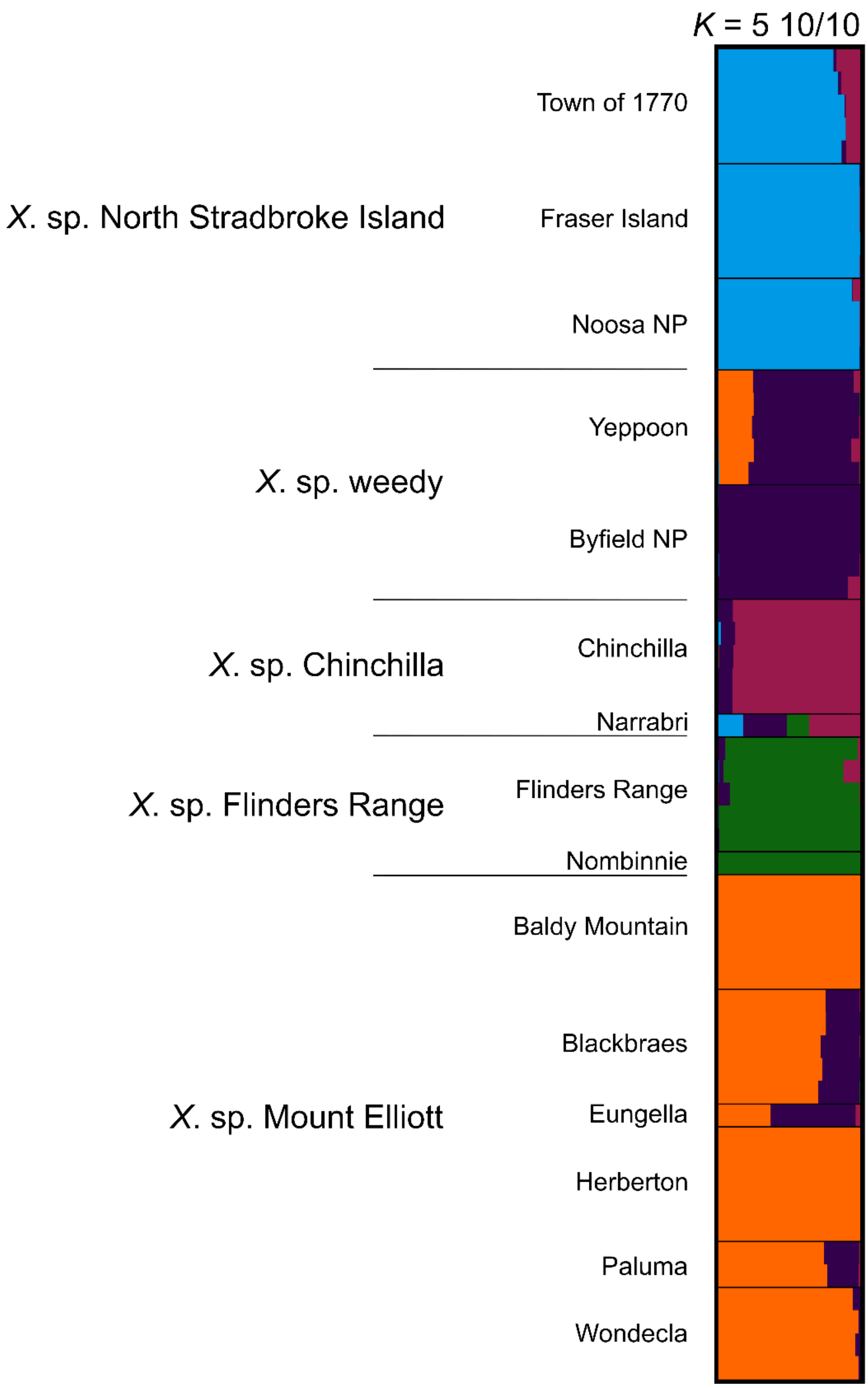

Fig. S22. STRUCTURE bar plots for some putative species of *Xerochrysum* associated with *X*. sp. North Stradbroke Island and *X*. sp. Mount Elliott, major clustering modes $K = 5$. Bar plots show each individual as a horizontal bar divided into segments based on the proportion of ancestry suggested for 1–10 subpopulations across all of the 10 runs; n = 58. Fine black lines delineate sampling locations.

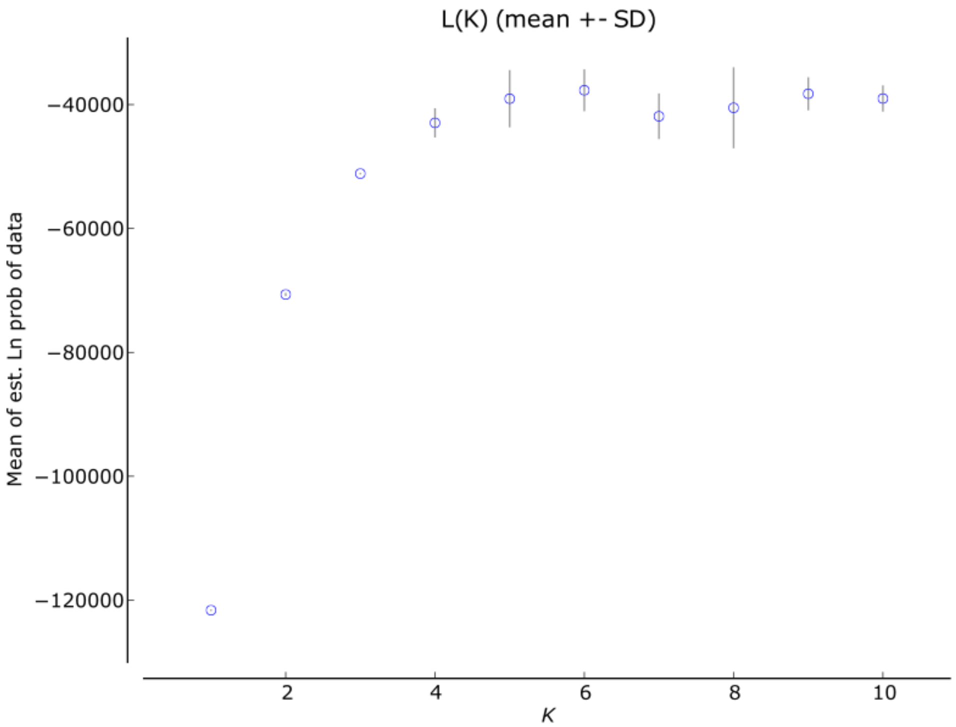

Fig. S23. Mean of estimated log probability of data *v*. *K* for *Xerochrysum subundulatum*, *X*. sp. Blackfellows Gap, *X*. *viscosum*, *X*. *bracteatum sens. str.*, *X*. *palustre* and *X*. aff. *palustre* samples. n = 114.

Table S14. Location and putative entity numbers used to identify bar plots in STRUCTURE bar plots for *Xerochrysum subundulatum*, *X.* sp. Blackfellows Gap, *X. viscosum*, *X. bracteatum sens. str.*, *X. palustre* and *X.* aff. *palustre*.

Number	Taxon	Location
1	*X. subundulatum*	Lake Augusta, Tasmania
2	*X. subundulatum*	Lake Lee Road, Tasmania
3	*X. subundulatum*	Cradle Mountain, Tasmania
4	*X. subundulatum*	Ben Lomond, Tasmania
5	*X. subundulatum*	Mount Buller, Victoria
6	*X. subundulatum*	Connors Hill, NSW
7	*X. subundulatum*	Dead Horse Gap, NSW
8	*X. subundulatum*	Wares Yard, NSW
9	*X. subundulatum*; *X*. sp. Blackfellows Gap	Namadgi NP, ACT; Namadgi NP, ACT
10	*X. viscosum*	St Arnaud NP, Victoria
11	*X. viscosum*	Black Mountain, ACT
12	*X. viscosum*	Warby-Ovens NP, Victoria
13	*X. viscosum*	Lithgow, NSW
14	*X. bracteatum sens. strict.*	Nethercote Falls, NSW
15	*X. bracteatum sens. strict.*	Gulaga NP, NSW
16	*X. bracteatum sens. strict.*	The Oaks, NSW
17	*X. bracteatum sens. strict.*	Bulli Lookout, NSW
18	*X. bracteatum sens. strict.*	Mount Keira, NSW
19	*X. palustre*	Bronte Lagoon, Tasmania
20	*X. palustre*	Smiths Lagoon, Tasmania
21	*X*. aff. *palustre*	Kanangra Boyd NP, NSW
22	*X*. aff. *palustre*	Reids Road, Tasmania
23	*X*. aff. *palustre*	Southern Forests NP, NSW

ACT, Australian Capital Territory, NP, National Park, NSW, New South Wales.

References

Gruber B, Unmack PJ, Berry OF, Georges A (2018) *dartr*: an *r* package to facilitate analysis of SNP data generated from reduced representation genome sequencing. *Molecular Ecology Resources* **18**, 691–699.