

Appendix 11. Results of SOWH tests of monophyletic relationships conducted under all best-fit models as well as the K2P model. Tests were conducted for 27 hypotheses posed by the original authors of six data sets. Test statistics were evaluated against null distributions composed of 100 simulated replicates. Hypotheses were evaluated at $\alpha = 0.05$; significant P -values are given in bold type. Highlighted text indicates that the outcome of a test was influenced by the use of an alternative model.

Data Set 4

TreeBASE ID S904/M1486

Hypothesis 1: Deuterostomes form a monophyletic clade.

GTR+I+ Γ	$P = 0.08$
TrN+I+ Γ	$P = \mathbf{0.01}$
F81+I+ Γ	$P < \mathbf{0.01}$
K2P	$P < \mathbf{0.01}$

Hypothesis 2: Arthropods form a monophyletic clade.

GTR+I+ Γ	$P = \mathbf{0.03}$
TrN+I+ Γ	$P = \mathbf{0.05}$
F81+I+ Γ	$P = 0.11$
K2P	$P < \mathbf{0.01}$

Hypothesis 3: Nemerteans form a monophyletic clade.

GTR+I+ Γ	$P < \mathbf{0.01}$
TrN+I+ Γ	$P < \mathbf{0.01}$
F81+I+ Γ	$P < \mathbf{0.01}$
K2P	$P < \mathbf{0.01}$

Data Set 14

TreeBASE ID S1120/M1917

Hypothesis 1: *Acanthocalyx* forms a monophyletic clade.

GTR+ Γ $P > 0.99$

TVM+ Γ $P > 0.99$

K2P $P > 0.99$

Hypothesis 2: *Cryptothladia* forms a monophyletic clade.

GTR+ Γ $P > 0.99$

TVM+ Γ $P > 0.99$

K2P $P > 0.99$

Hypothesis 3: *Morina* forms a monophyletic clade.

GTR+ Γ $P = \mathbf{0.03}$

TVM+ Γ $P = \mathbf{0.03}$

K2P $P < \mathbf{0.01}$

Hypothesis 4: *Morina* and *Cryptothladia* form a monophyletic clade.

GTR+ Γ $P > 0.99$

TVM+ Γ $P > 0.99$

K2P $P > 0.99$

Hypothesis 5: Morinaceae forms a monophyletic clade.

GTR+ Γ $P > 0.99$

TVM+ Γ $P > 0.99$

K2P $P > 0.99$

Hypothesis 6: Dipsacaceae forms a monophyletic clade.

GTR+ Γ $P > 0.99$

TVM+ Γ $P > 0.99$

K2P $P > 0.99$

Hypothesis 7: Dipsacaceae and *Triplostegia* form a monophyletic clade.

GTR+ Γ $P > 0.99$

TVM+ Γ $P > 0.99$

K2P $P > 0.99$

Hypothesis 8: Valerianaceae forms a monophyletic clade.

GTR+ Γ $P > 0.99$

TVM+Γ $P > 0.99$

K2P $P > 0.99$

Hypothesis 9: Valerianaceae, Dipsacaceae, and *Triplostegia* form a monophyletic clade.

GTR+Γ $P > 0.99$

TVM+Γ $P > 0.99$

K2P $P > 0.99$

Data Set 32

TreeBase ID S725/M1156

Hypothesis 1: Mexican *T. harzianum* form a monophyletic clade.

HKY+I+Γ $P < 0.01$

K2P+I+Γ $P < 0.01$

K2P $P < 0.01$

Hypothesis 2: All North American *T. harzianum* form a monophyletic clade.

HKY+I+Γ $P < 0.01$

K2P+I+Γ $P < 0.01$

K2P $P < 0.01$

Hypothesis 3: South American *T. harzianum* form a monophyletic clade.

HKY+I+Γ $P < 0.01$

K2P+I+Γ $P < 0.01$

K2P $P < 0.01$

Hypothesis 4: European *T. harzianum* form a monophyletic clade.

HKY+I+Γ $P < 0.01$

K2P+I+Γ $P < 0.01$

K2P $P < 0.01$

Hypothesis 5: Japanese *T. harzianum* form a monophyletic clade.

HKY+I+Γ $P < 0.01$

K2P+I+Γ $P < 0.01$

K2P $P < 0.01$

Hypothesis 6: All Asian *T. harzianum* form a monophyletic clade.

HKY+I+Γ $P < 0.01$

K2P+I+Γ $P < 0.01$

K2P $P < 0.01$

Hypothesis 7: Continental Asian *T. harzianum* form a monophyletic clade.

HKY+I+Γ $P < 0.01$

K2P+I+Γ $P < 0.01$

K2P $P < 0.01$

Hypothesis 8: African *T. harzianum* form a monophyletic clade.

HKY+I+Γ $P < 0.01$

K2P+I+Γ $P < 0.01$

K2P $P < 0.01$

Hypothesis 9: *Hypocrea* species form a monophyletic clade.

HKY+I+Γ $P < 0.01$

K2P+I+Γ $P < 0.01$

K2P $P < 0.01$

Data Set 51

TreeBase ID S1262/M2204

Hypothesis 1: *Conradina* forms a monophyletic group.

GTR+I $P = 0.44$

HKY+Γ $P = 0.61$

HKY+I $P = 0.31$

K2P $P = 0.31$

Hypothesis 2: *Clinopodium* forms a monophyletic group.

GTR+I $P < 0.01$

HKY+Γ $P = 0.04$

HKY+I $P < 0.01$

K2P $P < 0.01$

Data Set 158

TreeBase ID S1262/M2204

Hypothesis 1: *C. acutifolia*, *C. megarhiza*, *C. joanneana*, and *C. arctica* form a monophyletic clade.

GTR+I+ Γ $P < 0.01$

TIM+I+ Γ $P < 0.01$

K2P $P < 0.01$

Hypothesis 2: *C. acutifolia*, *C. tuberosa*, *C. ogilviensis*, and *C. megarhiza* form a monophyletic clade.

GTR+I+ Γ $P < 0.01$

TIM+I+ Γ $P < 0.01$

K2P $P < 0.01$

Data Set 229

TreeBASE ID S1305/M2286

Hypothesis 1: *Mitrula* belongs to family Sclerotiniaceae (*Mitrula*, *Ciboria*, *Sclerotinia*, *Monolinia*, *Scleromitula*, and *Rutstroemia* form a monophyletic clade).

GTR+I+ Γ $P < 0.01$

TrN+I+ Γ $P < 0.01$

K2P $P < 0.01$

Hypothesis 2: *Mitrula* belongs to family Geoglossaceae (*Mitrula*, *Geoglossum*, and *Trichoglossum* form a monophyletic clade).

GTR+I+ Γ $P < 0.01$

TrN+I+ Γ $P < 0.01$

K2P $P < 0.01$