New Phytologist Supporting Information

Article title: The symmetry spectrum in a hybridizing, tropical group of rhododendrons
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The following Supporting Information is available for this article:

Fig. S1 Clustering threshold series for *Rhododendron* sect. *Schistanthe* RAD-seq data.
Y-axis shows mean (+/- SD) percentage of clusters per sample that were assembled according to Ilut *et al.* (2014) method. X-axis shows maximum pairwise distances allowed between reads within a cluster. Blue data represent single haplotype clusters (homozygous loci), red data represent three or more haplotype clusters (paralogous loci), and green data represent two-haplotype clusters (heterozygous loci). A maximum distance of nine was determined as the optimum clustering threshold to maximize two-haplotype clusters and minimize single haplotype clusters.
Fig. S2 *ipyrad* parameter settings for *Rhododendron* sect. *Schistanthe* RAD-seq data. A range of settings for a variety of *ipyrad* parameters were experimented with to identify the optimal setting based on number of retained loci. (a) maximum indels per locus. (b) maximum SNPs per locus. (c) maximum shared heterozygosity per locus. (d) minimum sample coverage per locus.
Fig. S3 RAxML topology of *Rhododendron* sect. *Schistante* and outgroups that was generated from the min4 dataset, which required four samples per locus. Support values at nodes for *Rhododendron* are shown in the following order: Quartet Concordance/Quartet Differential/Quartet Informativeness/bootstrap. Seven main clades (1-7) were identified in the study and referred to based on subsectional classification: Pseudovireya, Discovireya, Malayovireya, Euvireya A, Euvireya B, Euvireya C, and Euvireya D, respectively.
Fig. S4 RAxML topology of *Rhododendron* sect. *Schistante* and outgroups that was generated from the min37 dataset, which required 37 samples per locus. Support values at nodes for *Rhododendron* are shown in the following order: Quartet Concordance/Quartet Differential/Quartet Informativeness/bootstrap. Seven main clades (1-7) were identified in the study and referred to based on subsectional classification: Pseudovireya, Discovireya, Malayovireya, Euvireya A, Euvireya B, Euvireya C, and Euvireya D, respectively.
Fig. S5 RAxML topology of *Rhododendron* sect. *Schistante* and outgroups that was generated from the min74 dataset, which required 74 samples per locus.
Support values at nodes for *Rhododendron* are shown in the following order: Quartet Concordance/Quartet Differential/Quartet Informativeness/bootstrap. Seven main clades (1-7) were identified in the study and referred to based on subsectional classification: Pseudovireya, Discovireya, Malayovireya, Euvireya A, Euvireya B, Euvireya C, and Euvireya D, respectively.
Fig. S6 RAxML topology of *Rhododendron* sect. *Schistante* and outgroups that was generated from the min111 dataset, which required 111 samples per locus.

Support values at nodes for *Rhododendron* are shown in the following order: Quartet Concordance/Quartet Differential/Quartet Informativeness/bootstrap. Seven main clades (1-7) were identified in the study and referred to based on subsectional classification: Pseudovireya, Discovireya, Malayovireya, Euvireya A, Euvireya B, Euvireya C, and Euvireya D, respectively.
Fig. S7 SVDQuartets consensus topology of *Rhododendron* sect. *Schistante* that was generated from the min37 dataset, which required 37 samples per locus. Support values at nodes for the ingroup are shown in the following order: Quartet Concordance/Quartet Differential/Quartet Informativeness/bootstrap. Seven main clades (1-7) were identified in the study and referred to based on subsectional classification: Pseudovireya, Discovireya, Malayovireya, Euvireya A, Euvireya B, Euvireya C, and Euvireya D, respectively.
Fig. S8 SVDQuartets consensus topology of *Rhododendron* sect. *Schistante* that was generated from the min74 dataset, which required 74 samples per locus. Support values at nodes for the ingroup are shown in the following order: Quartet Concordance/Quartet Differential/Quartet Informativeness/bootstrap. Seven main clades (1-7) were identified in the study and referred to based on subsectional classification: Pseudovireya, Discovireya, Malayovireya, Euvireya A, Euvireya B, Euvireya C, and Euvireya D, respectively.
Fig. S9 SVDQuartets consensus topology of *Rhododendron* sect. *Schistante* that was generated from the min111 dataset, which required 111 samples per locus. Support values at nodes for the ingroup are shown in the following order: Quartet Concordance/Quartet Differential/Quartet Informativeness/bootstrap. Seven main clades (1-7) were identified in the study and referred to based on subsectional classification: Pseudovireya, Discovireya, Malayovireya, Euvireya A, Euvireya B, Euvireya C, and Euvireya D, respectively.
Fig. S10 Heatmap of $D_{min}$-statistics in *Rhododendron* sect. *Schistanthe*.

$D$-statistics were calculated for all possible trios without assuming any knowledge of relationships; then, the lowest $D$-statistic for each trio was used as a conservative estimate. P2 and P3 taxa are arranged along the vertical and horizontal axes. Clade designations and numbers are indicated along taxon names: Pse = Pseudovireya, Dis = Discovireya, Mal = Malayovireya, EuA = Euvireya A, EuB = Euvireya B, EuC = Euvireya C, and EuD = Euvireya D. The most significant $D$-statistic found for two species across all possible P1 taxa is indicated by heatmap cells. Red cells indicate higher $D$-statistics (presence of introgression), blue cells indicate lower $D$-statistics (absence of introgression), increasing color saturation indicates greater significance based on $P$-values, and white cells indicate lack of information.
Fig. S11 Heatmap of $D_{\text{tree}}$-statistics in *Rhododendron* sect. *Schistanthe*.

$D$-statistics were calculated using the species relationships from the SVDQuartets analyses of the min4 dataset. P2 and P3 taxa are arranged along the vertical and horizontal axes. Clade designations and numbers are indicated along taxon names: Pse = Pseudovireya, Dis = Discovireya, Mal = Malayovireya, EuA = Euvireya A, EuB = Euvireya B, EuC = Euvireya C, and EuD = Euvireya D. The most significant $D$-statistic found for two species across all possible P1 taxa is indicated by heatmap cells. Red cells indicate higher $D$-statistics (presence of introgression), blue cells indicate lower $D$-statistics (absence of introgression), increasing color saturation indicates greater significance based on $P$-values, and white cells indicate lack of information.
Fig. S12 Panel of outlines used to reconstruct floral morphospaces for *Rhododendron* sect. *Schistanthe*.
Specific epithets corresponding to each outline are indicated inside each outline. (a) Front-view outlines of corollas. (b) Side-view outlines of corollas.
Fig. S13 Morphospace variation and clustering of corollas from *Rhododendron* sect. *Schistanthe* using principal components analysis (PCA).
Colored dots and polygons correspond to the number of clusters identified by K-means clustering. Polygons represent total morphospace occupied by each cluster. (a-b) Morphospace for the front view of corollas (K = 5). (c-d) Morphospace for the side view of corollas (K = 2).
Fig. S14 Morphospace variation of corollas from *Rhododendron* sect. *Schistanthe* using principal components analysis (PCA) and flower color. Colored dots and polygons correspond to flower color in (b). Polygons represent total morphospace occupied by each flower color. (a-b) Morphospace for the front view of corollas. (c-d) Morphospace for the side view of corollas.
Table S1 Samples and vouchers used in this study.

| Taxon                                      | Collection locality                                                                 | Voucher information                  |
|--------------------------------------------|-------------------------------------------------------------------------------------|--------------------------------------|
| *Empetrum nigrum* L.                      | Cultivated, USA, Washington, Seattle, University of Washington, Medicinal Herb Garden | Soza 1957 (WTU)                      |
| *Erica arborea* L.                        | Cultivated, USA, Washington, Seattle, University of Washington Botanic Gardens, Washington Park Arboretum, Accession No. 184-81 | Barczak 34 (WTUH)                    |
| *Erica scoparia* L.                       | Cultivated, USA, Washington, Seattle, University of Washington Botanic Gardens, Washington Park Arboretum, Accession No. 303-81 | N/A¹                                 |
| *Kalmia latifolia* L.                     | Cultivated, USA, Washington, Seattle, University of Washington Botanic Gardens, Washington Park Arboretum, Accession No. 1054-40 | Herbarium Committee 1935 (WTUH)      |
| *Kalmia* sp.                              | Cultivated, USA, Washington, Seattle                                               | N/A                                  |
| *Kalmiopsis fragrans* Meinke & Kaye       | Cultivated, USA, Washington, Seattle, University of Washington Botanic Gardens, Washington Park Arboretum, Accession No. 106-13 | Rickenbaker 125 (WTUH)               |
| *Rhododendron abietifolium* Sleumer        | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19801209  | Conlon C216 (E)                      |
| *Rhododendron acrophilum* Merr. & Quisumb. | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19922768 | Conlon C424 (E)                      |
| *Rhododendron agathodaemonis* J.J.Sm.      | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 20080989  | N/A                                  |
| *Rhododendron albiflorum* Hook.           | Cultivated, USA, Washington, Federal Way, Rhododendron                             | N/A                                  |
| Species                          | Location Details                                                                 | Accession No.       |
|---------------------------------|----------------------------------------------------------------------------------|--------------------|
| *Rhododendron albrechtii* Maxim | Cultivated, USA, Washington, Federal Way, Rhododendron Species Botanical Garden, Accession No. 1999/105 | Soza & Ramage 1953 (WTU) |
| *Rhododendron album* Blume      | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19882540 | Conlon C127 (E)    |
| *Rhododendron alticola* Sleumer | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19710182 | Conlon C59 (E)     |
| *Rhododendron anagalliflorum* Wernham | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19821953 | Conlon C497 (E)    |
| *Rhododendron anthemopogon* D. Don | Cultivated, USA, Washington, Federal Way, Rhododendron Species Botanical Garden, Accession No. 1966/588 | Goetsch 036 (WTU)  |
| *Rhododendron apoanum* Stein    | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19933034 | Conlon C261 (E)    |
| *Rhododendron bagobonum* H.F.Copel. #9 | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19820933 | Galloway 8 (E)     |
| *Rhododendron bagobonum* H.F.Copel. #5 | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 20040442 | Galloway 9 (E)     |
| *Rhododendron bagobonum* H.F.Copel. #6 | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19991922 | Argent s.n. (E)    |
| *Rhododendron bagobonum* H.F.Copel. #10 | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19982490 | Galloway 10 (E)    |
| *Rhododendron bagobonum*        | Cultivated, UK, Scotland,                                                      | Galloway 11 (E)    |
| **Rhododendron bagobonum** | **Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No.** | **Galloway 12 (E)** |
|-----------------------------|--------------------------------------------------------------------------------|---------------------|
| **H.F.Copel. #7**           | 19801146                                                                      |                     |
| **Rhododendron bagobonum**  | **Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No.**    | **Galloway 13 (E)** |
| **H.F.Copel. #3**           | 20000482                                                                      |                     |
| **Rhododendron bagobonum**  | **Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No.**    | **Galloway 14 (E)** |
| **H.F.Copel. #8**           | 19922741                                                                      |                     |
| **Rhododendron bagobonum**  | **Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No.**    | **Argent s.n. (E)** |
| **H.F.Copel. #1**           | 19922777                                                                      |                     |
| **Rhododendron bagobonum**  | **Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No.**    | **Conlon C396 (E)** |
| **H.F.Copel. #4**           | 20080074                                                                      |                     |
| **Rhododendron banghamiorum** (J.J.Sm.) Sleumer | **Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No.** | **Conlon C487 (E)** |
| **Sleumer**                 | 20010334                                                                      |                     |
| **Rhododendron beyerinckianum Koord.** | **Cultivated, USA, Washington, Federal Way, Rhododendron Species Botanical Garden, Accession No. 1985/047** | **Soza *et al.* 1926/1933 (WTU)** |
| **Rhododendron blackii Sleumer** | **Cultivated, USA, Washington, Federal Way, Rhododendron Species Botanical Garden, Accession No. 2017/033** | **Soza *et al.* 1927 (WTU)** |
| **Rhododendron bloembergenii Sleumer** | **Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19973620** | **Argent s.n. (E)** |
| **Rhododendron borneense (J.J.Sm.) Argent, A.L.Lamb & Phillipps subsp. villosum (J.J.Sm.) Argent, A.L.Lamb &** | **Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19821510** | **Conlon C461 (E)** |
| Species Name                           | Cultivation Details                                                                 | Accession No.  | Conlon C... |
|---------------------------------------|-------------------------------------------------------------------------------------|----------------|-------------|
| **Rhododendron brassii**              | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19930917 |                | C477 (E)    |
| Sleumer                               |                                                                                     |                |             |
| **Rhododendron burtii**               | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19672565 |                | C50 (E)     |
| P.Woods                               |                                                                                     |                |             |
| **Rhododendron buxifolium**           | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19962012 |                | C405 (E)    |
| H.Low ex Hook.f.                      |                                                                                     |                |             |
| **Rhododendron caliginis**            | Cultivated, USA, Washington, Federal Way, Rhododendron Species Botanical Garden,    | 1989/003       | Soza et al.1928 (WTU) |
| Kores                                 | Accession No. 1989/003                                                               |                |             |
| **Rhododendron camtschaticum**        | Cultivated, USA, Washington, Federal Way, Rhododendron Species Botanical Garden,    | 1977/080       | Soza & Ramage 1934 (WTU) |
| Pall.                                 | Accession No. 1977/080                                                               |                |             |
| **Rhododendron carringtoniae**        | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19741502 |                | C240 (E)    |
| F.Muell.                              |                                                                                     |                |             |
| **Rhododendron celebicum**            | Cultivated, USA, Washington, Federal Way, Rhododendron Species Botanical Garden,    | 1997/062       | Soza 1964 (WTU) |
| DC.                                   | Accession No. 1997/062                                                               |                |             |
| **Rhododendron chevalieri**           | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 20010651 |                | C285 (E)    |
| Dop ex A.Chev.                        |                                                                                     |                |             |
| **Rhododendron christi**              | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19861623 |                | C356 (E)    |
| F.Foerst.                             |                                                                                     |                |             |
| **Rhododendron christianae**          | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19731628 |                | C28 (E)     |
| Sleumer                               |                                                                                     |                |             |
| **Rhododendron citrinum**             | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No.              |                | C135 (E)    |
| Hassk.                                |                                                                                        |                |             |
| Species                             | Cultivation Details                                                                 | Accession No.  |
|------------------------------------|--------------------------------------------------------------------------------------|----------------|
| *Rhododendron cockburnii*          | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 20080655    | Conlon C431 (E) |
| (Argent, A.L.Lamb & Phillipps) Craven |                                                                                      |                |
| *Rhododendron commonae*            | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19973645    | Conlon C468 (E) |
| F.Foerst.                          |                                                                                      |                |
| *Rhododendron crassifolium*        | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19801206    | Conlon C218 (E) |
| Stapf                              |                                                                                      |                |
| *Rhododendron culminicolum*        | Cultivated, USA, Washington, Federal Way, Rhododendron Species Botanical Garden, SEH #11023 | N/A            |
| F.Muell.                           |                                                                                      |                |
| *Rhododendron dielsianum*          | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19752618    | N/A            |
| Schltr. var. *dielsianum*           |                                                                                      |                |
| *Rhododendron edanoi* Merr. & Quisumb. subsp. edanoi | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19981819 | Conlon C44 (E) |
| *Rhododendron emarginatum*         | Cultivated, USA, Washington, Federal Way, Rhododendron Species Botanical Garden, Accession No. 1996/054 | N/A            |
| Hemsl. & E.H.Wilson                 |                                                                                      |                |
| *Rhododendron ericoideas*          | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19871806    | Conlon C21 (E) |
| H.Low ex Hook.f.                   |                                                                                      |                |
| *Rhododendron ferrugineum*         | Cultivated, USA, Washington, Federal Way, Rhododendron Species Botanical Garden, Accession No. 1998/772 | Goetsch 045 (WTU) |
| L.                                 |                                                                                      |                |
| *Rhododendron flavoviride*         | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19930971    | Conlon C313 (E) |
| J.J.Sm.                            |                                                                                      |                |
| *Rhododendron gardenia*            | Cultivated, UK, Scotland,                                                           | Conlon C320 (E) |


| Species | Notes | Accession Nos. |
|---------|-------|---------------|
| Rhododendron goodenoughii Sleumer | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19772400 | Conlon C208 (E) |
| Rhododendron gracilentum F.Muell. | Cultivated, USA, Washington, Federal Way, Rhododendron Species Botanical Garden, Accession No. 1978/103 | Goetsch 104 (WTU) |
| Rhododendron hellwigii Warb. | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19762978 | Conlon C379 (E) |
| Rhododendron herzogii Warb. | Cultivated, USA, Washington, Federal Way, Rhododendron Species Botanical Garden, Accession No. 1989/004 | Goetsch 068 (WTU) |
| Rhododendron himantodes Sleumer var. himantodes | Cultivated, USA, Washington, Federal Way, Rhododendron Species Botanical Garden, Accession No. 2007/020 | Soza 1963 (WTU) |
| Rhododendron hyacinthosum Sleumer | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19750104 | Conlon C211 (E) |
| Rhododendron impositum J.J.Sm. | Cultivated, USA, Washington, Federal Way, Rhododendron Species Botanical Garden, Accession No. 1997/055 | Soza 1961 (WTU) |
| Rhododendron inconspicuum J.J.Sm. | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19614237 | Conlon C129 (E) |
| Rhododendron jasminiflorum Hook. subsp. jasminiflorum | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19680638 | Conlon C113 (E) |
| Rhododendron javanicum Benn. subsp. brookeanum (H.Low ex Lindl.) Argent & Phillipps #2 | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19841173 | Galloway 15 (E) |
| **Rhododendron javanicum** Benn. subsp. **brookeanum** (H.Low ex Lindl.) Argent & Phillipps #1 | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19773440 | Galloway 16 (E) |
| **Rhododendron javanicum** Benn. subsp. **cladotrichum** (Sleumer) Argent #2 | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19952758 | Conlon C99 (E) |
| **Rhododendron javanicum** Benn. subsp. **cladotrichum** (Sleumer) Argent #1 | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19913084 | Argent s.n. (E) |
| **Rhododendron javanicum** Benn. subsp. **gracile** (Lindl.) Argent, A.L.Lamb & Phillipps #1 | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19831219 | Galloway 17 (E) |
| **Rhododendron javanicum** Benn. subsp. **gracile** (Lindl.) Argent, A.L.Lamb & Phillipps #2 | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19851901 | Conlon C387 (E) |
| **Rhododendron javanicum** Benn. subsp. **javanicum** | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19812954 | Conlon C60 (E) |
| **Rhododendron javanicum** Benn. subsp. **kinabalense** (Argent, A.L.Lamb & Phillipps) Argent | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19690955 | Conlon C365 (E) |
| **Rhododendron javanicum** Benn. subsp. **moultonii** (Ridl.) Argent | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19913192 | Conlon C159 (E) |
| **Rhododendron javanicum** Benn. subsp. **palawanense** Argent #1 | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19922762 | Conlon C24 (E) |
| **Rhododendron javanicum** Benn. subsp. **palawanense** Argent #2 | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19981796 | N/A |
| **Rhododendron javanicum** Benn. subsp. **schadenbergii** (Warb.) Argent #2 | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. | Argent s.n. (E) |
| Species                                      | Cultivation Details                                                                 | Accession No.       | Accession Code |
|----------------------------------------------|---------------------------------------------------------------------------------------|---------------------|----------------|
| Rhododendron javanicum Benn. subsp. schadenbergii (Warb.) Argent #1 | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19922809 | 19991884            |                |
| Rhododendron javanicum Benn. subsp. schadenbergii (Warb.) Argent #3 | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19991944 |                     | N/A            |
| Rhododendron kawakamii Hayata                | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19902930    |                     | N/A            |
| Rhododendron kochii Stein                   | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19972500    |                     | Conlon C198 (E) |
| Rhododendron konori Becc. var. konori        | Cultivated, USA, Washington, Federal Way, Rhododendron Species Botanical Garden, Accession No. 1979/036 |                     | Goetsch 069 (WTU) |
| Rhododendron laetum J.J.Sm                  | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19670214    |                     | Conlon C70 (E) |
| Rhododendron lagunculicarpum J.J.Sm.         | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19981654    |                     | Conlon C201 (E) |
| Rhododendron lamrialianum Argent & T.J.Barkman subsp. lamrialianum | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19841164 |                     | Conlon C94 (E) |
| Rhododendron lanceolatum Ridl.               | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 20010617  |                     | Conlon C168 (E) |
| Rhododendron leptanthum F. Muell.            | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19681436  |                     | Conlon C409 (E) |
| Rhododendron leptobrachion Sleumer           | Cultivated, USA, Washington, Federal Way, Rhododendron                               |                     | Soza 1959 (WTU) |
| Species | Botanical Garden Accession No. | Cultivation Details | Conlon Accession Code |
|---------|-------------------------------|---------------------|-----------------------|
| *Rhododendron leucogigas*  
Sleumer | Species Botanical Garden, Accession No. 2017/059 | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19682431 | Conlon C138 (E) |
| *Rhododendron lochae*  
F.Muell. |  | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19961303 | Argent s.n. (E) |
| *Rhododendron longiflorum*  
Lindl. |  | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19821503 | Conlon C478 (E) |
| *Rhododendron loranthiflorum*  
Sleumer subsp. *loranthiflorum* 'Dick Shaw' |  | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19830533 | Galloway 1 (E) |
| *Rhododendron luraluense*  
Sleumer |  | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19830534 | Conlon C436 (E) |
| *Rhododendron macgregoriae*  
F.Muell. |  | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19681160 | Conlon C297 (E) |
| *Rhododendron macrophyllum*  
D. Don ex G. Don | USA, Oregon, Whitewater Road NF-2243 |  | N/A |
| *Rhododendron maius*  
(J.J.Sm.) Sleumer |  | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19681423 | Conlon C294 (E) |
| *Rhododendron malayanum*  
Jack |  | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19820746 | Galloway 18 (E) |
| *Rhododendron meliphagidum*  
J.J.Sm. |  | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19880517 | Conlon C114 (E) |
| *Rhododendron minus*  
Michx. | Species Botanical Garden, Accession No. 2017/059 | Cultivated, USA, Washington, Federal Way, Rhododendron Species Botanical Garden, Goetsch 054 | (WTU) |
| Rhododendron Species | Accession No. | Cultivated Location | Additional Information |
|----------------------|--------------|---------------------|-----------------------|
| *Rhododendron molle* G.Don | 1998/173 | USA, Washington, Federal Way, Rhododendron Species Botanical Garden, Accession No. 1980/091 | Soza & Ramage 1932 (WTU) |
| *Rhododendron multicolor* Miq. | | UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 20110585 | N/A |
| *Rhododendron muscicola* J.J.Sm. | | UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19943025 | N/A |
| *Rhododendron orbiculatum* Ridl. | | UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19982489 | Conlon C361 (E) |
| *Rhododendron pachystigma* Sleumer | | UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 20061685 | N/A |
| *Rhododendron pauciflorum* King & Gamble | | UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19750119 | Conlon C18 (E) |
| *Rhododendron perakense* King & Gamble | | UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19973642 | Conlon C231 (E) |
| *Rhododendron periclymenoides* (Michx.) Shinners | | USA, Washington, Federal Way, Rhododendron Species Botanical Garden, Accession No. 1976/292 | N/A |
| *Rhododendron phaeochitum* F.Muell. | | USA, Washington, Federal Way, Rhododendron Species Botanical Garden, Accession No. 1986/022 | Soza 1960 (WTU) |
| *Rhododendron polyanthemum* Sleumer | | UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19801295 | Conlon C305 (E) |
| *Rhododendron praetervisum* Sleumer | | UK, Scotland, Royal Botanic Garden | Conlon C89 (E) |
| **Rhododendron primuliflorum**<br>Bureau & Franch. | Edinburgh, Accession No. 19790954 | Cultivated, USA, Washington, Federal Way, Rhododendron Species Botanical Garden, Accession No. 1977/603 | N/A |
| **Rhododendron pulleanum**<br>Koord. | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 20002004 | N/A |
| **Rhododendron quadrasianum**<br>S.Vidal var. quadrasianum | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19972518 | Conlon C202 (E) |
| **Rhododendron radians**<br>J.J.Sm. | Cultivated, USA, Washington, Federal Way, Rhododendron Species Botanical Garden, Accession No. 1997/063 | Goetsch 070 (WTU) |
| **Rhododendron rappardii**<br>Sleumer | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 20090776 | Argent et al. 39 (E) |
| **Rhododendron rarilepidotum**<br>J.J.Sm. | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19881429 | Conlon C126 (E) |
| **Rhododendron rarum**<br>Schltr. | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19681098 | Conlon C460 (E) |
| **Rhododendron retivenium**<br>Sleumer #1 | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19801288 | Conlon C316 (E) |
| **Rhododendron retivenium**<br>Sleumer #2 | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19952750 | Galloway 19 (E) |
| **Rhododendron retusum**<br>(Blume) Benn. | Cultivated, USA, Washington, Federal Way, Rhododendron Species Botanical Garden, Accession No. 1979/027 | Soza et al. 1930 (WTU) |
| **Rhododendron rhodoleucum** | Cultivated, UK, Scotland, | Conlon C221 (E) |
| Species                                      | Location                                      | Accession No.            | Conlon Code |
|----------------------------------------------|-----------------------------------------------|--------------------------|-------------|
| **Sleumer**                                  | Royal Botanic Garden Edinburgh, Accession No. 19682180 |                          |             |
| **Rhododendron robinsonii** Ridl.            | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19731358 |                          | Conlon C130 (E) |
| **Rhododendron rousei Argent & Madulid**     | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19902330 |                          | Galloway 20 (E) |
| **Rhododendron rubineiflorum** Craven        | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19962429 |                          | Conlon C327 (E) |
| **Rhododendron rugosum** H.Low ex Hook.f. var. rugosum | Cultivated, USA, Washington, Federal Way, Rhododendron Species Botanical Garden, Accession No. 1999/288 |                          | Goetsch 121 (WTU) |
| **Rhododendron rushforthii** Argent & D.F.Chamb. | Cultivated, USA, Washington, Federal Way, Rhododendron Species Botanical Garden, Accession No. 1997/087 |                          | N/A         |
| **Rhododendron ruttenii** J.J.Sm.            | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19880508 |                          | Conlon C197 (E) |
| **Rhododendron santapaui** Sastry & al.      | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19830996 |                          | Conlon C206 (E) |
| **Rhododendron saxifragoides** J.J.Sm.       | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19913932 |                          | Conlon C162 (E) |
| **Rhododendron scortechinii** King & Gamble  | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 20041584 |                          | Conlon C400 (E) |
| **Rhododendron searleanum** Sleumer          | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19741176 |                          | Conlon C303 (E) |
| **Rhododendron solitarium** Sleumer | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19681395 | Conlon C22 (E) |
| **Rhododendron sp. nova** | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 20061814 | Argent s.n. (E) |
| **Rhododendron stapfianum** Hemsl. ex Prain | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19821522 | Conlon C203 (E) |
| **Rhododendron stenophyllum** Hook.f. ex Stapf subsp. stenophyllum | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19801190 | Conlon C455 (E) |
| **Rhododendron suaveolens** Sleumer | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19762590 | Conlon C268 (E) |
| **Rhododendron superbum** Sleumer | Cultivated, USA, Washington, Federal Way, Rhododendron Species Botanical Garden, Accession No. 1978/094 | Goetsch 099 (WTU) |
| **Rhododendron sutchuenense** Franch. | Cultivated, USA, Washington, Federal Way, Rhododendron Species Botanical Garden, Accession No. 1965/348 | N/A |
| **Rhododendron taxifolium** Merr. | Cultivated, USA, Washington, Federal Way, Rhododendron Species Botanical Garden, Accession No. 2013/241 | Soza & Ramage 1954 (WTU) |
| **Rhododendron tuba** Sleumer | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19830538 | Conlon C64 (E) |
| **Rhododendron vaccinoides** Hook.f. | Cultivated, USA, Washington, Federal Way, Rhododendron Species Botanical Garden, Accession No. 1999/308 | N/A |
| **Rhododendron vidalii** Rolfe subsp. vidalii | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. | Argent s.n. (E) |
| Species | Cultivation Details | Accession No. | Cultivation Location | Accession No. | Collection No. |
|---------|---------------------|---------------|----------------------|---------------|----------------|
| Rhododendron vinicolor Sleumer | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19990504 | 19972468 | Conlon C469 (E) |
| Rhododendron vitis-idaea Sleumer | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19722383 | | Conlon C183 (E) |
| Rhododendron wentianum Koord. | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19951950 | | Argent s.n. (E) |
| Rhododendron womersleyi Sleumer | Cultivated, USA, Washington, Federal Way, Rhododendron Species Botanical Garden, Accession No. 1999/738 | | Soza 1962 (WTU) |
| Rhododendron wrightianum Koord. var. wrightianum | Cultivated, USA, Washington, Federal Way, Rhododendron Species Botanical Garden, Accession No. 1994/375 | | N/A |
| Rhododendron yelliotii Warb. | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19861767 | | Conlon C97 (E) |
| Rhododendron zoelleri Warb | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19550409 | | Conlon C16 (E) |
| Rhododendron zollingeri J.J.Sm. | Cultivated, UK, Scotland, Royal Botanic Garden Edinburgh, Accession No. 19981653 | | Argent s.n. (E) |

¹Not applicable (N/A).
Table S2 Characteristics for each dataset used in Rhododendron sect. Schistanthe analyses.

| Characteristics (for analyses)/Dataset | min4  | min37 | min74  | min111 |
|---------------------------------------|-------|-------|--------|--------|
| No. loci                              | 120,904 | 36,655  | 20,029 | 6,575  |
| Total bp (for RAxML)                  | 11,093,231 | 3,377,539 | 1,834,035 | 599,067 |
| Total SNPs (for Dsuite)               | 1,501,380 | 781,316  | 468,512 | 155,808 |
| Unlinked SNPs (for SVDQuartets)       | 117,121 | 36,644  | 20,028 | 6,575  |

Methods S1 Library preparation

Samples with insufficient initial DNA concentrations were re-extracted as follows. We increased incubation of the sample in Qiagen P3 buffer to 30 min and omitted binding of the DNA to the DNeasy Mini spin column. Instead, we precipitated the cleared lysate from the Qia-shredder column using isopropanol, followed by a second precipitation using ethanol and sodium acetate. We then estimated DNA quantity using a Qubit® 2.0 Fluorometer (Invitrogen™, Life Technologies™, Carlsbad, CA, USA).

Low concentration DNAs were digested in multiple reactions, then combined and concentrated using Agencourt® AMPure XP (Beckman Coulter, Indianapolis, IN, USA). P1 adapter-ligated DNA was pooled and sheared using a Bioruptor® Pico (Diagenode Inc, Denville, NJ, USA) according to the manufacturer’s protocol. Sheared DNA was size selected for 300- to 500-bp fragments by electrophoresis on 1% 1X TAE agarose. After RAD tag enrichment, DNA was size selected again for 300- to 500-bp fragments and verified by qPCR using the KAPA Universal Library Quantification Kit (Roche Sequencing, Pleasanton, CA, USA).

Methods S2 Data processing

We used a number of bioinformatic tools to further process the restriction-site associated DNA (RAD) data. To determine the optimal clustering threshold to use in ipyrad, we followed the method of Ilut et al. (2014). SEED (Bao et al., 2011) was used to remove redundant reads from each sample’s data. Custom Python scripts removed sequences with less than four reads. SlideSort v2 (Shimizu & Tsuda, 2010) found matching pairs of reads at distance thresholds from one to 20 under default settings. Transitive clusters were then generated using scripts kindly provided by D. Ilut (Cornell University, Ithaca, NY, USA) and visualized in R v4.0.3 (R Core Team, 2020) using ggplot2 (Wickham, 2016). The optimal clustering threshold was determined based on maximization of clusters with two haplotypes and minimization of clusters with one haplotype (Supporting Information Fig. S1).

Next, we filtered reads again using ipyrad with level two strictness for filtering adapters. We then conducted a reference-based assembly of loci within ipyrad under default settings, a clustering threshold of 0.91, as determined above, and a minimum depth of ten (Ilut et al., 2014) for statistical base calling and majority-rule base calling. To determine the optimum values for maximum number of indels, maximum number of SNPs, and maximum shared heterozygosity allowed per locus, we followed the method of Nieto-Montes de Oca et al. (2017)
and visualized our results in R v4.0.3. Based on these results (Supporting Information Fig. S2a-c), we allowed a maximum of eight indels, 34 SNPs, and 0.3 shared heterozygosity per locus to obtain alignments for phylogenetic inference.

**Methods S3 Phylogenetic analyses**

First, we performed a maximum likelihood (ML) topology search in RAxML v8.2.11 (Stamatakis, 2014) using the concatenated alignment of all loci from ipyrad for each of the four datasets (Supporting Information Table S2). We specified Kalmia and Kalmiopsis as outgroups and ran a rapid bootstrap analysis and search for the best-scoring ML tree under the GTRCAT model, using the extended majority-rule consensus tree bootstopping criterion (Pattengale et al., 2009).

Second, we reconstructed topologies for each dataset using the multispecies coalescent model in SVDQuartets (Chifman & Kubatko, 2014, 2015) on a concatenated alignment of one SNP sampled per locus from ipyrad (Supporting Information Table S2). For these analyses, we only included close outgroups from subg. *Rhododendron*. We conducted analyses in PAUP* v4.0a159 or 4.0a161 (Swofford, 2003) with 100 standard bootstrap replicates, evaluating all possible quartets, building trees using the Quartet FM (Reaz et al., 2014) quartet assembly, using the multispecies coalescent tree model, and distributing ambiguities. We then summarized topologies using Consense v3.6.6 (Felsenstein, 2005) on the CIPRES Science Gateway v3.3 (Miller et al., 2010) to compute a majority rule extended consensus tree.

To assess our two phylogenetic reconstruction methods on each of the four datasets, we used both bootstrap (bs) support and Quartet Sampling v1.3.1 (Pease et al., 2018). First, we calculated the percent of bootstrap values for each topology that had support greater than or equal to 70% to find the highest supported topology from each reconstruction method. We then used Quartet Sampling on each of the four topologies resulting from the four datasets for each reconstruction method. We used the concatenated alignment of loci for each dataset with its respective topologies to obtain enough information for Quartet Informativeness (QI). We conducted Quartet Sampling with 500 replicates under default settings using RAxML-NG v0.9.0 (Kozlov et al., 2019) as the engine. We visualized bootstrap and Quartet Sampling scores on topologies in R v4.0.3 using treeio v1.12.0 (Wang et al., 2020) and ggtree v2.2.4 (Yu, 2020).

**Methods S4 Introgression analyses**

Reconstructed species relationships within clades varied among datasets and among phylogenetic reconstruction methods. Therefore, we assessed whether admixture could be a factor for incongruences using the D-statistic (ABBA-BABA test) (Green et al., 2010; Durand et al., 2011) as implemented in Dsuite v0.3r21 (Malinsky et al., 2020). We used Dtrios on all SNPs resulting from ipyrad to calculate the D-statistic using three methods under default settings: (1) computing the D-statistic for all possible trios of species, without assuming any a priori knowledge of relationships, then using the lowest D-statistic ($D_{\min}$) for each trio as a conservative estimate, (2) inferring species relationships using the frequency of BBAA patterns, then calculating discordant site patterns with the $D$-statistics ($D_{BBAA}$), and (3) using the topology
from our reconstruction methods, with the most support for clades and their relationships, as a guide for relationships in computing the $D$-statistic ($D_{\text{tree}}$) (Malinsky et al., 2018, 2020).

**Methods S5 Molecular dating**
We used fossil calibration points for *Erica*, *Kalmia*, and *Rhododendron* and a maximum age for the root: 5.33, 15.97, 56, and 89.8 mya, respectively (Collinson & Crane, 1978; Van Der Burgh, 1987; Nixon & Crepet, 1993; Mai, 2001). We first conducted a priming analysis to determine the best optimization parameters, followed by a random subsample and replicate cross validation to determine the optimum smoothing value. We then conducted a thorough analysis in treePL on the bootstrap replicates generated above under default settings, but with a smoothing value of 0.1, gradient based optimizer of 2, auto-differentiation based optimizer of 2, and auto-differentiation cross validation based optimizer of 1. We summarized the dated bootstrap replicates with TreeAnnotator v2.6.0 (Bouckaert et al., 2019) to obtain confidence intervals. However, the confidence intervals were very narrow, so we just report the mean ages in the chronogram.

**Methods S6 Morphometric analyses**
For the front of the corolla, most outlines were generated by reflecting the half of the corolla that was in best shape or easiest to extract. For the side of the corolla, we attempted outlines either closed (i.e., with a line connecting petal lobes to form an unbroken outline) or open at the mouth. After comparing both, we determined that open outlines preserved the whole side better for some species with reflexed petals. For grouping taxa in morphospaces by corolla color, color was assigned to taxa based on the three categories used by Stevens (1976) to describe floral types in sect. *Schistanthe*: red, yellow, and white. In cases where a taxon was polymorphic in color, we used the corolla color represented in our sampled taxon.

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