

Table S3. Percentage of bases that differ (down) and are identical (above) for the species sequences of the *Melanothamnus* clade included in our *rbcL* alignment.

	<i>Neosiphonia bajacali</i>	<i>Polysiphonia pseudovillum</i>	<i>Polysiphonia savatieri</i>	<i>Neosiphonia thailandica</i>	<i>Neosiphonia</i> sp.	<i>Neosiphonia silvae</i>	<i>Neosiphonia ferulacea</i>	<i>Polysiphonia</i> sp.	<i>Polysiphonia</i> cf. <i>minutissima</i>	<i>Polysiphonia blandii</i>	<i>Neosiphonia flavimarina</i>	<i>Neosiphonia harveyi</i>	<i>Neosiphonia tongatensis</i>	<i>Neosiphonia sphaerocarpa</i>	<i>Neosiphonia collabens</i>	<i>Neosiphonia peruviansis</i>	<i>Neosiphonia simplex</i> (as <i>ramirezii</i>)	<i>Neosiphonia simplex</i>	<i>Polysiphonia forfex</i>	<i>Fernandosiphonia unilateralis</i>	<i>Melanothamnus afaqhusainii</i>	<i>Melanothamnus somalensis</i>	<i>Fernandosiphonia</i> cf. <i>hancockii</i>	<i>Polysiphonia strictissima</i>	<i>Neosiphonia yendoii</i>	<i>Polysiphonia</i> sp.	<i>Neosiphonia baliana</i>	<i>Polysiphonia</i> sp.	<i>Polysiphonia nuda</i>	<i>Polysiphonia incompta</i>	<i>Neosiphonia teradomariensis</i>
<i>Neosiphonia bajacali</i>	90.7	90.9	90.2	92.3	90.9	92.6	90.4	90.4	91.7	90.6	90.9	91.6	91.2	90.6	91.2	91.5	90.6	91	91.2	91.8	91.9	90.9	91.2	91.3	91.1	92	91.8	92.6	91.2	92.1	
<i>Polysiphonia pseudovillum</i>	9.3	91.9	92.8	92	92.4	92.8	92.4	92.1	93.1	92.2	92.4	92.4	92.2	92.4	93	93	91.7	92.8	92.4	93.1	93.3	92.1	93.2	92.3	91.4	92.3	92.6	92.8	91.8	92.8	
<i>Polysiphonia savatieri</i>	9.1	8.1	91.7	91.5	91.7	92.7	93.3	93.4	91.4	93	93.1	91.7	93.6	92.9	92.5	92	91.4	91.8	92.2	91.4	92.1	92.4	92.2	93.2	91.7	91.6	91.9	92.7	90.6	92.5	
<i>Neosiphonia thailandica</i>	9.8	7.2	8.3	92.4	92.6	92.5	93.1	92.5	93	92.4	92.9	91.7	92.7	93.3	93.2	92.7	90.5	92.3	92	92.1	92	91.8	92.8	93.5	91.7	91.8	92.9	92.9	91	93.1	
<i>Neosiphonia</i> sp.	7.7	8	8.5	7.6	92.8	93.6	91.8	91.3	92.6	92	92.2	92.7	92.5	92.6	92.4	92.2	91.4	92.2	91.4	93.3	93.5	92	92.5	92.3	91.5	91.4	92.8	92.9	92.4	92.9	
<i>Neosiphonia silvae</i>	9.1	7.6	8.3	7.4	7.2	92.8	92.7	92	92.8	91.9	92.2	92.4	92.1	91.8	93.1	92.9	92.2	91.8	91.2	93.6	93.7	91.4	91.9	92.4	90.7	91.7	91.7	91.9	92.5	92.1	
<i>Neosiphonia ferulacea</i>	7.4	7.2	7.3	7.5	6.4	7.2	92	91.8	93.8	92.9	92.9	93.3	92.6	92.3	93.3	93.2	90.9	93.2	93.1	94	94.1	92.6	92.8	93.1	92	92.6	93.3	93.5	93	93.7	
<i>Polysiphonia</i> sp.	9.6	7.6	6.7	6.9	8.2	7.3	8	96.5	92	92.7	93.5	92.2	94	94.3	94	93.5	91.5	92.6	92.3	91.6	92.5	92.7	92.6	93.3	92	93.1	92.9	92.5	91.8	93.8	
<i>Polysiphonia</i> cf. <i>minutissima</i>	9.6	7.9	6.6	7.5	8.7	8	8.2	3.5	91.7	91.9	92.3	92	93.5	93.2	92.7	91.9	91.4	91.5	91.8	91.4	91.7	91.9	91.3	92.6	91	91.1	91.4	92.2	90.2	92.1	
<i>Polysiphonia blandii</i>	8.3	6.9	8.6	7	7.4	7.2	6.2	8	8.3	91.8	92.3	95.8	92.1	91.9	93	92.6	90.9	94	92.1	92.8	92.6	92.2	92.8	93.3	92.3	91.7	93.4	93.3	93.3	93.4	
<i>Neosiphonia flavimarina</i>	9.4	7.8	7	7.6	8	8.1	7.1	7.3	8.1	8.2	99.6	93.7	92.8	93.4	93.7	93.7	92.5	92.9	93.4	92.4	92.9	95.7	96.1	95.8	91.6	92.4	92.7	93.2	91.6	93.7	
<i>Neosiphonia harveyi</i>	9.1	7.6	6.9	7.1	7.8	7.8	7.1	6.5	7.7	7.7	0.4	93.9	93	94.3	94.2	94	92.8	93.3	93.3	92.5	93.3	95.8	96.7	96.7	91.9	93.5	92.9	93.1	92	94.3	
<i>Neosiphonia tongatensis</i>	8.4	7.6	8.3	8.3	7.3	7.6	6.7	7.8	8	4.2	6.3	6.1	92.1	92.4	93.5	93.3	91.9	93	92.7	93.2	93.3	93.1	93.6	93.4	92.9	93.7	94.2	94.1	91.9	94.3	
<i>Neosiphonia sphaerocarpa</i>	8.8	7.8	6.4	7.3	7.5	7.9	7.4	6	6.5	7.9	7.2	7	7.9	95.5	93.7	93.6	92.7	93.2	92.5	92.3	93	93.4	93	93.7	92.6	91.8	93.2	93	91.8	93.6	
<i>Neosiphonia collabens</i>	9.4	7.6	7.1	6.7	7.4	8.2	7.7	5.7	6.8	8.1	6.6	5.7	7.6	4.5	94.1	93.5	92.5	93.1	91.8	92	92.5	93.4	93.4	94.5	92	92.5	93	92.7	92.3	94.1	
<i>Neosiphonia peruviansis</i>	8.8	7	7.5	6.8	7.6	6.9	6.7	6	7.3	7	6.3	5.8	6.5	6.3	5.9	97.8	96.6	93.5	93.1	92.7	93.4	94.3	95	94.2	91.9	93.3	93.7	93.4	92.2	94.5	
<i>Neosiphonia simplex</i> (as <i>ramirezii</i>)	8.5	7	8	7.3	7.8	7.1	6.8	6.5	8.1	7.4	6.3	6	6.7	6.4	6.5	2.2	99	93.5	93.7	92.7	93.4	93.8	95	93.5	91.4	93	93.6	92.7	92.4	93.7	
<i>Neosiphonia simplex</i>	9.4	8.3	8.6	9.5	8.6	7.8	8.1	8.5	8.6	9.1	7.5	7.2	8.1	7.3	7.5	3.4	1	92.2	92.7	91.7	92.5	92.2	93.7	92.1	89.9	91.1	91.8	91.7	92.1	91.7	
<i>Polysiphonia forfex</i>	9	7.2	8.2	7.7	7.8	8.2	6.8	7.4	8.5	6	7.1	6.7	7	6.8	6.9	6.5	6.5	7.8	95.3	92.6	93.1	92.8	93.4	93.8	92.3	93.5	94.2	93.3	91.8	94.8	
<i>Fernandosiphonia unilateralis</i>	8.8	7.6	7.8	8	8.6	8.8	6.9	7.7	8.2	7.9	6.6	6.7	7.3	7.5	8.2	6.9	6.3	7.3	4.7	91.3	91.9	92.8	93.2	93.4	91.4	93.5	93	92.9	91.2	93.4	
<i>Melanothamnus afaqhusainii</i>	8.2	6.9	8.6	7.9	6.7	6.4	6	8.4	8.6	7.2	7.6	7.5	6.8	7.7	8	7.3	7.3	8.3	7.4	8.7	98.6	91.9	92.7	92.4	91.6	92.9	93.7	93.2	93.1	93.3	
<i>Melanothamnus somalensis</i>	8.1	6.7	7.9	8	6.5	6.3	5.9	7.5	8.3	7.4	7.1	6.7	6.7	7	7.5	6.6	6.6	7.5	6.9	8.1	1.4	92.7	93.5	93	92	93.2	94.1	93.5	93.5	94.1	
<i>Fernandosiphonia</i> cf. <i>hancockii</i>	9.1	7.9	7.6	8.2	8	8.6	7.4	7.3	8.1	7.8	4.3	4.2	6.9	6.6	6.6	5.7	6.2	7.8	7.2	7.2	8.1	7.3	95.5	95.3	91.7	92.5	93	93	91.2	93.4	
<i>Polysiphonia strictissima</i>	8.8	6.8	7.8	7.2	7.5	8.1	7.2	7.4	8.7	7.2	3.9	3.3	6.4	7	6.6	5	5	6.3	6.6	6.8	7.3	6.5	4.5	96.1	91.3	93.8	93.3	93.2	92.2	93.9	
<i>Neosiphonia yendoii</i>	8.7	7.7	6.8	6.5	7.7	7.6	6.9	6.7	7.4	6.7	4.2	3.3	6.6	6.3	5.5	5.8	6.5	7.9	6.2	6.6	7.6	7	4.7	3.9	91.5	93.3	92.7	93.2	92.5	94.1	
<i>Polysiphonia</i> sp.	8.9	8.6	8.3	8.3	8.5	9.3	8	8	9	7.7	8.4	8.1	7.1	7.4	8	8.1	8.6	10.1	7.7	8.6	8.4	8	8.3	8.7	8.5	93.8	95.8	94.5	90.3	95.3	
<i>Neosiphonia baliana</i>	8	7.7	8.4	8.2	8.6	8.3	7.4	6.9	8.9	8.3	7.6	6.5	6.3	8.2	7.5	6.7	7	8.9	6.5	6.5	7.1	6.8	7.5	6.2	6.7	6.2	95.6	97.4	91.4	96	
<i>Polysiphonia</i> sp.	8.2	7.4	8.1	7.1	7.2	8.3	6.7	7.1	8.6	6.6	7.3	7.1	5.8	6.8	7	6.3	6.4	8.2	5.8	7	6.3	5.9	7	6.7	7.3	4.2	4.4	96	92	97.9	
<i>Polysiphonia nuda</i>	7.4	7.2	7.3	7.1	7.1	8.1	6.5	7.5	7.8	6.7	6.8	6.9	5.9	7	7.3	6.6	7.3	8.3	6.7	7.1	6.8	6.5	7	6.8	6.8	5.5	2.6	4	92.4	96	
<i>Polysiphonia incompta</i>	8.8	8.2	9.4	9	7.6	7.5	7	8.2	9.8	6.7	8.4	8	8.1	8.2	7.7	7.8	7.6	7.9	8.2	8.8	6.9	6.5	8.8	7.8	7.5	9.7	8.6	8	7.6	92.5	
<i>Neosiphonia teradomariensis</i>	7.9	7.2	7.5	6.9	7.1	7.9	6.3	6.2	7.9	6.6	6.3	5.7	5.7	6.4	5.9	5.5	6.3	8.3	5.2	6.6	6.7	5.9	6.6	6.1	5.9	4.7	4	2.1	4	7.5	

Table S4. Percentage of bases that differ (down) and are identical (above) for the species sequences of the *Vertebrata* clade included in our *rbcL* alignment.

	<i>Vertebrata lanosa</i>	<i>Enelittosiphonia stimpsonii</i>	<i>Polysiphonia constricta</i>	<i>Polysiphonia aterrima</i>	<i>Polysiphonia lobophoralis</i>	<i>Boergeseniella fruticulosa</i>	<i>Boergeseniella thuyoides</i>	<i>Polysiphonia tripinnata</i>	<i>Polysiphonia furcellata</i>	<i>Polysiphonia subulifera</i>	<i>Brongniartella australis</i>	<i>Ctenosiphonia hypnoides</i>	<i>Lophosiphonia reptabunda</i>	<i>Polysiphonia simulans</i>	<i>Polysiphonia urbana</i>	<i>Polysiphonia foetidissima</i>	<i>Polysiphonia isogona</i>	<i>Polysiphonia paniculata</i>	<i>Polysiphonia fucooides</i>	<i>Brongniartella byssoides</i>	<i>Polysiphonia nigra</i>
<i>Vertebrata lanosa</i>	89.8	90.3	91.4	91.7	90.8	91.2	91.5	90.5	90	91.9	90.2	89.8	90.9	91.6	91.9	91.6	91.4	91	91.3	91.2	
<i>Enelittosiphonia stimpsonii</i>	10.2		91.1	90.9	91.3	91.5	91.3	92.3	91.4	90.7	93.1	91.5	90.7	90.1	92.2	91.6	91.7	92.2	90.7	92.3	91.2
<i>Polysiphonia constricta</i>	9.7	8.9		91	91.2	91.6	91.8	91.7	91	90.7	92.2	91.1	90.4	91.3	92.7	92.5	92	91.5	91.1	91.6	91.4
<i>Polysiphonia aterrima</i>	8.6	9.1	9		92.4	91.6	92.2	91.7	92.2	91.4	93.2	90.9	90.8	91.6	92.6	92.2	92.8	92.1	91.7	91.7	91.6
<i>Polysiphonia lobophoralis</i>	8.3	8.7	8.8	7.6		91.7	92.7	90.5	90.9	90.8	93.4	90.5	91	91.6	91.7	91.5	91.3	90.7	90.3	91	91.1
<i>Boergeseniella fruticulosa</i>	9.2	8.5	8.4	8.4	8.3		97.4	96.6	95.3	95.4	93.6	91.9	91.4	92	92.9	92.4	92.1	92.2	92	92.8	92.5
<i>Boergeseniella thuyoides</i>	8.8	8.7	8.2	7.8	7.3	2.6		96.4	96.1	95.5	94.6	92.2	91.5	92.9	94	93.5	93	92.8	92.4	93.1	93.3
<i>Polysiphonia tripinnata</i>	8.5	7.7	8.3	8.3	9.5	3.4	3.6		95.7	96.3	93.8	92.3	90.5	93.6	94.5	94.1	94.5	93.3	93.8	94.1	94.1
<i>Polysiphonia furcellata</i>	9.5	8.6	9	7.8	9.1	4.7	3.9	4.3		94.7	93.4	91.7	90.5	92	93.5	92.9	92.4	92	91.5	92.4	92.2
<i>Polysiphonia subulifera</i>	10	9.3	9.3	8.6	9.2	4.6	4.5	3.7	5.3		92.9	91.6	90	91.4	92.8	91.9	91.5	90.9	91.2	91.7	91.6
<i>Brongniartella australis</i>	8.1	6.9	7.8	6.8	6.6	6.4	5.4	6.2	6.6	7.1		92.6	92.1	92.4	94.6	94	94	93.3	92.5	93.5	93.5
<i>Ctenosiphonia hypnoides</i>	9.8	8.5	8.9	9.1	9.5	8.1	7.8	7.7	8.3	8.4	7.4		92.3	92.4	93.4	93.1	92.8	92.5	92.2	92.8	92.5
<i>Lophosiphonia reptabunda</i>	10.2	9.3	9.6	9.2	9	8.6	8.5	9.5	9.5	10	7.9	7.7		92	92.8	92.2	92.4	92.2	91.4	92.1	92.3
<i>Polysiphonia simulans</i>	9.1	9.9	8.7	8.4	8.4	8	7.1	6.4	8	8.6	7.6	7.6	8		94.2	93.8	93.5	93.9	94.2	94.8	94.8
<i>Polysiphonia urbana</i>	8.4	7.8	7.3	7.4	8.3	7.1	6	5.5	6.5	7.2	5.4	6.6	7.2	5.8		97.9	97.4	94.7	94.5	95.3	95.2
<i>Polysiphonia foetidissima</i>	8.1	8.4	7.5	7.8	8.5	7.6	6.5	5.9	7.1	8.1	6	6.9	7.8	6.2	2.1		98.1	94.9	94.3	95.2	95.4
<i>Polysiphonia isogona</i>	8.4	8.3	8	7.2	8.7	7.9	7	5.5	7.6	8.5	6	7.2	7.6	6.5	2.6	1.9		95.1	94.2	94.8	95.2
<i>Polysiphonia paniculata</i>	8.6	7.8	8.5	7.9	9.3	7.8	7.2	6.7	8	9.1	6.7	7.5	7.8	6.1	5.3	5.1	4.9		94.3	95	95.5
<i>Polysiphonia fucooides</i>	9	9.3	8.9	8.3	9.7	8	7.6	6.2	8.5	8.8	7.5	7.8	8.6	5.8	5.5	5.7	5.8	5.7		95.7	96.4
<i>Brongniartella byssoides</i>	8.7	7.7	8.4	8.3	9	7.2	6.9	5.9	7.6	8.3	6.5	7.2	7.9	5.2	4.7	4.8	5.2	5	4.3		96.5
<i>Polysiphonia nigra</i>	8.8	8.8	8.6	8.4	8.9	7.5	6.7	5.9	7.8	8.4	6.5	7.5	7.7	5.2	4.8	4.6	4.8	4.5	3.6	3.5	