



PARASIPHULA ^{1 2}

Gintaras Kantvilas ³

Parasiphula Kantvilas & Grube, in M. Grube & G. Kantvilas, *Lichenologist* 38: 246 (2006).

Type: *P. fragilis* (Hook.f. & Taylor) Kantvilas & Grube

Thallus foliose to fruticose, rarely \pm squamulose, comprised of highly variable lobes mostly forming extensive swards, mats, small cushions or tufts; lobes flattened or terete, usually a shade of pale yellowish grey, yellowish brown or dull grey, frequently with a pinkish tinge, sometimes entirely or partially red-brown, \pm isobilateral, anchored to the substratum by basal tufts of terete, highly branched, root-like, pale brown rhizines 0.5–1.5 mm thick at the point of attachment. Photobiont a unicellular green alga with globose cells 5–12 μm diam. Ascomata and conidiomata unknown. Chemistry: dibenzofuranes, depsidones or lacking lichen substances.

A genus of eight species restricted to cold to cool temperate regions of the Southern Hemisphere. It grows on peaty soil, mostly in treeless, windswept, wet environments, often submerged in shallow pools or at the fringes of small lakes. *Parasiphula* displays remarkable morphological similarities with *Siphula*, with the two genera lacking fruiting bodies and having a similar habitat ecology and similar root-like rhizines. Correlations between chemical and morphological characters in *Siphula*-like lichens were found to be supported by molecular data, which revealed that the two genera are only distantly related (Grube & Kantvilas 2006). Whereas *Siphula* is classified in the Lecanophilaceae together with, for example, *Dibaeis*, *Knightiella* and *Thamnolia*, the relationships of *Parasiphula* lie in the chiefly crustose lichen family Coccotremataceae. These differences are further illustrated by the two genera supporting entirely different complements of parasitic fungi (Motiejūnaitė *et al.* 2019). With experience, the species of *Parasiphula* can be identified in the field. However, when growing in non-optimum habitats, they can display very variable and convergent morphologies, making chemical analyses using TLC mandatory. Thallus colour can be a helpful character, but this changes over time, and most species and specimens acquire a distinct pinkish tinge with storage. Table 1 summarises many of their salient features and supplements the identification key.

Key references: Kantvilas (1987, 1994, 1996, 2023); Grube & Kantvilas (2006).

1	Lobes predominantly terete, at most flattened slightly only at the base; lichen substances always absent	2
	Lobes flattened, at most with some terminal segments terete to subterete; lichen substances sometimes present	3
2(1)	Lobes simple, mostly erect, forming dispersed swards on moist soil	<i>P. jamesii</i>
	Lobes densely branched and entangled, forming decumbent cushions or tufts, usually fully submerged in water	<i>P. comata</i>

1 This work can be cited as: Kantvilas G (2023). *Parasiphula*, **version 2023:1**. In MF de Salas (Ed.) *Flora of Tasmania Online*. 8 pp. (Tasmanian Herbarium, Tasmanian Museum and Art Gallery: Hobart). <https://flora.tmag.tas.gov.au/lichen-genera/parasiphula/>

2 This treatment was supported by the Australian Biological Resources Study's National Taxonomy Research Grant Program (grant no. 4-EHINNOL).

3 Tasmanian Herbarium, Tasmanian Museum & Art Gallery, PO Box 5058, UTAS LPO, Sandy Bay, TAS 7005, Australia.

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| 3(1) Thallus squamulose, lacking lichen substances or at most with traces of atranorin; growing on very thin soil, ± directly on rock | P. squamosa |
| Thallus foliose or fruticose, lacking lichen substances or containing porphyritic or lobaric acids; thallus typically growing on peaty or gravelly soil | 4 |
| 4(3) Thallus fruticose, containing porphyritic acid; lobes relatively robust (to 0.25 mm thick) and elongate | 5 |
| Thallus foliose to fruticose, containing lobaric acid or lacking lichen substances; lobes very thin, brittle and fragile (to 0.15 mm thick), generally broadly rounded | 6 |
| 5(4) Thallus containing porphyritic acid and methyl porphyrylate; commonly forming extensive swards in very moist or inundated alpine habitats, mainly on dolerite | P. complanata |
| Thallus containing porphyritic acid only; widespread, mostly forming tufts in peat-filled rock crevices at high elevations | P. georginae |
| 6(5) Lobes whitish grey, at most developing a faint pinkish or yellowish tinge in storage, markedly scabrid, areolate to verruculose; lichen substances absent | P. foliacea |
| Lobes ± entirely red-brown or at least distinctly red-brown to reddish pink at the apices, smooth or minutely scabrid; lobaric acid present or lichen substances absent | 7 |
| 7(5) Lobes typically entirely red-brown; lichen substances absent; common and widespread | P. fragilis |
| Lobes pinkish grey with red-brown tints mainly towards the lobe apices; containing lobaric acid; rare in the south-west | P. elixii |

1 *Parasiphula comata* (Nyl.) Kantvilas & Grube

In M. Grube & G. Kantvilas, *Lichenologist* 38: 246 (2006); —*Siphula ramalinoidea* var. *comata* Nyl., in J.M. Crombie, *J. Linn. Soc. Bot.* 15: 226 (1876); *Siphula comata* (Nyl.) R.Sant. ex Kantvilas, *Herzogia* 12: 14 (1996).

Thallus fruticose, forming loose tufts or dense cushions. Lobes elongate and slender, terete or subterete, richly branched and entangled, 0.2–0.5(–0.7) mm wide, to 25 mm long when in water but frequently much shorter, unevenly tapered and twisted, sometimes becoming fused in places; surface pale yellowish brown to brownish grey, often developing a pinkish tinge, not scabrid, typically undulate, puckered, verruculose to scrobiculate; apices rounded, rather nodulose, very brittle and frequently broken off.

Chemistry: nil; all spot tests negative.

First described from southern South America; occasional in Tasmania at alpine elevations where it grows on muddy soil and rocks fringing tarns and puddles. When permanently submerged, the lobes are long, loosely interwoven and float freely in water. In intermittently inundated situations, it forms shorter, compact cushions. Also occurring in such aquatic habitats is *P. complanata*, but that species has flattened, strap-like lobes and contains porphyritic acid and methyl porphyrylate.

Dove Lake, 41°39'S 145°58'E, 950 m, 1984, G. Kantvilas 319/84 & P. James (BM, HO); Mt Field West Plateau, 42°40'S 146°31'E, 1380 m, 2014, G. Kantvilas 141/14 (HO); Ben Lomond, Meadow Vale, 41°32'S 147°40'E, 1430 m, 2021, G. Kantvilas 530/21 (HO).

2 *Parasiphula complanata* (Hook.f. & Taylor) Kantvilas & Grube

In M. Grube & G. Kantvilas, *Lichenologist* 38: 246 (2006); —*Sphaerophoron complanatum* Hook.f. & Taylor, *London J. Bot.* 3: 654 (1844); *Siphula complanata* (Hook.f. & Taylor) R.Sant., in D.J. Galloway, *New Zealand J. Bot.* 21: 197 (1983).

Thallus fruticose, mostly forming spreading mats or swards sometimes several metres in extent, less commonly in small tufts. Lobes very variable, typically broadly flattened and strap-shaped, simple to sparsely branched, ± discrete or entangled, erect, ascending or decumbent, to 50 mm tall, 0.5–5 mm wide and 0.12–0.25 mm thick, sometimes twisted, constricted or of uneven width along their length, occasionally partly or entirely subterete in the upper part and c. 0.3 mm thick; surface pale yellowish grey to yellowish brown, mostly with a pinkish tinge, more rarely dull grey, smooth to dimpled or puckered, in part ± faveolate,

at times scabrid or mealy, especially towards the apices; apices rather truncate in broader lobes, smooth or rather nodulose in subterete lobes, brittle and easily broken off; margins entire, unthickened.

Chemistry: porphyritic acid and methyl porphyrate; cortex K⁺ yellowish, KC⁻, C⁻, P⁻, UV⁻; medulla K⁺ yellowish, KC⁻, C[±] pale greenish, P⁻, UV⁻; the C-test is usually inconclusive.

Common and widespread in Tasmania at alpine elevations, mostly on dolerite peaks. The typical strap-shaped form is usually seen in boggy or semi-permanently inundated situations, especially fringing small tarns or in seasonal puddles, where it grows together with the reddish brown *P. fragilis*. In drier areas, such as in sheltered rock crevices, the lobes become increasingly subterete and entangled in tufts; such reduced thalli usually require TLC to distinguish them from *P. georginae* (with porphyritic acid only) or *P. squamosa* (nil substances or atranorin). This species is also widespread in New Zealand and southern South America.

Crater Peak, 41°39'S 145°56'E, 1200 m, 1984, G. Kantvilas 308/84 & P. James (BM, HO); track to Stacks Bluff, 41°37'S 147°43'E, 1000 m, 1996, G. Kantvilas 6/96 (HO); Mt Eliza, 42°58'S 146°24'E, 1270 m, 2004, G. Kantvilas 140/04 (GZU, HO).

3 *Parasiphula elixii* (Kantvilas) Kantvilas & Grube

In M. Grube & G. Kantvilas, *Lichenologist* 38: 246 (2006); —*Siphula elixii* Kantvilas, *New Zealand J. Bot.* 32: 17 (1994). Type: Tasmania, Mt Sprent, 42°48'S 145°58'E, on shallow peat on sheltered rock ledge, 1020 m, 17 February 1987, G. Kantvilas 43/87 (holo—HO!; iso—CANB!, MEL!, WELT!).

Thallus foliose to fruticose, forming spreading mats. Lobes very brittle and fragile, broadly flattened, irregularly branched and lacerate, crowded together, erect or ascending, to 10(–25) mm tall, 1–8 mm wide and 0.1–0.15 mm thick; surface pinkish grey, usually pale to deep reddish brown towards the apices, rarely pale grey, minutely scabrid and areolate, usually more so on one side of the lobes, rarely ± smooth; margins and apices entire or minutely crenulate, not or only very slightly thickened.

Chemistry: lobaric acid and conlobaric acid (trace); cortex K⁻, KC[±] reddish (inconclusively), C⁻, P⁻, UV⁻.

Restricted mostly to higher elevation areas with a Precambrian or Ordovician geology, where it grows on peaty or gravelly soil over large rock outcrops in buttongrass moorland and heathland; also known from New Zealand. The presence of lobaric acid distinguishes it from all other species of the genus. *Parasiphula fragilis* and *P. foliacea* have a similar, very fragile thallus of broadly flattened lobes, but they tend to grow in different habitats and are unlikely to cause confusion.

Mt Counsel, 43°27'S 146°14'E, 750 m, 1986, G. Kantvilas s.n. (HO); summit of Black Bluff, 41°27'S 145°57'E, 1335 m, 2000, G. Kantvilas 136/00 (HO); Mt Orion, 43°09'S 146°16'E, 1120 m, 2006, G. Kantvilas 479/06 (HO).

4 *Parasiphula foliacea* (D.J.Galloway) Kantvilas & Grube

In M. Grube & G. Kantvilas, *Lichenologist* 38: 246 (2006); —*Siphula foliacea* D.J.Galloway, *New Zealand J. Bot.* 21: 197 (1983). Type: Tasmania, with *Siphula complanata* and *S. fragilis* on mosses in recesses and crevices of rocky crags at summit of saddle overlooking Hartz Lake, c. 700 m, 29 March 1963, P. James 2095 (holo—BM!; iso—UPS).

Thallus foliose, forming spreading mats. Lobes very brittle and fragile, broadly flattened and undulate, sparsely and irregularly bifurcate, very densely crowded together, mostly erect, or ascending with the margins curved inwards and then concave, 5–15 mm tall, 4–12 mm wide at the apices, 0.1–0.15 mm thick; surface whitish grey, sometimes with a faint pinkish or yellowish brown tinge, smooth below, usually markedly scabrid, areolate to verruculose towards the apices, more so on one side of the lobes; margins and apices entire, not or sometimes slightly thickened.

Chemistry: nil; all spot tests negative.

Seemingly restricted to the southern ranges, especially from the Hartz Mountains to Mt La Perouse, and extending westwards as far as Mt Bobs; also known from New Zealand. It is most commonly seen in peat-

filled crevices on alpine boulders. This species is characterised by the thin, highly flattened, broad lobes and the absence of lichen substances. The lobes are usually densely crowded and when viewed from above can look like stacked, draining dinner plates. It usually grows with *P. fragilis* from which it is readily distinguished by its grey (rather than red-brown) colour.

Mt La Perouse, 43°30'S 146°44'E, 1150 m, 1986, G. Kantvilas 184/86 (HO); Mt Bobs, 43°18'S 146°36'E, 1080 m, 1998, G. Kantvilas 52/98 (HO); Adamsons Peak, 43°21'S 146°50'E, 1150 m, G. Kantvilas 16/01 (GZU, HO, M).

5 *Parasiphula fragilis* (Hook.f. & Taylor) Kantvilas & Grube

In M. Grube & G. Kantvilas, *Lichenologist* 38: 246 (2006); —*Endocarpon fragile* Hook.f. & Taylor, *Lond. J. Bot.* 3: 639 (1844); *Siphula fragilis* (Hook.f. & Taylor) J.Murray, in W.A. Weber, *Lichenes Exsiccati Colo.*, Fasc. 7, no. 265 (1969). Type: [Tasmania] Van Diemens Land, R.W. Lawrence (holo—FH).

Thallus foliose, forming extensive mats or small tufts. Lobes very brittle and fragile, broadly flattened, plane to undulate, sparsely and irregularly bifurcate, sometimes lacerate, scattered or densely crowded together, mostly decumbent, or ascending to erect, 2–10 mm tall, 1–10 mm wide, 0.1–0.15 mm thick; surface pale to deep reddish brown, rarely pale pinkish grey in shade, smooth throughout or occasionally slightly puckered in older lobes; margins and apices entire, mostly slightly thickened.

Chemistry: nil; all spot tests negative.

Widespread on peaty soil at high elevations throughout Tasmania; also known from Victoria and New Zealand. Although very variable, this species is nevertheless usually easily recognised by its red-brown, smooth lobes and the absence of lichen substances. In wet habitats such as semi-permanently or seasonally inundated fringes of tarns and puddles, the lobes tend to be loose, undulate and decumbent. In drier sites, such as in peat-filled rock crevices, they become more erect and densely crowded. In extreme shade, the red-brown coloration becomes less pronounced. The superficially similar *P. foliacea* tends to be more uniformly grey and has a scabrid to verruculose surface, whereas *P. elixii* contains lobaric acid.

Mt Mawson, 42°42'S 146°35'E, 1200 m, 1965, G.C. Bratt 2935 & J.A. Cashin (AD, HO, MEL); Legges Tor, 41°32'S 147°40'E, 1500 m, 1991, A. Moscal 22242 (HO); Eastern Arthur Range, c. 1 km S of East Portal, 43°14'S 146°26'E, 930 m, 1991, G. Kantvilas 104/91 (HO).

6 *Parasiphula georginae* (Kantvilas) Kantvilas & Grube

In M. Grube & G. Kantvilas, *Lichenologist* 38: 246 (2006); —*Siphula georginae* Kantvilas, *Herzogia* 12: 12 (1996). Type: Tasmania, western foothills of Mt Giblin, 43°01'S 146°10'E, in moist, exposed rock crevices in buttongrass moorland, 700 m, 13 March 1991, G. Kantvilas 95/91 (holo—HO!).

Thallus fruticose, forming dense mats or pulvinate tufts. Lobes very variable, typically broadly flattened, simple, irregularly bifurcate or distinctly branched several times, discrete or tightly crowded, erect, ascending or decumbent, to 10–30 mm tall, 3–5 mm wide and 0.15–0.25 mm thick, sometimes becoming nodulose and subterete in the upper part and then only 0.3–0.4 mm wide; surface dull pale grey with a pinkish or yellowish brown tinge, smooth to scabrid, especially towards the apices, sometimes transversely cracked, occasionally wrinkled towards the base; apices typically rounded, sometimes minutely crenulate or thickened, nodulose and easily broken off in terete lobes; margins entire, generally unthickened.

Chemistry: porphyritic acid; cortex K⁺ yellowish, KC⁻, C⁻, P⁻, UV⁻; medulla K⁺ yellowish, KC⁻, C[±] pale greenish, P⁻, UV⁻; the C-test is usually inconclusive.

Widely distributed in Tasmania in high rainfall areas and at high elevations; also known from New Zealand. The typical habitat of this species is in peat-filled crevices of quartzitic boulders in the buttongrass moorlands of the south-west, where it forms dense mats of erect, broad lobes with rounded, usually scabrid apices. Species of *Siphula* can occur in similar habitats but have a chalky white thallus and mostly contain thamnolic acid (K⁺ yellow). When growing on thin soil amongst mosses on exposed rocks, especially dolerite, the thallus of *P. georginae* becomes smaller, with subterete, nodulose lobes or lobe apices. Such forms can be morphologically indistinguishable from *P. squamosa* and *P. complanata*, and chemical analysis

by TLC is mandatory for identification. The reduced form is dominant on the dolerite peaks of the Central Plateau and North-East highlands.

Coalmine Crag, 41°35'S 147°39'E, 1450 m, 1998, G. Kantvilas 86/98 (HO); southern summit of Mt Wright, 42°37'S 146°20'E, 1110 m, 2008, G. Kantvilas 17/08 (HO); Crest Range, 43°17'31"S 146°30'26"E, 960 m, 2016, G. Kantvilas 169/16 (HO).

7 *Parasiphula jamesii* (Kantvilas) Kantvilas & Grube

In M. Grube & G. Kantvilas, *Lichenologist* 38: 246 (2006); —*Siphula jamesii* Kantvilas, *Nordic J. Bot.* 7: 585 (1987). Type: Tasmania, Twelvetreets Range, on wet peaty soil in buttongrass moorland, 690 m, 2 November 1986, G. Kantvilas 171/86 & J. Jarman (holo—HO!; iso—BM!, MEL!).

Thallus fruticose, forming sparse swards. Lobes elongate and slender, terete to subterete, simple or very sparingly branched, discrete and dispersed, erect or ascending, rarely decumbent, (6–)12–35 mm tall, 0.2–0.8 mm thick, irregularly twisted and tapering unevenly from a subterete to slightly flattened base to 1.5 mm wide; surface ivory-white, occasionally with a pale greenish or brownish tinge, smooth or undulate, rarely slightly scrobiculate towards the apices, never scabrid; apices rounded, rather nodulose, very brittle and frequently broken off.

Chemistry: nil; all spot tests negative.

Widespread and common in south-western Tasmania, and largely confined to areas of Precambrian quartzite, Ordovician conglomerate and Devonian granite; reports from New Zealand remain unconfirmed. This species is most similar to *P. comata*, which also lacks lichen substances and is composed ± entirely of terete to subterete lobes. However, that species differs by consisting of highly branched and entangled lobes that form tufts or cushions. Some narrow-lobed forms of *P. complanata* and *P. georginae* can also resemble *P. jamesii* but contain porphyritic acid and have scabrid lobe apices. In its typical form, *P. jamesii* is seen as scattered, erect, ivory-grey lobes in muddy or gravelly gaps between shrubs and sedges in button-grass moorland, associated with the chalky white *Siphula decumbens* Nyl.

South Darwin Peak, 42°18'S 145°35'E, 1971, G.C. Bratt 71/954 (AD, HO, MEL); High Rocky Peak, 42°29'S 146°08'E, 880 m, 1985, G. Kantvilas 156/85 (HO); Green Head, c. 3 km SSE of Greystone Bluff, 43°06'S 146°04'E, 880 m, 1991, G. Kantvilas 66/91 (HO).

8 *Parasiphula squamosa* Kantvilas

Lichenologist 55: 18 (2023). Type: Tasmania, Ben Lomond, Stonjeks Lookout, summit of Hamilton Crags, 41°32'S 147°40'S, 1535 m, on skeletal soil over alpine dolerite boulders, 20 November 2021, G. Kantvilas 552/21 (holo—HO!).

Thallus squamulose to small-foliose, forming sparse to dense cushions. Squamules very brittle and fragile, plane, undulate or concave, broadening from a narrow base and sparingly branched in several planes, densely congested, erect, ascending or decumbent, 1.5–5 mm tall, 1–3(–4) mm wide at the widest point, 0.13–0.25(–0.3) mm thick; surface dull grey or greyish white, sometimes discoloured darkish grey due to an overlying weft of unidentified fungal hyphae, dimpled and puckered but not scabrid; apices rounded, unthickened, sometimes ± crenulate, commonly broken off, sometimes nodulose or with the ultimate segments ± terete, erect or ascending, to c. 0.25 mm wide, occasionally with terete lobes dominating the thallus and obscuring the flattened basal parts.

Chemistry: atranorin and chloroatranorin present in trace amounts, or nil; cortex K± very pale yellowish, KC–, C–, P–, UV–.

Widely scattered but rarely common, mostly on the mountains of the north-east, but with isolated occurrences in the south-west and at lower elevations. It typically grows on very thin soil directly over rocks. Although characterised by the combination of a grey, squamulose or minutely foliose thallus and a chemical composition that includes traces of atranorin and chloroatranorin, *P. squamosa* is easily confused with forms

of *P. georginae* and with *Siphula decumbens*, both of which can occur in the same habitats. Chemical analysis via TLC is mandatory to identify this enigmatic species.

Mt Victoria, 41°19'S, 147°50'E, 1160 m, 1971, G.C. Bratt 71/58 et al. (HO); Meadstone Falls, 41°45'S 148°05'E, 400 m, 1999, G. Kantvilas 323/99 (HO); Mt Sprent Track, 42°47'S 145°58'E, 900 m, 2003, G. Kantvilas 58/03 (GZU, HO).

Table 1. Salient features of the species of *Parasiphula*

	<i>P. comata</i>	<i>P. complanata</i>	<i>P. elixii</i>	<i>P. foliacea</i>	<i>P. fragilis</i>	<i>P. georginae</i>	<i>P. jamesii</i>	<i>P. squamosa</i>
thallus	fruticose	fruticose	foliose to fruticose	foliose	foliose	fruticose	fruticose	squamulose to small-foliose
colour when dry	pale yellowish brown to brownish grey, later developing a pinkish tinge	pale yellowish grey to yellowish brown or dull grey, often with a pinkish tinge	pinkish grey, with pale to deep reddish brown apices	whitish grey, sometimes developing a faint pinkish or yellowish brown tinge	deep reddish brown	dull pale grey with a pinkish or yellowish brown tinge	ivory-white	dull grey or greyish white
lobes	terete, densely branched and entangled	typically broadly flattened and strap-shaped, simple to sparsely branched	broadly flattened, sparsely branched, brittle and fragile	broadly flattened, sparsely branched, brittle and fragile	broadly flattened, sparsely branched, very brittle and fragile	broadly flattened to elongate and subterete, simple to sparsely branched	terete to subterete, simple or very sparingly branched	plane, undulate or concave, sparsely branched
surface	mostly undulate and puckered	smooth to dimpled or puckered	minutely scabrid and areolate	markedly scabrid, areolate to verruculose	smooth throughout or occasionally slightly puckered	smooth to scabrid	smooth or undulate	dimpled and puckered
lobe height	to 25 mm	to 50 mm	10(–25) mm	5–15 mm	2–10 mm	10–30 mm	(6–)12–35 mm	1.5–5 mm
lobe width	0.2–0.5(–0.7) mm	0.5–5 mm	1–8 mm	4–12 mm	1–10 mm	3–5 mm	0.2–0.8 mm	1–3(–4) mm
lobe thickness	-	0.12–0.25 mm	0.1–0.15 mm	0.1–0.15 mm	0.1–0.15 mm	0.15–0.25 mm	-	0.13–0.25(–0.3)
chemistry	nil	porphyritic acid and methyl porphyrilate	lobaric acid	nil	nil	porphyritic acid	nil	atranorin (±)
ecology	submerged in alpine environments	boggy alpine soil, often seasonally inundated, mostly on dolerite	peaty or gravelly soil over rocks in heathland and/or montane habitats in the west and south-west	peat-filled crevices on alpine boulders, mostly on dolerite in the southern ranges	wet peaty soil at high elevations, often inundated	peaty soil in rock crevices	wet soil in moorland, exclusively in the west and south-west	rocks, usually at alpine elevations, mostly on dolerite in the north-east

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INDEX

C		
Coccotremataceae.....	1	
D		
<i>Dibaeis</i>	1	
E		
<i>Endocarpon fragile</i>	4	
I		
lcmadophilaceae.....	1	
K		
<i>Knightiella</i>	1	
P		
<i>Parasiphula</i>	1	
<i>Parasiphula comata</i>	2	
<i>Parasiphula complanata</i>	2, 4, 5	
<i>Parasiphula elixii</i>	3, 4	
<i>Parasiphula foliacea</i>	3, 4	
<i>Parasiphula fragilis</i>	1, 3, 4	
		<i>Parasiphula georginae</i>3, 4, 5, 6
		<i>Parasiphula jamesii</i>5
		<i>Parasiphula squamosa</i>3, 4, 5
		S
		<i>Siphula</i>1, 4
		<i>Siphula comata</i>2
		<i>Siphula complanata</i>2, 3
		<i>Siphula decumbens</i>5, 6
		<i>Siphula elixii</i>3
		<i>Siphula foliacea</i>3
		<i>Siphula fragilis</i>4
		<i>Siphula georginae</i>4
		<i>Siphula jamesii</i>5
		<i>Siphula ramalinooides</i>2
		<i>Sphaerophoron complanatum</i>2
		T
		<i>Thamnolia</i>1