

**BROWNLIELLOIDEAE, A NEW SUBFAMILY  
IN THE TELOSCHISTACEAE  
(LECANOROMYCETES, ASCOMYCOTA)**

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Brownlielloideae, a new subfamily in the Teloschistaceae, is proposed based on phylogenetic analyses of nuclear ribosomal DNA and 12S SSU mitochondrial DNA sequences. The data indicates that the new subfamily includes eight genera, i.e. *Brownliella*, *Marchantiana* and six new genera proposed here, *Lazarenkoella*, *Raesaeneniana*, *Streimanniella*, *Tarasginia*, *Tayloriella* and *Thelliana*. *Lecanora kobeana* Nyl. is lectotypified and shown to be an older name for the type species of the genus *Brownliella*, *B. aequata*. In addition, a seventh new genus, *Neobrownliella* is proposed in the subfamily Teloschistoideae. This new genus and the new species, *Thelliana pseudokiamae* are described. 13 new combinations are proposed: *Brownliella kobeana*, *Fulgogasparrea appressa*, *Lazarenkoella zoroasteriorum*, *Neobrownliella brownlieae*, *N. montisfracti*, *Raesaeneniana maulensis*, *Streimanniella burneyensis*, *S. kalbiorum*, *S. michelagoensis*, *S. seppeltii*, *Tarasginia tomareana*, *T. whinrayi* and *Tayloriella erythrosticta*.

Key words: Brownlielloideae, *Lazarenkoella*, *Neobrownliella*, new genera, *Raesaeneniana*, *Streimanniella*, *Tarasginia*, *Tayloriella*, *Thelliana*

## INTRODUCTION

The number of genera in the Teloschistaceae has increased rapidly in recent years, from 10 in the phylogenetic study by Kärnefelt (1989) to presently ca 70. Many new segregates have been proposed by Arup *et al.* (2013a), Fedorenko *et al.* (2012) and Kondratyuk *et al.* (2013c, 2014a, b). The genus *Caloplaca*, previously one of the largest of all lichen genera comprising around 1,000 species, is now segregated into 42 genera spread over the entire family

(Arup *et al.* 2013a, Kondratyuk *et al.* 2013c, 2014a, 2015). However, a number of these new genera have not been generally accepted (Miadlikowska *et al.* 2014).

Three major clades, corresponding the subfamilies Xanthorioideae, Caplacoideae and Teloschistoideae were recently introduced within the Teloschistaceae (Arup *et al.* 2013b, Gaya *et al.* 2012), but only the latter has been described formally and considered to include 9 genera (Arup *et al.* 2013b). However, the delimitation of the subfamilies is still not settled since new species and genera continue to be discovered.

A fourth major clade is identified here and proposed as the new subfamily Brownlielloideae, positioned as a sister group to the subfamilies Teloschistoideae and Xanthorioideae (Fig. 1). The new genus *Neobrownliella*, belonging to the subfamily Teloschistoideae, is described below. It is segregated from the polyphyletic genus *Brownliella*, now included in the subfamily Brownlielloideae.

## MATERIALS AND METHODS

The methods used for extraction, amplification and phylogenetic analyses are described in Fedorenko *et al.* (2009, 2012) and in Kondratyuk *et al.* (2013a, c, d, 2014a, b). Genomic DNA was obtained from fresh samples and herbarium specimens. Voucher specimens included in the phylogenetic analyses are listed in Table 1.

Table 1  
Specimens included into phylogenetic analysis with GenBank numbers  
(newly submitted data derived from this study are in boldface)

Species name	Voucher/source	ITS1/ITS2	LSU	12S mtSSU
<i>Blastenia ferruginea</i>	SK593, Kondratyuk <i>et al.</i> (2014a)			KJ023188
<i>Blastenia ferruginea</i>	Arup and Akelius (2009)	FJ866808		
<i>Blastenia ferruginea</i>	Arup <i>et al.</i> (2013a)		KC179163	
<i>Brigantiaea ferruginea</i>	SK779, Kondratyuk <i>et al.</i> (2013c)	KF264622		KF264684
<i>Brigantiaea ferruginea</i>	SK780, Kondratyuk <i>et al.</i> (2013c)	KF264623		KF264685
<b><i>Brownliella kobeana</i></b>	<b>120032, South Korea, Jeollanam-do, Goheung-gun, Geumsan-myeon, Gagum-do, Okryong coast, Ojeon-ri, 34° 26' 16.9" N, 127° 07' 15.4" E, 6 m alt., on rock, 17.04.2012, U. Jayalal, J. S. Park &amp; J. A. Ryu</b>			
	<b>120032 (KoLRI 014623), this paper</b>	<b>KT456212</b>	<b>KT456227</b>	<b>KT456242</b>
<b><i>Brownliella kobeana</i></b>	<b>130231, South Korea: Jeollanam-do, Sinan-gun, Bigeum-myeon, Imjado, nearby wharf Jinri, 35° 05' 21.1" N, 126° 07' 17.6" E, 11 m alt., on rock, 6.06.2013, S. O. Oh, J. S. Park, J. J. Woo</b>			
	<b>130231 (KoLRI 018576), this paper</b>	<b>KT456213</b>	<b>KT456228</b>	<b>KT456243</b>

Table 1 (continued)

Species name	Voucher/source	ITS1/ITS2	LSU	12S mtSSU
<b><i>Brownliella kobeana</i></b>	<b>130318</b> , South Korea: Jeollanam-do, Aphae-do, Sinan-gun, seaside, 34° 49' 10.2" N, 126° 21' 38.7" E, 1 m alt., on rock, 7.06.2013, S. O. Oh, J. S. Park, J. J. Woo 130318 (KoLRI 018663), <b>this paper</b>	<b>KT456214</b>	<b>KT456229</b>	<b>KT456244</b>
<i>Caloplaca cerina</i>	FNM 185, Fedorenko <i>et al.</i> (2009, 2012)	EU681284		EU680863
<i>Caloplaca cerina</i>	Gaya <i>et al.</i> (2012)		JQ301549	
' <i>Caloplaca</i> ' <i>lateritia</i>	SK232, Kondratyuk <i>et al.</i> (2013c)		KF264663	
' <i>Caloplaca</i> ' <i>lateritia</i>	SK878, Kondratyuk <i>et al.</i> (2013c)	KF264628		
<i>Catenaria desolata</i>	Söchting <i>et al.</i> (2014)	KF657317		KF657319
<i>Eilifdahlia dahlii</i>	SK959, Kondratyuk <i>et al.</i> (2014a)	KJ021318	KJ021253	KJ021279
<i>Elenkiniana gloriae</i>	SK613, Kondratyuk <i>et al.</i> (2014a)	KJ021322		KJ021283
<i>Elenkiniana gloriae</i>	SK611, Kondratyuk <i>et al.</i> (2014a)		KJ021256	
<i>Filsoniana australiensis</i>	SK751, Kondratyuk <i>et al.</i> (2013c)	KF264631	KF264665	KF264691
<i>Follmannia orthoclada</i>	Arup <i>et al.</i> (2013a)	KC179291		
<i>Franwilsia bastowii</i>	SK811, Kondratyuk <i>et al.</i> (2014a)	KJ021325	KJ021258	KJ021285
<i>Fulgogasparrea appressa</i>	Arup <i>et al.</i> (2013a)	KC179332		
<i>Fulgogasparrea decipioidea</i>	SK691, Kondratyuk <i>et al.</i> (2013c)	KF264643		KF264694
<i>Fulgogasparrea decipioidea</i>	Arup <i>et al.</i> (2013a)	KC179333	KC179269	KC179608
<i>Fulgogasparrea decipioidea</i>	SK689, Kondratyuk <i>et al.</i> (2013c)	KF264644		KF264695
<i>Golubkovaea trachyphylla</i>	SK491, Kondratyuk <i>et al.</i> (2014b)	KJ133460		
<i>Golubkovaea trachyphylla</i>	Arup <i>et al.</i> (2013a)	KC179283	KC179623	
<i>Gyalolechia aurea</i>	Arup <i>et al.</i> (2013a)	KC179434	KC179196	KC179530
<i>Haloplaca sorediella</i>	Arup <i>et al.</i> (2013a)	KC179293		
<i>Haloplaca suedae</i>	Vondrák <i>et al.</i> (unpubl.)	HM582197		
<i>Honeggeria rosmariae</i>	Eichenberger <i>et al.</i> (unpubl. as <i>Xanthomendoza weberi</i> )	AM697873		
<i>Honeggeria rosmariae</i>	Arup <i>et al.</i> (2013a as <i>Xanthomendoza weberi</i> )	KC179145	KC179285	KC179625
<i>Huneckia pollinii</i>	SK870, Kondratyuk <i>et al.</i> (2014a)	KJ021337	KJ021266	KJ021297
<i>Josefpoeltia parva</i>	Eichenberger <i>et al.</i> (unpubl.)	AM697883		
<i>Josefpoeltia parva</i>	Arup <i>et al.</i> (2013a)		KC179204	KC179539
<i>Kaernea kaernefeltii</i>	SK919, Kondratyuk <i>et al.</i> (2013c)	KF264651	KF264679	KF264702
<b><i>Lazarenkoella zoroasteriorum</i></b>	<b>SK A45</b> , Iran: Razavi Khorasan, 75 km route of Mashhad-Torbat-e Heidarieh, Bazehure, 35° 47' N, 59° 22' E, 1,500 m alt., 9.04.2013, M. Haji Moniri BH_S1 & S. Parsa (KW-L), <b>this paper</b>	<b>KT456215</b>	<b>KT456230</b>	<b>KT456245</b>
<b><i>Lazarenkoella zoroasteriorum</i></b>	<b>SK A51</b> , Iran: Razavi Khorasan, 75 km route of Mashhad-Torbat-e Heidarieh, Bazehure, 35° 47' N, 59° 22' E, 1,500 m alt., 9.04.2013, M. Haji Moniri BH_A1 & S. Parsa (KW-L), <b>this paper</b>	<b>KT456216</b>	<b>KT456231</b>	<b>KT456246</b>
<b><i>Lazarenkoella zoroasteriorum</i></b>	<b>SK A55</b> , Iran: Razavi Khorasan, Dargaz, Tandoureh National Park, Alibolagh, 37° 32' N, 58° 35' E, 920 m alt., 9.05.2011, M. Haji Moniri A-4-K (KW-L), <b>this paper</b>	<b>KT456217</b>	<b>KT456232</b>	<b>KT456247</b>
<i>Marchantiana occidentalis</i>	SK981, Kondratyuk <i>et al.</i> (2014a)	KJ021227	KJ021268	KJ021303

Table 1 (continued)

Species name	Voucher/source	ITS1/ITS2	LSU	12S mtSSU
<i>Marchantia occidentalis</i>	SK982, Kondratyuk <i>et al.</i> (2014a)	KJ021228	KJ021269	KJ021304
<i>Martinjahnsia resendei</i>	Martin and Winka (2000)	AF101285		
<i>Martinjahnsia resendei</i>	Arup <i>et al.</i> (2013a)		KC179290	KC179630
<i>Mikhtomia oxnerii</i>	90117, Kondratyuk <i>et al.</i> (2014a)	KJ021233		KJ021311
<i>Mikhtomia multicolor</i>	SK A14, Kondratyuk <i>et al.</i> (2014a)		KJ021272	
<i>Neobrownliella brownlieae</i>	SK831, Kondratyuk <i>et al.</i> (2013c)	KF264626	KF264661	KF264687
<i>Neobrownliella brownlieae</i>	SK838, Kondratyuk <i>et al.</i> (2013c)	KF264627	KF264662	KF264688
<i>Neobrownliella montisfracti</i>	SK230, Kondratyuk <i>et al.</i> (2013c)	KF264624	KF264659	
<i>Niorma chrysophthalma</i>	Eichenberger <i>et al.</i> (unpubl.)	AM292836		
<i>Niorma chrysophthalma</i>	Gaya <i>et al.</i> (2012)		JQ301576	JQ301518
<i>Pyrenodesmia alociza</i>	SK747, Kondratyuk <i>et al.</i> (2014a)	KJ021239		KJ021313
<i>Pyrenodesmia chalybaea</i>	Gaya <i>et al.</i> (2012)		JQ301550	
<b><i>Raesaeneniiana maulensis</i></b>	<b>SK993, Chile, 'Laguna del Maule', Maule, on rock. 35° 54' 28.4" S; 70° 38' 27.9" W; Alt.: ca 1,353 m a.s.l. Coll.: Wang, X. Y., Oh, S.-O. and Hur, J.-S., 30.01.2012. Holotype: KoLRI-014500 (CL 120331), this paper</b>	<b>KT456218</b>	<b>KT456233</b>	<b>KT456248</b>
<i>Raesaeneniiana maulensis</i>	SK994, Kondratyuk <i>et al.</i> (2014a)	KJ023182	KJ023184	
<i>Scutaria andina</i>	Arup <i>et al.</i> (2013a)	KC179298	KC179242	KC179581
<b><i>Seiophora blumii</i></b>	<b>SK A65, Iran: Razavi Khorasan, Dargaz, Tandoureh National Park, Alibolagh, 37° 32' N, 58° 35' E, 920 m alt., 9.05.2011, M. Haji Moniri AI_4 (KW-L), this paper</b>	<b>KT456219</b>	<b>KT456234</b>	<b>KT456249</b>
<i>Shackletonia sauronii</i>	Arup <i>et al.</i> (2013a)	KC179120	KC179241	KC179580
<i>Sirenophila bermaguiana</i>	SK979, Kondratyuk <i>et al.</i> (2013c)			KF264706
<i>Sirenophila bermaguiana</i>	Arup <i>et al.</i> (2013a)	KC179299	KC179245	KC179584
<i>Sirenophila eos</i>	SK912, Kondratyuk <i>et al.</i> (2013c)	KF264656		
<i>Sirenophila eos</i>	Arup <i>et al.</i> (2013a)	KC179300	KC179246	KC179585
<i>Sirenophila gintarasii</i>	Arup <i>et al.</i> (2013a)	KC179302		
<i>Sirenophila jackelixii</i>	Arup <i>et al.</i> (2013a)	KC179303	KC179248	KC179587
<i>Sirenophila jackelixii</i>	SK910, Kondratyuk <i>et al.</i> (2013c)	KF264655	KF264683	KF264707
<i>Sirenophila jackelixii</i>	SK911, Kondratyuk <i>et al.</i> (2013c)			KF264708
<i>Sirenophila maccarthii</i>	Arup <i>et al.</i> (2013a)	KC179304	KC179249	KC179588
<i>Sirenophila sp. 20</i>	Arup <i>et al.</i> (2013a)	KC179306	KC179250	KC179589
<i>Sirenophila sp. 45</i>	Arup <i>et al.</i> (2013a)	KC179307		
<i>Squamulea squamosa</i>	Arup <i>et al.</i> (2013a)	KC179125	KC179252	KC179591
<i>Stellarangia elegantissima</i>	Arup <i>et al.</i> (2013a)	KC179310	KC179254	KC179593
<i>Streimanniella kalbiorum</i>	SK939, Kondratyuk <i>et al.</i> (2014a)	KJ021225	KJ023183	KJ021300
<i>Streimanniella michelagoensis</i>	SK971, Kondratyuk <i>et al.</i> (2014a)	KJ021226	KJ023185	KJ021301
<i>Streimanniella seppeltii</i>	SK855, Kondratyuk <i>et al.</i> (2014a)	KJ021229	KJ023186	KJ021305
<b><i>Tarasginia whinrayi</i></b>	<b>SK A95, South Australia: Kangaroo Island, summit of bluff W of Windmill Bay, 35° 51' S, 138° 07' E, 40 m alt., on granite boulder in coastal heathland, 17.09.2012, G. Kantvilas 506/12 (KW-L) ex HO 567270), this paper</b>	<b>KT456220</b>	<b>KT456235</b>	<b>KT456250</b>
<i>Tarasginia whinrayi</i>	SK B02, South Australia: Kangaroo Island, 20.09.2012, G. Kantvilas 464/12 B. de Villiers (KW-L) ex HO 567227), this paper	KT456221	KT456236	KT456251

Table 1 (continued)

Species name	Voucher/source	ITS1/ITS2	LSU	12S mtSSU
<i>Tassiloa digitaurea</i>	SK A34, Kondratyuk <i>et al.</i> (2015)	KP096222		KP096224
<i>Tayloriella erythrosticta</i>	<b>SK 817, Western Australia,</b> 9.01.2004, S. Y. Kondratyuk 20435 (LD), <b>this paper</b>	<b>KT456222</b>	<b>KT456237</b>	<b>KT456252</b>
<i>Tayloriella erythrosticta</i>	<b>SK 814, Western Australia,</b> 9.01.2004, S. Y. Kondratyuk 20435 (KW-L), <b>this paper</b>	<b>KT456223</b>	<b>KT456238</b>	<b>KT456253</b>
<i>Tayloriella erythrosticta</i>	<b>SK 819, Western Australia,</b> 9.01.2004, S. Y. Kondratyuk 20435 (LD), <b>this paper</b>	<b>KT456224</b>	<b>KT456239</b>	<b>KT456254</b>
<i>Teloschistes flavicans</i>	FNM-139, Fedorenko <i>et al.</i> (2009, 2012)	EU681363		EU680955
<i>Teloschistopsis bonae-spei</i>	Arup <i>et al.</i> (2013a)	KC179324	KC179257	KC179596
<i>Teloschistopsis eudoxa</i>	Arup <i>et al.</i> (2013a)	KC179322	KC179258	KC179597
<i>Thelliana pseudokiamae</i>	<b>SK925, South Australia,</b> Quorn, 17.01.1999, I. Kärnefelt 994101 (LD 1101337), <b>this paper</b>	<b>KT456225</b>	<b>KT456240</b>	<b>KT456255</b>
<i>Thelliana pseudokiamae</i>	<b>SK926, South Australia,</b> Quorn, 17.01.1999, I. Kärnefelt 994101 (LD 1101337), <b>this paper</b>	<b>KT456226</b>	<b>KT456241</b>	<b>KT456256</b>
<i>Vilophora isidioclada</i>	Arup <i>et al.</i> (2013a)	KC179325	KC179266	KC179606
<i>Wetmoreana texana</i>	SK537, Kondratyuk <i>et al.</i> (2013c)	KF264657		KF264710
<i>Wetmoreana texana</i>	SK536, Kondratyuk <i>et al.</i> (2013c)	KF264658		KF264711
<i>Wetmoreana texana</i>	Arup <i>et al.</i> (2013a)	KC179337	KC179273	KC179612
<i>Xanthomendoza mendoza</i>	FNM 215, Fedorenko <i>et al.</i> (2009)	EU681349		
<i>Xanthomendoza mendoza</i>	FNM 069, Fedorenko <i>et al.</i> (2009)			EU680939
<i>Xanthomendoza mendoza</i>	Arup <i>et al.</i> (2013a)		KC179281	
<i>Xanthoria parietina</i>	FNM-177, Fedorenko <i>et al.</i> (2009, 2012)	EU681289		EU680868
<i>Xanthoria parietina</i>	Gaya <i>et al.</i> (2012)		JQ301589	

Three regions targeted for this study were: 0.6 kb of the ITS1/ITS2 region using the primers ITS1 and ITS4 (White *et al.* 1990) and the primer ITS1F (Gardes and Bruns 1993), 0.8 kb of the 28S LSU using the primer LR5 (Vilgalys and Hester 1990), and 0.8 kb of 12S mtSSU using the primers mtSSU1-mtSSU3R and mtSSU2R (Fedorenko *et al.* 2009, 2012).

Automated reaction clean up and visualisation of the results were performed at the Lichen Bioresource Genome Sequencing and Analysis Core Facility of the Korean Lichen Research Institute, Sunchon National University, South Korea. Sequence fragments were subjected to BLAST searches for the first verification of their identities. They were assembled and edited using Sequencher version 4.8 (Gene Codes Corporation, Ann Arbor, MI), and aligned manually.

The phylogenetic analyses of the manually aligned sequences were performed with PAUP version 4.0b10 (Swofford 2002). Trees were calculated using the general heuristic search option, maximising the number of saved trees to 1,000, whereas gaps were treated as missing characters. Bootstrap analyses

with 1,000 replicates were performed using the same settings. Support values of 50 or above are marked in the consensus tree (Fig. 1). PM, LM and ME were performed.

The morphological results are based mainly on studies of our own specimens, collected during field trips in Europe, Asia, Australia and New Zealand. For anatomical studies, lichen sections were prepared manually or using a Kryomat, Leitz freezing microtome, mounted in water or in lactophenol cotton blue and studied through a Zeiss Axioscope light microscope.

## RESULTS

### *The separate analyses*

The ITS analysis included 96 specimens of 61 species and a total of 550 positions of which 357 were informative. The LSU analysis included 81 specimens representing 52 species and a total of 762 positions of which 194 were informative, whereas the 12S mtSSU analysis included 84 specimens of 50 species and a total of 744 positions of which 229 were informative.

The seven genera proposed below, i.e. *Lazarenkoella*, *Neobrownliella*, *Raesaeneniana*, *Streimanniella*, *Tarasginia*, *Tayloriella*, and *Thelliana* reveal strong support in the separate analyses (not shown in Figure 1). The four genera *Marchantiana*, *Raesaeneniana*, *Streimanniella*, and *Thelliana* form a sister group to the remaining part of the Teloschistaceae in the separate analyses, while the other genera described here, i.e. *Lazarenkoella*, *Neobrownliella*, *Tarasginia*, and *Tayloriella*, are positioned within the Teloschistoideae.

### *The combined analysis*

The combined analysis of nuclear ITS, LSU and 12S mtSSU data sets included 78 specimens of 55 species and a total of 2,056 positions of which 787 were informative.

All seven genera, proposed below, i.e. *Lazarenkoella*, *Neobrownliella*, *Raesaeneniana*, *Streimanniella*, *Tarasginia*, *Tayloriella*, and *Thelliana* are strongly supported in the combined analysis (Fig. 1). Three of the genera (*Marchantiana*, *Streimanniella*, *Raesaeneniana*) form three single clades, whereas five of the genera (*Brownliella*, *Lazarenkoella*, *Tarasginia*, *Tayloriella*, *Thelliana*) are positioned in a second, weakly supported clade of the Brownlielloideae. However, the genus *Neobrownliella*, proposed below, is doubtlessly a member of the Teloschistoideae (Fig. 1).

The Brownlielloideae is preliminarily divided into two weakly supported clades, the *Brownliella* clade and the *Marchantiana* clade. The *Brownliella*

clade includes five genera, i.e. *Brownliella*, *Lazarenkoella*, *Tarasginia*, *Tayloriella* and *Thelliana*, while the Marchantiana clade includes the genera *Marchantiana*, *Raesaeneniana* and *Streimanniella*.

### Taxonomy

Seven new genera are proposed for the strongly supported monophyletic branches; i.e. *Lazarenkoella* for the Asian species *Caloplaca zoroasteriorum*; *Neobrownliella* for the Australian *Caloplaca brownliae* group; *Raesaeneniana* for the South American species *Marchantiana maulensis*; *Streimanniella* for the Australian *Caloplaca michelagoensis* group; *Tarasginia* for the Australian *Caloplaca whinrayi* group; *Tayloriella* for the Australian species *Caloplaca erythrostickta*; and *Thelliana* for the Australian species *Thelliana pseudokiamae*.

Examined material in the present phylogeny study shows that the genus *Brownliella* forms a separate subfamily in the Teloschistaceae together with 7 additional genera, namely *Lazarenkoella*, *Marchantiana*, *Raesaeneniana*, *Streimanniella*, *Tayloriella*, *Tarasginia* and *Thelliana* (Fig. 1). Six strongly supported clades were identified and are proposed here as new genera. A strong branch comprising two species was discovered in the genus *Brownliella* within the subfamily Teloschistoideae and is proposed here as the genus *Neobrownliella*.

### **Brownlielloideae** S. Y. Kondr., Kärnefelt, Elix et A. Thell, *subfam. nova*

Mycobank no.: MB 813890.

Type genus: *Brownliella* S. Y. Kondr., Kärnefelt, Elix, A. Thell et J.-S. Hur.

Differs from the subfamilies Teloschistoideae, Caloplacoideae and Xanthorioideae in the following mtSSU DNA sequence, in usually having a T – not an A – in the sequence AGATTAGATTATATTCTTCTA, and together with the subfamily Xanthorioideae, differs from the subfamilies Caloplacoideae and Teloschistoideae in usually having an A – not a G (C) – in the sequence TTCTAGGTAGAGTAATGATAACGACA, and from Teloschistoideae and Xanthorioideae in having an A rather than the usual G, as well as from Caloplacoideae in having a G or T rather than a C in the sequence TATGATA-GAAGGGACTAAGATAAG.

The new subfamily forms a fourth main branch of the Teloschistaceae. In our analysis, the subfamily Caloplacoideae appears as a sister group to the three other subfamilies (Fig. 1), with Brownlielloideae a sister group of Xanthorioideae and Teloschistoideae. The Brownlielloideae is preliminary divided into two clades, firstly the *Brownliella* clade including the genera

*Brownliella*, *Lazarenkoella*, *Tarasginia*, *Tayloriella* and *Thelliana* and secondly, the Marchantiana clade including the genera *Marchantiana*, *Raesaeneniana* and *Streimanniella*.

The Brownlielloideae occurs mainly in the Southern Hemisphere, in particular, on the Australian continent. A few species are also known from the Northern Hemisphere.

The Marchantiana branch of the Brownlielloideae clade is well supported and positioned separately from the Teloschistoideae, Caloplacoideae and Xanthorioideae in all cases of the analysis, while the *Brownliella* clade is sometimes positioned in the Teloschistoideae if only genera from this subfamily are included. If the subfamily Caloplacoideae is included in the phylogenetic analysis, the position of *Brownliella* in the Brownlielloideae becomes stable.

The new subfamily is named after the genus *Brownliella* S. Y. Kondr., Kärnefelt, Elix, A. Thell et J.-S. Hur, a genus which, when described, was included in the subfamily Teloschistoideae, albeit in an isolated position relative to the remainder of the subfamily (Kondratyuk *et al.* 2013c, 2014a).

***Brownliella* S. Y. Kondr., Kärnefelt, Elix, A. Thell et J.-S. Hur**  
Acta Bot. Hung. 55(3–4): 265 (2013)

Type species: *Brownliella aequata* (Hue) S. Y. Kondr., Kärnefelt, A. Thell, Elix, J. Kim, A. S. Kondratyuk et J.-S. Hur, Acta Bot. Hung. 55(3–4): 271 (2013); *Caloplaca aequata* (Hue) Zahlbr., Cat. Lich. Univ. 7: 211 (1930) [1931]. – Basionym: *Lecanora aequata* Hue, Ann. Mycol. 13(2): 78 (1915), “in Corea quartzicolam legit R. P. Faurie in Kang-ouen-to, n. 4289 et 4819, ac in Fusan n. 4395, Julio et octobri 1901” (PC? not seen).

= *Brownliella kobeana* (Nyl.) S. Y. Kondr., Kärnefelt, Elix, A. Thell et J.-S. Hur – Basionym: *Lecanora kobeana* Nyl., Lichenes Japoniae: 36. 1890. = *Caloplaca kobeana* (Nyl.) Zahlbr., Cat. Lich. Univ. 7: 241 (1930) [1931].

*Brownliella aequata* was selected as the type of this genus when the species was considered to have a western Pacific distribution. It was originally described as *Lecanora aequata* from Korea by Hue (1915) and subsequently from Australia by Kondratyuk and coauthors as ‘*Caloplaca brownlieae*’ in 2011 (Lumbsch *et al.* 2011). At that time ‘*Caloplaca brownlieae*’ was believed to be a superfluous name, however, its status as an independent species was subsequently supported by molecular data (see below).

Australian collections of *Brownliella* appeared nested within the Filsoniana–*Brownliella* clade of the subfamily Teloschistoideae (Kondratyuk *et al.* 2013c).

Both the morphology and molecular phylogeny of *Brownliella aequata* have since been revised and Hue’s *Lecanora aequata* was found to be a latter synonym of *Lecanora kobeana* Nyl.



Furthermore, phylogenetic analyses using ITS1/ITS2 and LSU nrDNA and 12S SSU mtDNA sequences confirmed that the Asian *Brownliella kobeana* was not conspecific with the Australian '*Caloplaca*' *brownlieae*. According to a combined data set, the Asian material of *Brownliella* was positioned within the Brownlielloideae clade, whereas the Australian material of '*Caloplaca*' *brownlieae* remained in the subfamily Teloschistoideae, and here proposed to constitute the new genus, *Neobrownliella*.

***Lazarenkoella*** S. Y. Kondr., Kärnefelt, A. Thell, Elix et J.-S. Hur,  
*gen. nova*

Mycobank no.: MB 813891.

*Thallus* crustose, areolate to squamulose, sometimes richly soresediate/blastidiate, whitish. Apothecia zeorine; cortical layer of thalline exciple paraplectenchymatous; true exciple paraplectenchymatous; asci with 8(–12–16) ascospores. Apothecial disc with anthraquinones of the parietin chemosyndrome.

Type species: *Lazarenkoella zoroasteriorum* (S. Y. Kondr. et M. Haji Moniri) S. Y. Kondr., Kärnefelt, A. Thell, Elix, J. Kim, A. S. Kondratiuk et J.-S. Hur.

*Thallus* small, usually indistinct, consisting of tiny, scattered whitish areoles or squamules, sometimes richly soresediate, with very rare, small apothecia. Blastidia or soredia regularly rounded, rarely forming irregular conblastidia. Apothecia zeorine; cortical layer of thalline exciple paraplectenchymatous, cell lumina 7.5–12.5 µm wide (*Massjukiella* type, sensu Fedorenko *et al.* 2012); true exciple paraplectenchymatous; asci with 8(–12–16) ascospores; ascospores ellipsoid with rather narrow septa; disc K+ purple (with anthraquinones of the parietin chemosyndrome), thallus K–.

Ecology: The single species occurs on deciduous trees (*Prunus* sp. and *Populus* spp.), often along roadside or close to waterfalls, or reservoirs.

Distribution: *Lazarenkoella zoroasteriorum* is known from several localities in Iran and Uzbekistan.

Etymology: The generic name is in the honour of the Ukrainian bryologist and lichen-collector Andrij S. Lazarenko (1901–1979) who worked in both Kyiv and Lviv, and provided important collections from several central Asian countries.

Taxonomic notes: The genus *Lazarenkoella* is morphologically and anatomically similar to some species of *Calogaya* (particularly the *Calogaya lobulata* group, i.e.: sect. *Xanthoriella* of the genus *Caloplaca* sensu Steiner and Poelt (1982), including *Calogaya polycarpoides* and *C. persica*), as well as to some species representatives of *Scythioria* and '*Caloplaca*' (see also Kondratiuk *et al.*

2013a, b). The genera, *Calogaya* and *Scythioria*, are members of the subfamily Xanthorioideae, while *Caloplaca* belongs to the Caloplacoideae.

It will be some time before we know how many species can be included in *Lazarenkoella*. Furthermore, additional species of *Calogaya* and *Scythioria* should be included in future analyses to delineate the borders between these genera.

***Marchantiana*** S. Y. Kondr., Kärnefelt, Elix, A. Thell et J.-S. Hur  
Acta Bot. Hung. 56(1–2): 103 (2014)

Type species: *Marchantiana occidentalis* (Elix, S. Y. Kondr. et Kärnefelt) S. Y. Kondr., Kärnefelt, Elix, A. Thell, J. Kim, A. S. Kondratiuk et J.-S. Hur.

Originally *Marchantiana* included five Australian species (i.e. *M. burneyensis* (S. Y. Kondr. et Kärnefelt) S. Y. Kondr., Kärnefelt, A. Thell, Elix, J. Kim, A. S. Kondratiuk et J.-S. Hur, *M. kalbiorum* (S. Y. Kondr. et Kärnefelt) S. Y. Kondr., Kärnefelt, A. Thell, Elix, J. Kim, A. S. Kondratiuk et J.-S. Hur, *M. michelagoensis* (Elix, S. Y. Kondr. et Kärnefelt) S. Y. Kondr., Kärnefelt, A. Thell, Elix, J. Kim, A. S. Kondratiuk et J.-S. Hur, *M. occidentalis* (Elix, S. Y. Kondr. et Kärnefelt) S. Y. Kondr., Kärnefelt, A. Thell, Elix, J. Kim, A. S. Kondratiuk et J.-S. Hur and *M. seppeltii* (S. Y. Kondr. et Kärnefelt) S. Y. Kondr., Kärnefelt, A. Thell, Elix, J. Kim, A. S. Kondratiuk et J.-S. Hur), as well as *M. maulensis* S. Y. Kondr. et J.-S. Hur from South America (Kondratyuk *et al.* 2014a). The genus so defined, was quite diverse in both morphological and chemical characters, but nevertheless strongly supported by the analysis based on the combined molecular data set. *Marchantiana occidentalis* is characterised by having biatorine or rarely zeorine apothecia with a pseudoprosoplectenchymatous true exciple, and in containing ascumatic acid and related dibenzofurans. It should also be mentioned that the mitochondrial DNA data indicated that *M. occidentalis* occupied a separate and rather distant position from other *Marchantiana* species, but all of the species form a strongly supported monophyletic branch using the combined data set (Kondratyuk *et al.* 2014a).

***Neobrownliella*** S. Y. Kondr., Elix, Kärnefelt et A. Thell, *gen. nova*

MycoBank no.: MB 813892.

*Thallus* continuous or areolate, yellow to reddish orange or pink; cortical layer paraplectenchymatous. Apothecia immersed to biatorine; true exciple poorly developed; conidia narrowly bacilliform; constituents: anthraquinones of the parietin chemosyndrome.

Type species: *Neobrownliella brownlieae* (S. Y. Kondr., Elix et Kärnefelt) S. Y. Kondr., Elix, Kärnefelt et A. Thell. – Basionym: *Caloplaca brownlieae* S. Y. Kondr., Elix et Kärnefelt, *Phytotaxa* 18: 28 (2011). Type: Australia. New South Wales: above Lake Eucumbene, on granite boulder, coll.: Brownlie, April 1969 (holotype: MEL 1023635).

Thallus continuous to areolate, sometimes becoming sublobate in the peripheral zone, dull pink, brownish pink to bright orange or reddish orange, cortical layer palisade paraplectenchymatous. Apothecia immersed or rarely adnate, biatorine, true exciple very thin. Ascospores polaribilocular, 8 per ascus, usually with only (2–)4–6 spores well developed, rather small. Conidia bacilliform to narrowly bacilliform. Thallus and apothecia K<sup>+</sup> purple; constituents: anthraquinones of the parietin chemosyndrome or parietin with additional gyrophoric, ovoic and lecanoric acids, xanthorin and erythroglauclin (in small amount).

Etymology: The name was chosen to illustrate the relationship with the genus *Brownliella*.

Taxonomic notes: *Neobrownliella* differs from the *Caloplaca* in having a continuous or areolate thallus containing anthraquinones, in having a palisade paraplectenchymatous cortical layer, and in lacking a thick palisade cortical layer on the underside of the thalline exciple. Unlike the other six genera proposed in this study, *Neobrownliella* is nested in the subfamily Teloschistoidae (Fig. 1).

The genus *Neobrownliella* is morphologically similar to the Northern Hemisphere *Brownliella*, but differs from the latter in having an Australian distribution, as well as in molecular characters.

At present *Neobrownliella* includes two species, *Neobrownliella brownlieae* and *N. montisfracti* (Kondratyuk *et al.* 2007, Lumbsch *et al.* 2011), both exclusively Australian. The widely distributed '*Brownliella*' *cinnabarina* may also belong here, but the phylogenetic position of that species has yet to be confirmed.

***Raesaeneniana*** S. Y. Kondr., Kärnefelt, A. Thell, Elix et J.-S. Hur,  
*gen. nova*

Mycobank no.: MB 813893.

*Thallus* crustose, knobby to microlobulate, dull brownish orange to dull reddish brown. *Apothecia* lecanorine, disc dark reddish brown to orange-brown; proper exciple present only in the basal portion; hymenium and subhymenium with numerous oil droplets and irregular oil inclusions.

Type species: *Raesaeneniana maulensis* (S. Y. Kondr. et J.-S. Hur) S. Y. Kondr., Elix, Kärnefelt et A. Thell.

Thallus crustose, consisting of aggregations of plane, more or less flattened or rounded microlobules, dull brownish orange to dull reddish brown. Upper surface knobby to microlobulate; lower cortex paraplectenchymatous, with very small cell lumina. Apothecia lecanorine, thalline margin microcrenulate, persistent, dull brownish orange, concolorous with thallus; disc dark reddish brown to orange-brown; proper exciple not developed in the lateral portion, often only present in the basal portion; hymenium and subhymenium with numerous oil droplets and irregular oil inclusions; asci 8-spored, but only with 1–2(–4) bipolar ascospores together with simple, aborted ascospores, bipolar ascospores with medium sized septa in water, becoming much wider in K.

Etymology: The genus is named in the honour of the Finnish lichenologist Veli (Johannes Paavo Bartholomeus) Räsänen (1888–1953) who made many collections of Teloschistaceae from South America and other parts of the world.

Ecology: On rock surfaces, detritus or bryophytes.

Distribution: This monotypic genus is only known from South America.

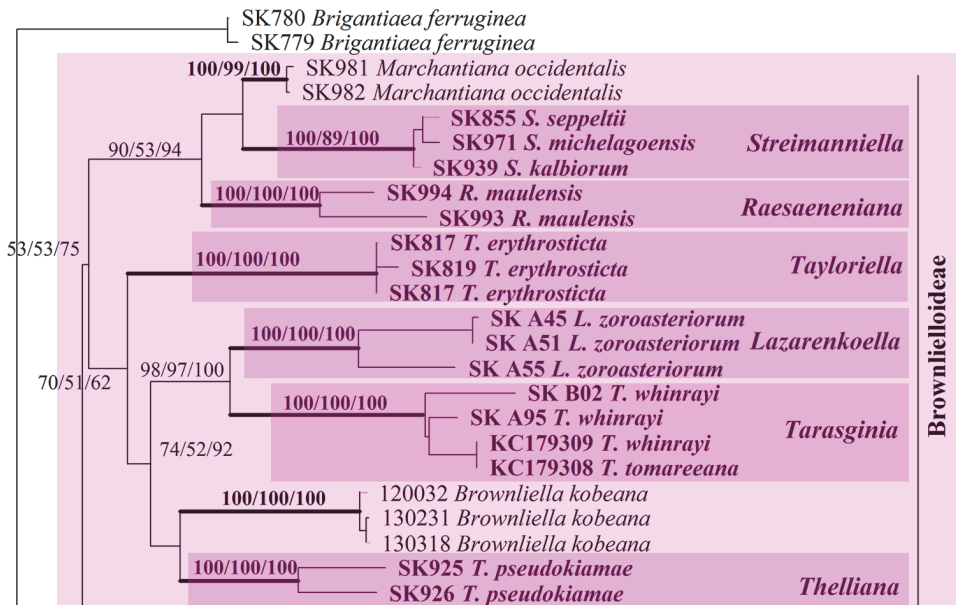


Fig. 1. Phylogenetic tree based on ITS, LSU and mtSSU-sequences, showing the position of the Brownlielloideae

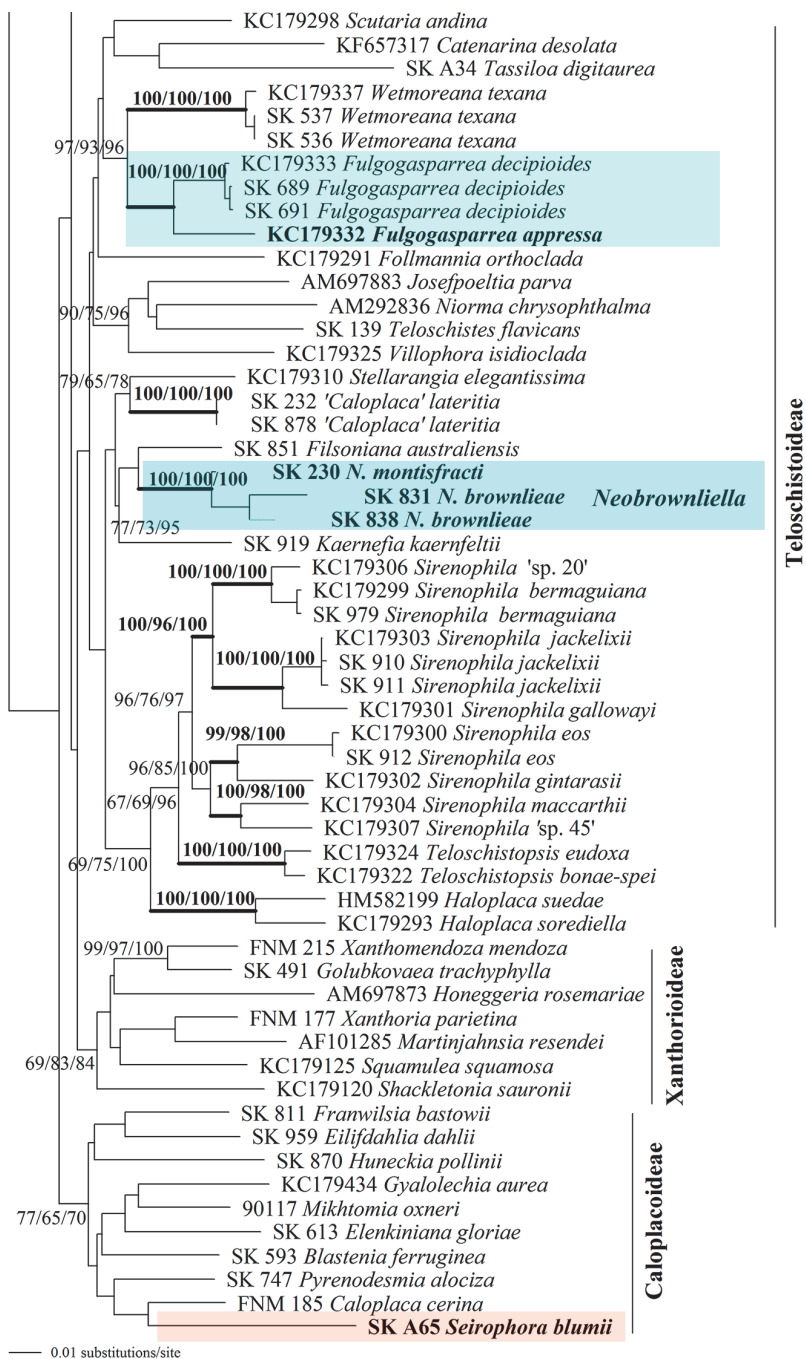


Fig. 1. (continued from the previous page)

Taxonomic notes: *Raesaeneniana* is similar to the Southern Hemisphere genera *Austroplaca* and *Villophora* and the Antarctic species, '*Caloplaca*' *iomma* Olech et Søchting, from which it differs in morphology, the size and shape of the ascospores (see also Kondratyuk *et al.* 2014a) and in its position in the phylogenetic tree of the Teloschistaceae. The genus *Austroplaca* is a member of the Xanthorioideae, whereas *Villophora* belongs to the Teloschistoideae and *Raesaeneniana* belongs to the Brownlielloideae.

Given the rather large areoles with a very uneven, knobby upper surface, *Raesaeneniana* may also resemble some species of *Squamulea* (i.e.: *S. squamosa* (B. de Lesd.) Arup, Søchting et Frödén) and *Xanthocarpia* (i.e.: *X. jerramunguensis* (S. Y. Kondr. et Kärnefelt) S. Y. Kondr., Kärnefelt, A. Thell, Elix, J. Kim, A. S. Kondratiuk et J.-S. Hur) of the Xanthorioideae and species in the genera *Variospora* and '*Caloplaca*' (i.e. '*Caloplaca*' *grimmiae* (Nyl.) H. Olivier and '*Caloplaca*' *hallasanensis* S. Y. Kondr., S.-O. Oh et J.-S. Hur, etc.) in the subfamily Caloplacoideae.

***Streimanniella*** S. Y. Kondr., Kärnefelt, A. Thell, Elix et J.-S. Hur,  
*gen. nova*

Mycobank no.: MB 813894.

*Thallus* continuous or areolate, from white to grey or dark brownish grey; cortical layer thin, paraplectenchymatous. Apothecia lecanorine or zeorine; true exciple paraplectenchymatous or composed of 'textura intricata'; ascospores bipolar becoming brownish or blackish in the asci or multiseptate; constituent: neochloroemodin.

Type species: *Streimanniella michelagoensis* (Elix, S. Y. Kondr. et Kärnefelt) S. Y. Kondr., Kärnefelt, A. Thell, Elix, J. Kim, A. S. Kondratiuk et J.-S. Hur.

*Thallus* continuous or areolate, from white to grey or dark brownish grey. Apothecia lecanorine or zeorine; thalline margin concolorous with the thallus, with a very thin paraplectenchymatous cortical layer; disc varying in colour from blackish, dirty brown, orange brown to concolorous with the thallus; true exciple paraplectenchymatous or composed of 'textura intricata'; paraphyses richly branched, not swollen, brownish towards the tips; asci 2–4–6–8-spored; ascospores bipolar, becoming brownish or blackish in the asci, or multiseptate. Epithymenium K+ purple; constituent: neochloroemodin.

**Etymology:** The genus is named in honour of the Australian bryologist and lichen collector Heinar Streimann (1938–2001) (Canberra, Australia) who has made many collections from the Australian continent.

**Taxonomic notes:** *Streimanniella* differs from *Caloplaca* s. str. in having a continuous or areolate thallus containing neochloroemodin, with a much

thinner paraplectenchymatous cortical layer, in lacking a thick palisade cortical layer on the underside of the thalline exciple of apothecia, and in lacking apically swollen paraphyses and anthraquinones of the parietin chemosyndrome.

*Streimanniella* is similar to the Australian genus *Marchantiana*, but differs in having lecanorine or zeorine apothecia, a paraplectenchymatous true exciple or composed of 'textura intricata', in the presence of neochloroemodin, and in the absence of ascomatic acid and related dibenzofurans.

*Streimanniella* includes four Australian species, namely *S. burneyensis*, *S. kalbiorum*, *S. michelagoensis*, and *S. seppeltii*. The *Streimanniella seppeltii* group, characterised by multiseptate ascospores, is in need of further revision using molecular methods.

***Tarasginia* S. Y. Kondr., Kärnefelt, A. Thell, Elix et J.-S. Hur, gen. nova**

Mycobank no.: MB 813895.

*Thallus distinctly lobate, lemon yellow to dull yellow; lobes plane or convex, cortical layer paraplectenchymatous. Apothecia zeorine, disc bright red to brownish orange; hymenium and subhymenium with oil droplets; true exciple comprising hyphae and matrix; conidia broadly bacilliform; constituents: anthraquinones of the parietin chemosyndrome.*

Type species: *Tarasginia whinrayi* (S. Y. Kondr. et Kärnefelt) S. Y. Kondr., Kärnefelt, A. Thell, Elix, J. Kim, A. S. Kondratiuk et J.-S. Hur.

Thallus distinctly lobate at the margin, verrucose to warty in the central part, lemon yellow or greenish yellow to dull yellow, occasionally reddish yellow or orange; lobes plane or convex, cortical layer paraplectenchymatous. Apothecia zeorine, attenuated at the base, disc bright red or red-orange to brownish red or brownish orange; hymenium and subhymenium with oil droplets; true exciple comprising hyphae and matrix; paraphyses distinctly swollen towards the tips, often with oil droplets; conidia widely bacilliform; constituents: anthraquinones of the parietin chemosyndrome.

Etymology: The genus is named in the honour of the Tasmanian lichenologist Gintaras Kantvilas, who made many collections of Teloschistaceae in Tasmania and other regions of Australia.

Taxonomic notes: *Tarasginia* differs from *Caloplaca* s. str. in having a lobate thallus containing anthraquinones, and in lacking a thick palisade cortical layer on the underside of the thalline exciple of the apothecia, and its position in the subfamily Brownlielloideae.

Given the lobate thalli *Tarasginia* is similar to the Northern Hemisphere genus *Fulgogasparrea* and the Southern Hemisphere genera *Filsoniana* and *Follmanniana*, all three belonging to subfamily Telochistoideae, and the Northern Hemisphere genera *Elenkiniana*, *Gyalolechia* s. str. and *Variospora* in subfamily Caloplacoideae and the Southern Hemisphere genera *Austroplaca*, *Gondwania* and *Verrucoplaca* in the Xanthorioideae. *Tarasginia* differs from all these genera in having its centre of distribution on the Australian continent, and its phylogenetic position in the new subfamily Brownlielloideae.

The species of *Tarasginia* were previously included in the genus *Sirenophila* in subfamily Teloschistoideae according to ITS1/IT2 nrDNA data (Arup *et al.* 2013a). However, when LSU nrDNA and 12S SSU mtDNA sequences were included in the analysis, this genus forms a strongly supported clade within the Brownlielloideae (Fig. 1).

*Tarasginia* includes two Australian species, *T. whinrayi* and *T. tomareeana* (Kondratyuk *et al.* 2007). A third species, referred to as '*Sirenophila* sp. 45' by Arup *et al.* (2013a) presumably belongs here.

***Tayloriella*** S. Y. Kondr., Kärnefelt, A. Thell, Elix et J.-S. Hur, *gen. nova*

Mycobank no.: MB 813896.

*Thallus* areolate, orange to orange reddish, sorediate. Apothecia zeorine, bright brownish red or brownish orange. Cortex of thalline exciple palisade paraplectenchymatous, true exciple paraplectenchymatous with well-developed matrix. Constituents: anthraquinones of the parietin chemosyndrome and O-methylvioxanthin.

Type species: *Tayloriella erythrostickta* (Taylor) S. Y. Kondr., Kärnefelt, A. Thell, Elix, J. Kim, A. S. Kondratiuk et J.-S. Hur. – Synonym: *Caloplaca erythrostickta* (Taylor) Zahlbr., Cat. Lich. Univ. 7: 116 (1930). Type: Swan River, on bark, coll.: J. Drummond (holotype: FH, isotype: BM). Basionym: *Lecanora erythrostickta* Taylor, J. Bot. (Hooker) 6: 161 (1847).

Thallus of very small or poorly developed areoles, orange to orange reddish brown, corticolous, sorediate, usually richly fertile. Soralia rather rare, from punctiform and rounded, to crater-like, often forming a sorediose mass covering the entire thallus. Soredia sometimes becoming isidioid. Apothecia zeorine, usually very abundant, bright brownish red or brownish orange. True exciple paraplectenchymatous with well-developed matrix. Cortex of thalline exciple palisade paraplectenchymatous (with rounded or spherical cells). Ascospores bipolar, long and narrow, with broad septa. Constituents: anthraquinones of the parietin chemosyndrome and O-methylvioxanthin.



**Etymology:** The name *Tayloriella* honours the English botanist Thomas Taylor (1775–1848) who described the type species of the genus.

**Taxonomic notes:** *Tayloriella* differs from *Caloplaca* in having an areolate thallus containing anthraquinones, in a palisade paraplectenchymatous cortical layer, and in lacking a thick palisade cortical layer on the underside of the thalline exciple of apothecia, and in its phylogenetic position within the Brownlielloideae.

*Tayloriella* is similar to the Northern Hemisphere genus *Flavoplaca* of subfamily Xanthorioideae, but differs in its distribution, being restricted to the Australian continent, and its phylogenetic position in the Brownlielloideae.

The genus *Tayloriella* is presently monotypic, however, some *Caloplaca* species are candidates for to this genus pending molecular studies, such as '*Caloplaca*' *microphyllina* (Tuck.) Hasse.

***Thelliana*** S. Y. Kondr., Kärnefelt, Elix et J.-S. Hur, *gen. nova*

Mycobank no.: MB 813897.

*Thallus* crustose, areolate, dull brownish yellow to dull brownish orange. Areoles plane to concave with edges folded upwards, with sparse soredia or punctiform, bright yellow soralia. Cortical layer paraplectenchymatous. Apothecia biatorine.

Type species: *Thelliana pseudokiamae* S. Y. Kondr., Kärnefelt, Elix et J.-S. Hur.

Thallus crustose, areolate, dull brownish yellow to dull brownish orange, with very sparse brighter yellow blastidia or punctiform soralia, apothecia rare. Areoles plane to concave with edges folded upwards, becoming somewhat thicker and densely aggregated, especially along the rock crevices, with sparse soredia or punctiform, bright yellow soralia or blastidia. Blastidia very small and rarely seen. Cortical layer paraplectenchymatous. Apothecia biatorine.

**Etymology:** The generic name honours our friend and colleague, the Swedish lichenologist Arne Thell, for his contributions to lichenology in general, and for his important collections from the Southern Hemisphere.

**Distribution:** This genus is only known from South Australia.

**Taxonomic notes:** *Thelliana* is similar to the genera *Squamulea* and *Flavoplaca*, but differs in the morphology and anatomy of the thallus and thalline areoles, the latter being plane or concave with edges folded upwards, and in its position in the Brownlielloideae. In contrast, *Squamulea* and *Flavoplaca* belong to the Xanthorioideae.

*Thelliana pseudokiamae* S. Y. Kondr., Kärnefelt, Elix et J.-S. Hur,  
*spec. nova*

Mycobank no.: MB 813898.

*Similar to Squamulea kiamae, but differs in having smaller thalli, thalline areoles and isidiate blastidia, and in lacking distinct rosettes of radiating thalline lobes.*

Type: Australia, South Australia, 12 km SW of Quorn on the road to Port Augusta, ca 400 m alt., 32° 25.72' S, 137° 58.26' E, on rock surface, coll.: I. Kärnefelt, 17.01.1999 (holotype: LD 1101337).

Thallus crustose, consisting of aggregations of plane, more or less flattened or rounded areoles with  $\pm$ undulating, raised margins, brownish yellow, with very sparse brighter yellow blastidia or punctiform soralia and rare apothecia. Areoles 0.4–1(–1.5) mm long, and 0.4–0.7 mm wide, plane and entire becoming thinner towards the margins, with a flat upper surface and undulating margins, often grouped into aggregations, but soon becoming much larger, to 1(–1.5) mm wide/across and somewhat thicker and with distinct, transverse cracks in the centre to 0.1 mm wide, and with margins often raised and undulate; areoles becoming somewhat thicker and densely aggregated, especially along the rock crevices.

Cortical layer paraplectenchymatous. Upper surface dull and matt to shiny, brownish yellow to dull brick-yellowish, blastidia or soralia bright yellowish. Rarely forming a blastidioid, seen only at higher magnification (70–120 $\times$ ) at margins of areoles; soralia-like formations punctiform to 0.1 mm wide, up to 3–5 per areole, rarely observed. Blastidia very small and hardly seen, 25–30  $\mu$ m diam., when blastidia isidioid to 30–50  $\mu$ m diam., seen on areole edges or at the areole on the substrate surface.

Apothecia 0.2–0.3 mm diam., only juvenile apothecia seen, biatorine, disc and proper margin concolorous, reddish orange, proper margin 0.03–0.05 mm wide, thin but well developed, distinctly raised above the disc, thalline margin not observed. Mature asci and ascospores not seen.

This species occurs on rock surfaces or in rock crevices, associated with *Caloplaca montisfracti*, *Filsoniana* aff. *scarlatina*, *Buellia* sp., *Acarospora* spp., *Verrucaria* sp., as well as *Xanthoparmelia* sp., and several lichens with cyanobionts.

Etymology: The species name reflects the similarity of this species to *Squamulea kiamae*.

Distribution: At present known only from the type collection.

Taxonomic notes: The thalli of both *Thelliana pseudokiamae* and *Squamulea kiamae* are brownish-yellowish in colour and have brighter yellowish blastidia and transverse cracks in the centre of the thalline areoles. However, *T. pseu-*

*dokiamae* differs in having smaller thalline areoles (0.4–1(–1.5) mm long and 0.4–0.7 mm wide vs. 0.7–1.8 mm long and 1.5–1.2 mm wide), smaller isidiate blastidia (ca 50 µm diam. vs. 50–70(–100) µm wide), in having blastidia throughout rather than just in the centre of thallus (the 1–2 mm wide peripheral zone usually lacks blastidia in *S. kiamae*), in not forming distinct rosettes of radiating thalline lobes, as well as in its position in the Brownlielloideae.

Juvenile thalli of *T. pseudokiamae* are very similar to *Filsoniana scarlatina* with which it often co-occurs, but it differs in having broader areoles (i.e.: 0.4–1(–1.5) mm vs. 0.2–0.5 mm wide) with characteristic cracks and undulating, often raised margins. It also differs in having blastidia, very rare apothecia (common in *F. scarlatina*), and in its position in the Brownlielloideae (vs. member of the Teloschistoideae).

The plane, thin, juvenile thalline areoles of *T. pseudokiamae* resemble those of *Flavoplaca cranfieldii*, but it differs in having a much darker dull brownish yellow to dull brownish orange coloured thallus, in having rather sparse soredia or blastidia (vs. a better developed sorediose mass in *F. cranfieldii*), in forming much thicker aggregations and wider range of variation in size and thickness of thalline areoles, and in its position in the Brownlielloideae (vs. the member of the Xanthorioideae).

*Thelliana pseudokiamae* which grows side by side with *Neobrownliella montisfracti*, differs in having dull brownish yellow coloured of thallus (vs. greyish yellow), sessile apothecia, much thicker and larger thalline areoles and blastidia, and in its position in the Brownlielloideae (vs. the member of the Teloschistoideae).

The Australian species *Caloplaca kiamae* S. Y. Kondr. et Kärnefelt was placed in the genus *Squamulea* in subfamily Xanthorioideae following ITS nrDNA sequence investigations of the type material (Arup *et al.* 2013a). However, subsequent phylogenetic analyses of ITS and LSU nrDNA and 12S SSU mtDNA established that it belonged to *Filsoniana* in subfamily Teloschistoideae (Kondratyuk *et al.* 2013c). However, these data were not based on type material of *Caloplaca kiamae* and a re-examination of this specimen showed, in addition, morphological differences from *Squamulea kiamae* (see above).

### New combinations

***Brownliella kobeana*** (Nyl.) S. Y. Kondr., Kärnefelt, A. Thell, Elix, J. Kim, A. S. Kondratiuk et J.-S. Hur, comb. nova [MycoBank no.: MB 813899]. – Basionym: *Lecanora kobeana* Nyl., Lich. Japon. 36 (1890).

***Fulgogasparrea appressa*** (Wetmore et Kärnefelt) S. Y. Kondr., Elix, Kärnefelt et A. Thell, comb. nova [MycoBank no.: MB 813900]. – Basionym: *Caloplaca appressa* Wetmore et Kärnefelt, Bryologist. 10(2): 233 (1998).

*Lazarenkoella zoroasteriorum* (S. Y. Kondr. et M. Haji Moniri) S. Y. Kondr., Kärnefelt, A. Thell, Elix, J. Kim, A. S. Kondratiuk et J.-S. Hur, comb. nova [MycoBank no.: MB 813932]. – Basionym: *Caloplaca zoroasteriorum* S. Y. Kondr. et M. Haji Moniri, in Kondratyuk *et al.*, Acta Bot. Hung. 55(1–2): 56 (2013).

*Neobrownliella brownlieae* (S. Y. Kondr., Elix et Kärnefelt) S. Y. Kondr., Elix, Kärnefelt et A. Thell, comb. nova [MycoBank no.: MB 813901]. – Basionym: *Caloplaca brownlieae* S. Y. Kondr., Elix et Kärnefelt, in Lumbsch *et al.*, Phytotaxa 18: 28 (2011).

*Neobrownliella montisfracti* (S. Y. Kondr. et Kärnefelt) S. Y. Kondr., Elix, Kärnefelt et A. Thell, comb. nova [MycoBank no.: MB 813902]. – Basionym: *Caloplaca montisfracti* S. Y. Kondr. et Kärnefelt, Bibl. Lichenol. 95: 370 (2007).

*Raesaeneniana maulensis* (S. Y. Kondr. et J.-S. Hur) S. Y. Kondr., Elix, Kärnefelt et A. Thell, comb. nova [MycoBank no.: MB 813903]. – Basionym: *Marchantiana maulensis* S. Y. Kondr. et J.-S. Hur, in Kondratyuk *et al.*, Acta Bot. Hung. 56(1–2): 108 (2014).

*Streimanniella burneyensis* (S. Y. Kondr. et Kärnefelt) S. Y. Kondr., Kärnefelt, A. Thell, Elix, J. Kim, A. S. Kondratiuk et J.-S. Hur, comb. nova [MycoBank no.: MB 813904]. – Basionym: *Caloplaca burneyensis* S. Y. Kondr. et Kärnefelt, Bibl. Lichenol. 100: 235 (2009).

*Streimanniella kalbiorum* (S. Y. Kondr. et Kärnefelt) S. Y. Kondr., Kärnefelt, A. Thell, Elix, J. Kim, A. S. Kondratiuk et J.-S. Hur, comb. nova [MycoBank no.: MB 813905]. – Basionym: *Caloplaca kalbiorum* S. Y. Kondr. et Kärnefelt, Bibl. Lichenol. 96: 158 (2007).

*Streimanniella michelagoensis* (Elix, S. Y. Kondr. et Kärnefelt) S. Y. Kondr., Kärnefelt, A. Thell, Elix, J. Kim, A. S. Kondratiuk et J.-S. Hur, comb. nova [MycoBank no.: MB 813924]. – Basionym: *Caloplaca michelagoensis* Elix, S. Y. Kondr. et Kärnefelt, Bibl. Lichenol. 100: 262 (2009).

*Streimanniella seppeltii* (S. Y. Kondr. et Kärnefelt) S. Y. Kondr., Kärnefelt, A. Thell, Elix, J. Kim, A. S. Kondratiuk et J.-S. Hur, comb. nova [MycoBank no.: MB 813926]. – Basionym: *Caloplaca seppeltii* S. Y. Kondr. et Kärnefelt, Bibl. Lichenol. 100: 267 (2009).

*Tarasginia tomareeana* (S. Y. Kondr. et Kärnefelt) S. Y. Kondr., Kärnefelt, A. Thell, Elix, J. Kim, A. S. Kondratiuk et J.-S. Hur, comb. nova [MycoBank no.: MB 813927]. – Basionym: *Caloplaca tomareeana* S. Y. Kondr. et Kärnefelt, Bibl. Lichenol. 95: 379 (2007).

*Tarasginia whinrayi* (S. Y. Kondr. et Kärnefelt) S. Y. Kondr., Kärnefelt, A. Thell, Elix, J. Kim, A. S. Kondratiuk et J.-S. Hur, comb. nova [MycoBank no.: MB 813928]. – Basionym: *Caloplaca whinrayi* S. Y. Kondr. et Kärnefelt, Bibl. Lichenol. 95: 381 (2007).

*Tayloriella erythrostickta* (Taylor) S. Y. Kondr., Kärnefelt, A. Thell, Elix, J. Kim, A. S. Kondratiuk et J.-S. Hur, comb. nova [Mycobank no.: MB 813929)]. – Basionym: *Lecanora erythrostickta* Taylor, J. Bot. (Hooker) 6: 161 (1847).

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