**Appendices**

**Appendix S1.** Voucher information and GenBank accession numbers for the analysed *Schlotheimia* specimens. Samples marked by an asterisk could not be sequenced for all markers and were used in the analyses of individual markers and possible combinations, but excluded from the combined analysis (*trn*L-F + *trn*G-R + ITS) presented in Fig. 1.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | DNA Code | Species names according to morphological identification, before barcoding analysis | Species names after barcoding analysis | Sporophyte | Herbarium | Voucher no. | Locality (Brazilian state) | Year of collection | Acc. no.  *trn*L-F | Acc. no.  *trn*G-R | Acc. no.  ITS |
|  | D104 | *Macromitrium carionis* Müll. Hal | *Macromitrium carionis* Müll. Hal | Absent | UB | Valente, D.V 2626 | GO | 2017 | MN245768 | MN259735 | MN077383 |
|  | D172 | *Macromitrium guatemalense* Müll. Hal. | *Macromitrium guatemalense* Müll. Hal. | Absent | UB | Valente, D.V. 1346 | RS | 2017 | MN245767 | MN259734 | MN077384 |
|  | D123 | *Schlotheimia appressifolia* Mitt | *Schlotheimia appressifolia* Mitt | Present | SP464442 | Peralta, D.F. 19055 | MG | 2016 | MN245769 | MN259736 | MN077385 |
|  | D125 | *Schlotheimia appressifolia* Mitt | *Schlotheimia appressifolia* Mitt | Present | SP439346 | Peralta, D.F. 14829 | SP | 2013 | MN245770 | MN259737 | MK991784 |
|  | D191 | *Schlotheimia tecta* Hook. f. & Wilson | *Schlotheimia appressifolia* Mitt | Absent | UB | Valente, D.V. 998 | RS | 2017 | MN245771 | MN259738 | MK991785 |
|  | D192 | *Schlotheimia tecta* Hook. f. & Wilson | *Schlotheimia appressifolia* Mitt | Absent | UB | Valente, D.V. 1003 | RS | 2017 | MN245772 | MN259739 | MK991786 |
|  | D194 | *Schlotheimia tecta* Hook. f. & Wilson | *Schlotheimia appressifolia* Mitt | Absent | UB | Valente, D.V. 1116 | RS | 2017 | MN245773 | MN259740 | MK991787 |
|  | D121 | *Schlotheimia pseudoaffinis* Müll. Hal. | *Schlotheimia capillaris* Hampe**\*** | Present | SP462545 | Peralta, D.F. 18094 | MG | 2016 | MN259730 | MN259741 | − |
|  | D232 | *Schlotheimia pseudoaffinis* Müll. Hal. | *Schlotheimia capillaris* Hampe | Present | SP483229 | Peralta, D.F. 21854 | SP | 2017 | MN245776 | MN259742 | MN077386 |
|  | D233 | *Schlotheimia pseudoaffinis* Müll. Hal. | *Schlotheimia capillaris* Hampe | Present | SP483465 | Peralta, D.F. 22090 | SP | 2017 | MN245777 | MN259743 | MN077387 |
|  | D15 | *Schlotheimia jamesonii* (Arn.) Brid. | *Schlotheimia jamesonii* (Arn.) Brid. | Present | UB | Valente, D.V. 2625 | − | 2013 | MN259728 | MN259744 | MN077388 |
|  | D27 | *Schlotheimia jamesonii* (Arn.) Brid. | *Schlotheimia jamesonii* (Arn.) Brid**.\*** | Absent | UB | Valente, D.V. 291 | ES | 2016 | MN259731 | − | MN077389 |
|  | D33 | *Schlotheimia* sp. | *Schlotheimia jamesonii* (Arn.) Brid. | Absent | UB | Valente, D.V. 323 | ES | 2016 | MN245778 | MN259745 | MN077390 |
|  | D85 | *Schlotheimia jamesonii* (Arn.) Brid. | *Schlotheimia jamesonii* (Arn.) Brid. | Absent | UB | Valente, D.V. 479 | ES | 2016 | MN245779 | MN259746 | MN077391 |
|  | D197 | *Schlotheimia jamesonii* (Arn.) Brid. | *Schlotheimia jamesonii* (Arn.) Brid. | Present | UB | Valente, D.V. 1044 | RS | 2017 | MN245780 | MN259747 | MN077392 |
|  | D143 | *Schlotheimia merkelii* Hornsch. | *Schlotheimia merkelii* Hornsch. | Present | UB191266 | Faria, J.E.Q. 2414 | MG | 2012 | MN245781 | MN259749 | MN077393 |
|  | D151 | *Schlotheimia rugifolia* (Hook.) Schwägr. | *Schlotheimia merkelii* Hornsch. | Absent | UB | Valente, D.V. 246 | ES | 2016 | MN245782 | MN259748 | MN077394 |
|  | D156 | *Schlotheimia jamesonii* (Arn.) Brid. | *Schlotheimia merkelii* Hornsch. | Present | SP419354 | Yano, O. 32541 | SP | 2010 | MN245783 | MN259750 | MN077395 |
|  | D18 | *Schlotheimia rugifolia* (Hook.) Schwägr. | *Schlotheimia rugifolia* (Hook.) Schwägr. | Present | UB | Valente, D.V. 351 | ES | 2016 | MN245784 | MN259751 | MN077396 |
|  | D198 | *Schlotheimia rugifolia* (Hook.) Schwägr. | *Schlotheimia rugifolia* (Hook.) Schwägr. | Present | UB | Valente, D.V. 902 | RS | 2017 | MN245785 | MN259752 | MN077397 |
|  | D145 | *Schlotheimia torquata* (Sw. ex Hedw.) Brid. | *Schlotheimia spinomitria* D.F. Peralta & R.Ristow | Present | UB | Camara, P.E.A.S 3828 | DF | 2016 | MN245794 | MN259758 | MN077403 |
|  | D159 | *Schlotheimia rugifolia* (Hook.) Schwägr. | *Schlotheimia spinomitria* D.F. Peralta & R.Ristow | Present | UB | Bijos, N.R. 101 | GO | 2016 | MN245795 | MN259759 | MN077404 |
|  | D112 | *Schlotheimia tecta* Hook. f. & Wilson | *Schlotheimia tecta* Hook. f. & Wilson | Present | SP477859 | Peralta, D.F. 19208 | ES | 2016 | MN245774 | MN259760 | MN077405 |
|  | D130 | *Schlotheimia tecta* Hook. f. & Wilson | *Schlotheimia tecta* Hook. f. & Wilson | Absent | UB | Valente, D.V. 346 | ES | 2016 | MN245775 | MN259761 | MN077406 |
|  | D110 | *Schlotheimia torquata* | *Schlotheimia torquata* (Sw. ex Hedw.) Brid. | Present | SP477917 | Peralta, D.F. 19266 |  | 2016 | MN245788 | MN259762 | MK993019 |
|  | D196 | *Schlotheimia torquata* (Sw. ex Hedw.) Brid. | *Schlotheimia torquata* (Sw. ex Hedw.) Brid.**\*** | Present | UB | Valente, D.V. 1065 | RS | 2017 | MN259732 | MN259763 | − |
|  | D236 | *Schlotheimia torquata* (Sw. ex Hedw.) Brid. | *Schlotheimia torquata* (Sw. ex Hedw.) Brid.\* | Present | SP486818 | Peralta, D.F. 23020 | SP | 2018 | MN259733 | MN259764 | − |
|  | D238 | *Schlotheimia* sp. | *Schlotheimia torquata* (Sw. ex Hedw.) Brid**.** | Absent | SP486440 | Peralta, D.F. 22642 | MG | 2018 | MN245789 | MN259765 | MK993020 |
|  | D116 | *Schlotheimia trichomitria* Schwägr | *Schlotheimia trichomitria* Schwägr. | Present | SP477363 | Carmo, D.M. 1391 | SP | 2016 | MN245790 | MN259766 | MN077407 |
|  | D117 | *Schlotheimia trichomitria* Schwägr | *Schlotheimia trichomitria* Schwägr. | Present | SP464461 | Peralta, D.F. 19074 | SP | 2016 | MN245791 | MN259767 | MN077408 |
|  | D118 | *Schlotheimia trichomitria* Schwägr | *Schlotheimia trichomitria* Schwägr. | Present | SP464411 | Peralta, D.F. 19034 | SP | 2016 | MN245792 | MN259768 | MN077409 |
|  | D71 | *Schlotheimia jamesonii* (Arn.) Brid. | *Schlotheimia elata* Mitt. | Absent | UB | Valente, D.V. 496 | ES | 2016 | MN259729 | MN259753 | MN077398 |
|  | D86 | *Schlotheimia jamesonii* (Arn.) Brid. | *Schlotheimia elata* Mitt. | Absent | UB | Valente, D.V. 506 | ES | 2016 | MN245793 | MN259754 | MN077399 |
|  | D87 | *Schlotheimia jamesonii* (Arn.) Brid. | *Schlotheimia elata* Mitt.\* | Absent | UB | Valente, D.V. 632 | ES | 2016 | − | MN259755 | MN077400 |
|  | D199 | *Schlotheimia rugifolia* (Hook.) Schwägr. | *Schlotheimia gracilescens* Broth. | Absent | UB | Valente, D.V. 1245 | RS | 2017 | MN245786 | MN259756 | MN077401 |
|  | D200 | *Schlotheimia rugifolia* (Hook.) Schwägr. | *Schlotheimia gracilescens* Broth. | Absent | UB | Valente, D.V. 1250 | RS | 2017 | MN245787 | MN259757 | MN077402 |

**Appendix S2.** Matrix used for morphological character reconstruction. **1)** Plant size: (1) robust, (2) medium-sized; **2)** Creeping stem covering: (1) short tomentose, (2) tomentose; **3)** Creeping stem format: (1) similar branches, (2) squarrose, (3) triangular; **4)** Branch length: (1) long, (2) short; **5)** Vegetative leaves (VL) shape: (1) lanceolate, (2) oblong-ovate, (3) oblong-lanceolate; **6)** VL lamina: (1) plane, (2) undulate to distally plane, (3) rugose; **7)** VL apex: (1) acute, (2) aristate, (3) mucronate; **8)** VL margin: (1) dentate, (2) entire; **9)** VL costa: (1) subpercurrent, (2) long excurrent, (3) short excurrent; **10)** Perichetial leaves (PL) lamina: (1) distally undulate, (2) distally plane, (3) rugose; **11)** PL apex: (1) aristate, (2) mucronate, (3) acuminate; **12)** PL costa: (1) long excurrent, (2) short excurrent; **13)** Seta length: (1) short, (2) long; **14)** Capsule exposure: (1) immersed, (2) exserted; **15)** Capsule shape: (1) ovoid, (2) ovoid-cylindrical; **16)** Calyptra shape: (1) campanulate, (2) mitrate-campanulate; **17)** Calyptra surface: (1) smooth, (2) rugose, (3) spinose with foliose trichomes, (4) pilose with filamentose trichomes.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| DNA number | Species | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
| D123 | *S. appressifolia* | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| D125 | *S. appressifolia* | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| D191 | *S. appressifolia* | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| D192 | *S. appressifolia* | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| D194 | *S. appressifolia* | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| D232 | *S. pseudoaffinis* | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 1 |
| D233 | *S. pseudoaffinis* | 2 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 1 |
| D15 | *S. jamesonii* | 1.2 | 2 | 3 | 2 | 1 | 2 | 3 | 2 | 3 | 1.2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 |
| D33 | *S. jamesonii* | 1.2 | 2 | 3 | 2 | 1 | 2 | 3 | 2 | 3 | 1.2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 |
| D85 | *S. jamesonii* | 1.2 | 2 | 3 | 2 | 1 | 2 | 3 | 2 | 3 | 1.2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 |
| D197 | *S. jamesonii* | 1.2 | 2 | 3 | 2 | 1 | 2 | 3 | 2 | 3 | 1.2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 |
| D143 | *S. merkelli* | 1 | 2 | 3 | 2 | 2 | 3 | 3 | 2 | 3 | 1 | 2 | 2 | 1 | 2 | 2 | 2 | 2 |
| D151 | *S. merkelli* | 1 | 2 | 3 | 2 | 2 | 3 | 3 | 2 | 3 | 1 | 2 | 2 | 1 | 2 | 2 | 2 | 2 |
| D156 | *S. merkelli* | 1 | 2 | 3 | 2 | 2 | 3 | 3 | 2 | 3 | 1 | 2 | 2 | 1 | 2 | 2 | 2 | 2 |
| D18 | *S. rugifolia* | 2 | 2 | 3 | 2 | 2 | 3 | 3 | 2 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 1 |
| D198 | *S. rugifolia* | 2 | 2 | 3 | 2 | 2 | 3 | 3 | 2 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 1 |
| D71 | *S. elata* | 1 | 1 | 3 | 1 | 3 | 2 | 3 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 |
| D86 | *S. elata* | 1 | 1 | 3 | 1 | 3 | 2 | 3 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 |
| D199 | *S. gracilescens* | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 |
| D200 | *S. gracilescens* | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 |
| D145 | *S. spinomitria* | 2 | 2 | 3 | 2 | 2 | 3 | 3 | 2 | 3 | 1 | 2 | 2 | 2 | 2 | 1 | 2 | 3 |
| D159 | *S. spinomitria* | 2 | 2 | 3 | 2 | 2 | 3 | 3 | 2 | 3 | 1 | 2 | 2 | 2 | 2 | 1 | 2 | 3 |
| D112 | *S. tecta* | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| D130 | *S. tecta* | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| D110 | *S. torquata* | 2 | 2 | 3 | 2 | 3 | 3 | 3 | 2 | 3 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 1 |
| D238 | *S. torquata* | 2 | 2 | 3 | 2 | 3 | 3 | 3 | 2 | 3 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 1 |
| D116 | *S. trichomitria* | 2 | 2 | 3 | 2 | 2 | 3 | 3 | 2 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 4 |
| D117 | *S. trichomitria* | 2 | 2 | 3 | 2 | 2 | 3 | 3 | 2 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 4 |
| D118 | *S. trichomitria* | 2 | 2 | 3 | 2 | 2 | 3 | 3 | 2 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 4 |

**Appendix S3.** Support values for the clades of Brazilian *Schlotheimia* species in different analyses of single markers and combinations, with indels included: Bootstrap support (BS) values (%) for neighbour joining (NJ), maximum parsimony (MP), and maximum likelihood (ML) and posterior probabilities (PP) for Bayesian inference (BI). Values below 70% (BS) and 0.95 (PP) are in red. Respective values for the combined analysis of all three markers are shown in Fig. 1.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Clade | *trn*L-F | | | | *trn*G-R | | | | ITS | | | | *trn*L-F + *trn*G-R | | | | *trn*L-F + ITS | | | | *trn*G-R+ ITS | | | |
|  | NJ | MP | ML | BI | NJ | MP | ML | BI | NJ | MP | ML | BI | NJ | MP | ML | BI | NJ | MP | ML | BI | NJ | MP | ML | BI |
| A - *S. appressifolia* | 84 | 88 | 99 | 1 | 80 | 80 | 90 | 1 | 89 | 93 | 97 | 1 | 99 | 98 | 100 | 1 | 97 | 97 | 99 | 1 | 97 | 97 | 98 | 1 |
| B - *S. tecta* | 98 | 99 | 100 | 1 | 93 | 97 | 100 | 1 | 99 | 100 | 100 | 1 | 100 | 100 | 100 | 1 | 100 | 100 | 100 | 1 | 100 | 100 | 100 | 1 |
| C - *S. gracilescens* | - | - | - | - | 96 | 96 | 100 | 1 | 100 | 100 | 100 | 1 | 95 | 94 | 100 | 1 | 100 | 100 | 100 | 1 | 100 | 100 | 100 | 1 |
| D - *S. merkelii* | - | - | - | - | 88 | 84 | 92 | 1 | 60 | 67 | 62 | 1 | 85 | 87 | 99 | 1 | 61 | 73 | 66 | 1 | 88 | 92 | 88 | 1 |
| E - *S. spinomitria* | - | - | 96 | 0.92 | - | - | 87 | - | 94 | 94 | 94 | 1 | 62 | 86 | 100 | 1 | 99 | 98 | 99 | 1 | 96 | 94 | 96 | 1 |
| F - *S. rugifolia* | - | - | - | - | 92 | 97 | 99 | 1 | 100 | 100 | 100 | 1 | 95 | 99 | 99 | 1 | 100 | 100 | 100 | 1 | 100 | 100 | 100 | 1 |
| G - *S. jamesonii* | 64 | 64 | 77 | 0.99 | 98 | 99 | 100 | 1 | 97 | 99 | 87 | 0.99 | 100 | 100 | 100 | 1 | 99 | 100 | 96 | 1 | 100 | 100 | 98 | 1 |
| H - *S. elata* | - | - | - | - | - | - | - | - | 67 | 64 | 69 | 0.99 | - | - | 40 | 0.79 | 93 | 89 | 92 | 1 | 79 | 82 | 86 | 1 |
| I - *S. pseudoaffinis* | - | - | - | - | 63 | 63 | 91 | 0.97 | 100 | 100 | 91 | 1 | 62 | 64 | 92 | 0.98 | 100 | 100 | 90 | 1 | 100 | 100 | 93 | 1 |
| J - *S. torquata* | - | - | - | - | 93 | 93 | 95 | 1 | 100 | 100 | 98 | 1 | 93 | 93 | 96 | 1 | 100 | 100 | 96 | 1 | 100 | 100 | 99 | 1 |
| K - *S. trichomitria* | - | 51 | 89 | 0.91 | 92 | 92 | 98 | 0.93 | 100 | 100 | 92 | 1 | 97 | 96 | 100 | 0.93 | 100 | 100 | 89 | 1 | 100 | 100 | 86 | 1 |

**Appendix S4.** Support values for the clades of Brazilian *Schlotheimia* species in different analyses of single markers and combinations, without indels: Bootstrap support (BS) values (%) for neighbour joining (NJ), maximum parsimony (MP), and maximum likelihood (ML) and posterior probabilities (PP) for Bayesian inference (BI). Values below 70% (BS) and 0.95 (PP) are in red.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Clade | *trn*L-F | | | | *trn*G-R | | | | ITS | | | | | *trn*L-F + *trn*G-R | | | | | *trn*L-F + ITS | | | | | *trn*G-R+ ITS | | | | | *trn*L-F + *trn*G-R+ ITS | | | | |
|  | NJ | MP | ML | BI | NJ | MP | ML | BI | NJ | MP | ML | BI | NJ | | MP | ML | BI | NJ | | MP | ML | BI | NJ | | MP | ML | BI | NJ | | MP | ML | BI |
| A-*S. appressifolia* | 84 | 84 | 97 | 0.97 | 80 | 81 | 91 | 1 | 89 | 92 | 94 | 1 | 99 | | 100 | 99 | 1 | 97 | | 97 | 97 | 1 | 97 | | 96 | 96 | 1 | 98 | | 98 | 99 | 1 |
| B - *S. tecta* | 98 | 98 | 100 | 1 | 93 | 93 | 99 | 1 | 99 | 99 | 100 | 1 | 100 | | 100 | 100 | 1 | 100 | | 100 | 100 | 1 | 100 | | 100 | 100 | 1 | 100 | | 100 | 100 | 1 |
| C - *S. gracilescens* | - | - | - | - | 96 | 95 | 99 | 1 | 100 | 100 | 100 | 1 | 95 | | 95 | 100 | 1 | 100 | | 100 | 100 | 1 | 100 | | 100 | 100 | 1 | 100 | | 100 | 100 | 1 |
| D - *S. merkelii* | - | - | - | - | 88 | 85 | 92 | 1 | 60 | 60 | 50 | 0.93 | 85 | | 88 | 97 | 1 | 61 | | 61 | 43 | 0.87 | 88 | | 88 | 79 | 1 | 89 | | 88 | 78 | 1 |
| E - *S. spinomitria* | - | - | 68 | - | - | - | 78 | ­­ | 94 | 96 | 99 | 1 | 62 | | 61 | 96 | 0.98 | 99 | | 99 | 100 | 1 | 96 | | 96 | 100 | 1 | 100 | | 99 | 100 | 1 |
| F - *S. rugifolia* | - | - | - | - | 92 | 94 | 97 | 1 | 100 | 100 | 100 | 1 | 95 | | 94 | 99 | 1 | 100 | | 100 | 100 | 1 | 100 | | 100 | 100 | 1 | 100 | | 100 | 100 | 1 |
| G - *S. jamesonii* | 64 | 64 | 79 | 0.98 | 98 | 99 | 100 | 1 | 97 | 96 | 86 | 0.96 | 100 | | 99 | 100 | 1 | 99 | | 99 | 98 | 1 | 100 | | 100 | 99 | 1 | 100 | | 100 | 100 | 1 |
| H - *S. elata* | - | - | - | - | - | - | - | ­­ | 67 | 67 | 67 | 0.97 | - | | - | 53 | - | 93 | | 94 | 94 | 1 | 79 | | 80 | 79 | 1 | 92 | | 91 | 91 | 1 |
| I-*S. pseudoaffinis* | - | - | - | - | 63 | 62 | 89 | 0.97 | 100 | 100 | 100 | 1 | 62 | | 65 | 90 | 0.97 | 100 | | 100 | 100 | 1 | 100 | | 100 | 100 | 1 | 100 | | 100 | 100 | 1 |
| J - *S. torquata* | - | - | - | - | 93 | 92 | 96 | 1 | 100 | 100 | 100 | 1 | 93 | | 93 | 95 | 1 | 100 | | 100 | 100 | 1 | 100 | | 100 | 100 | 1 | 100 | | 100 | 100 | 1 |
| K- *S. trichomitria* | - | - | 93 | 0.91 | 92 | 92 | 97 | 0.95 | 100 | 100 | 100 | 1 | 97 | | 96 | 100 | 0.97 | 100 | | 100 | 99 | 1 | 100 | | 100 | 100 | 1 | 100 | | 100 | 100 | 1 |

**Appendix S5.** Number of character state changes of 17 morphological characters in *Schlotheimia* as inferred from ancestral state reconstruction.

|  |  |  |
| --- | --- | --- |
| Number | Morphological character | No. of changes |
| 1 | Plant size | 7 |
| 2 | Creeping stem covering | 2 |
| 3 | Creeping stem format | 3 |
| 4 | Branch length | 3 |
| 5 | Vegetative leaves (VL) shape | 5 |
| 6 | VL lamina | 4 |
| 7 | VL apex | 2 |
| 8 | VL margin | 1 |
| 9 | VL costa | 2 |
| 10 | Perichetial leaves (PL) lamina | 9 |
| 11 | PL apex | 3 |
| 12 | PL costa | 2 |
| 13 | Seta length | 2 |
| 14 | Capsule exposure | 1 |
| 15 | Capsule shape | 2 |
| 16 | Calyptra shape | 1 |
| 17 | Calyptra surface | 3 |