Appendix 10. Results of Shimodaira-Hasegawa tests of monophyletic relationships conducted under all models selected by the hLRT, AIC_c, BIC, and DT methods as well as the K2P model. Tests were conducted for 27 hypotheses posed by the original authors of six data sets. Hypotheses were evaluated at $\alpha = 0.05$ against a null distribution derived from 1000 replicates analyzed with the RELL method; 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* = 0.45

TrN+I+Γ *P* = 0.42

F81+I+Γ *P* = 0.42

K2P *P* = 0.34

Hypothesis 2: Arthropods form a monophyletic clade.

GTR+I+Γ *P* = 0.46

TrN+I+Γ *P* = 0.45

F81+I+Γ *P* = 0.47

K2P *P* = 0.22

Hypothesis 3: Nemerteans form a monophyletic clade.

GTR+I+Γ *P* = 0.25

TrN+I+Γ *P* = 0.25

F81+I+Γ *P* = 0.25

K2P *P* = 0.07

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 $P = 0.29$

TVM+Γ $P = 0.30$

K2P $P = 0.28$

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 $P < \mathbf{0.01}$

K2P+I+Γ $P < \mathbf{0.01}$

K2P $P < \mathbf{0.01}$

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

HKY+I+Γ $P < \mathbf{0.01}$

K2P+I+Γ $P < \mathbf{0.01}$

K2P $P < \mathbf{0.01}$

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

HKY+I+Γ $P = 0.18$

K2P+I+Γ $P = 0.13$

K2P $P = 0.32$

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

HKY+I+Γ $P < \mathbf{0.01}$

K2P+I+Γ $P < \mathbf{0.01}$

K2P $P < \mathbf{0.01}$

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

HKY+I+Γ $P < \mathbf{0.01}$

K2P+I+Γ $P < \mathbf{0.01}$

K2P $P < \mathbf{0.01}$

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

HKY+I+Γ $P < \mathbf{0.01}$

K2P+I+Γ $P < \mathbf{0.01}$

K2P $P < \mathbf{0.01}$

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

HKY+I+Γ $P < \mathbf{0.01}$

K2P+I+Γ $P < \mathbf{0.01}$

K2P $P = \mathbf{0.05}$

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

HKY+I+Γ $P < \mathbf{0.01}$

K2P+I+Γ $P < \mathbf{0.01}$

K2P $P < \mathbf{0.01}$

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

HKY+I+Γ $P < \mathbf{0.01}$

K2P+I+Γ $P < \mathbf{0.01}$

K2P $P < \mathbf{0.01}$

Data Set 51

TreeBase ID S1262/M2204

Hypothesis 1: *Conradina* forms a monophyletic group.

GTR+I $P = 0.16$

HKY+Γ $P = 0.24$

HKY+I $P = 0.25$

K2P $P = 0.26$

Hypothesis 2: *Clinopodium* forms a monophyletic group.

GTR+I $P = 0.09$

HKY+Γ $P = 0.09, 0.08$

HKY+I	$P = 0.09, 0.08$
K2P	$P = 0.09$

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	$P < \mathbf{0.01}$
TIM+I+Γ	$P < \mathbf{0.01}$
K2P	$P < \mathbf{0.01}$

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

GTR+I+Γ	$P = \mathbf{0.02}$
TIM+I+Γ	$P = \mathbf{0.02}$
K2P	$P = \mathbf{0.02}$

Data Set 229

TreeBASE ID S1305/M2286

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

GTR+I+Γ	$P = 0.28$
TrN+I+Γ	$P = 0.28$
K2P	$P = 0.08$

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

GTR+I+Γ	$P = 0.11$
TrN+I+Γ	$P = 0.12$
K2P	$P = \mathbf{0.02}$