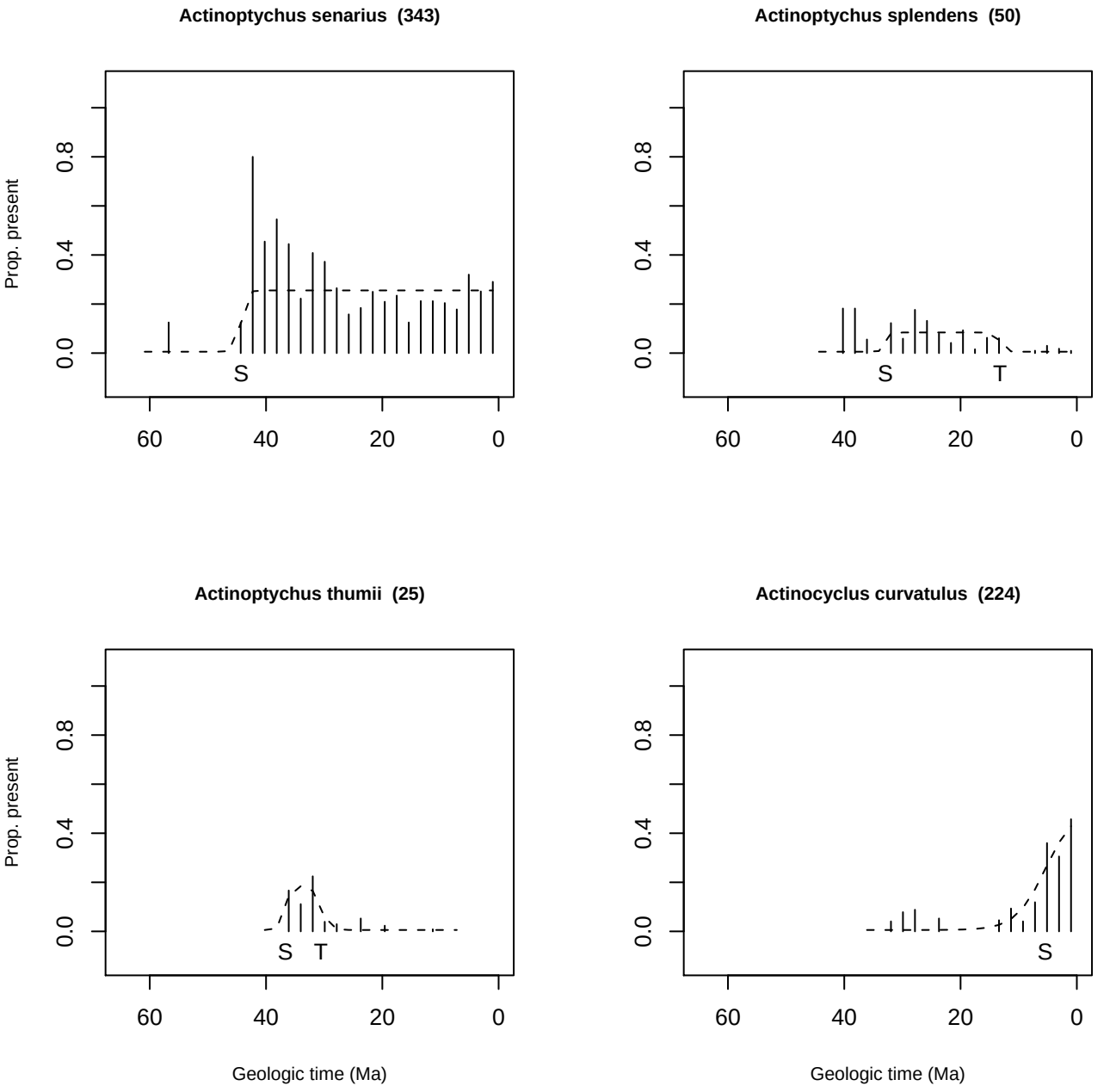
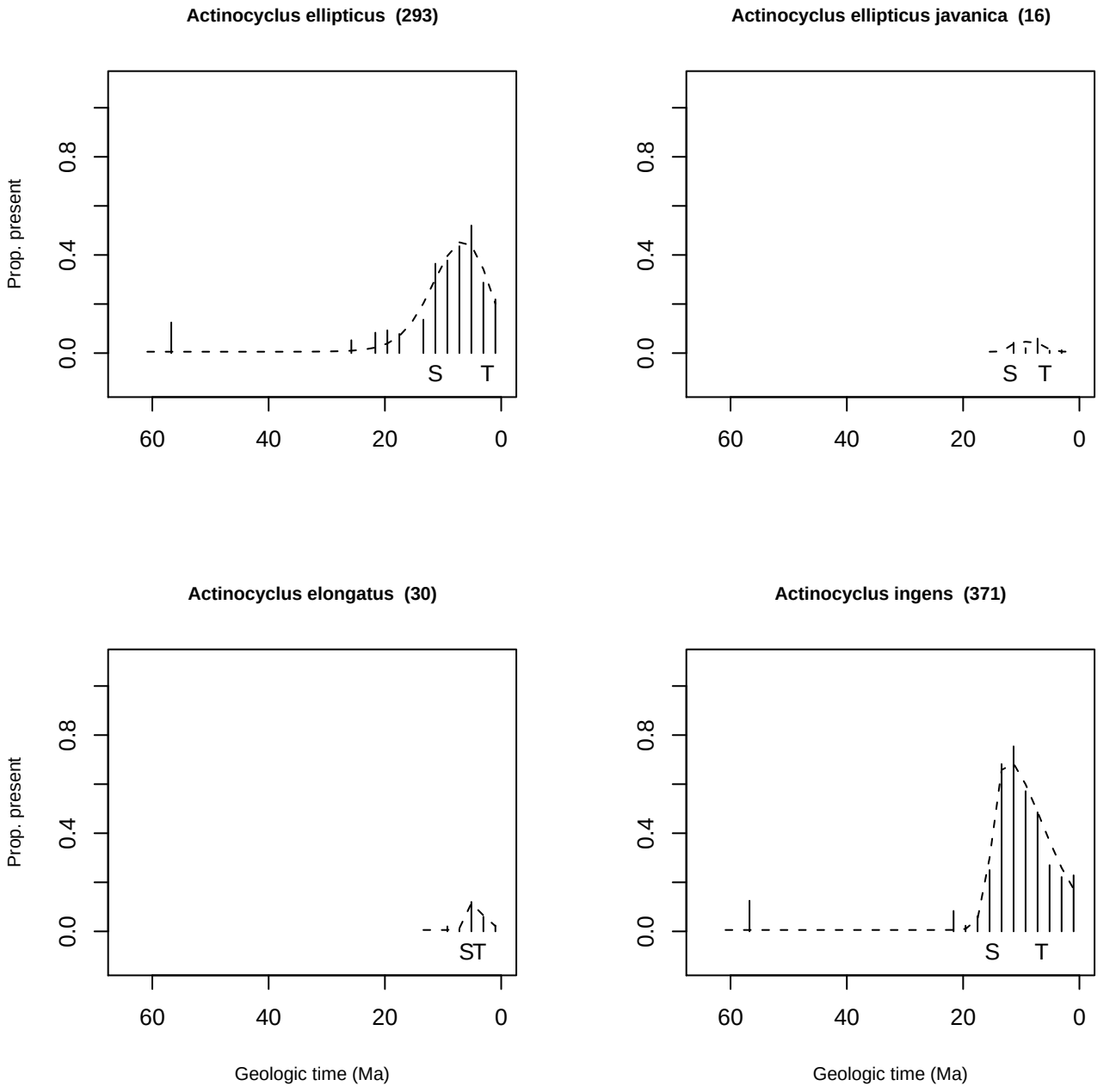
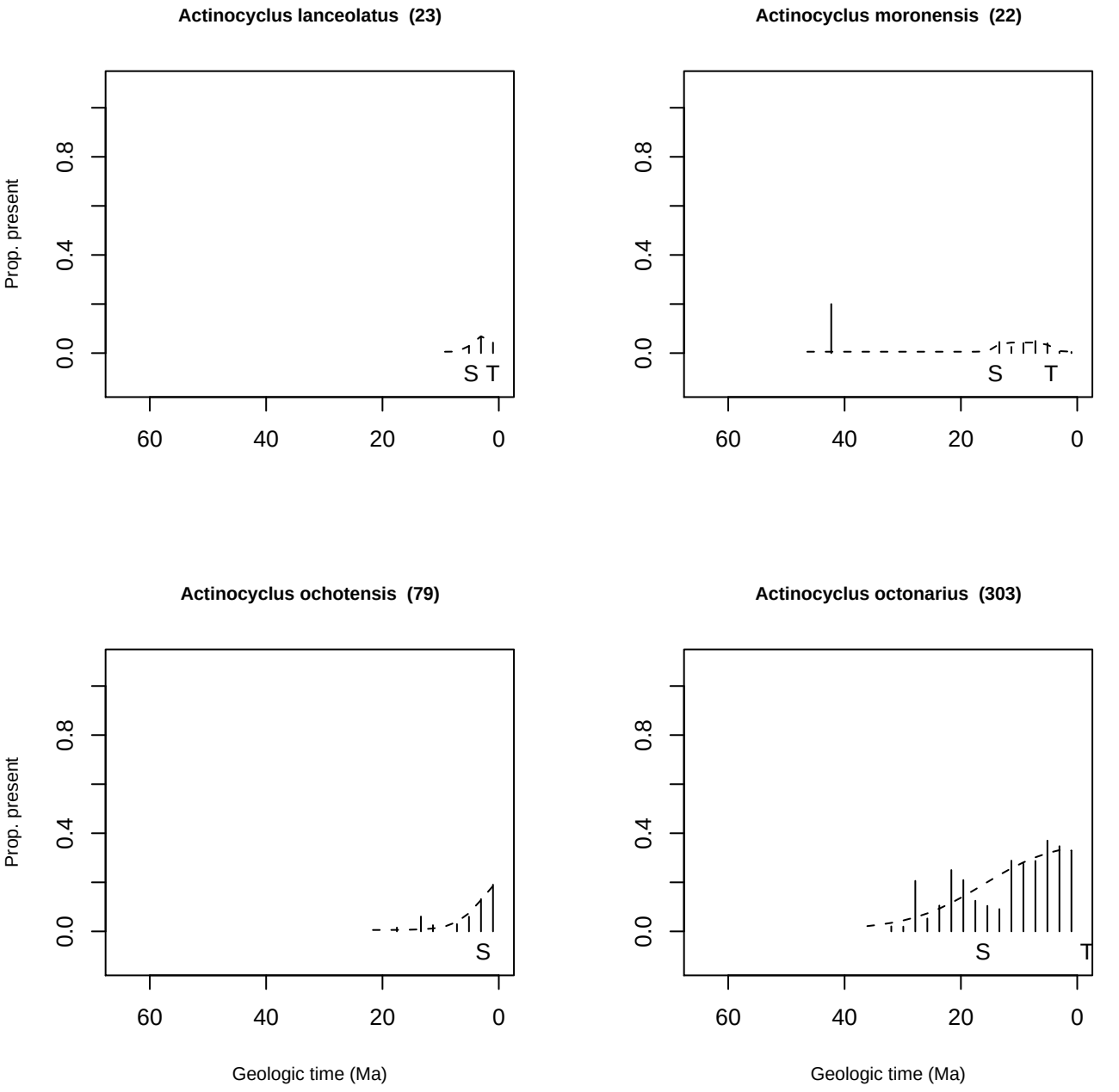
Supplementary Material: Diatoms

We first present plots of each of our model ("hat") fits to each diatom species. Vertical bars show the observed proportion of sites occupied by the species in 2 Myr bins. Dotted curves are the fitted curves. The labels "S" and "T" on each plot show the inflection points for the rise and fall of species (see model under methods), respectively. Following the species "hat", we show plots of the time period over which samples are available for each species and the temporal distribution of preservation status (preservation codes G for "good," M for "moderate" and P for "poor" and gray closed circles for samples with no preservation state coded). The first set of plots does not overlap completely with the second set because we have no preservation information for a few species.

Note that our model does not fit all species perfectly and that the parameter p_0 deals with cases such as *Actinocyclus ingens* which has a single Paleogene occurrence even though the bulk of its occurrences are in the Neogene with no intervening time periods where it occurs.


Actinoptychus senarius (343)
Actinoptychus splendens (50)
Actinoptychus thumii (25)
Actinocyclus curvatulus (224)
Prop. present
0.0
0.4
0.8
60
40
20
0
S
T
Geologic time (Ma)


Actinocyclus ellipticus (293)
Actinocyclus ellipticus javanica (16)
Actinocyclus elongatus (30)
Actinocyclus ingens (371)
Prop. present
0.0
0.4
0.8
60
40
20
0
S
T
ST
Geologic time (Ma)


Actinocyclus lanceolatus (23)
Actinocyclus moronensis (22)
Actinocyclus ochotensis (79)
Actinocyclus octonarius (303)
Prop. present
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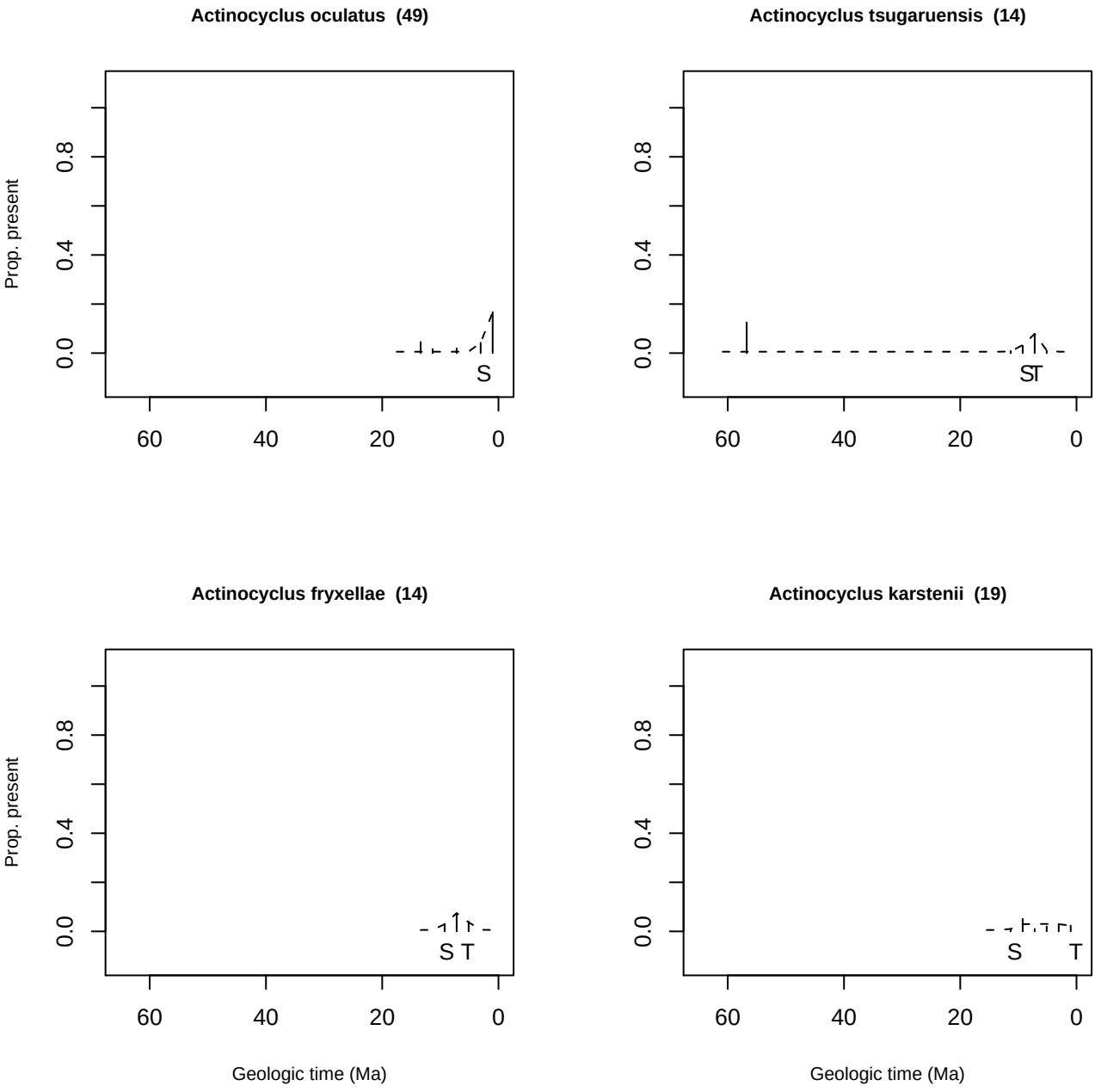
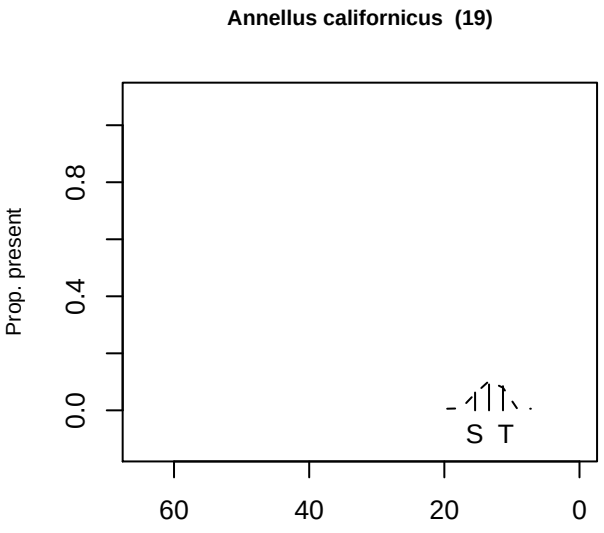
0.4
0.8
60
40
20
0
S
T
Geologic time (Ma)


Actinocyclus oculatus (49)
Actinocyclus tsugaruensis (14)
Actinocyclus fryxellae (14)
Actinocyclus karstenii (19)
Prop. present
0.0
0.4
0.8
60
40
20
0
S
ST
S T
S
T
Geologic time (Ma)
Geologic time (Ma)


Annellus californicus (19)
Prop. present
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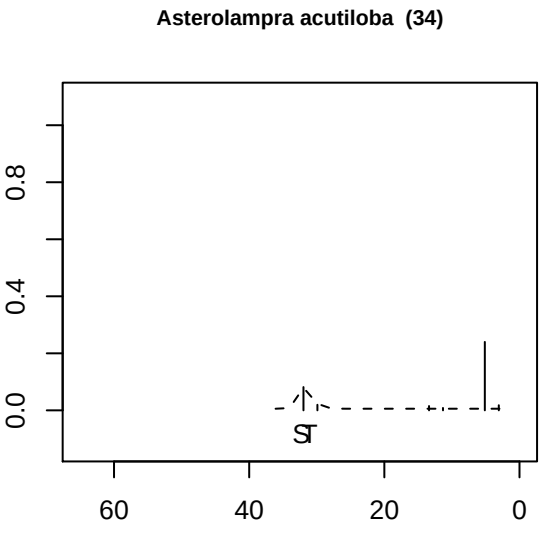
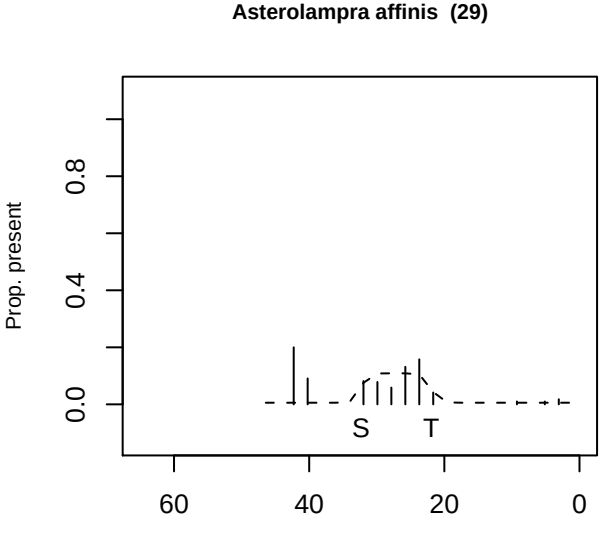
0.4
0.8
S
T
60
40
20
0


Asterolampra acutiloba (34)
0.0
0.4
0.8
S
T
60
40
20
0


Asterolampra affinis (29)
Prop. present
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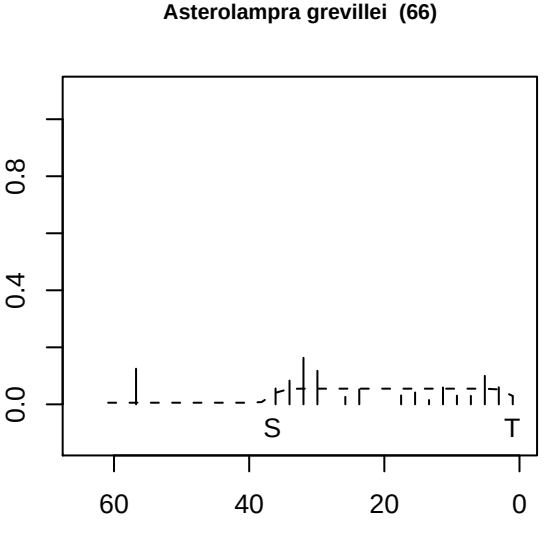
0.4
0.8
S
T
60
40
20
0
Geologic time (Ma)


Asterolampra grevillei (66)
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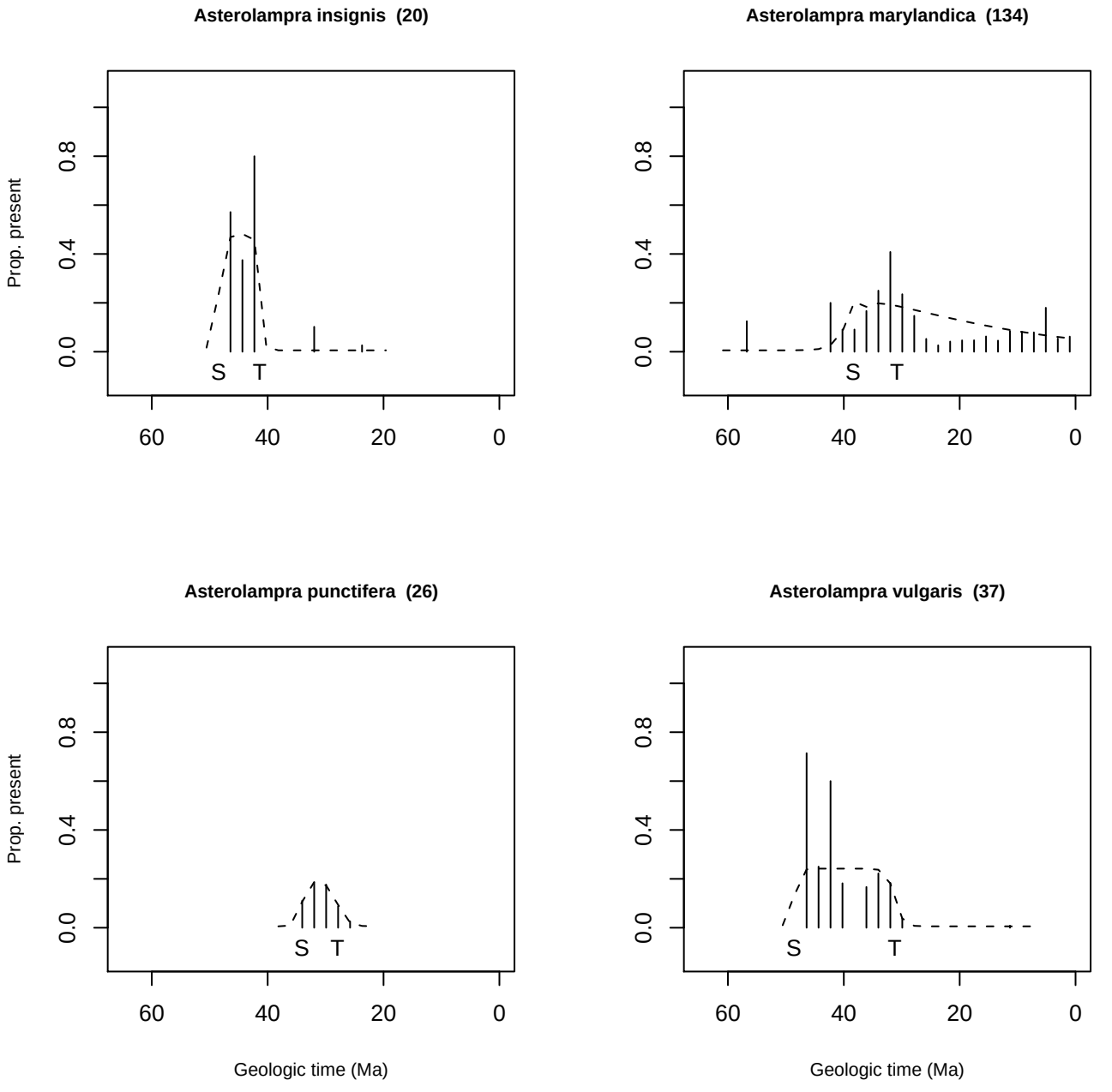
0.4
0.8
S
T
60
40
20
0
Geologic time (Ma)


Asterolampra insignis (20)
Asterolampra marylandica (134)
Asterolampra punctifera (26)
Asterolampra vulgaris (37)
Prop. present
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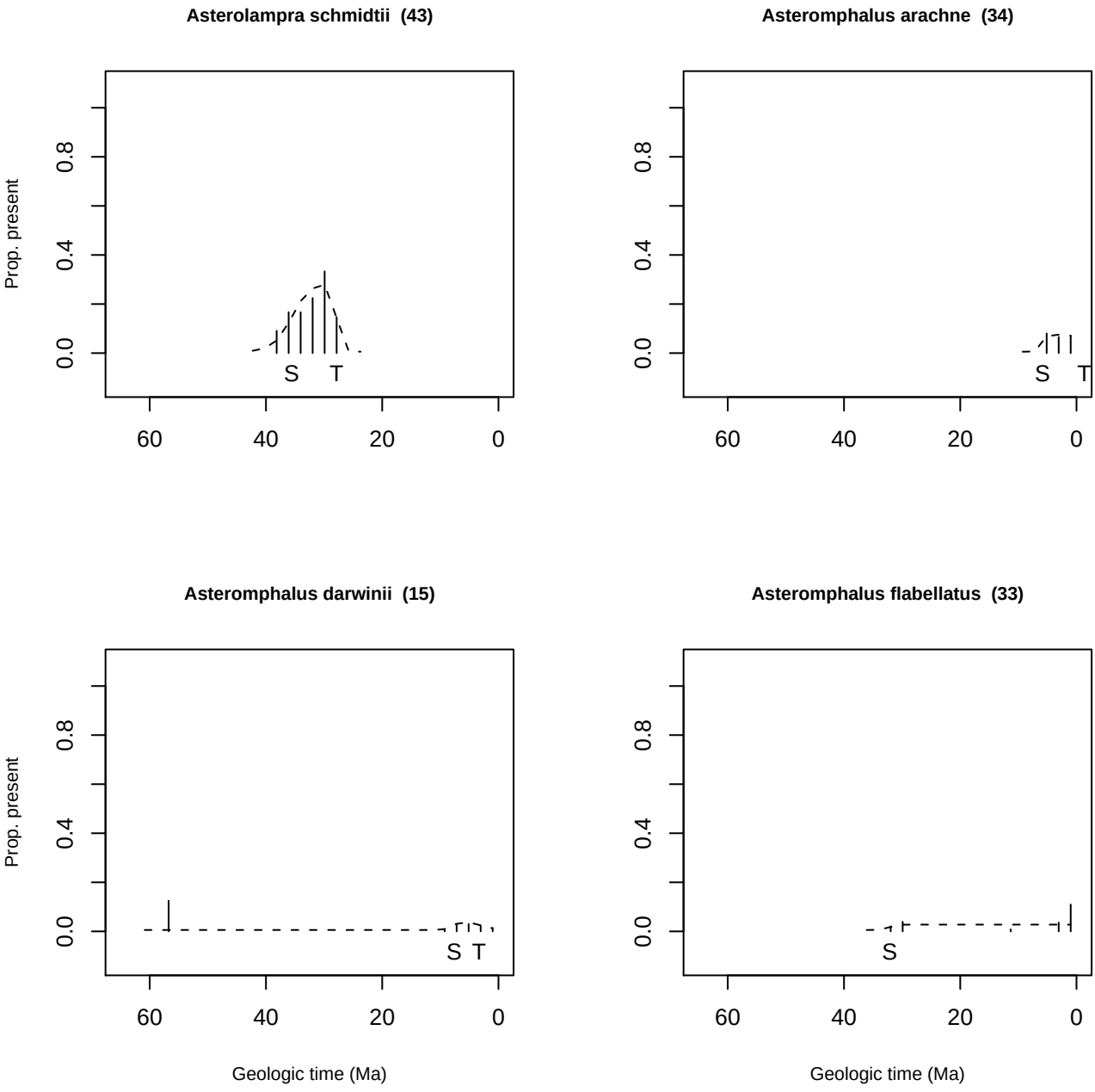
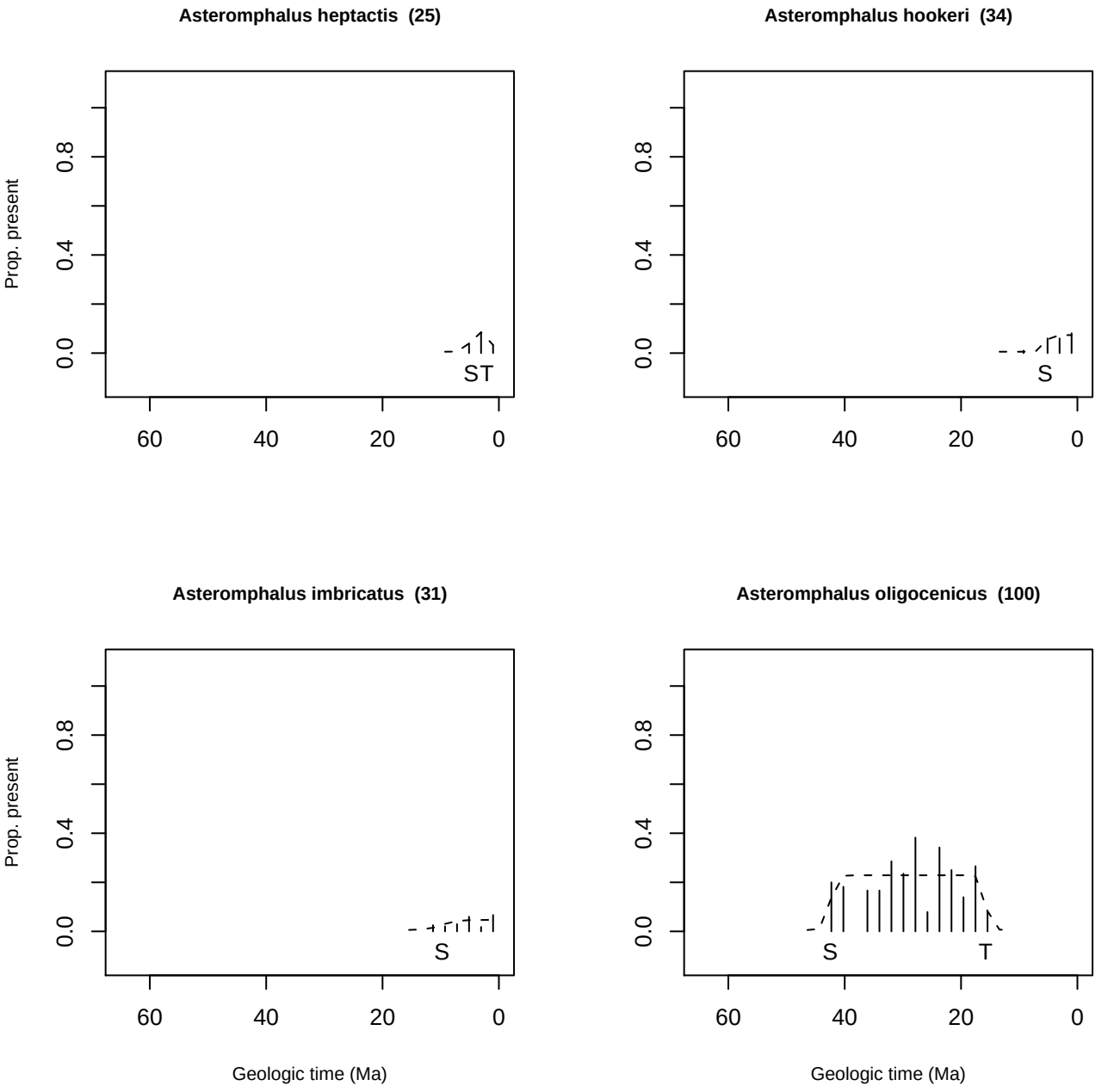
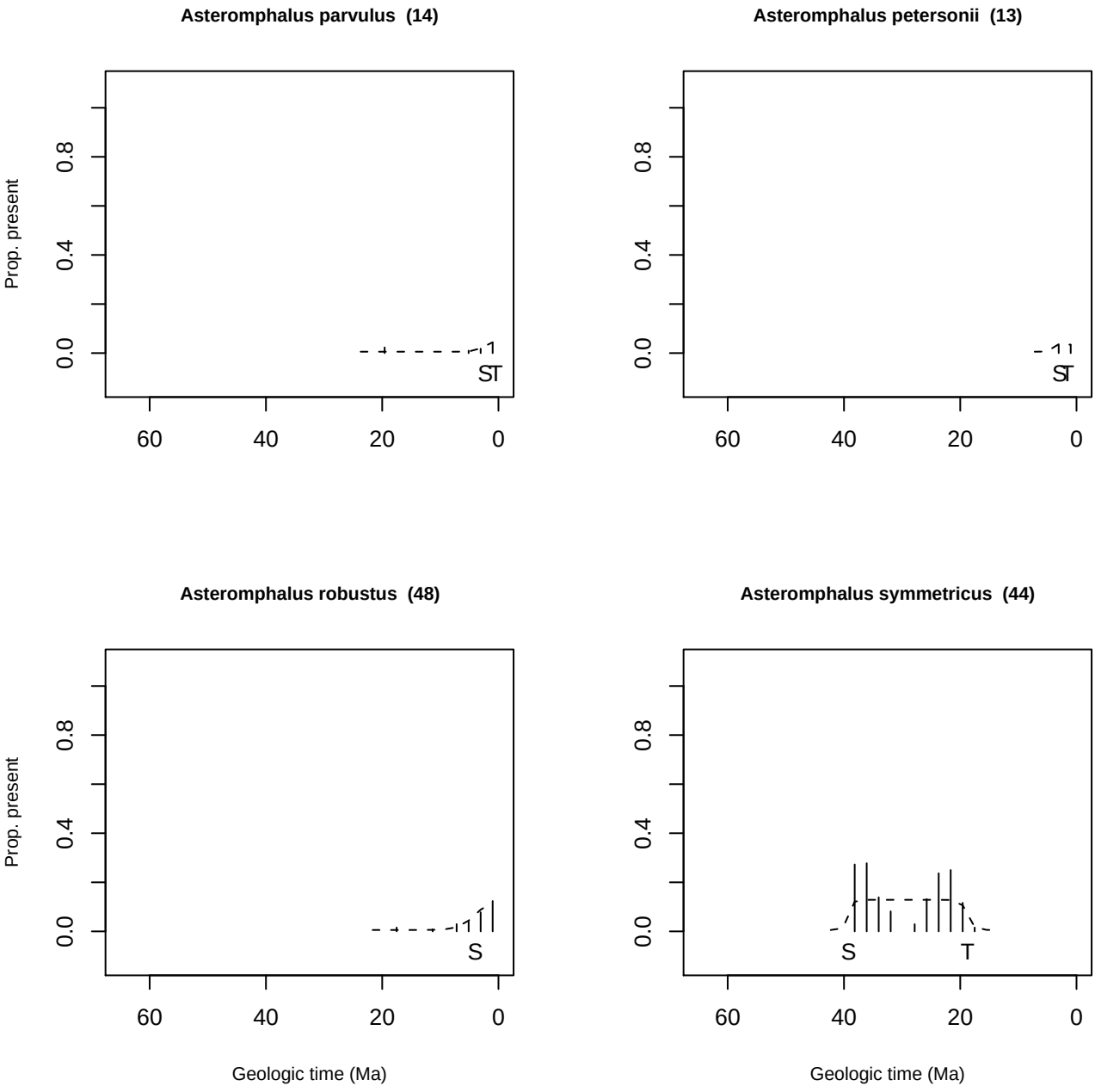
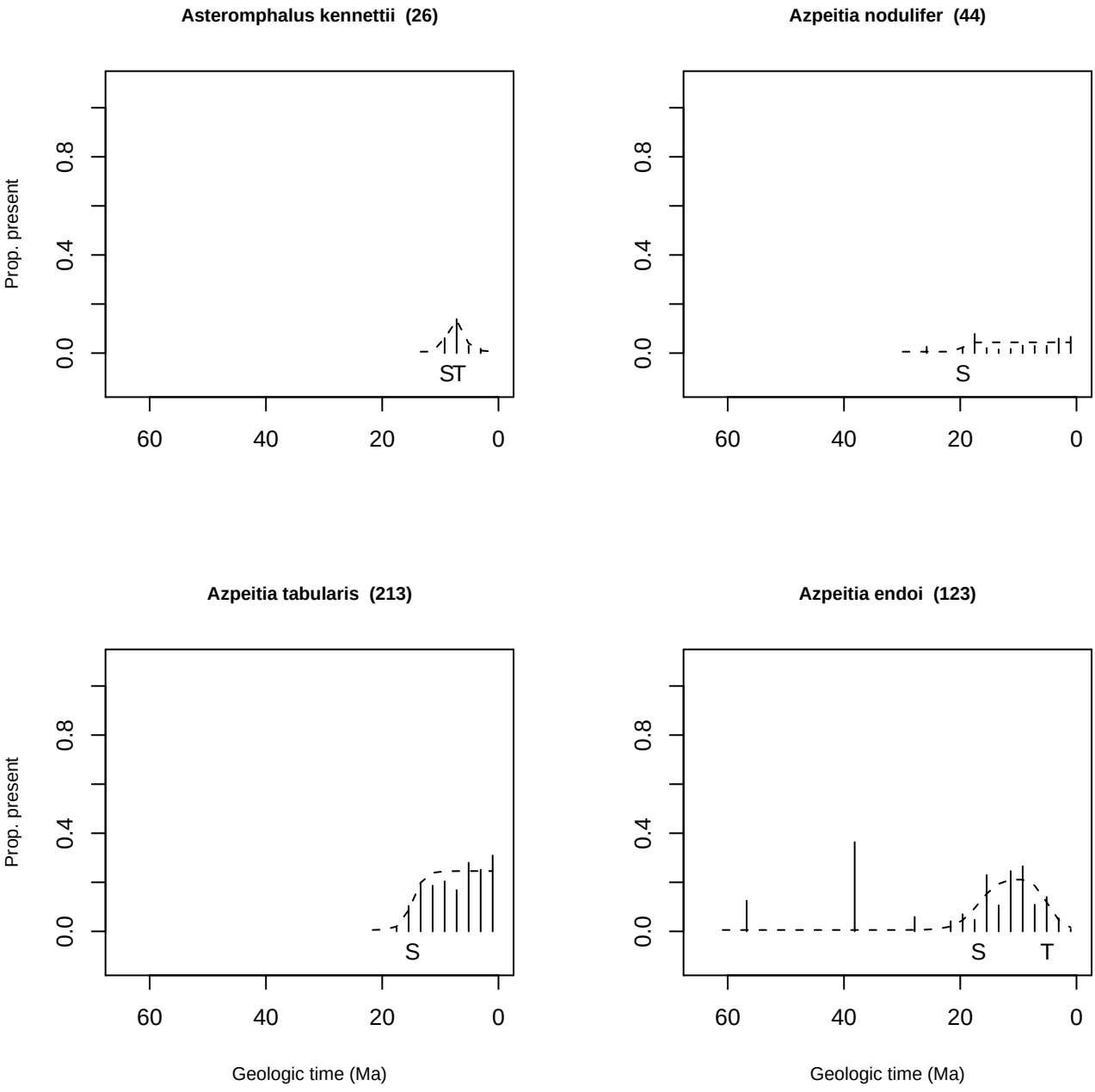
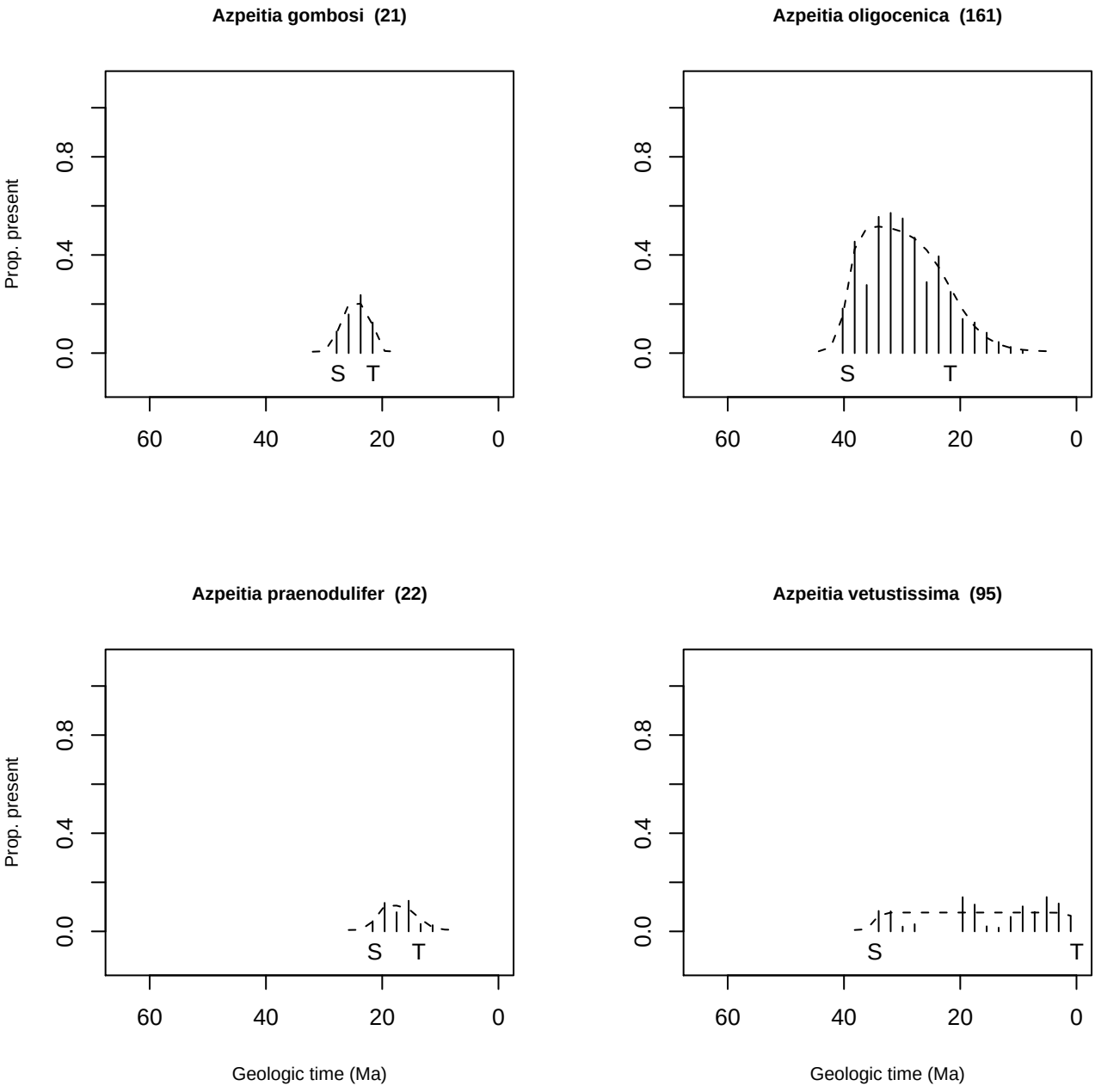
0.4
0.8
S
T
60
40
20
0
Geologic time (Ma)


Asterolampra schmidtii (43)
Asteromphalus arachne (34)
Asteromphalus darwinii (15)
Asteromphalus flabellatus (33)
Prop. present
0.0
0.4
0.8
60
40
20
0
S
T
Geologic time (Ma)


Asteromphalus heptactis (25)
Asteromphalus hookeri (34)
Asteromphalus imbricatus (31)
Asteromphalus oligocenicus (100)
Prop. present
0.0
0.4
0.8
60
40
20
0
ST
S
S
S
T
Geologic time (Ma)


Asteromphalus parvulus (14)
Asteromphalus petersonii (13)
Asteromphalus robustus (48)
Asteromphalus symmetricus (44)
Prop. present
0.0
0.4
0.8
60
40
20
0
S
T
Geologic time (Ma)


Asteromphalus kennettii (26)
Azpeitia nodulifer (44)
Azpeitia tabularis (213)
Azpeitia endoi (123)
Prop. present
0.0
0.4
0.8
ST
S
S
S
T
60
40
20
0
Geologic time (Ma)


Azpeitia gombosi (21)
Azpeitia oligocenica (161)
Azpeitia praenodulifer (22)
Azpeitia vetustissima (95)
Prop. present
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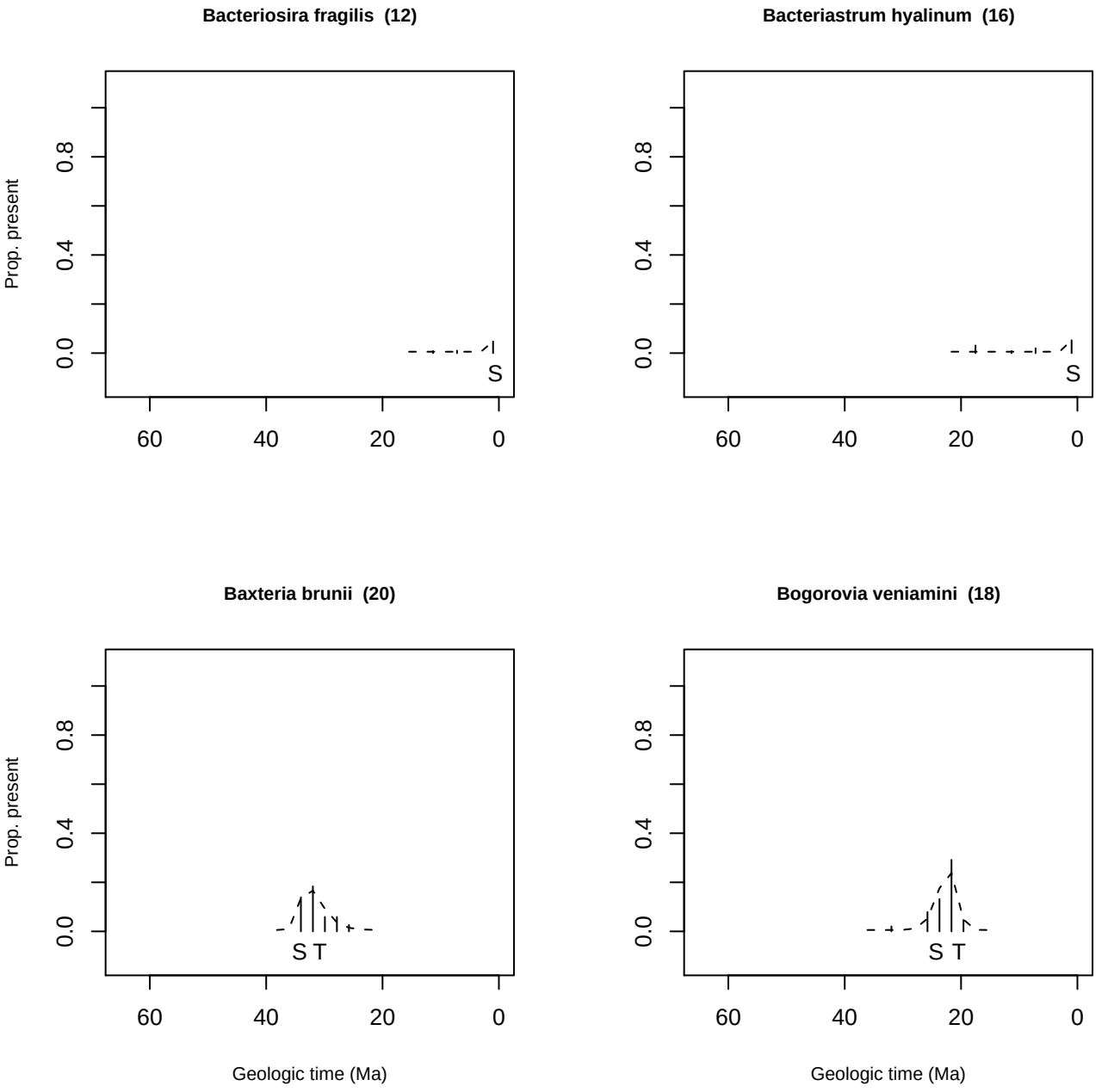
0.4
0.8
S
T
60
40
20
0
Geologic time (Ma)


Bacteriosira fragilis (12)
Bacteriastrum hyalinum (16)
Baxteria brunii (20)
Bogorovia veniamini (18)
Prop. present
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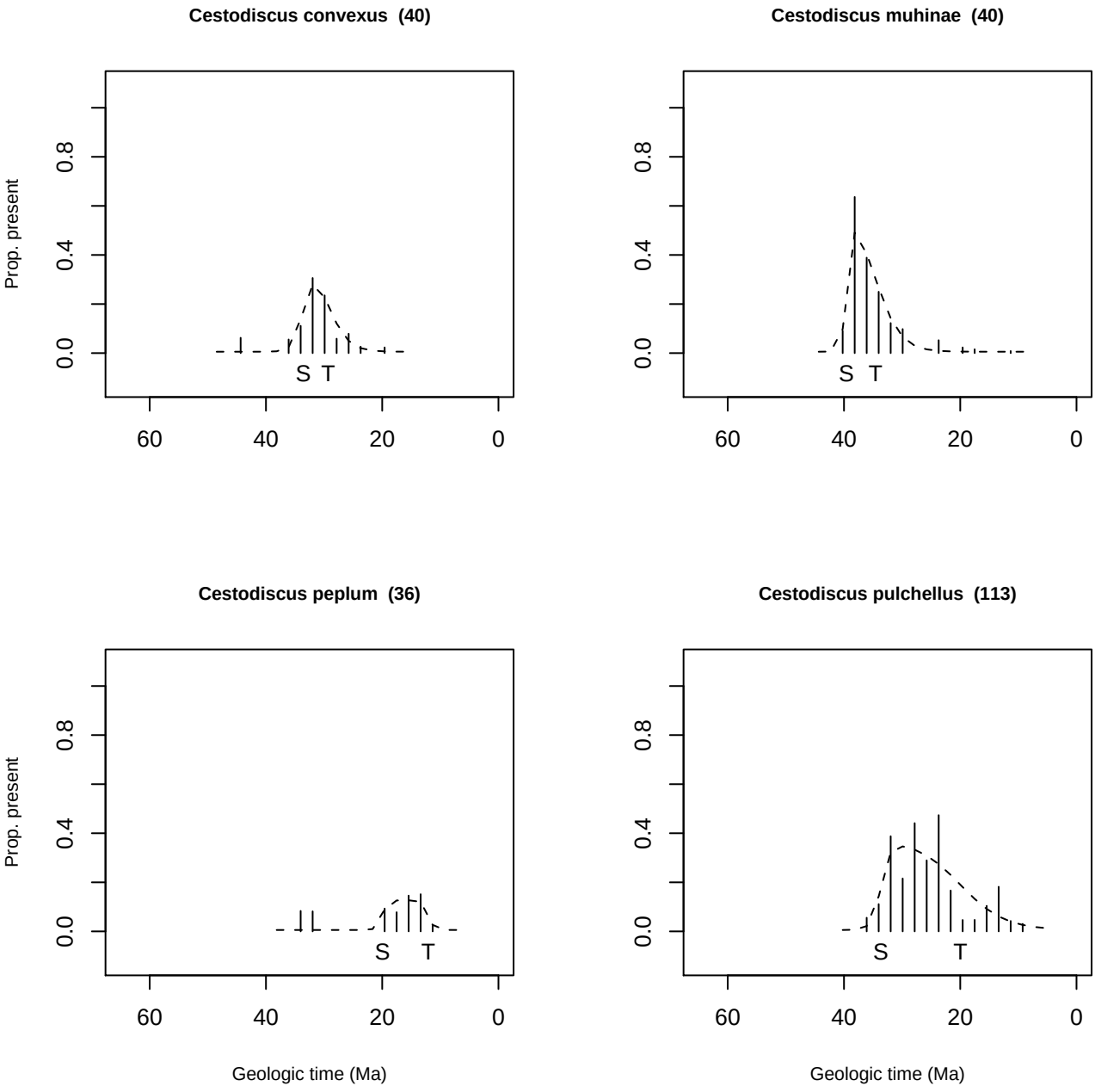
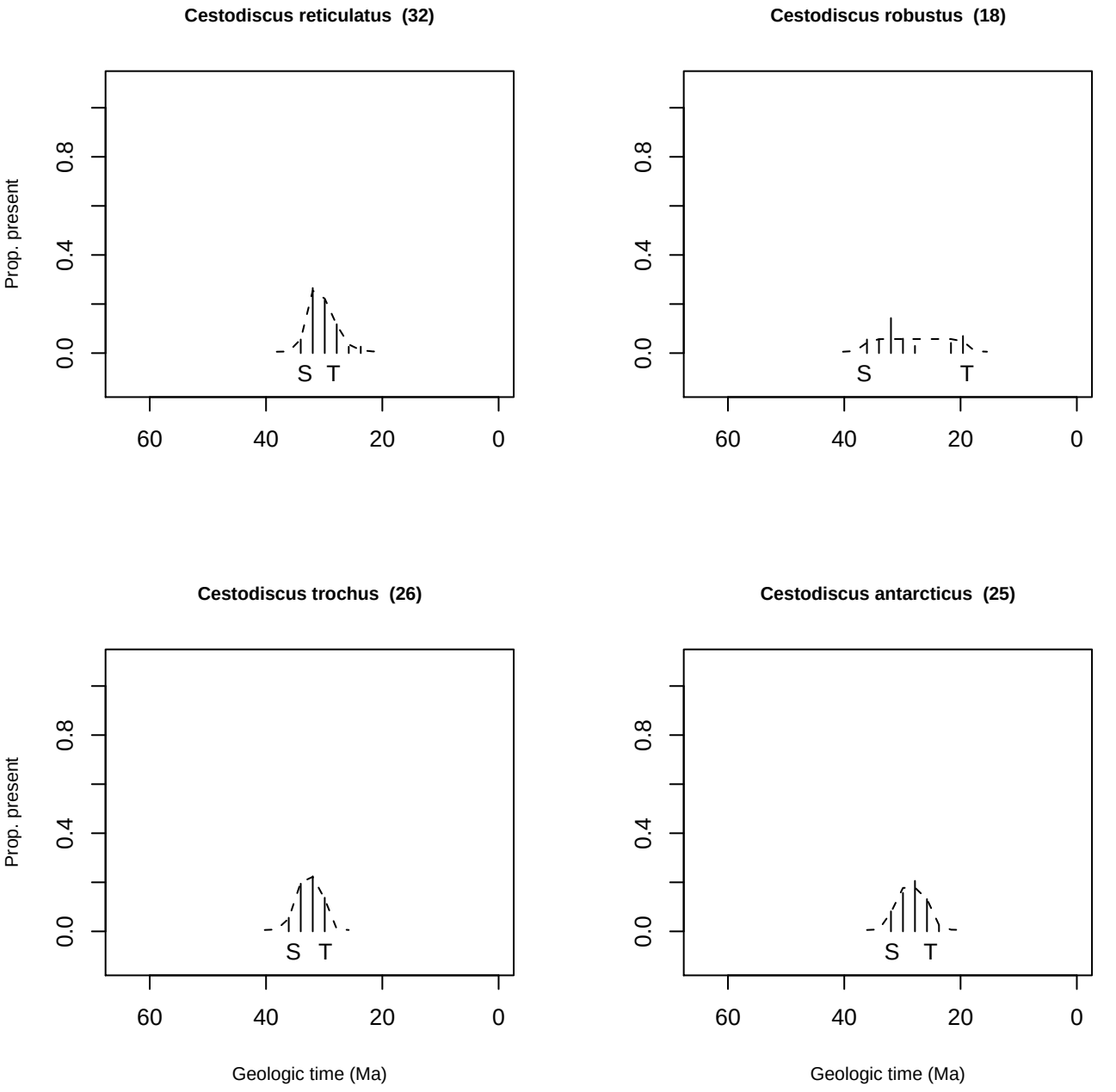
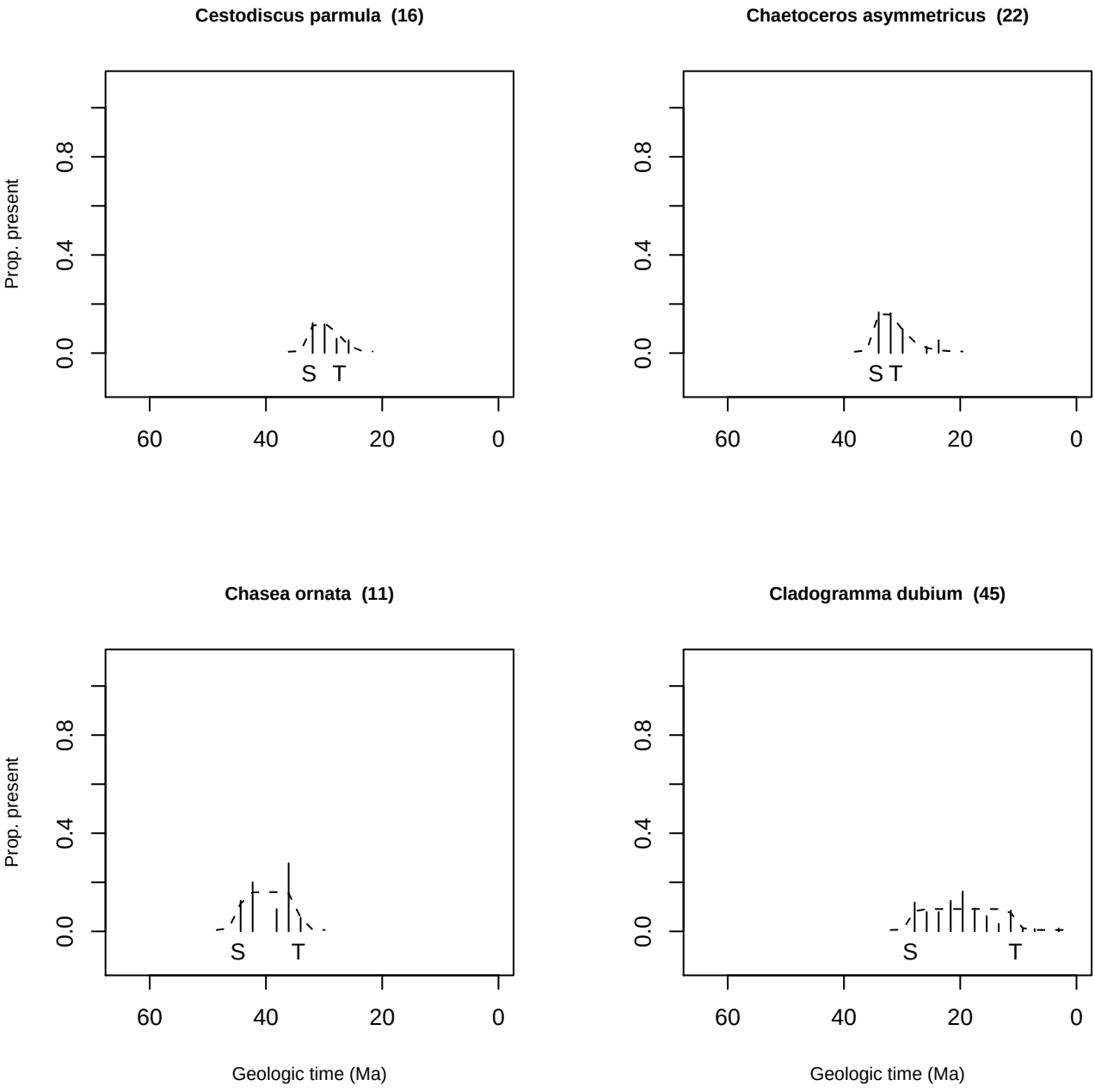
0.4
0.8
60
40
20
0
S
T
Geologic time (Ma)


Cestodiscus convexus (40)
Cestodiscus muhinae (40)
Cestodiscus peplum (36)
Cestodiscus pulchellus (113)
Prop. present
0.0
0.4
0.8
S
T
60
40
20
0
Geologic time (Ma)


Cestodiscus reticulatus (32)
Cestodiscus robustus (18)
Cestodiscus trochus (26)
Cestodiscus antarcticus (25)
Prop. present
0.0
0.4
0.8
S
T
60
40
20
0
Geologic time (Ma)


Cestodiscus parmula (16)
Chaetoceros asymmetricus (22)
Chasea ornata (11)
Cladogramma dubium (45)
Prop. present
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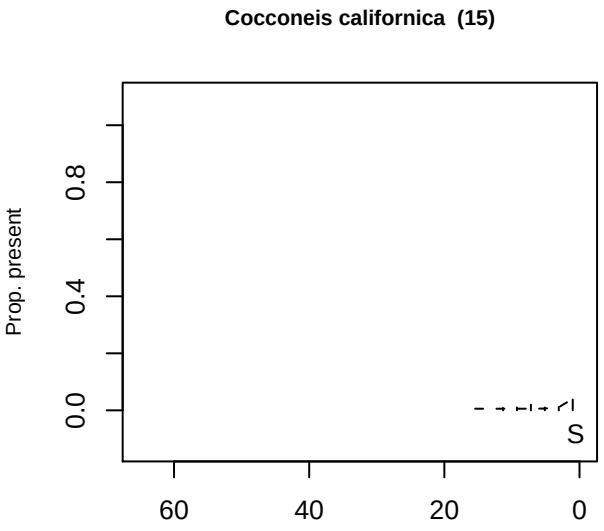
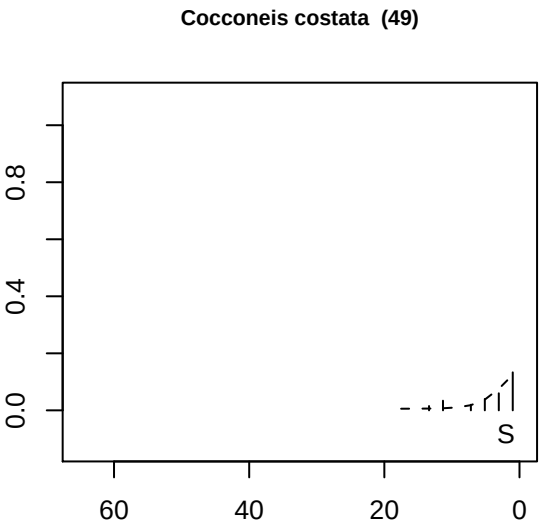
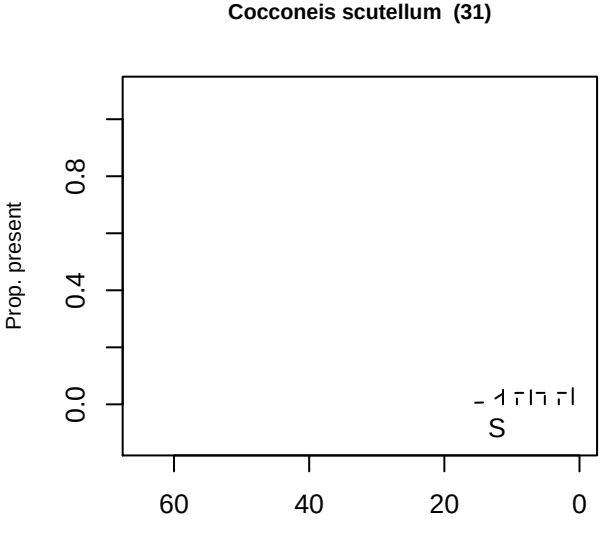
0.4
0.8
S
T
60
40
20
0
Geologic time (Ma)


Cocconeis californica (15)
Prop. present
0.0
0.4
0.8
S
60
40
20
0


Cocconeis costata (49)
0.0
0.4
0.8
S
60
40
20
0


Cocconeis scutellum (31)
Prop. present
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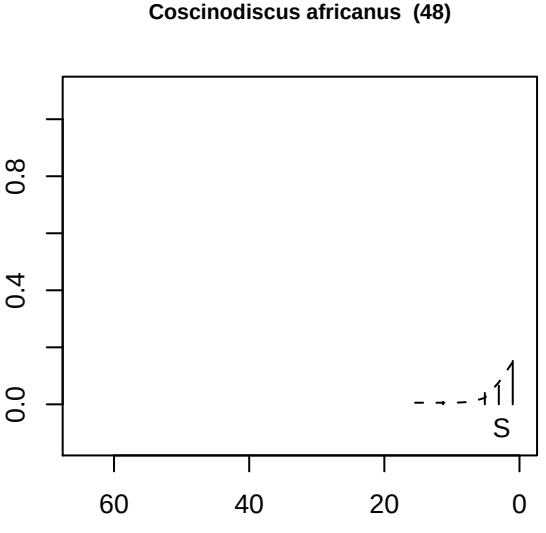
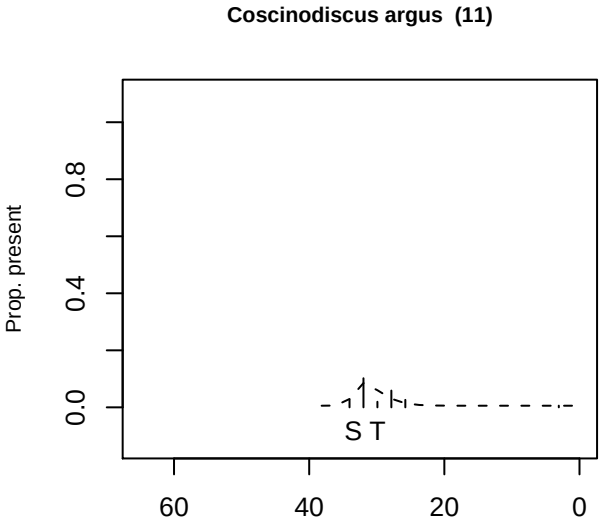
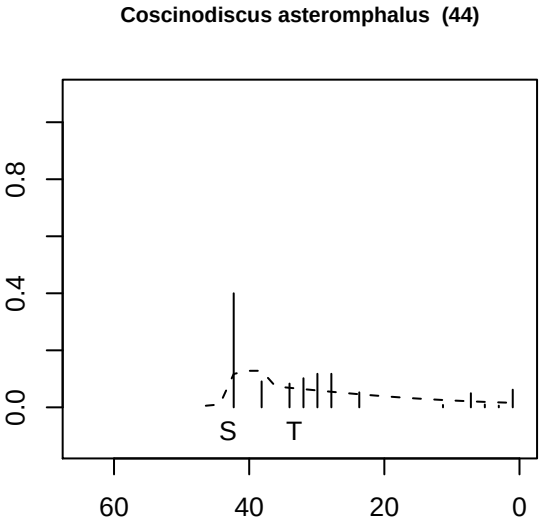
0.4
0.8
S
60
40
20
0
Geologic time (Ma)


Coscinodiscus africanus (48)
0.0
0.4
0.8
S
60
40
20
0
Geologic time (Ma)


Coscinodiscus argus (11)
Prop. present
0.0
0.4
0.8
S T
60
40
20
0


Coscinodiscus asteromphalus (44)
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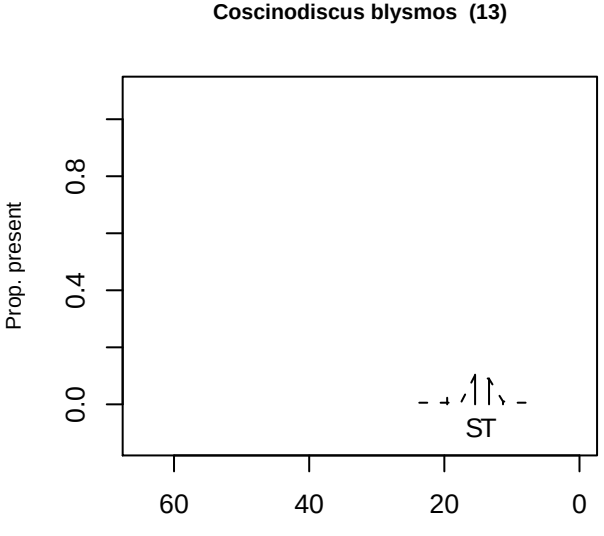
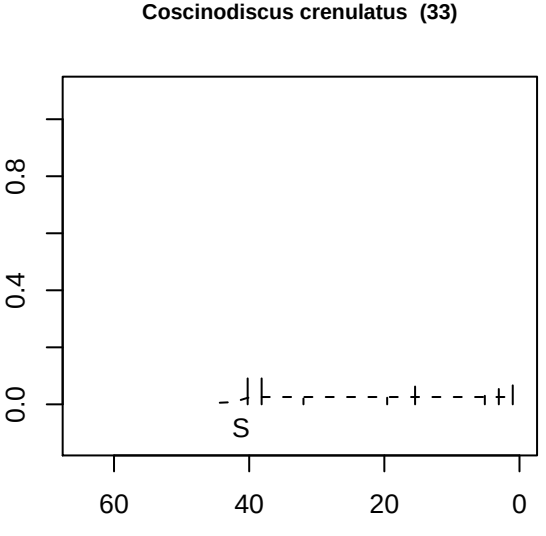
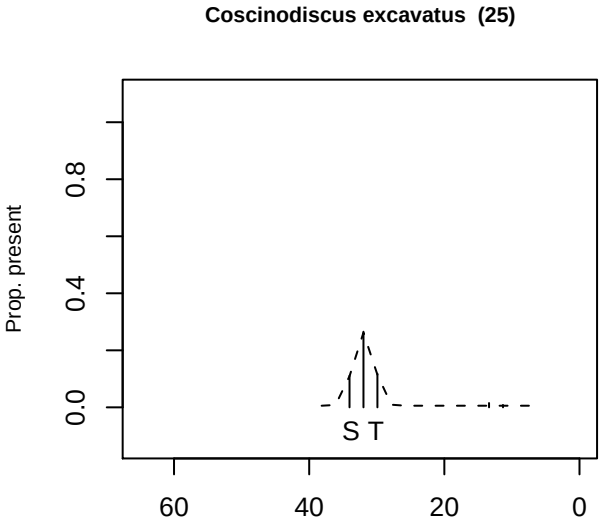
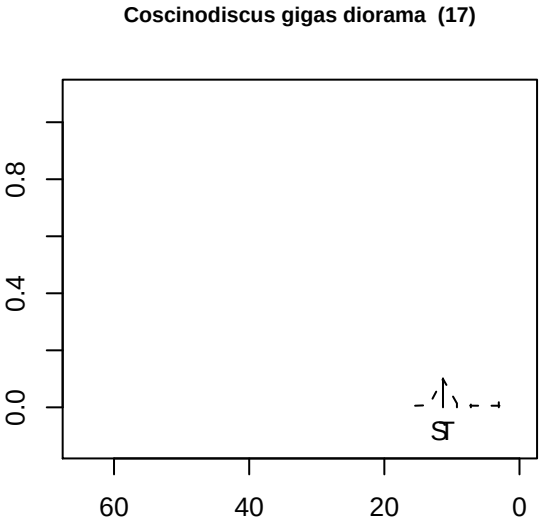
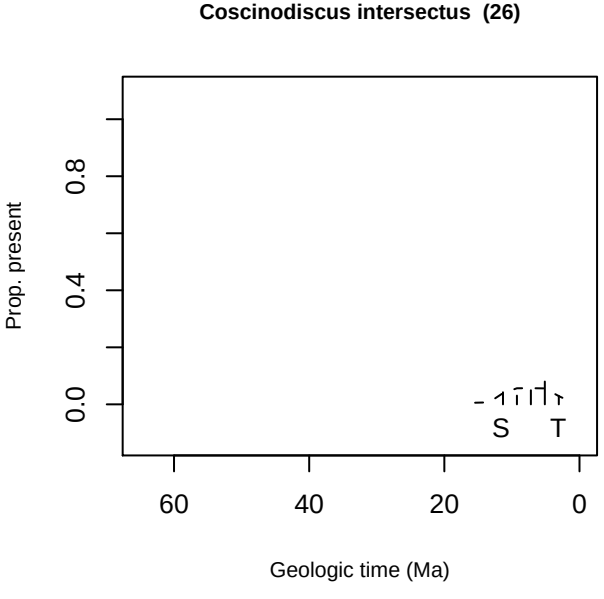
0.4
0.8
S
T
60
40
20
0


Coscinodiscus blysmos (13)
Prop. present
0.0
0.4
0.8
ST
60
40
20
0
Geologic time (Ma)


Coscinodiscus crenulatus (33)
0.0
0.4
0.8
S
60
40
20
0
Geologic time (Ma)


Coscinodiscus excavatus (25)
Prop. present
0.0
0.4
0.8
S T
60
40
20
0


Coscinodiscus gigas diorama (17)
0.0
0.4
0.8
S T
60
40
20
0


Coscinodiscus intersectus (26)
Prop. present
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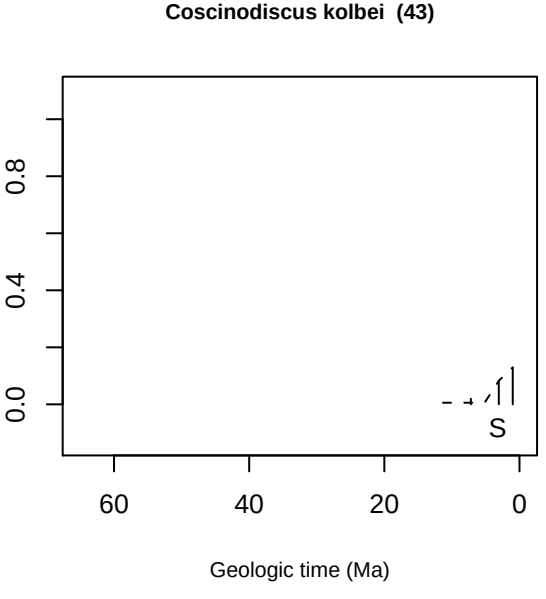
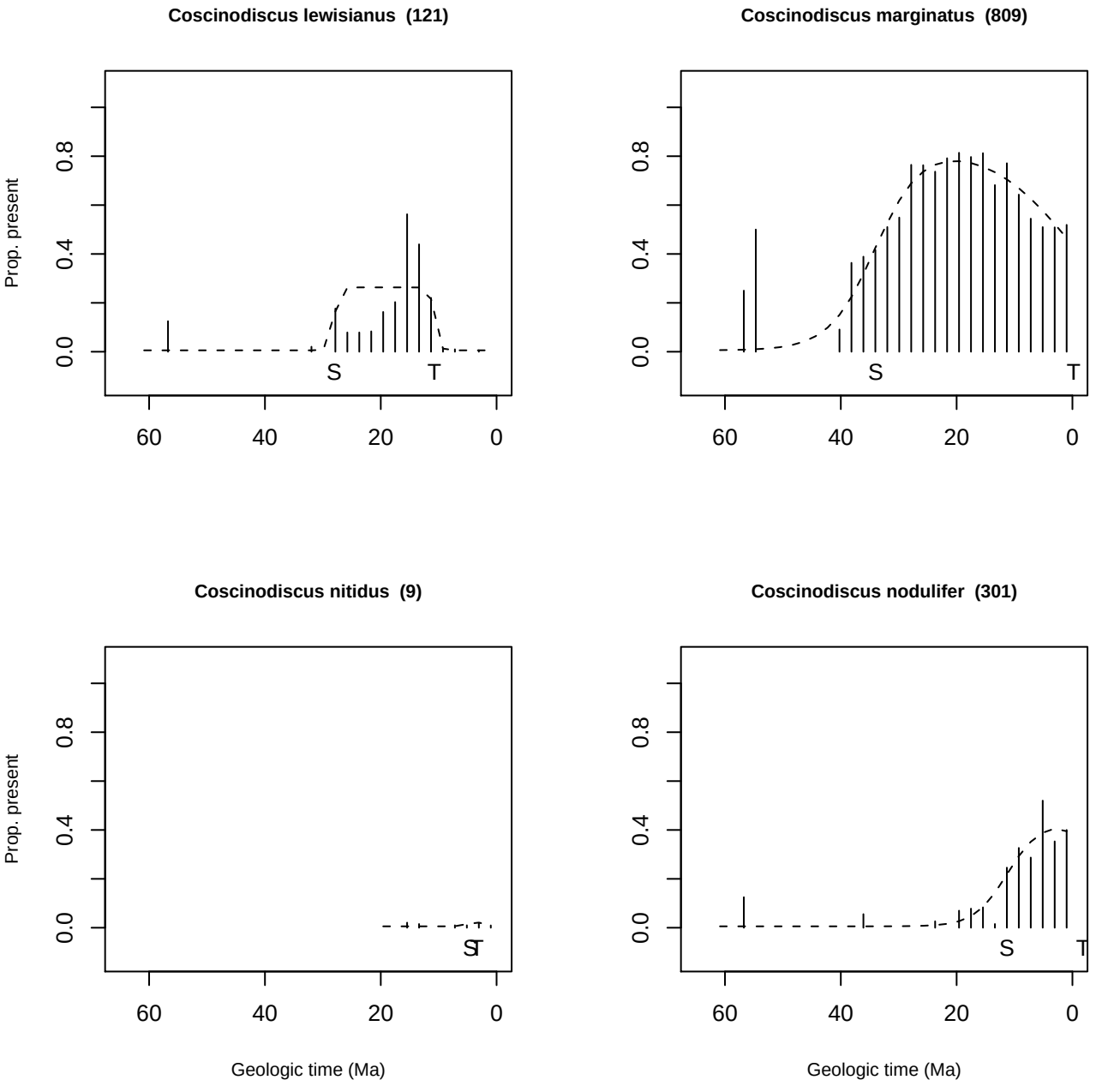
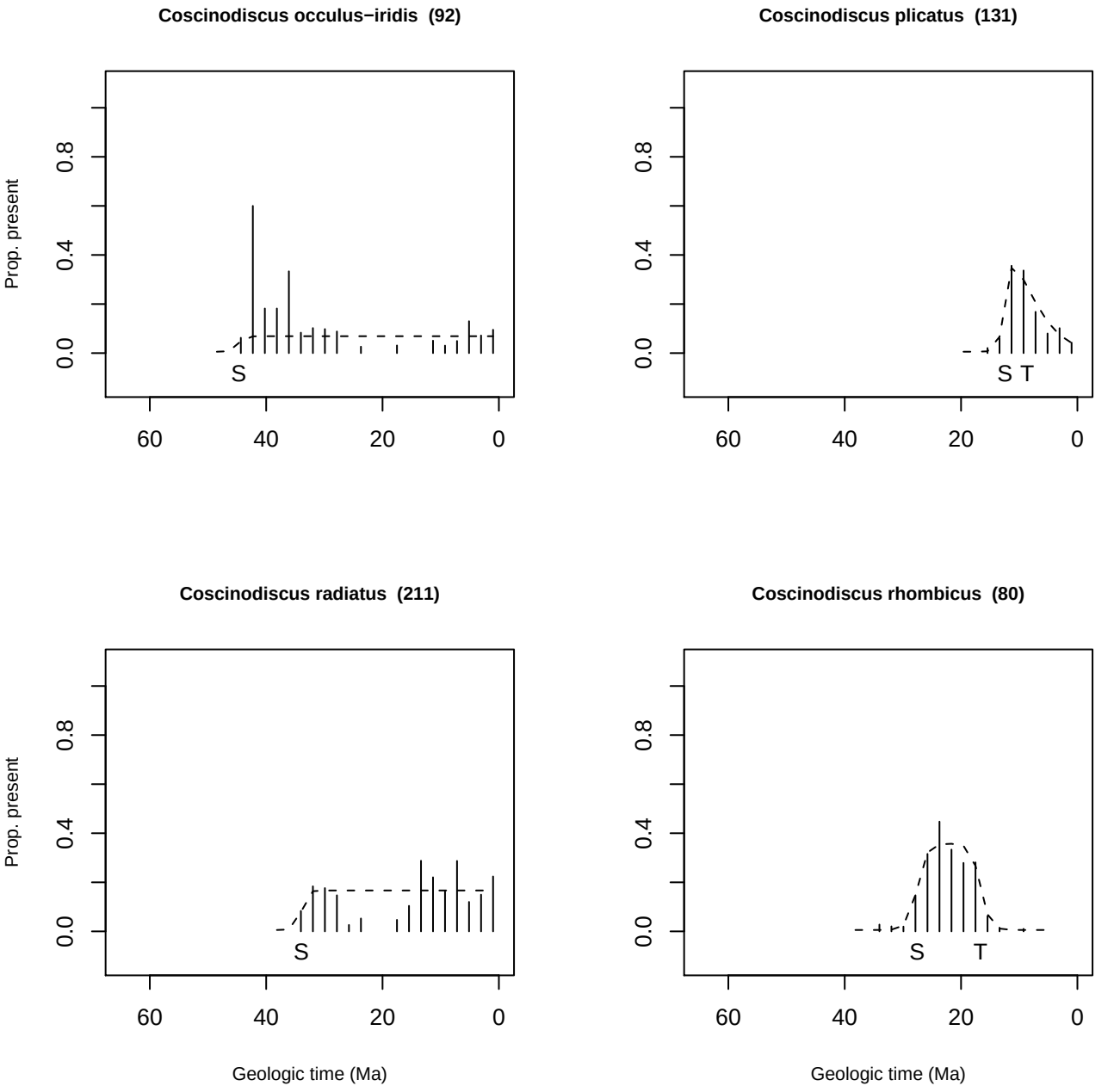
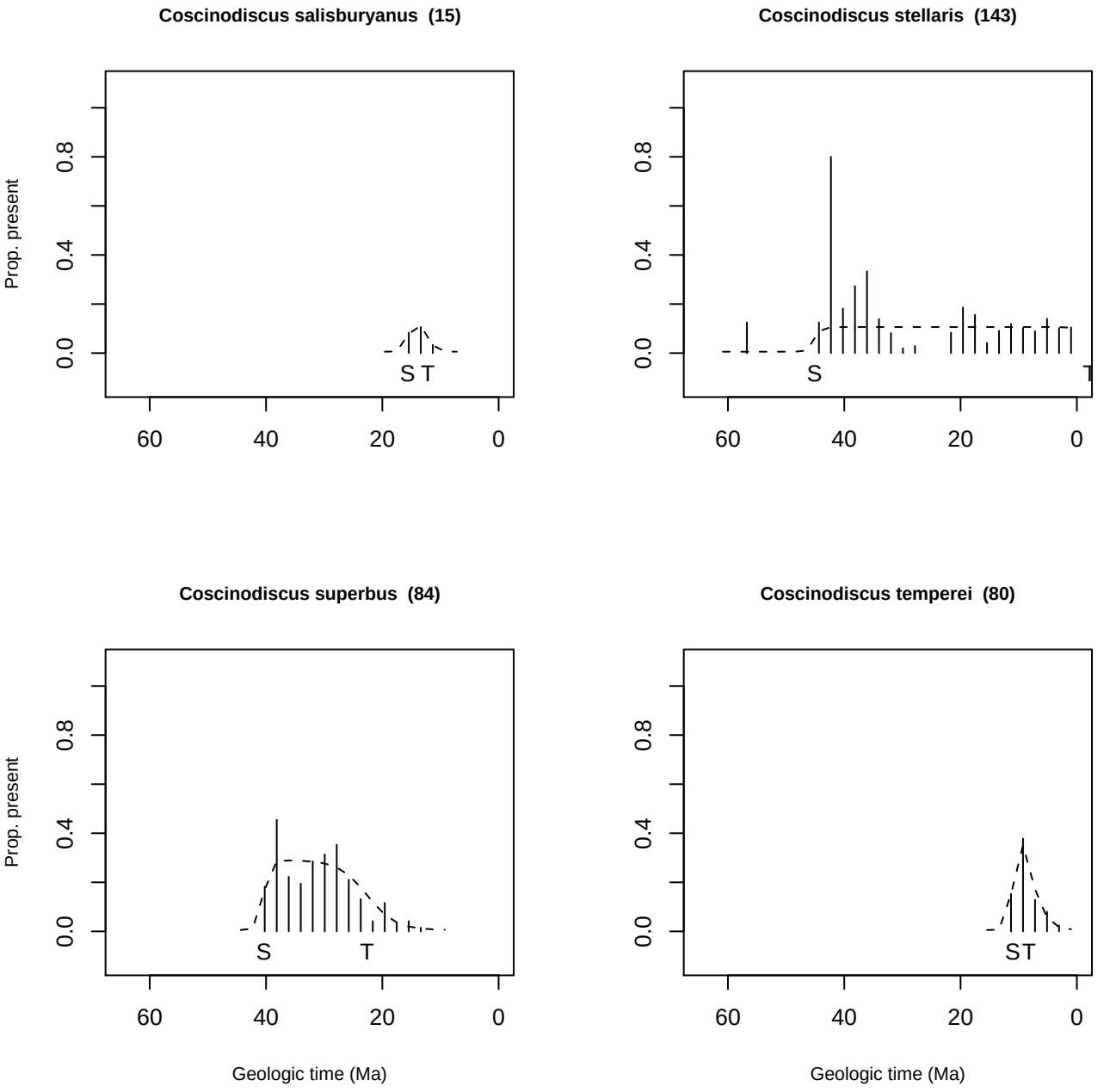
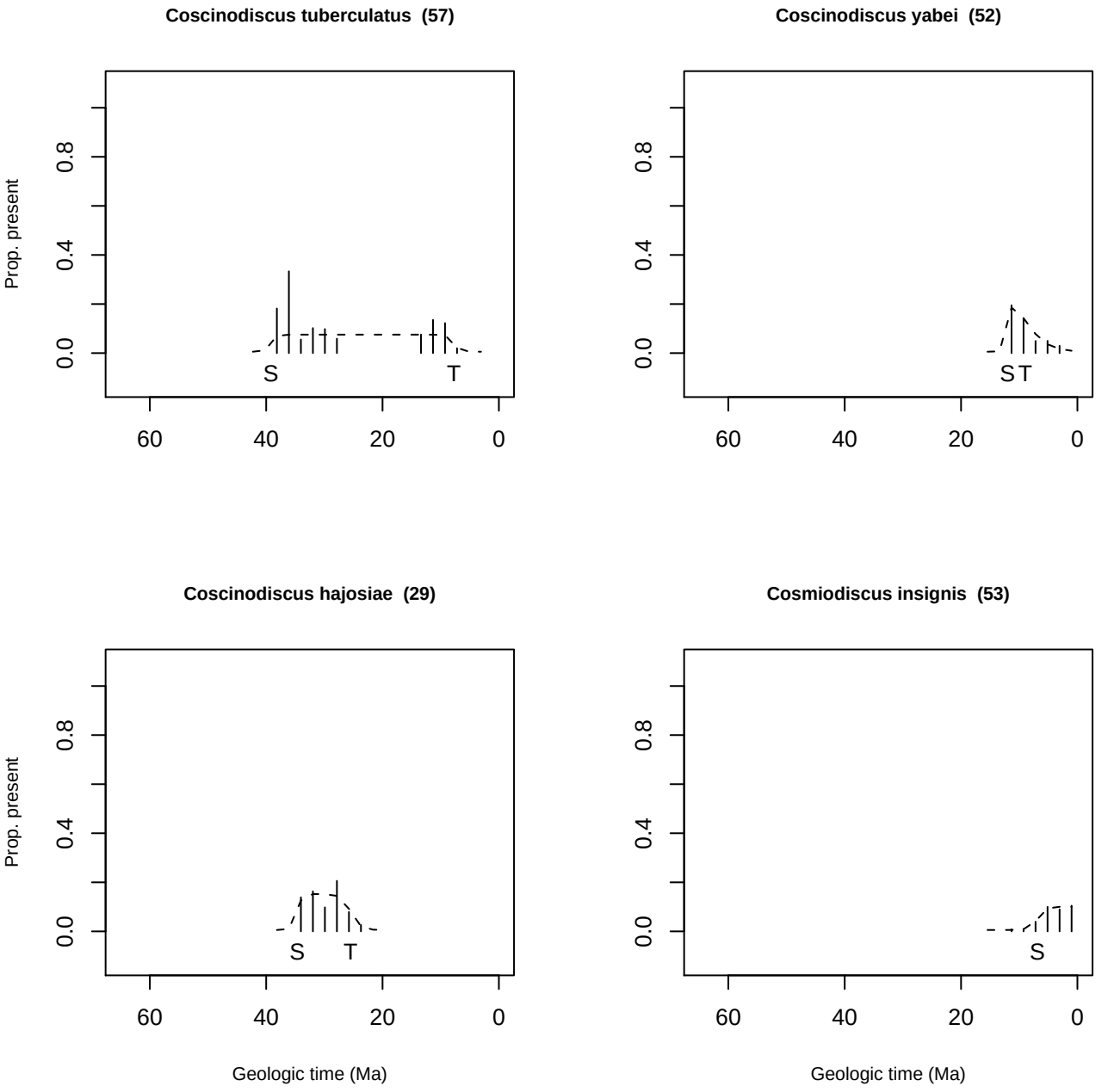
0.4
0.8
S T
60
40
20
0
Geologic time (Ma)

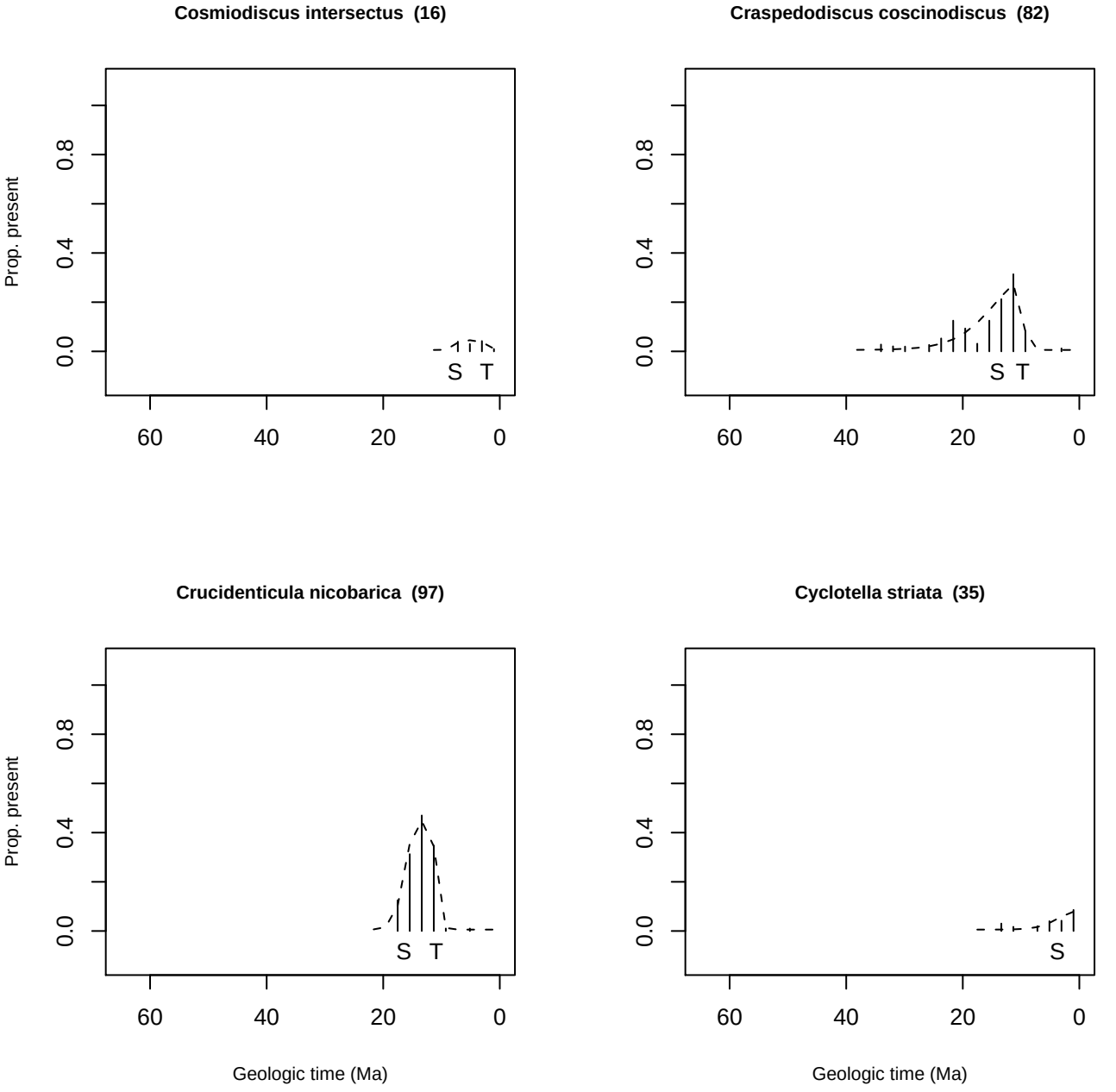

Coscinodiscus kolbei (43)
0.0
0.4
0.8
S
60
40
20
0
Geologic time (Ma)

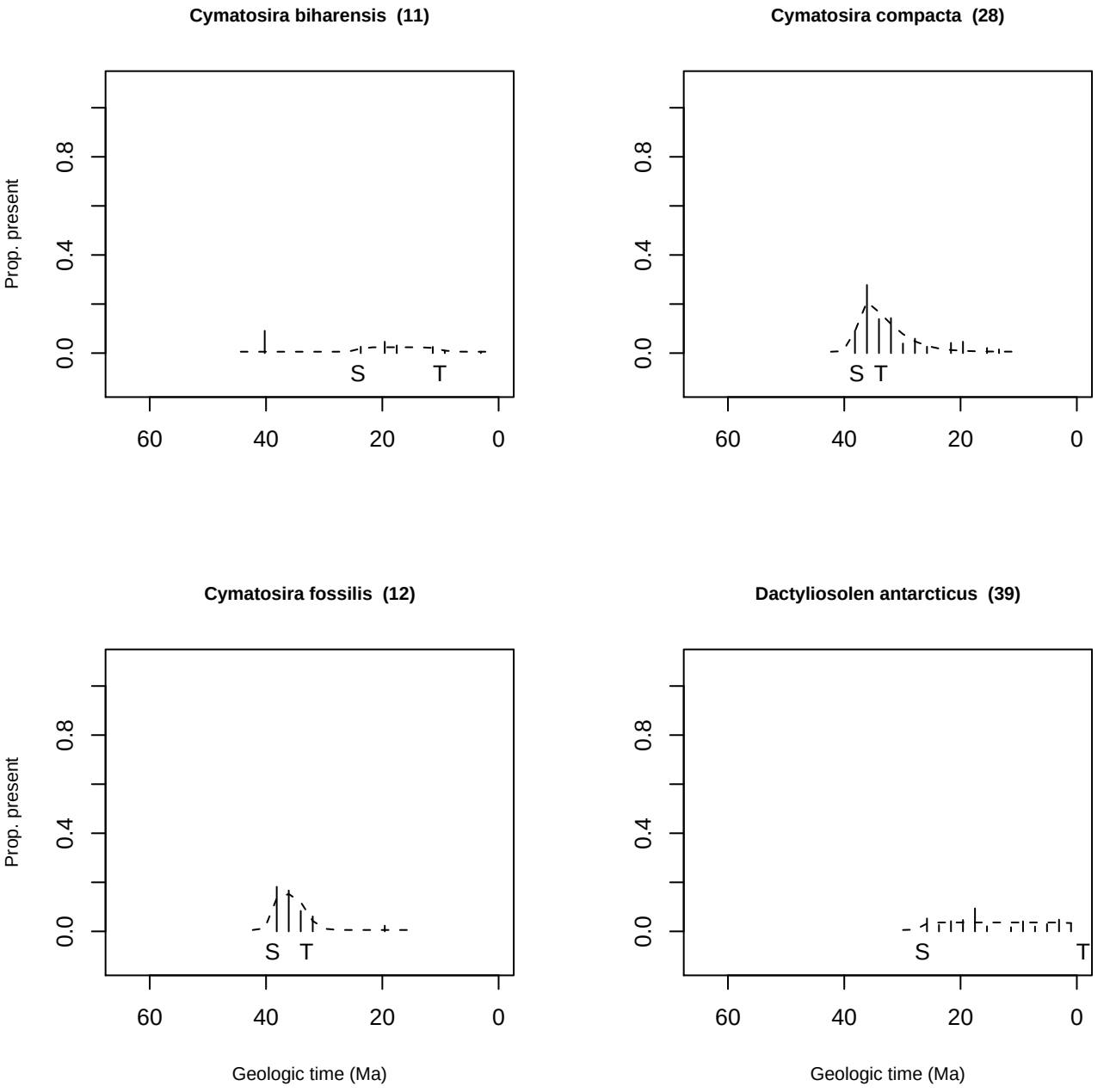

Coscinodiscus lewisianus (121)
Coscinodiscus marginatus (809)
Coscinodiscus nitidus (9)
Coscinodiscus nodulifer (301)
Prop. present
0.0
0.4
0.8
60
40
20
0
S
T
Geologic time (Ma)

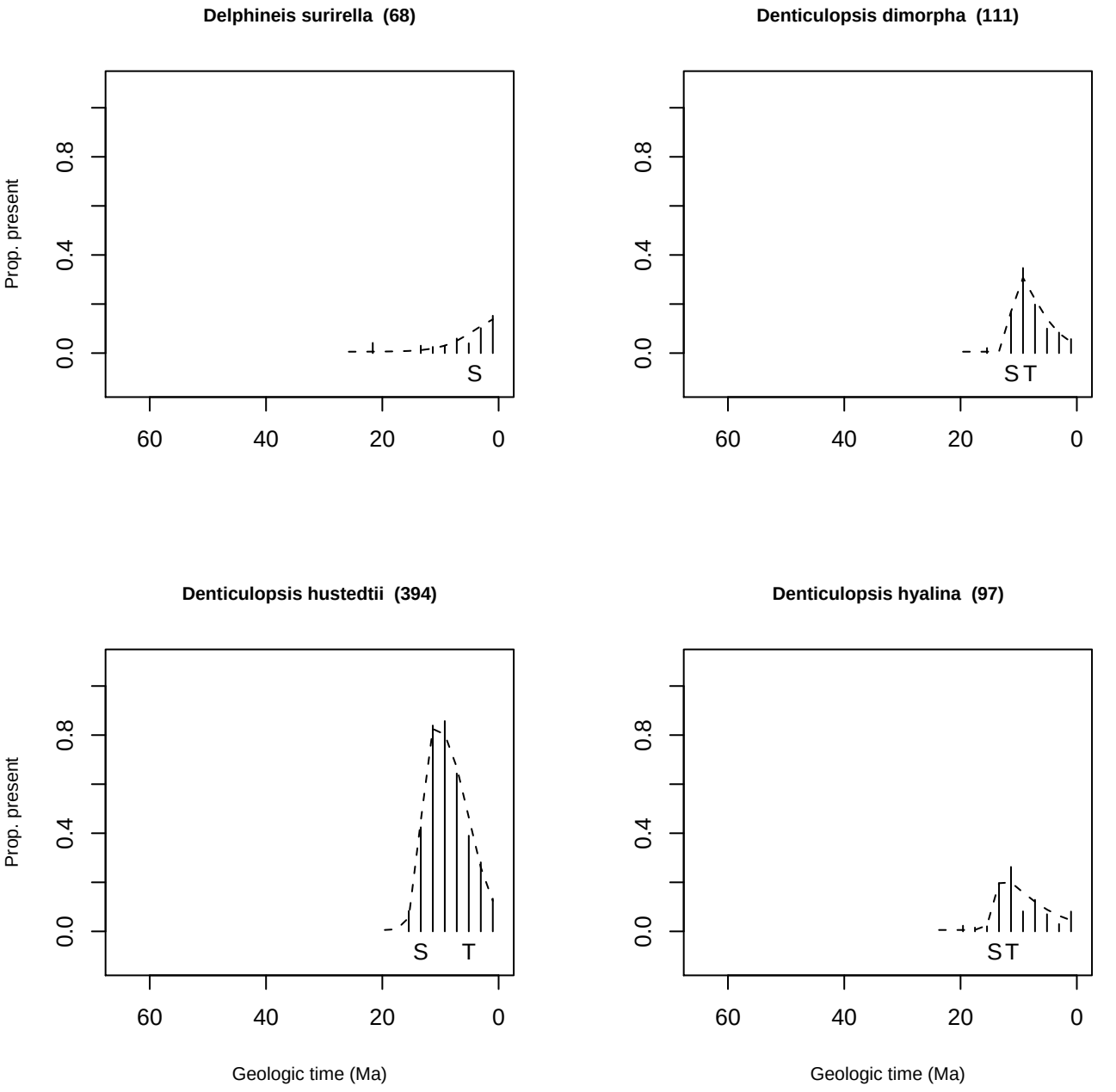

Coscinodiscus occulus−iridis (92)
Coscinodiscus plicatus (131)
Coscinodiscus radiatus (211)
Coscinodiscus rhombicus (80)
Prop. present
0.0
0.4
0.8
60
40
20
0
S
T
Geologic time (Ma)

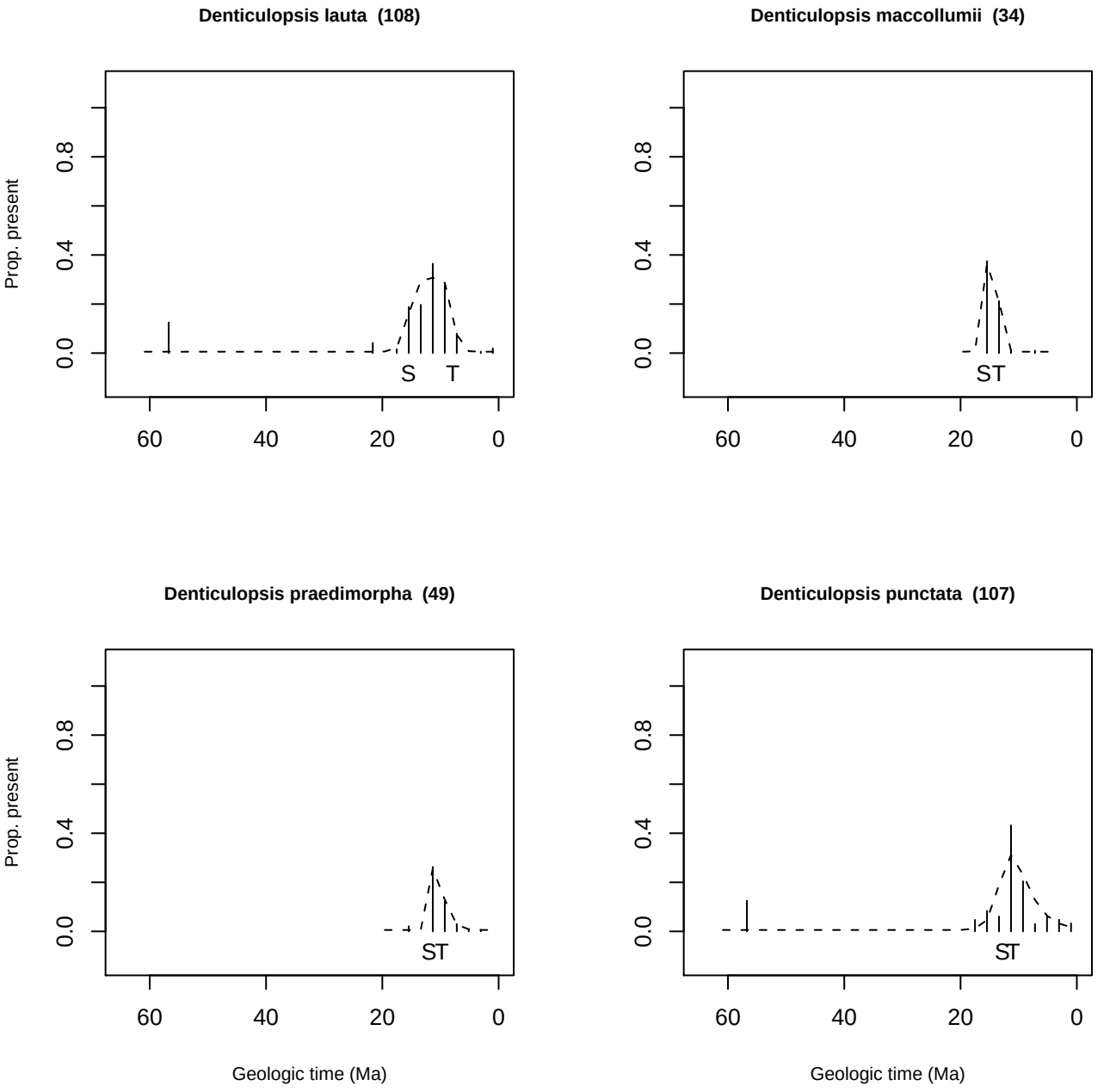

Coscinodiscus salisburyanus (15)
Coscinodiscus stellaris (143)
Coscinodiscus superbus (84)
Coscinodiscus temperei (80)
Prop. present
0.0
0.4
0.8
60
40
20
0
S T
S
T
ST
Geologic time (Ma)

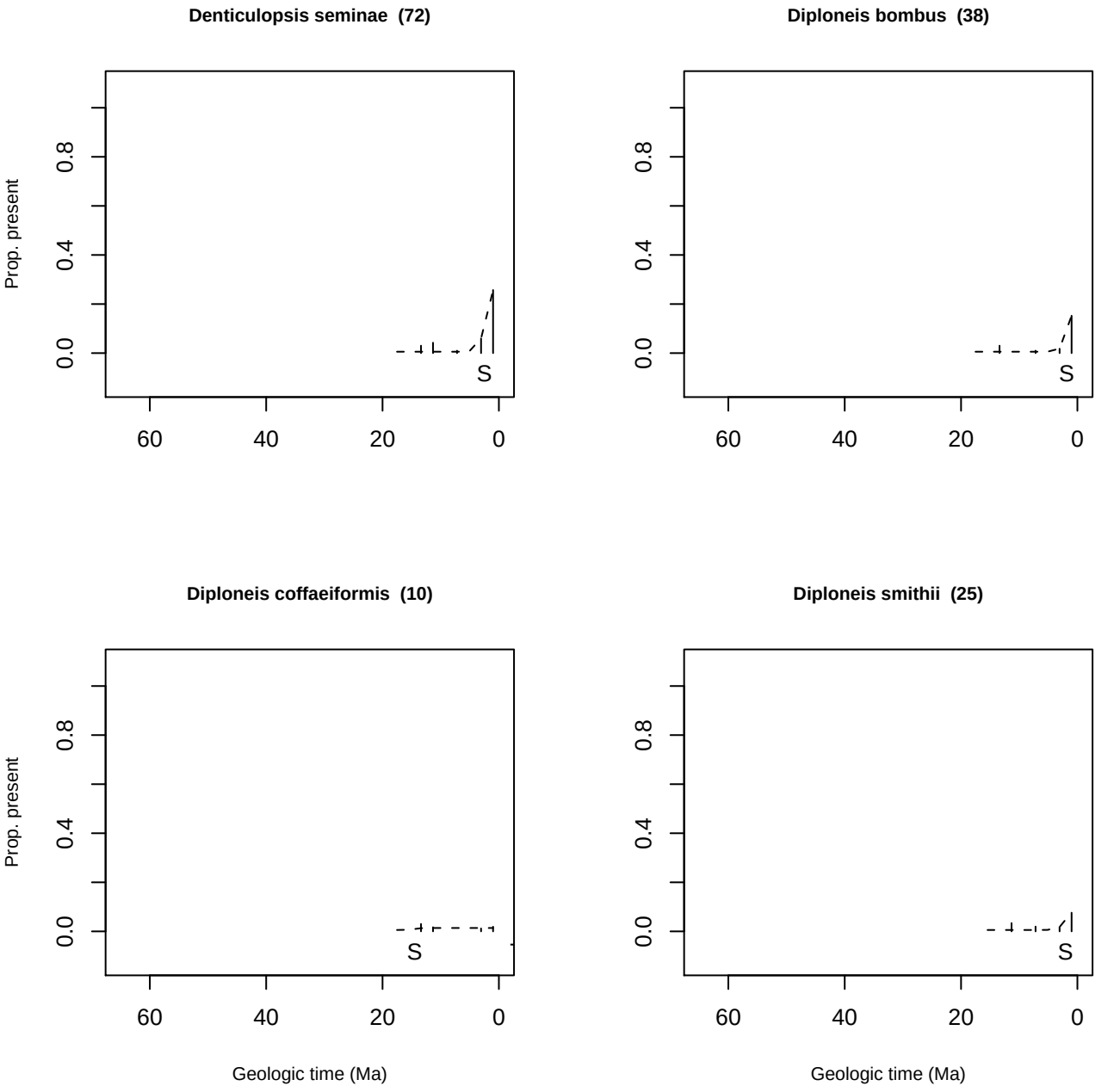

Coscinodiscus tuberculatus (57)
Coscinodiscus yabei (52)
Coscinodiscus hajosiae (29)
Cosmiodiscus insignis (53)
Prop. present
0.0
0.4
0.8
S
T
60
40
20
0
Geologic time (Ma)

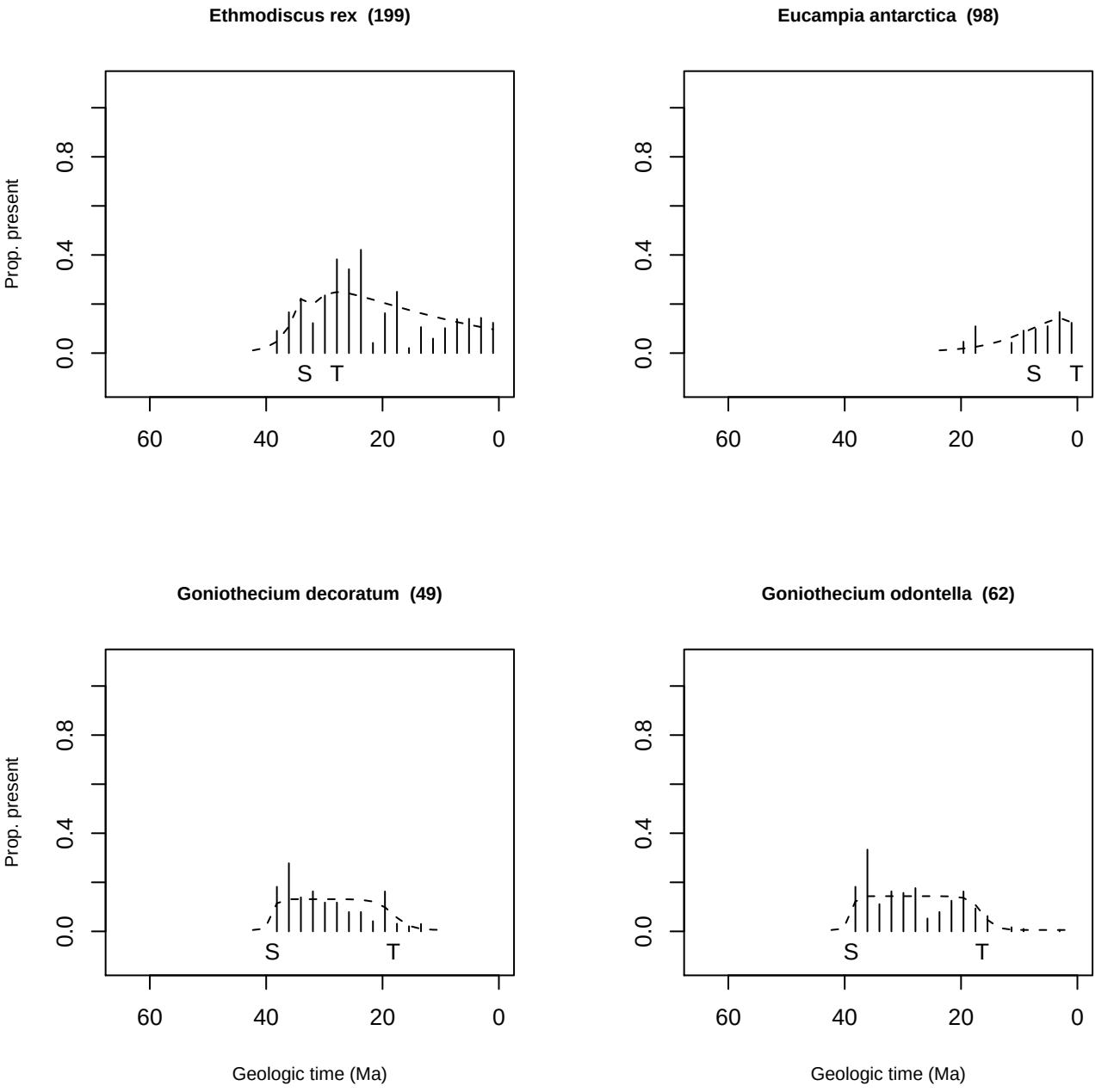

Cosmiodiscus intersectus (16)
Craspedodiscus coscinodiscus (82)
Crucidenticula nicobarica (97)
Cyclotella striata (35)
Prop. present
0.0
0.4
0.8
60
40
20
0
S
T
Geologic time (Ma)

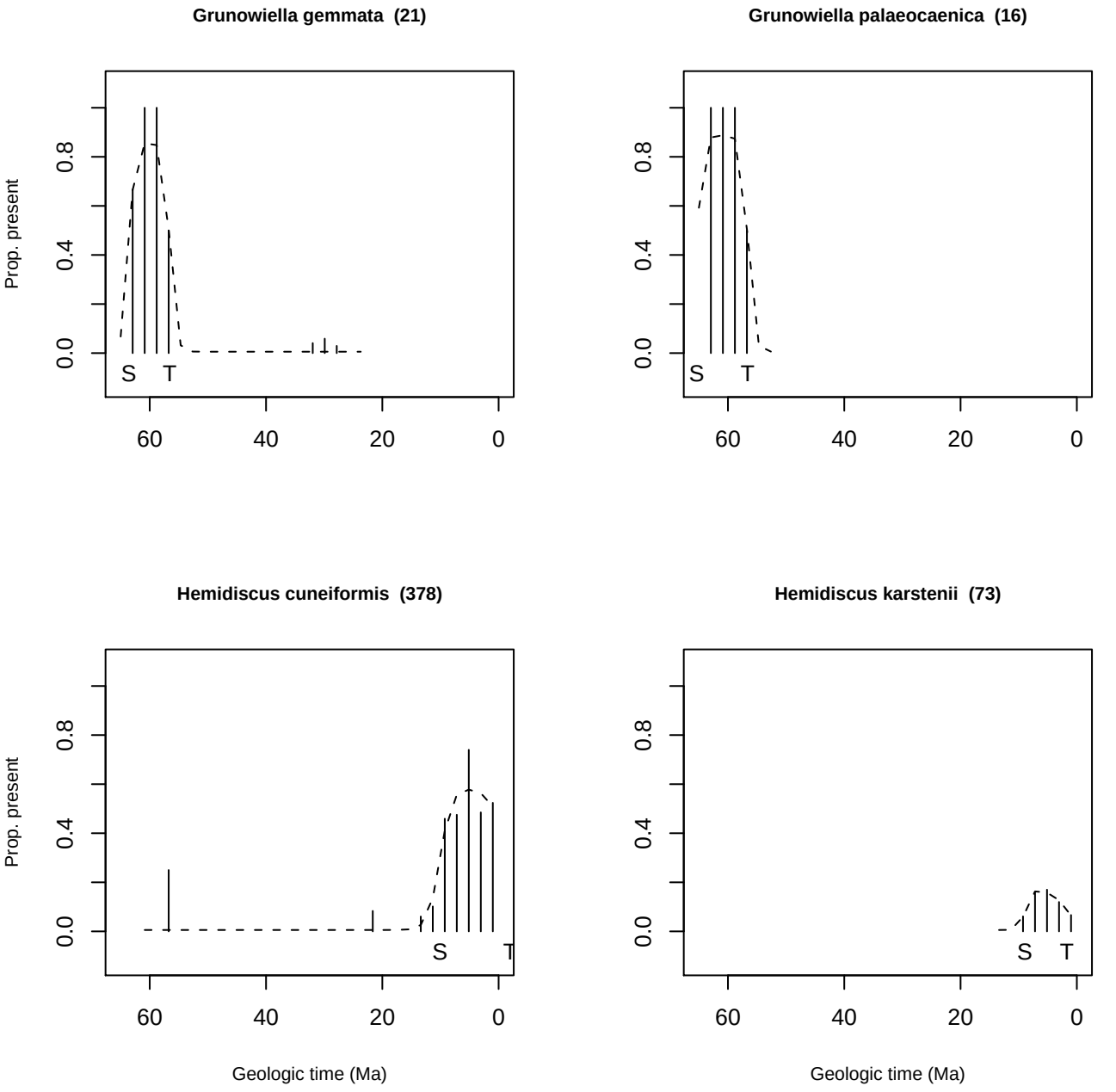

Cymatosira biharensis (11)
Cymatosira compacta (28)
Cymatosira fossilis (12)
Dactyliosolen antarcticus (39)
Prop. present
0.0
0.4
0.8
S
T
60
40
20
0
Geologic time (Ma)

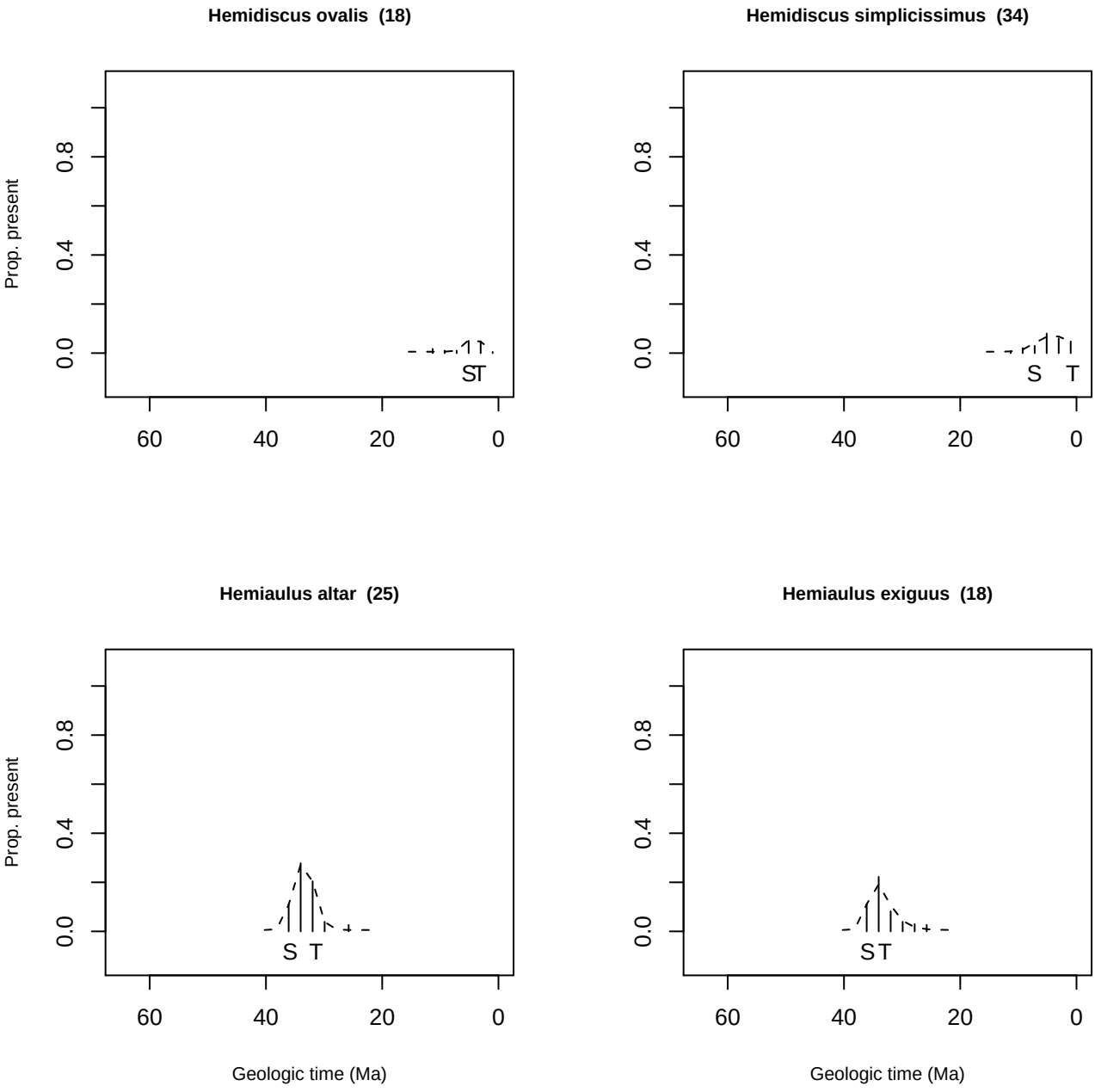

Delphineis surirella (68)
Denticulopsis dimorpha (111)
Denticulopsis hustedtii (394)
Denticulopsis hyalina (97)
Prop. present
0.0
0.4
0.8
60
40
20
0
S
S T
S T
S T
Geologic time (Ma)
Geologic time (Ma)

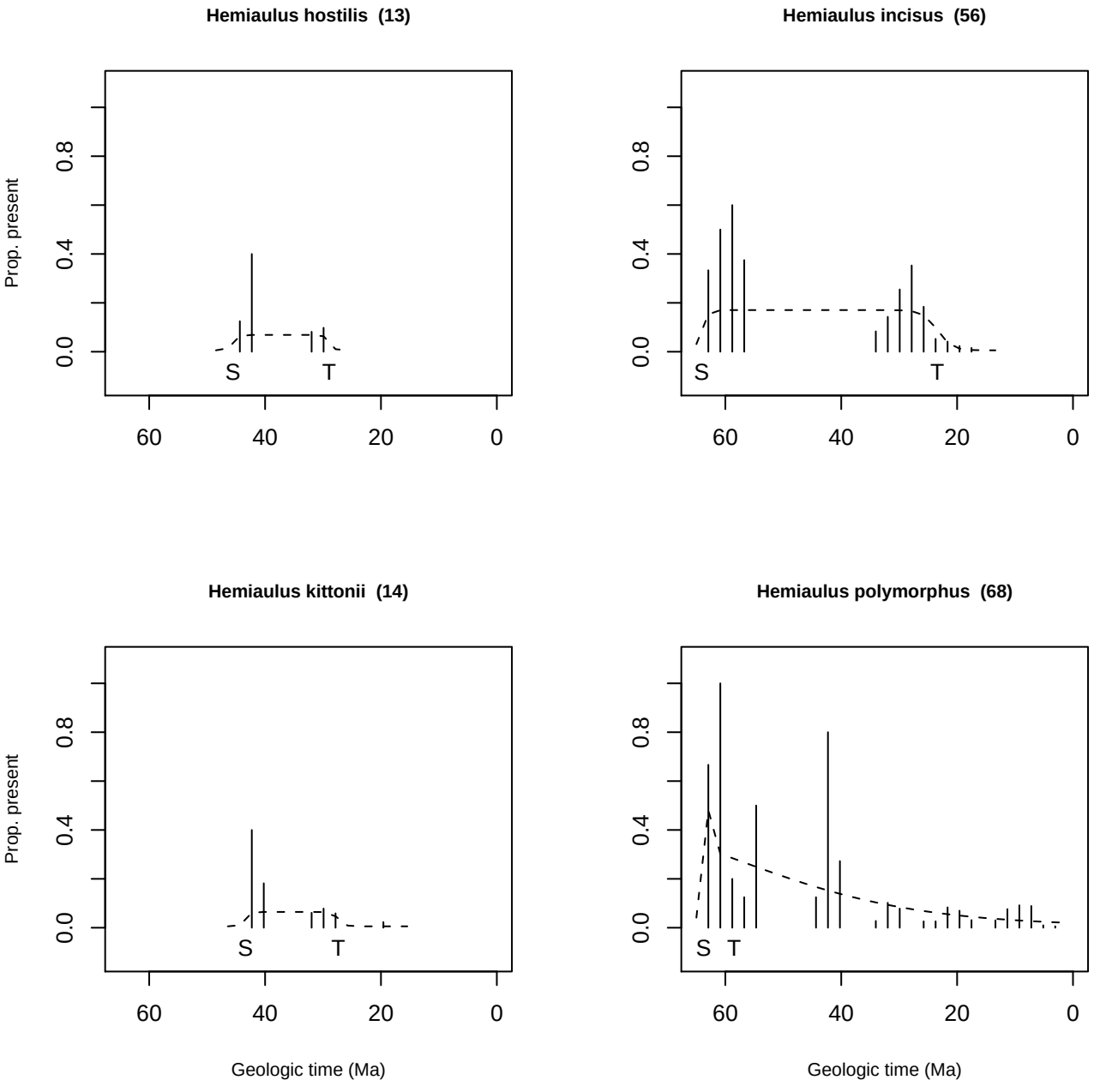

Denticulopsis lauta (108)
Denticulopsis maccollumii (34)
Denticulopsis praedimorpha (49)
Denticulopsis punctata (107)
Prop. present
0.0
0.4
0.8
60
40
20
0
S
T
ST
Geologic time (Ma)

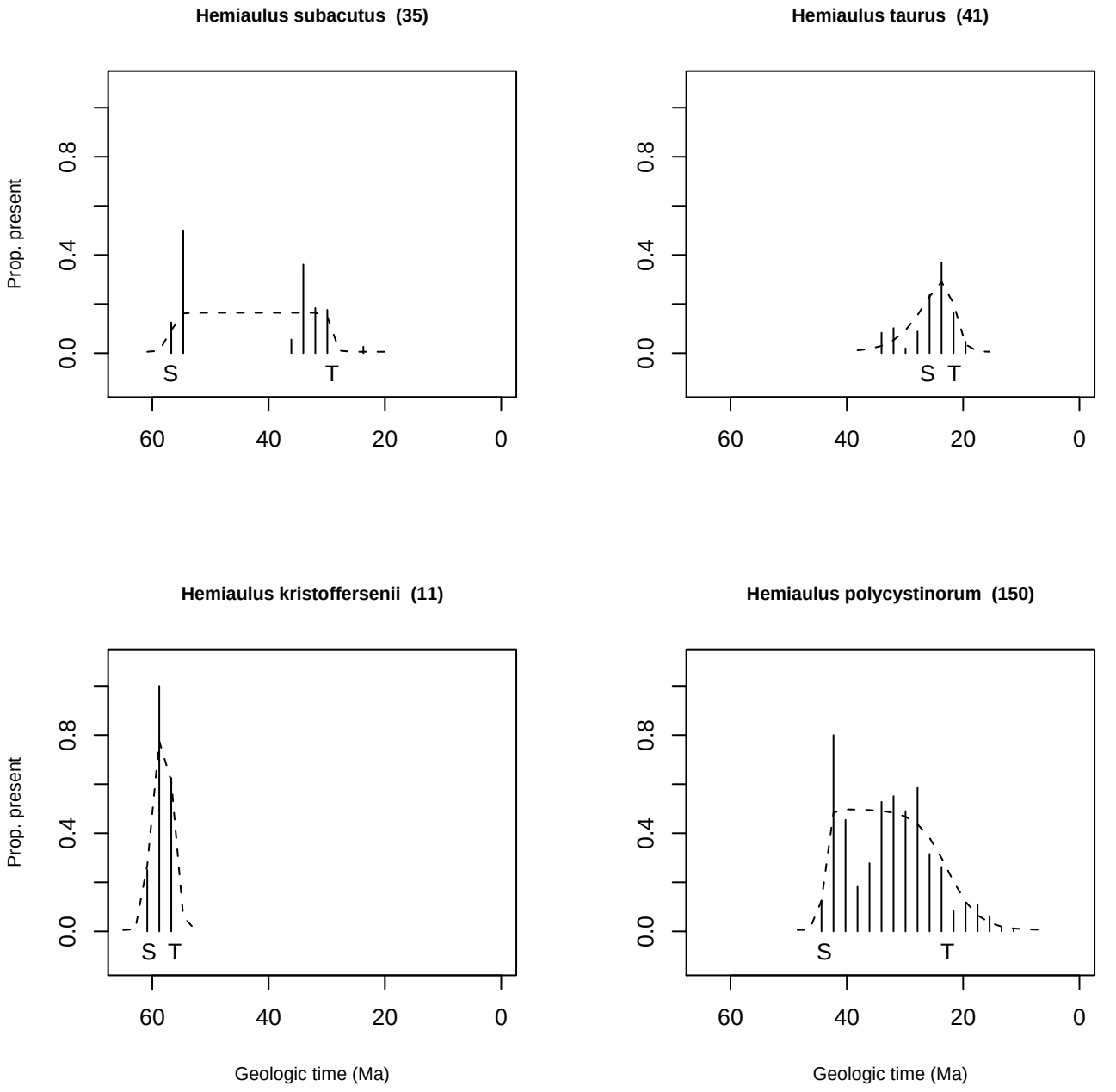

Denticulopsis seminae (72)
Diploneis bombus (38)
Diploneis coffaeiformis (10)
Diploneis smithii (25)
Prop. present
0.0
0.4
0.8
S
60
40
20
0
Geologic time (Ma)

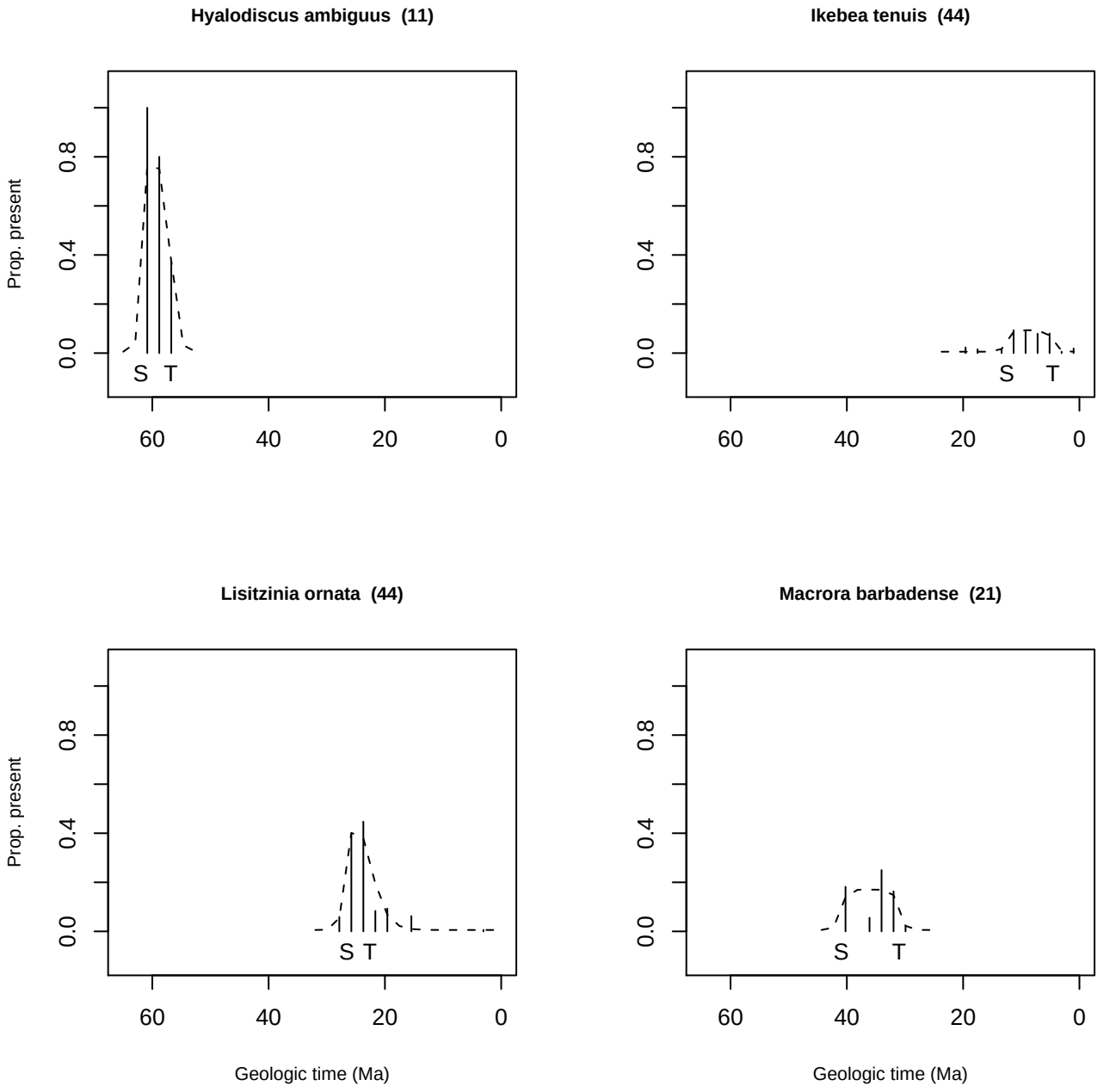

Ethmodiscus rex (199)
Eucampia antarctica (98)
Goniothecium decoratum (49)
Goniothecium odontella (62)
Prop. present
0.0
0.4
0.8
S
T
60
40
20
0
Geologic time (Ma)

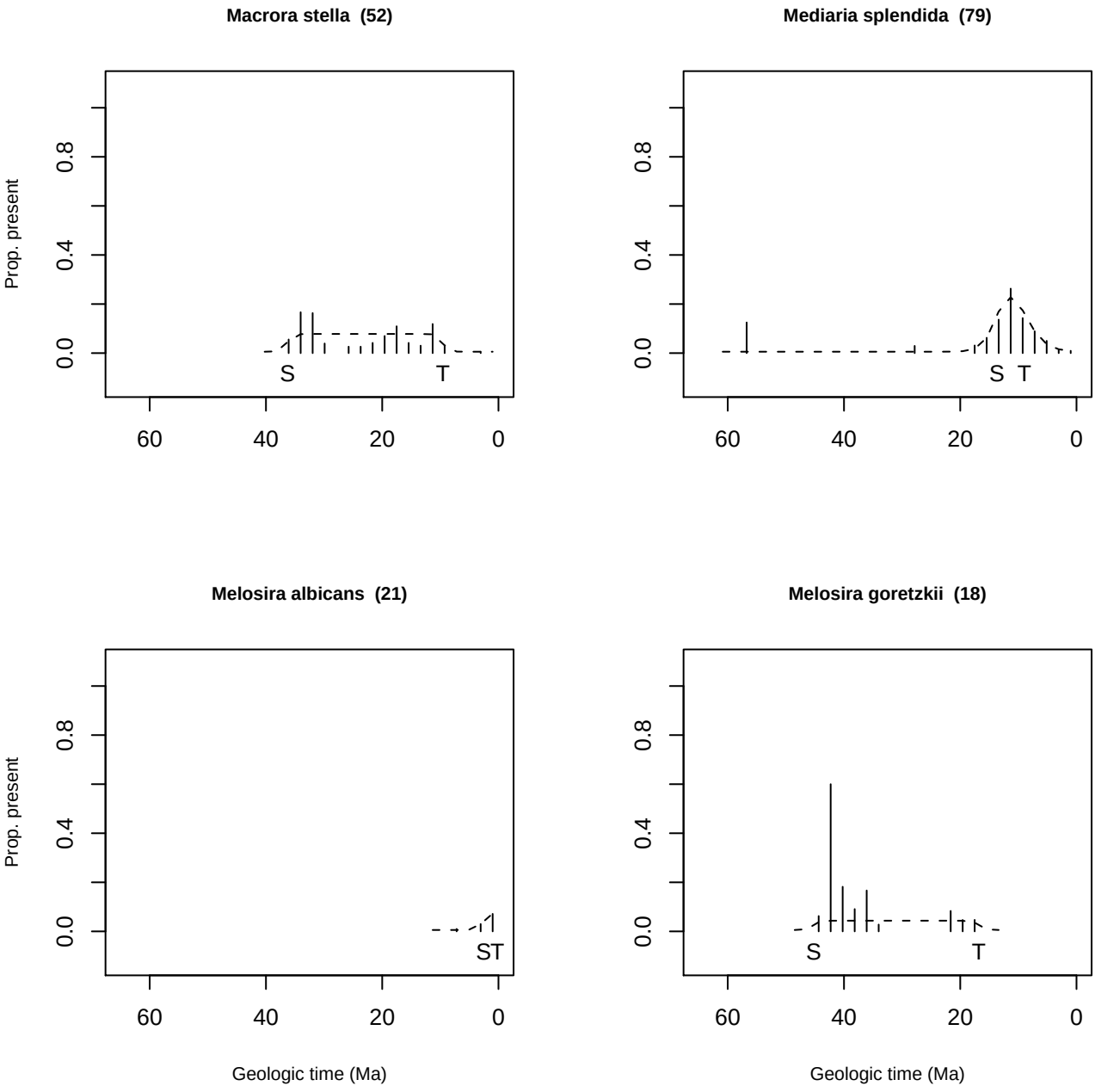

Grunowiella gemmata (21)
Grunowiella palaeocaenica (16)
Hemidiscus cuneiformis (378)
Hemidiscus karstenii (73)
Prop. present
0.0
0.4
0.8
S
T
60
40
20
0
Geologic time (Ma)

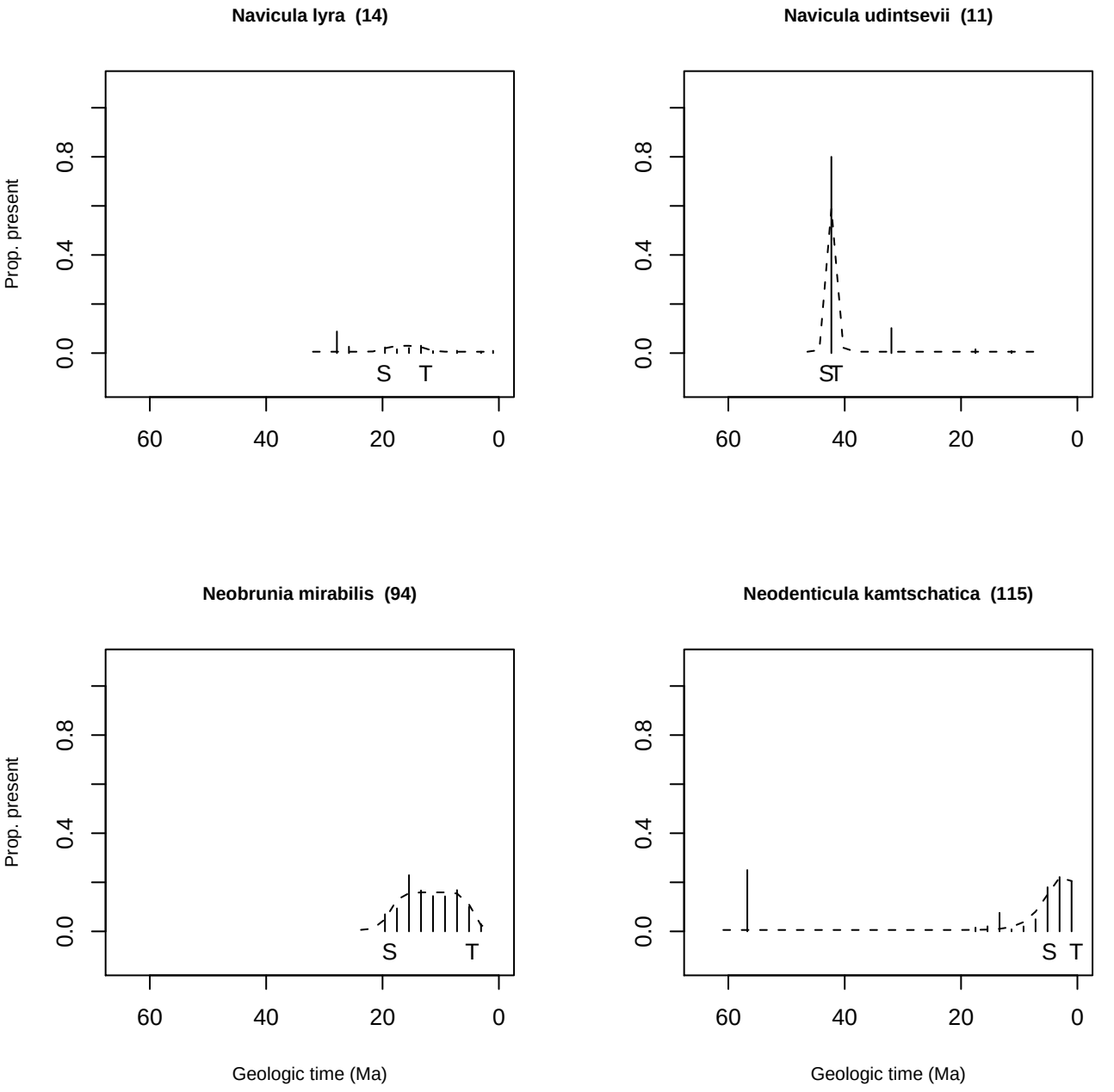

Hemidiscus ovalis (18)
Hemidiscus simplicissimus (34)
Hemiaulus altar (25)
Hemiaulus exiguus (18)
Prop. present
0.0
0.4
0.8
60
40
20
0
S
T
Geologic time (Ma)

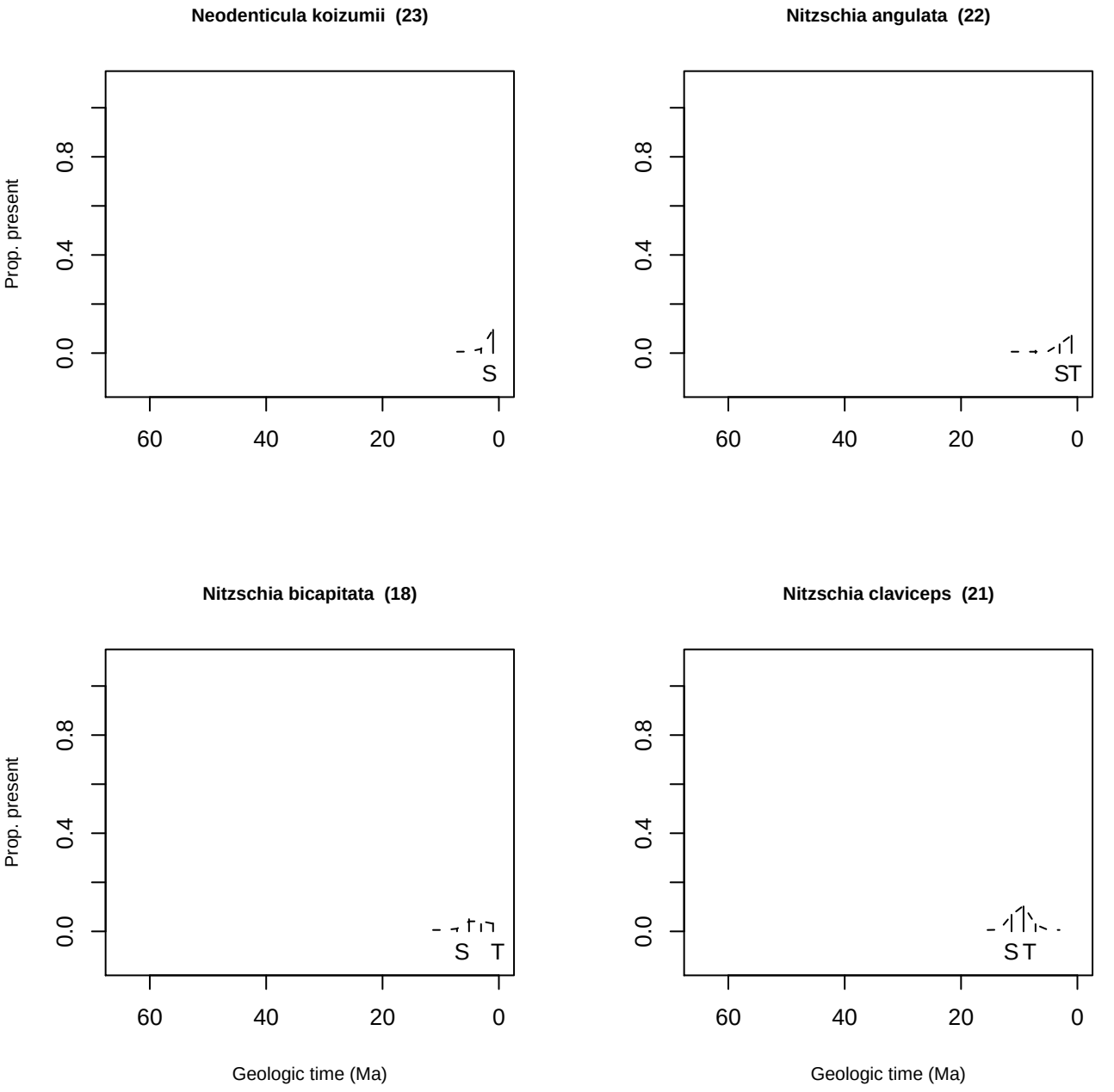

Hemiaulus hostilis (13)
Hemiaulus incisus (56)
Hemiaulus kittonii (14)
Hemiaulus polymorphus (68)
Prop. present
0.0
0.4
0.8
S
T
60
40
20
0
Geologic time (Ma)

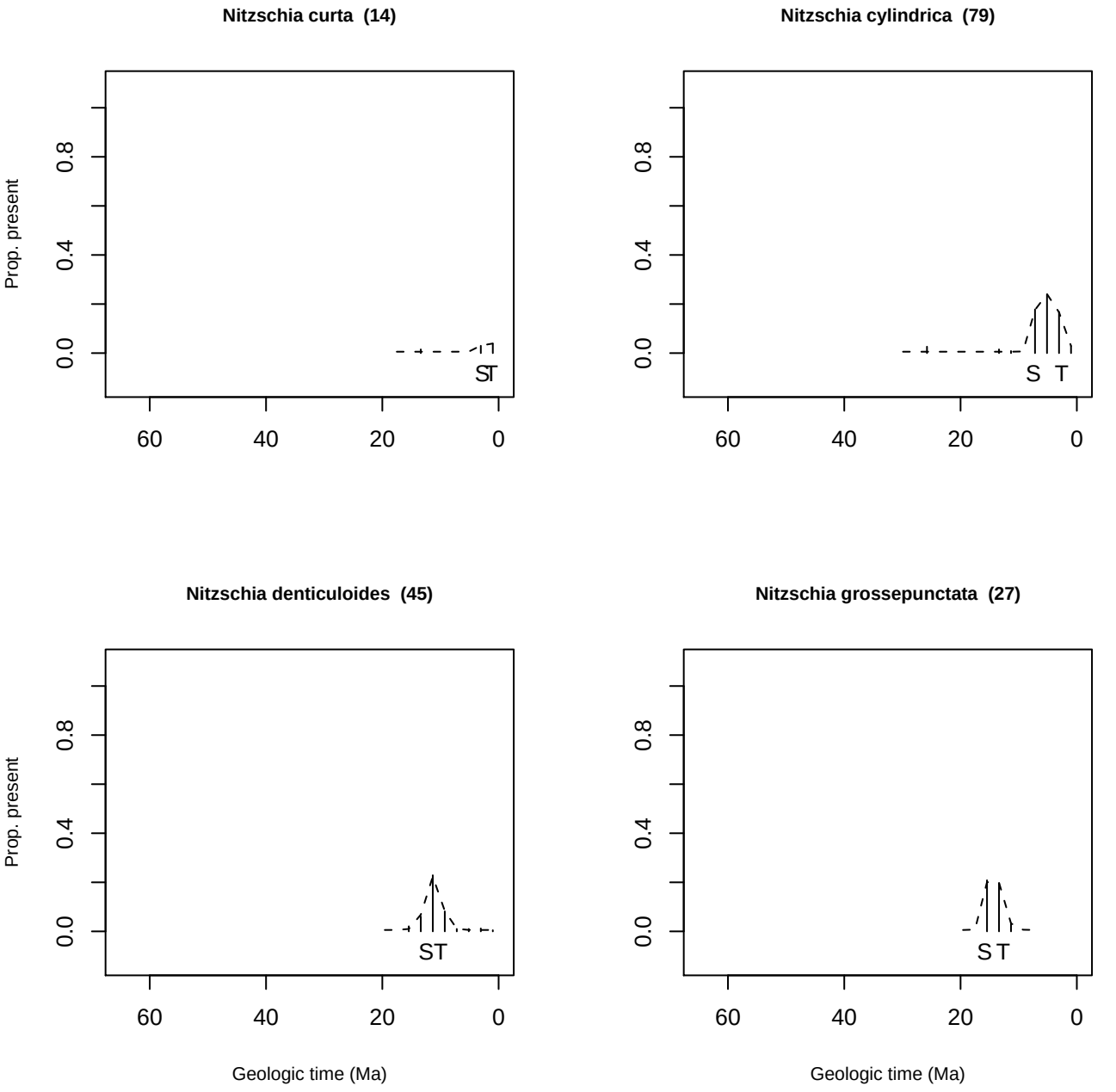

Hemiaulus subacutus (35)
Hemiaulus taurus (41)
Hemiaulus kristoffersenii (11)
Hemiaulus polycystinorum (150)
Prop. present
0.0
0.4
0.8
S
T
60
40
20
0
Geologic time (Ma)

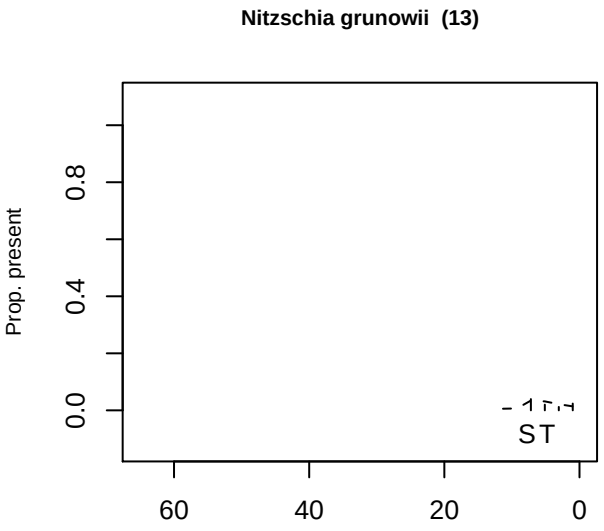

Hyalodiscus ambiguus (11)
Ikebea tenuis (44)
Lisitzinia ornata (44)
Macrora barbadense (21)
Prop. present
0.0
0.4
0.8
S
T
60
40
20
0
Geologic time (Ma)

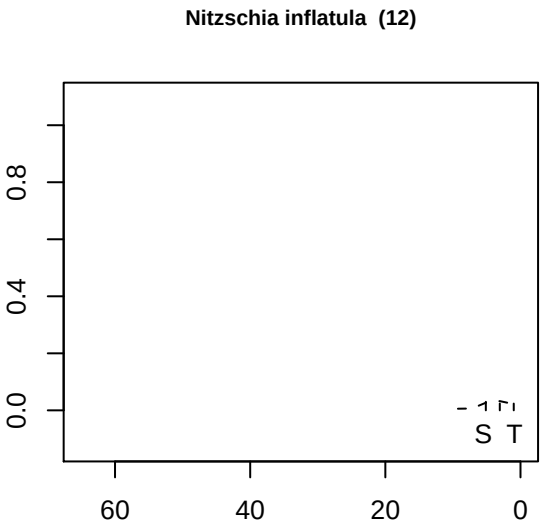

Macrora stella (52)
Mediaria splendida (79)
Melosira albicans (21)
Melosira goretzkii (18)
Prop. present
0.0
0.4
0.8
60
40
20
0
S
T
ST
Geologic time (Ma)

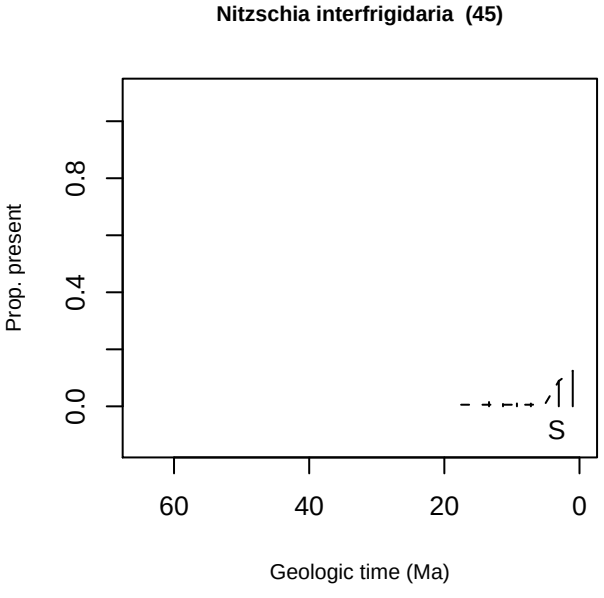

Navicula lyra (14)
Navicula udintsevii (11)
Neobrunia mirabilis (94)
Neodenticula kamtschatica (115)
Prop. present
0.0
0.4
0.8
60
40
20
0
S
T
ST
Geologic time (Ma)

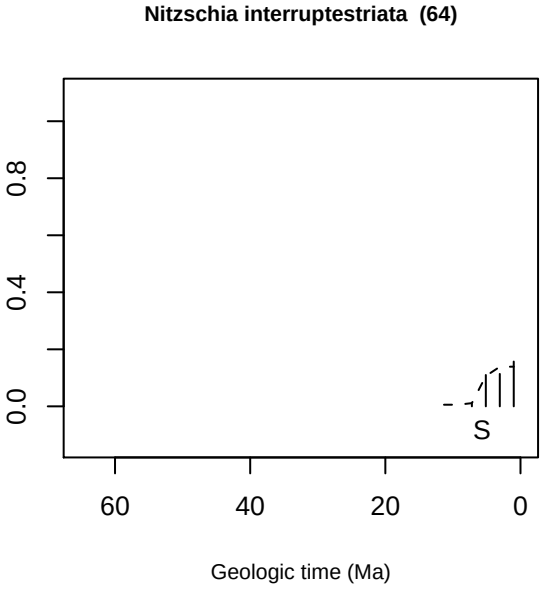

Neodenticula koizumii (23)
Nitzschia angulata (22)
Nitzschia bicapitata (18)
Nitzschia claviceps (21)
Prop. present
0.0
0.4
0.8
60
40
20
0
S
ST
S T
S T
Geologic time (Ma)

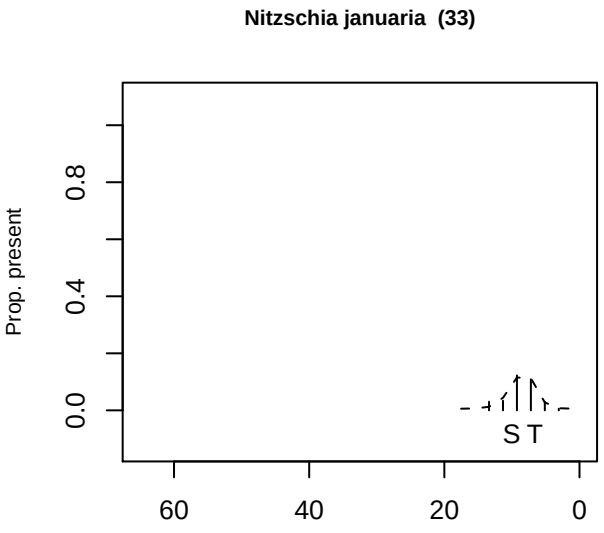

Nitzschia curta (14)
Nitzschia cylindrica (79)
Nitzschia denticuloides (45)
Nitzschia grossepunctata (27)
Prop. present
0.0
0.4
0.8
60
40
20
0
S
T
Geologic time (Ma)

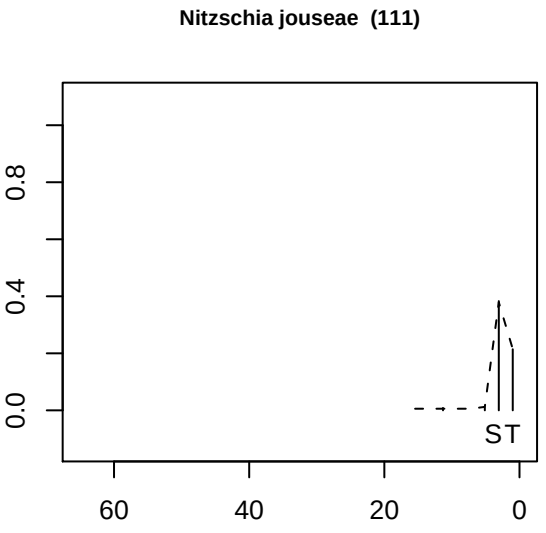

Nitzschia grunowii (13)
Prop. present
0.0
0.4
0.8
S T
60
40
20
0

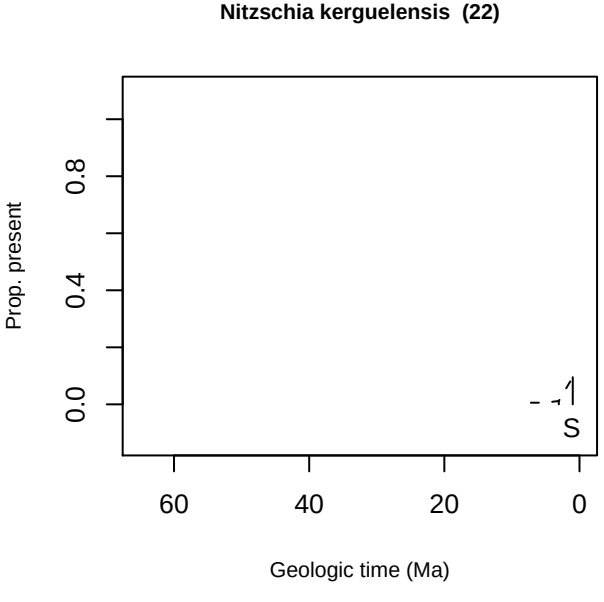

Nitzschia inflatula (12)
0.0
0.4
0.8
S T
60
40
20
0

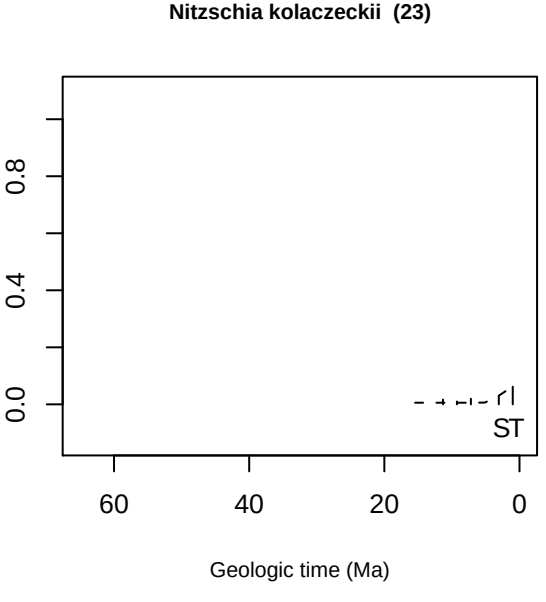

Nitzschia interfrigidaria (45)
Prop. present
0.0
0.4
0.8
S
60
40
20
0
Geologic time (Ma)

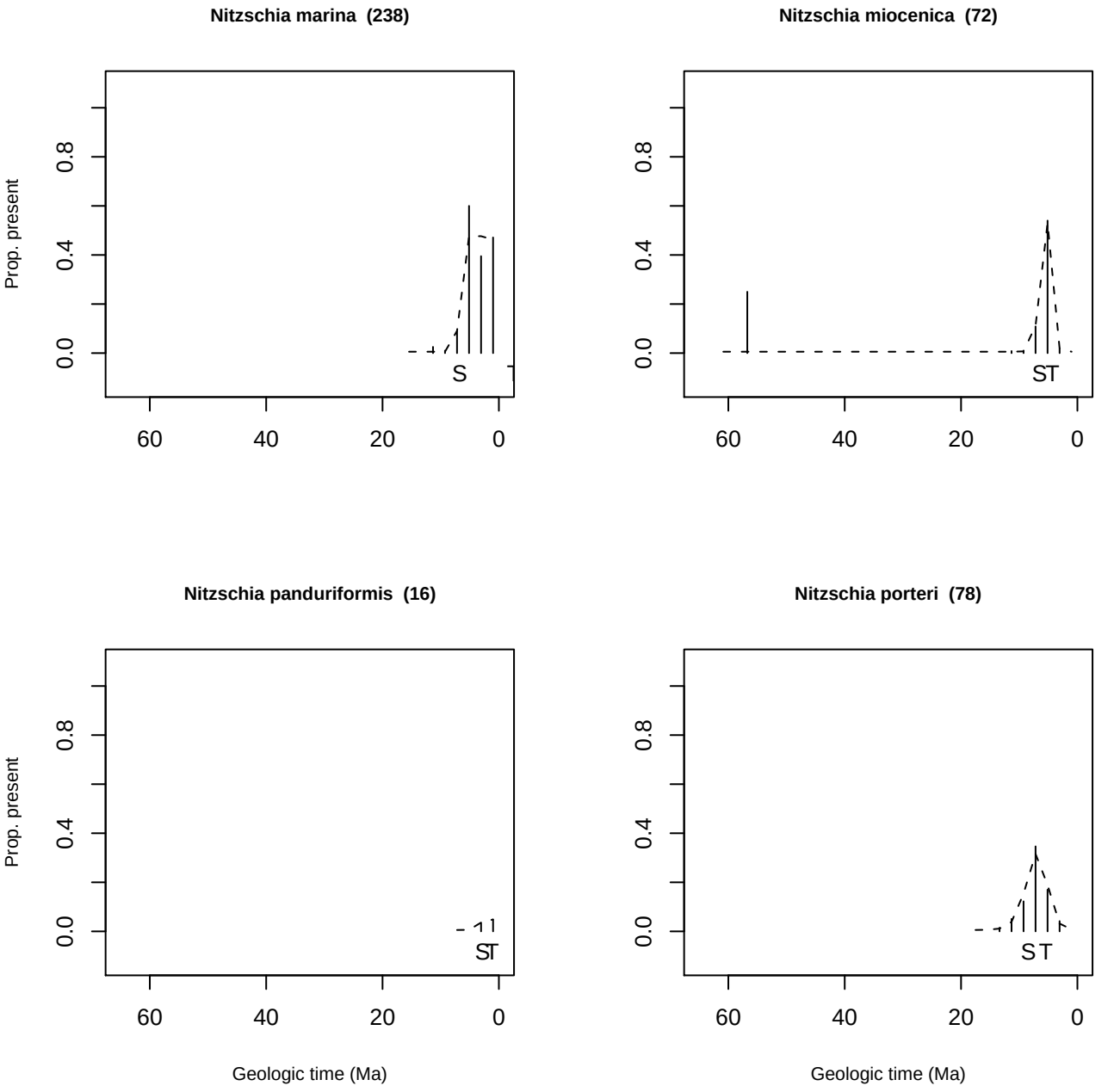

Nitzschia interruptestriata (64)
0.0
0.4
0.8
S
60
40
20
0
Geologic time (Ma)

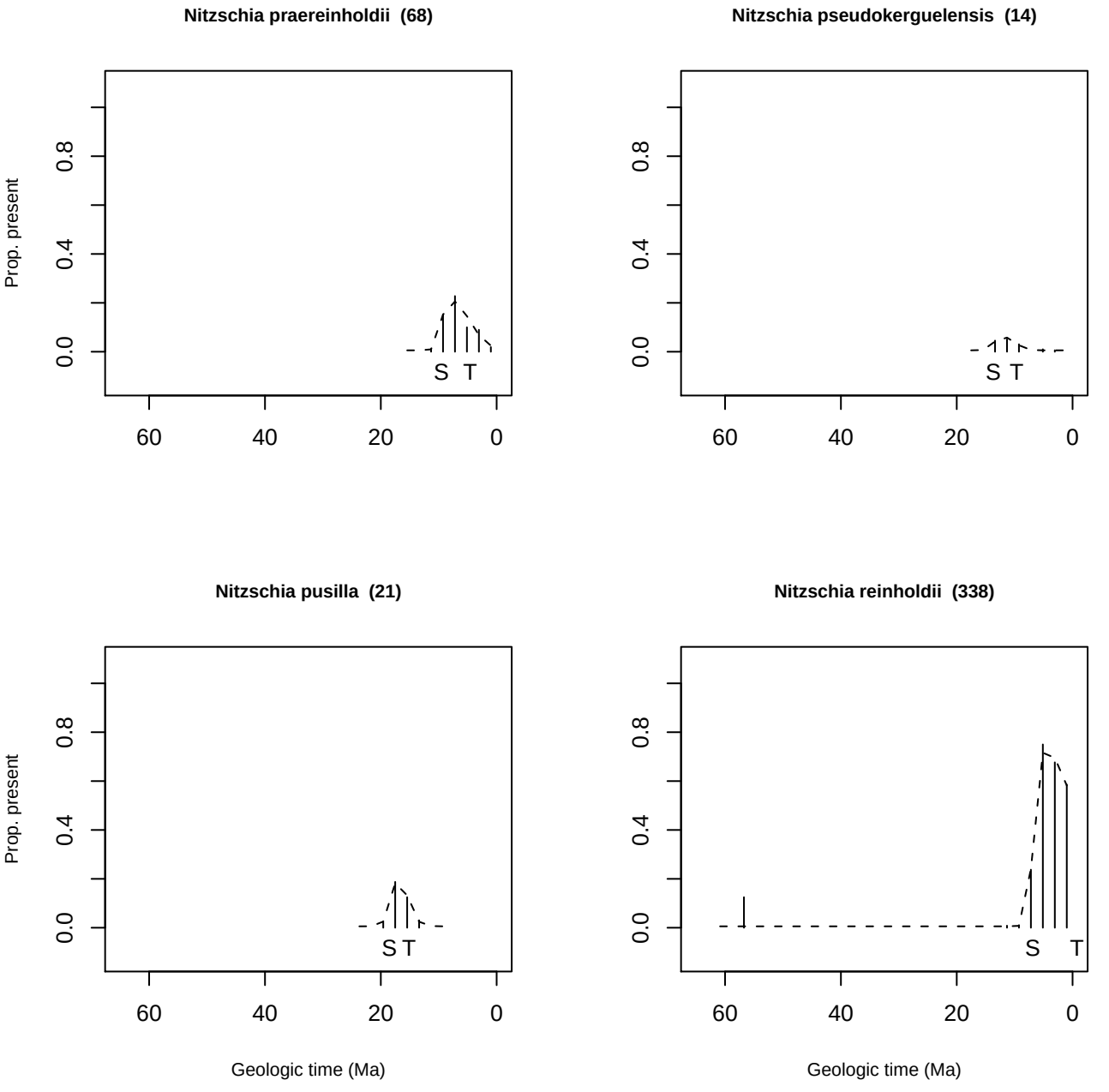

Nitzschia januaria (33)
Prop. present
0.0
0.4
0.8
S T
60
40
20
0

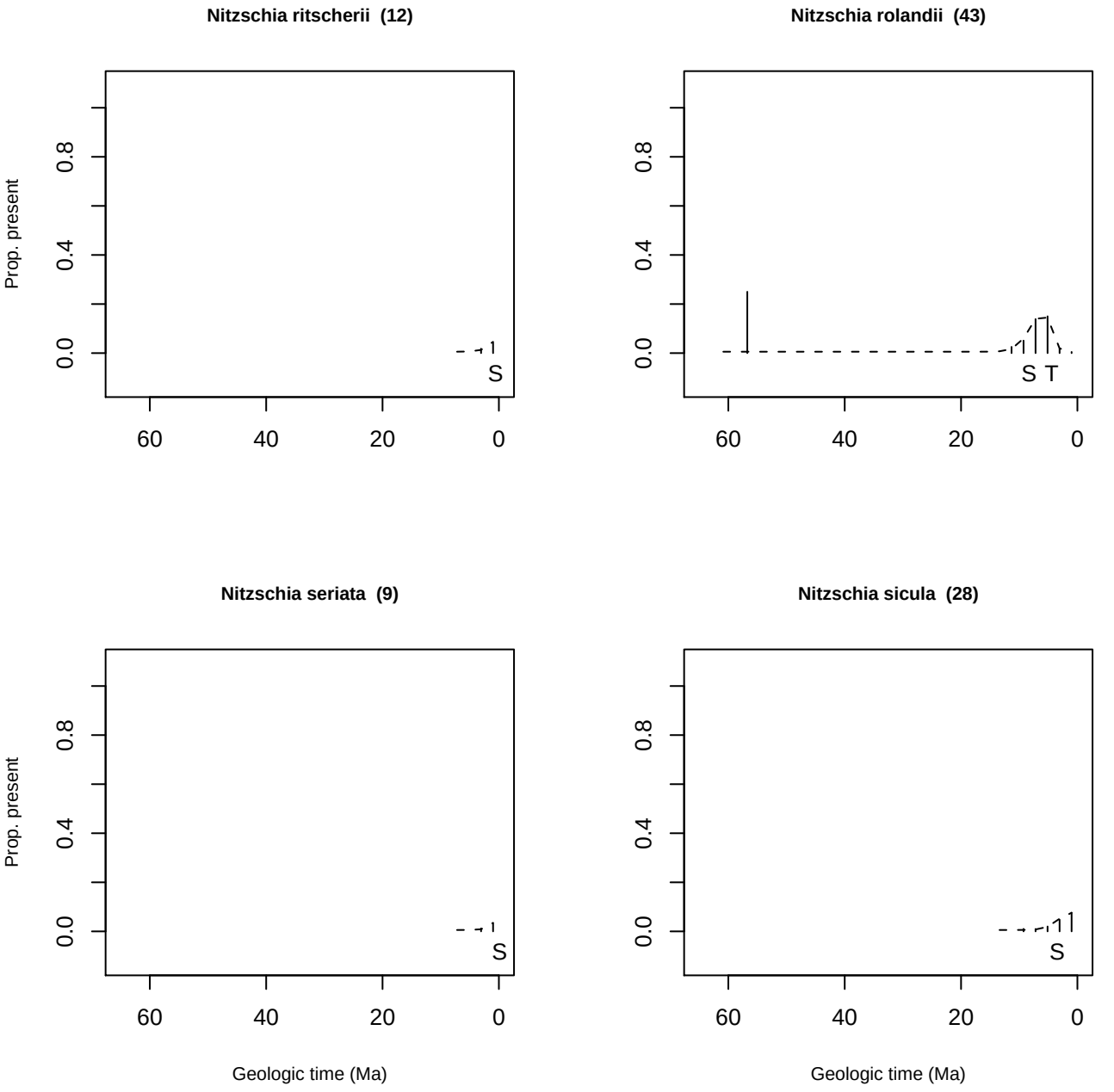

Nitzschia jouseae (111)
0.0
0.4
0.8
S T
60
40
20
0

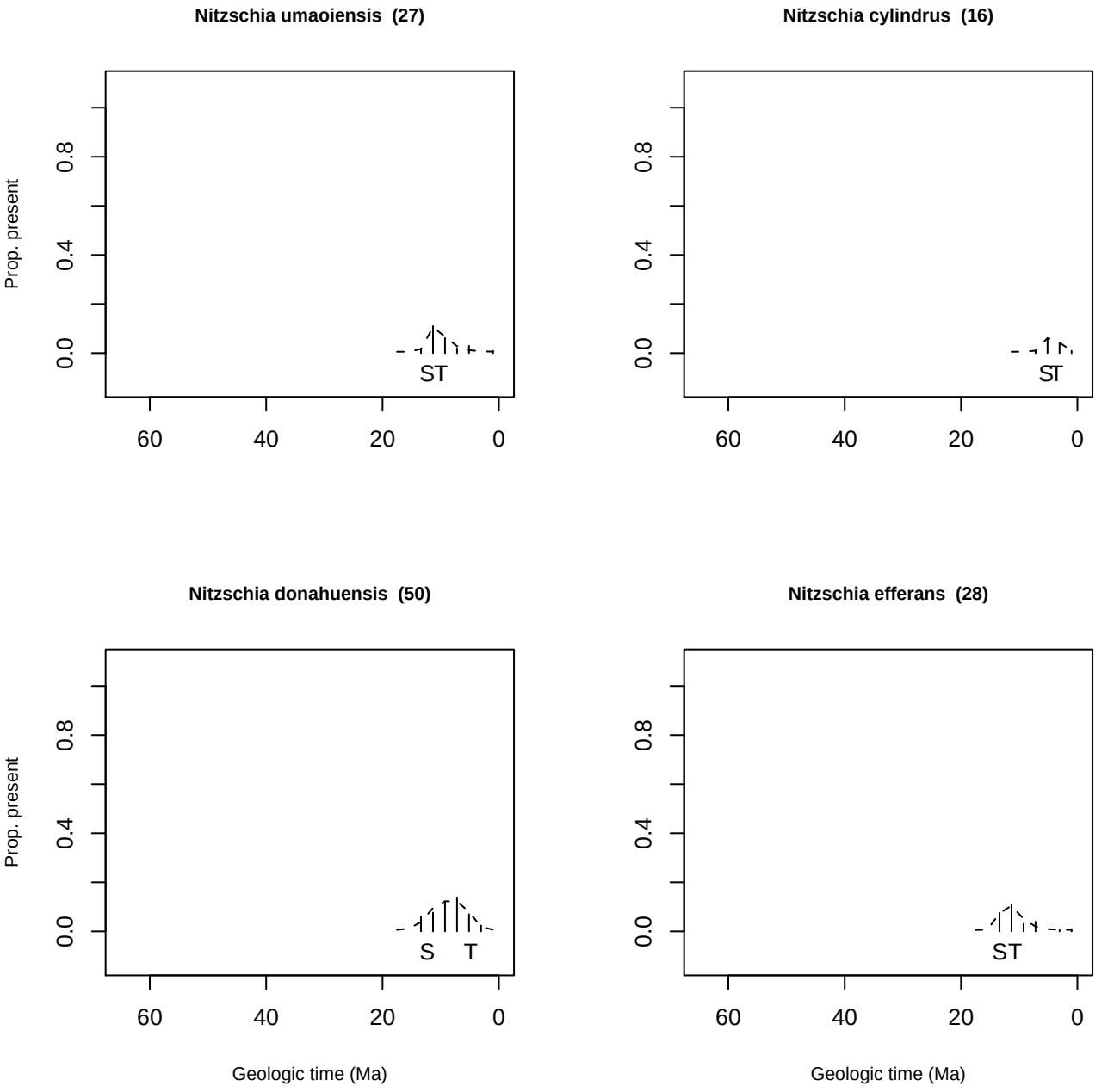

Nitzschia kerguelensis (22)
Prop. present
0.0
0.4
0.8
S
60
40
20
0
Geologic time (Ma)

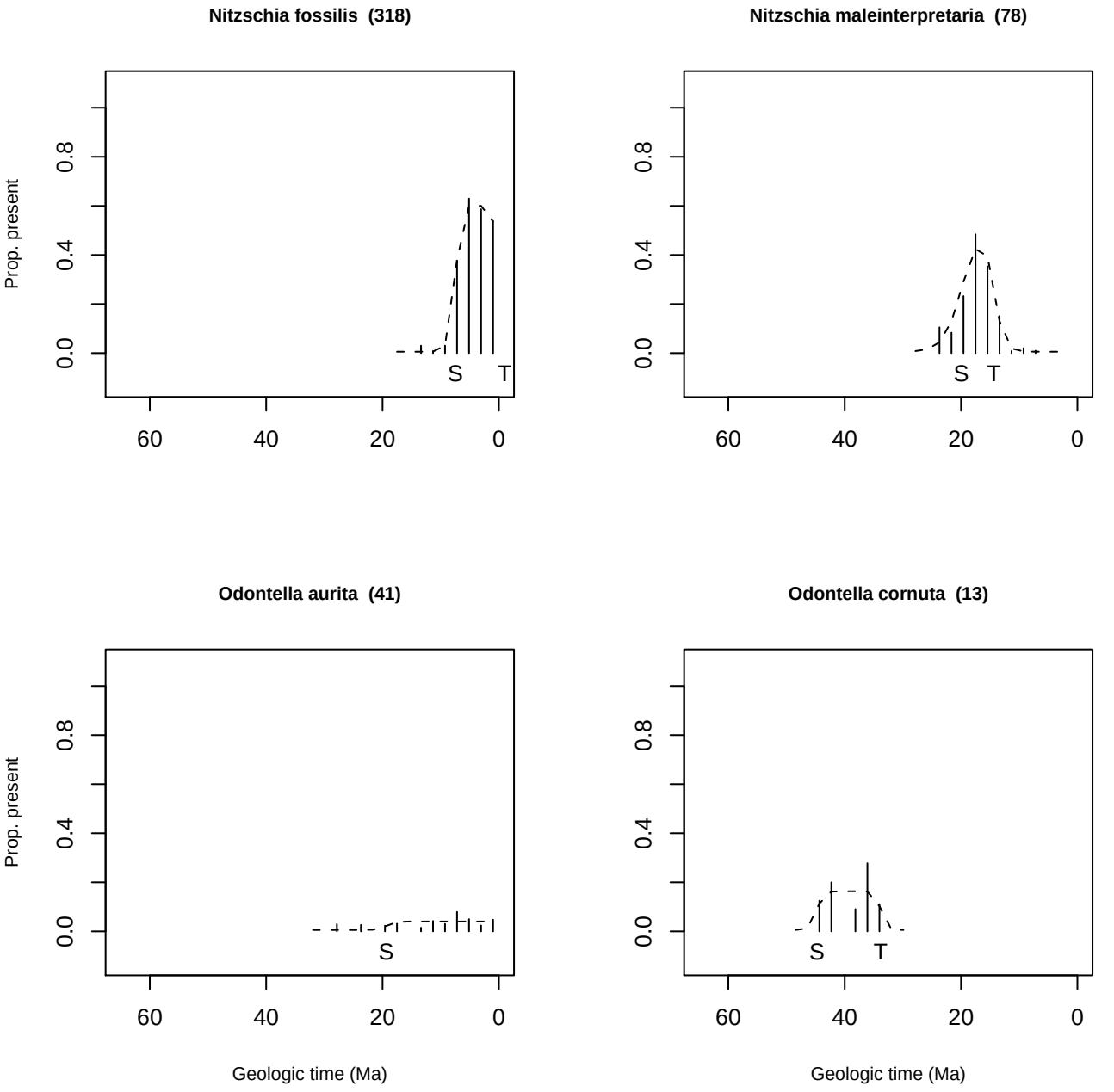

Nitzschia kolaczeckii (23)
0.0
0.4
0.8
ST
60
40
20
0
Geologic time (Ma)

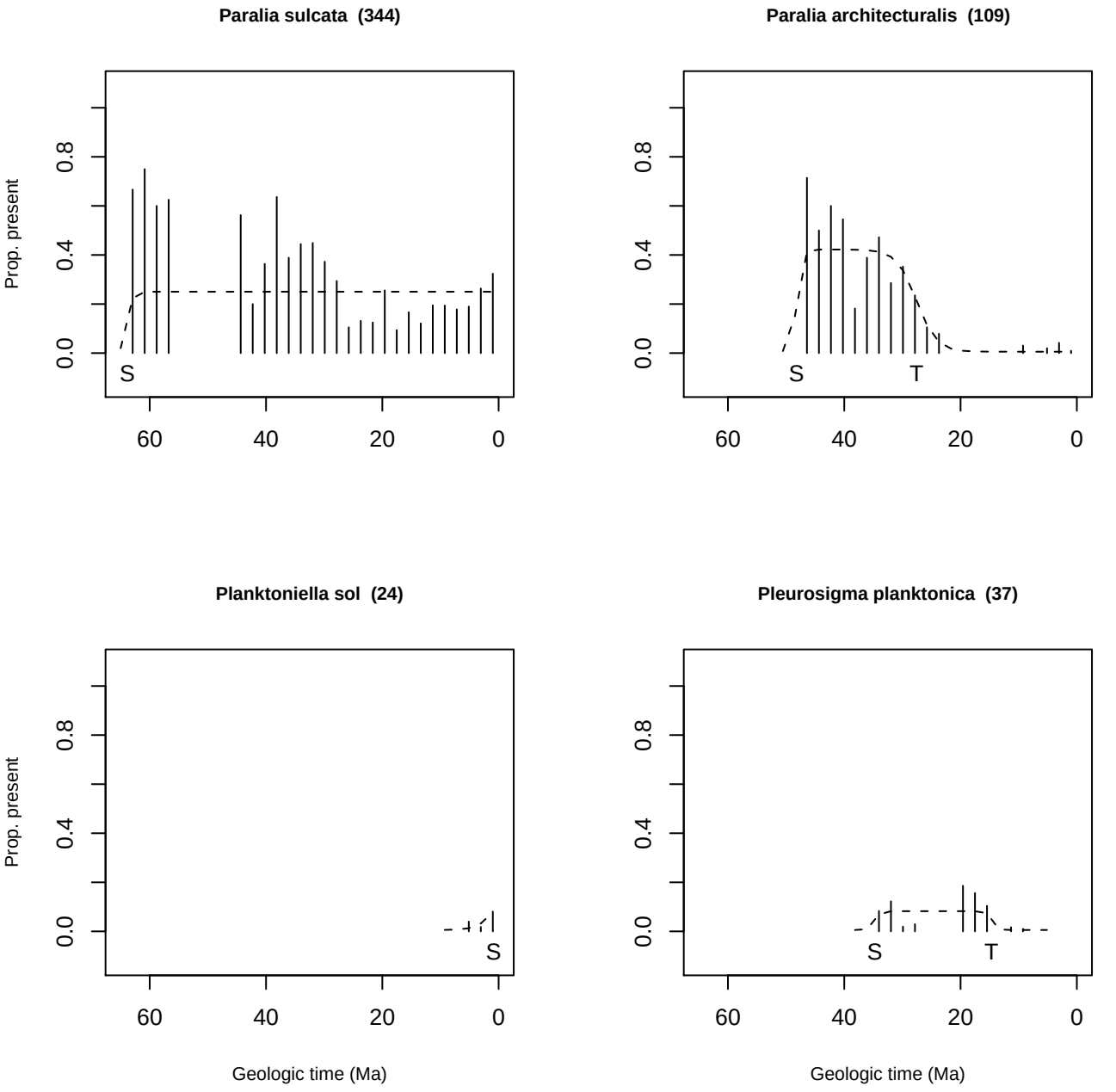

Nitzschia marina (238)
Nitzschia miocenica (72)
Nitzschia panduriformis (16)
Nitzschia porteri (78)
Prop. present
0.0
0.4
0.8
60
40
20
0
S
ST
Geologic time (Ma)

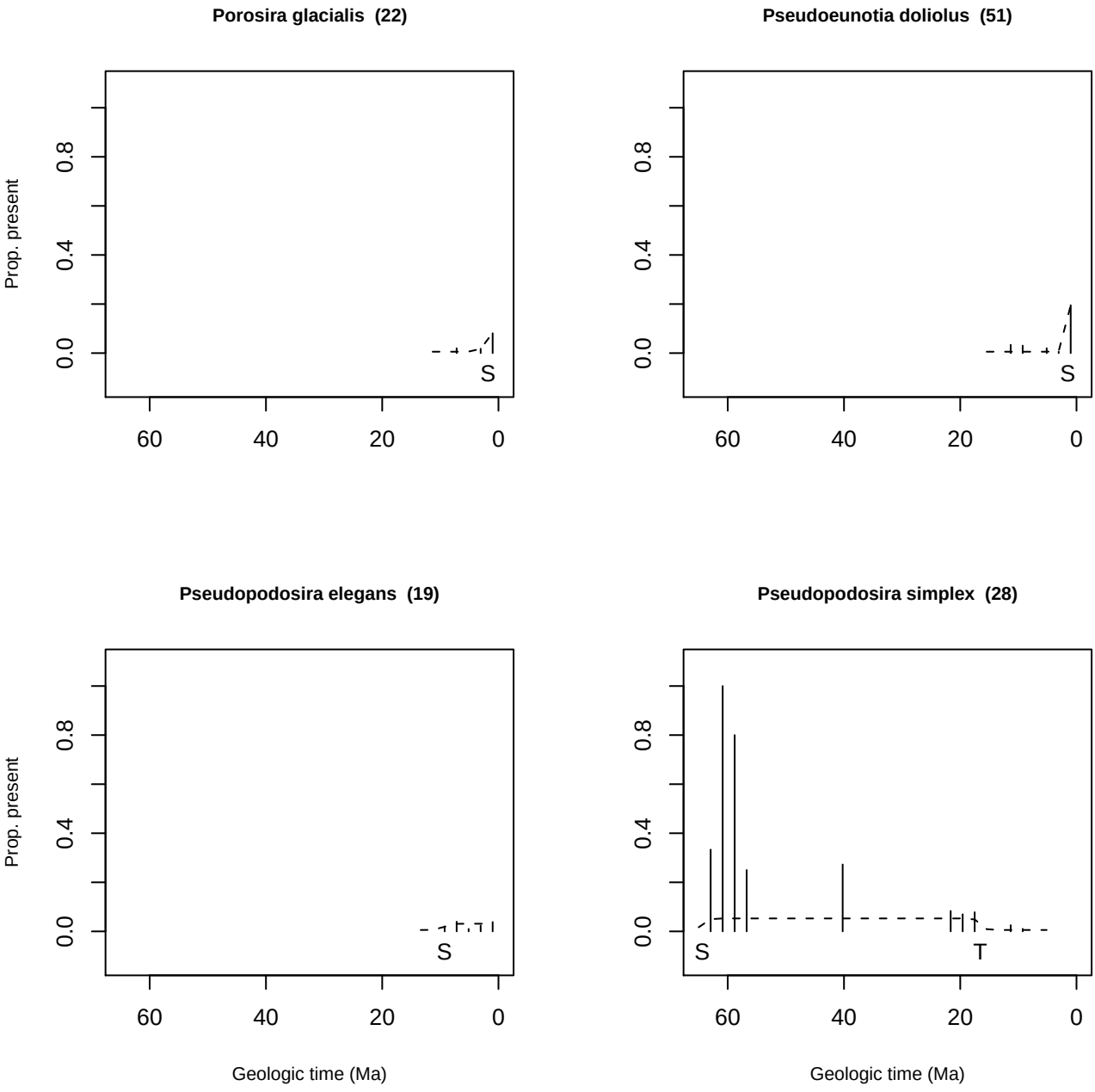

Nitzschia praereinholdii (68)
Nitzschia pseudokerguelensis (14)
Nitzschia pusilla (21)
Nitzschia reinholdii (338)
Prop. present
0.0
0.4
0.8
60
40
20
0
S
T
Geologic time (Ma)

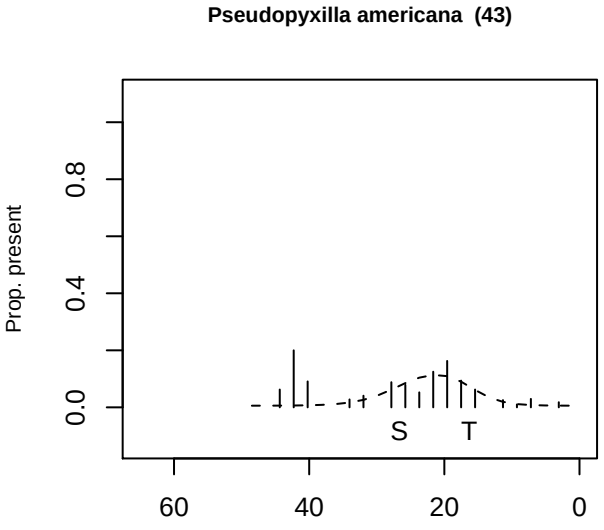

Nitzschia ritscherii (12)
Nitzschia rolandii (43)
Nitzschia seriata (9)
Nitzschia sicula (28)
Prop. present
0.0
0.4
0.8
60
40
20
0
S
T
Geologic time (Ma)

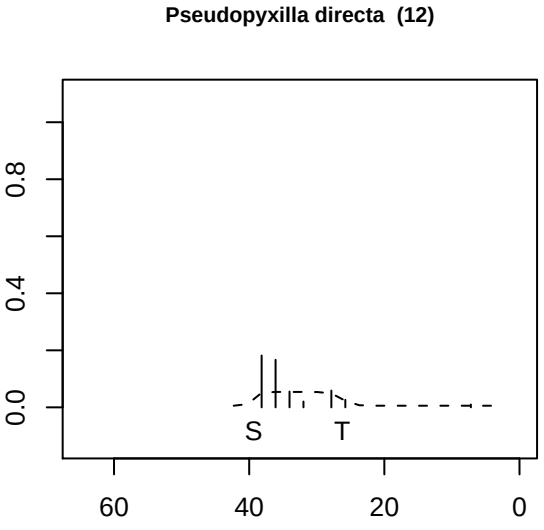

Nitzschia umaoiensis (27)
Nitzschia cylindrus (16)
Nitzschia donahuensis (50)
Nitzschia efferans (28)
Prop. present
0.0
0.4
0.8
60
40
20
0
ST
S
T
Geologic time (Ma)

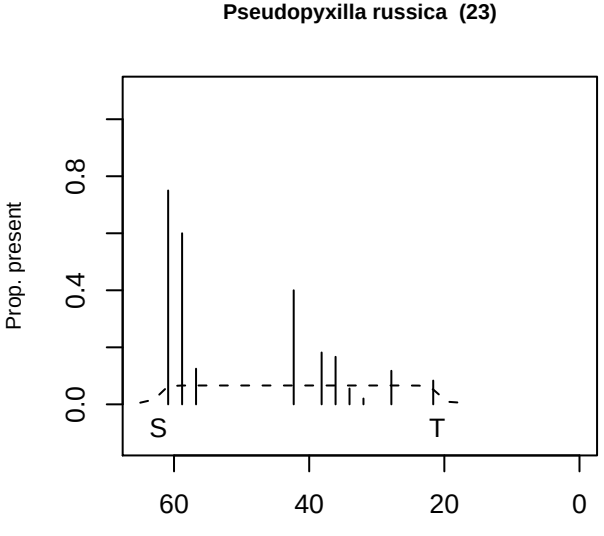

Nitzschia fossilis (318)
Nitzschia maleinterpretaria (78)
Odontella aurita (41)
Odontella cornuta (13)
Prop. present
0.0
0.4
0.8
60
40
20
0
S
T
Geologic time (Ma)

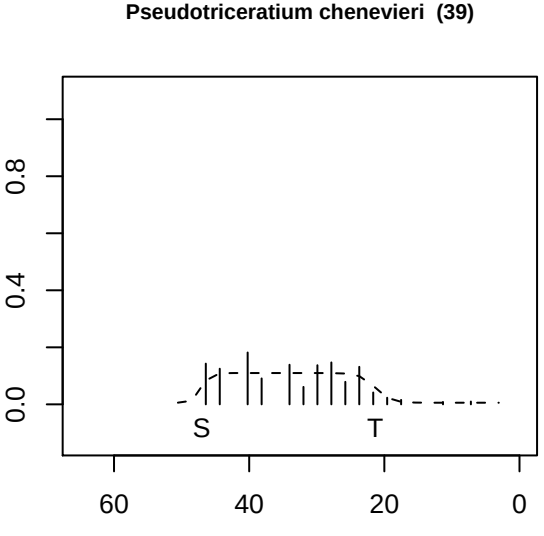

Paralia sulcata (344)
Paralia architecturalis (109)
Planktoniella sol (24)
Pleurosigma planktonica (37)
Prop. present
0.0
0.4
0.8
60
40
20
0
S
T
Geologic time (Ma)

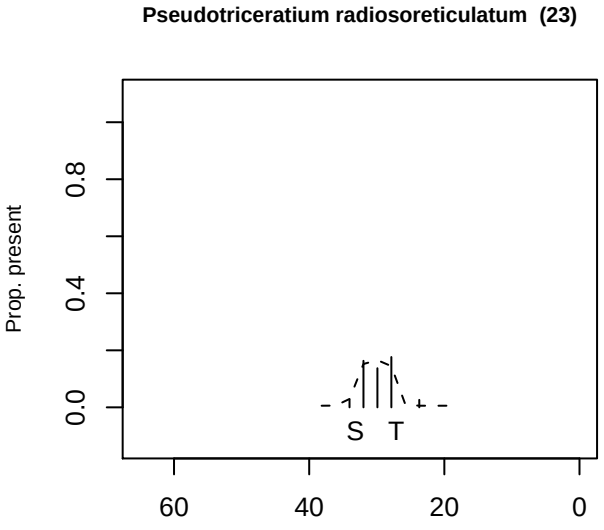

Porosira glacialis (22)
Pseudoeunotia doliolus (51)
Pseudopodosira elegans (19)
Pseudopodosira simplex (28)
Prop. present
0.0
0.4
0.8
60
40
20
0
S
T
Geologic time (Ma)

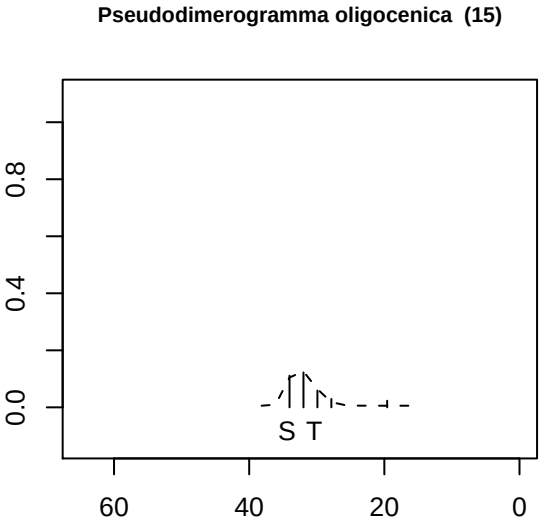

Pseudopyxilla americana (43)
Prop. present
0.0
0.4
0.8
S
T
60
40
20
0

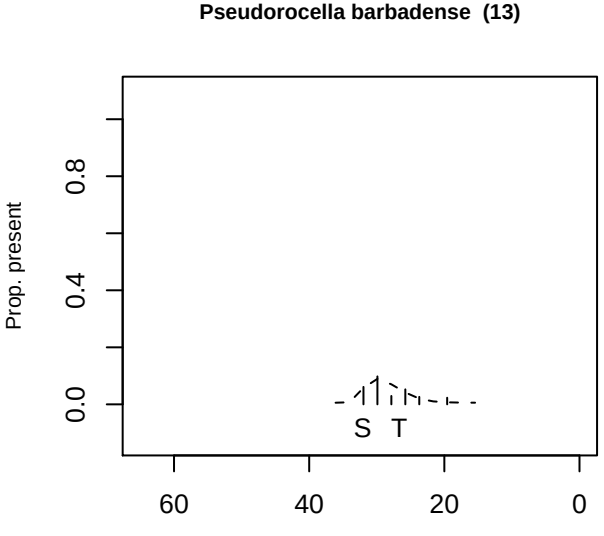

Pseudopyxilla directa (12)
0.0
0.4
0.8
S
T
60
40
20
0

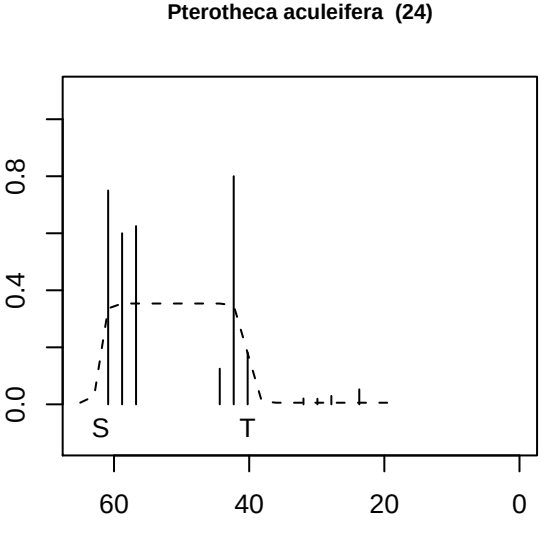

Pseudopyxilla russica (23)
Prop. present
0.0
0.4
0.8
S
T
60
40
20
0
Geologic time (Ma)


Pseudotriceratium chenevieri (39)
0.0
0.4
0.8
S
T
60
40
20
0
Geologic time (Ma)



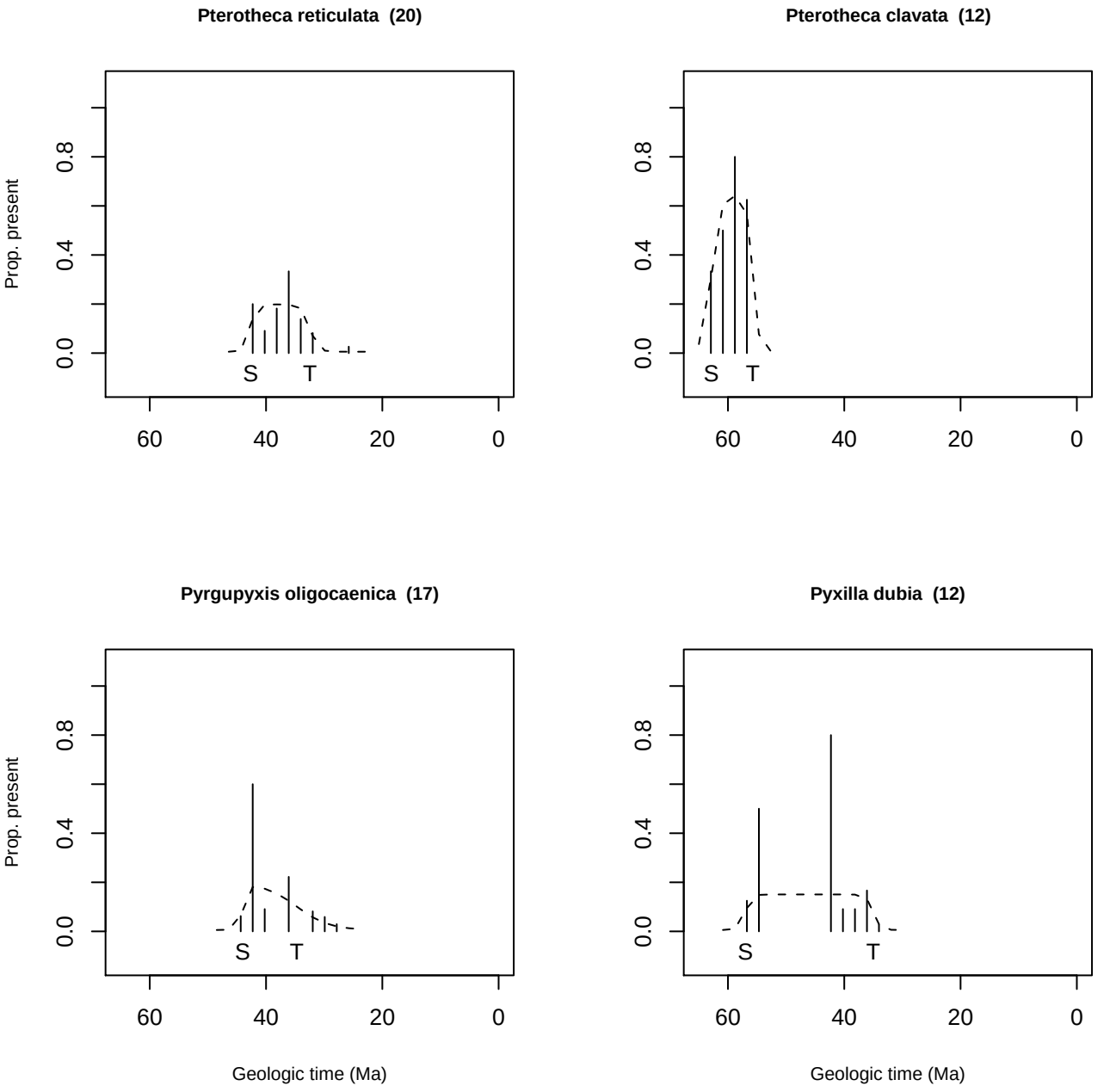


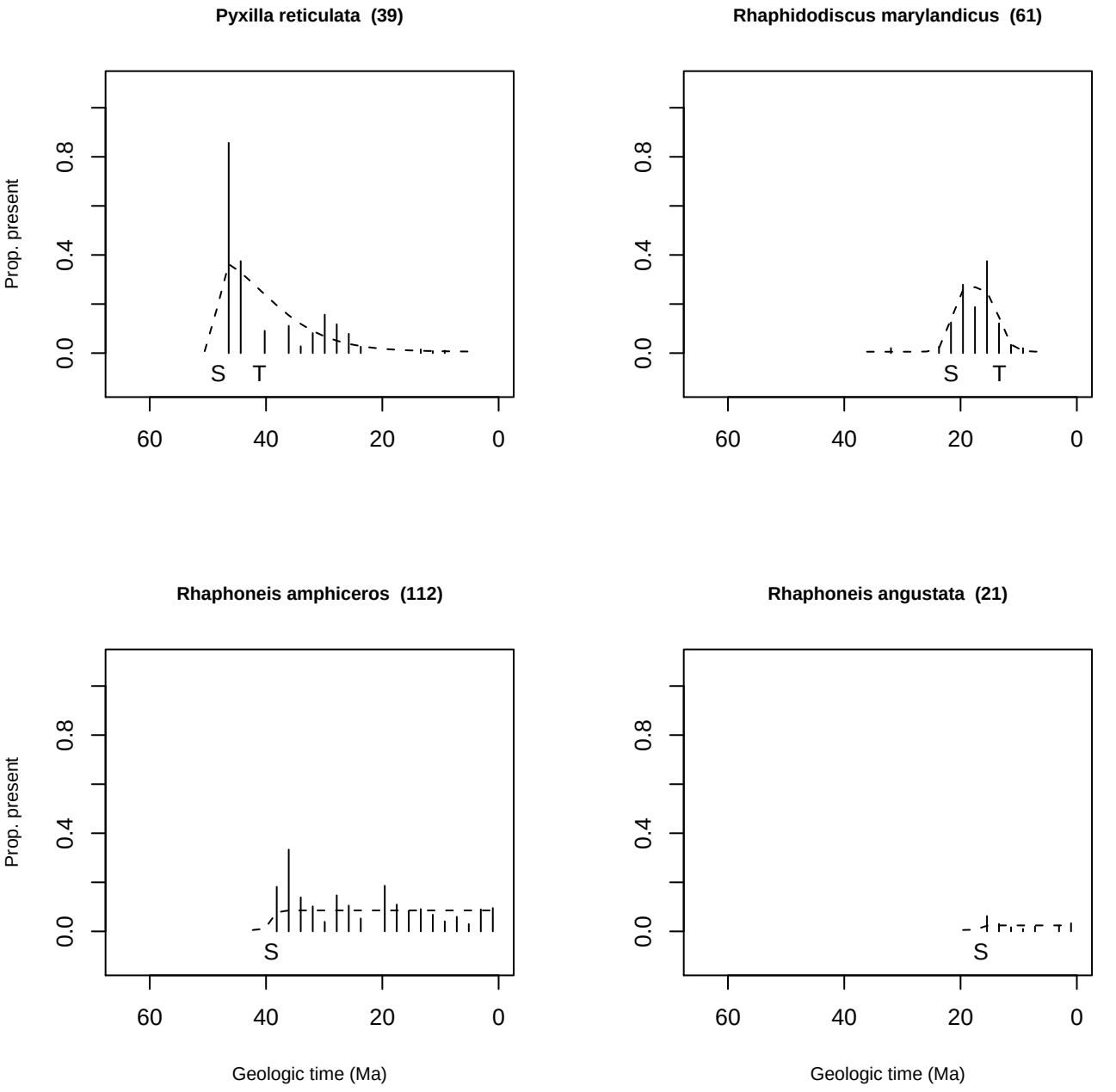


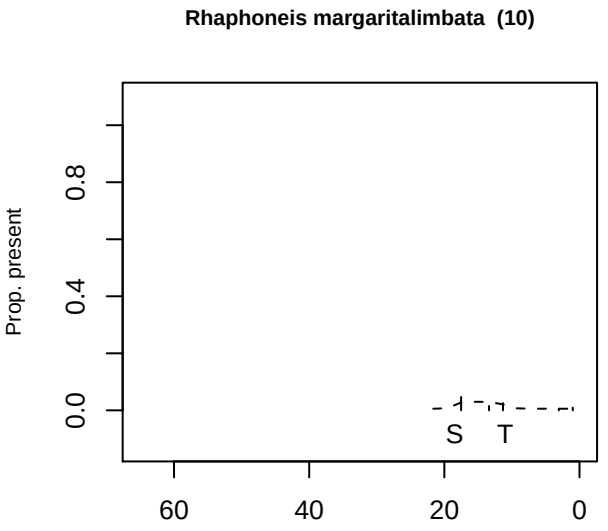


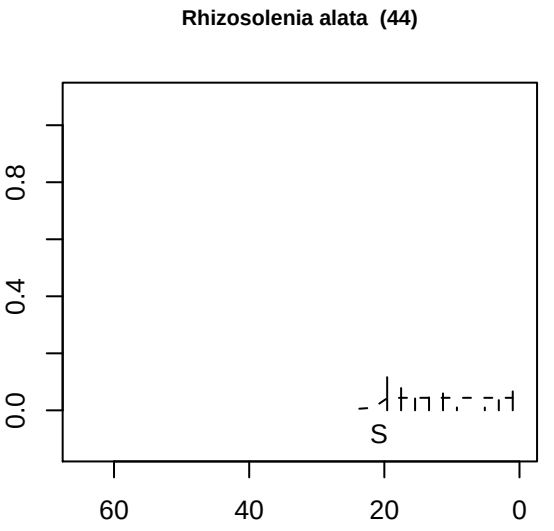
Geologic time (Ma)

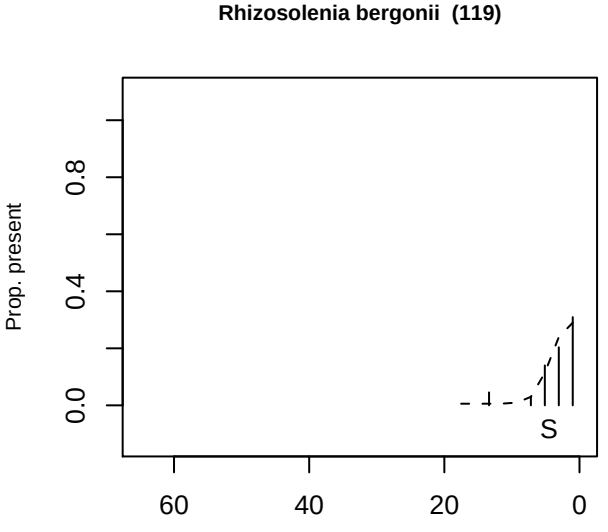
Geologic time (Ma)

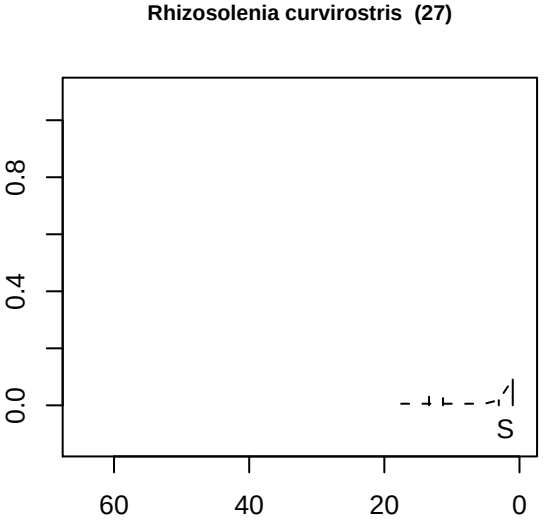

Pterotheca reticulata (20)
Pterotheca clavata (12)
Pyrgupyxis oligocaenica (17)
Pyxilla dubia (12)
Prop. present
0.0
0.4
0.8
S
T
60
40
20
0
Geologic time (Ma)

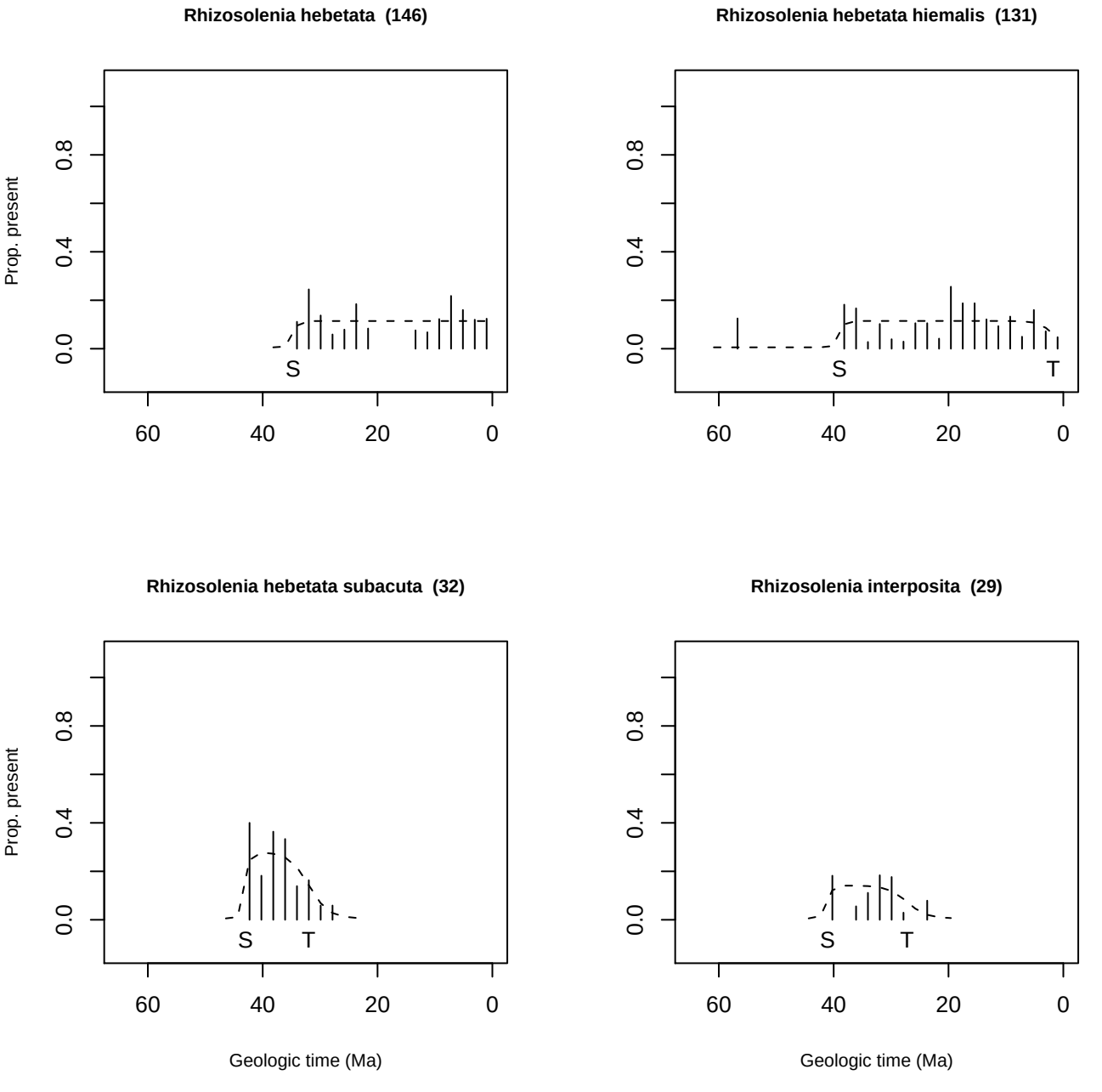

Pyxilla reticulata (39)
Rhaphidodiscus marylandicus (61)
Rhaphoneis amphiceros (112)
Rhaphoneis angustata (21)
Prop. present
0.0
0.4
0.8
S
T
60
40
20
0
Geologic time (Ma)

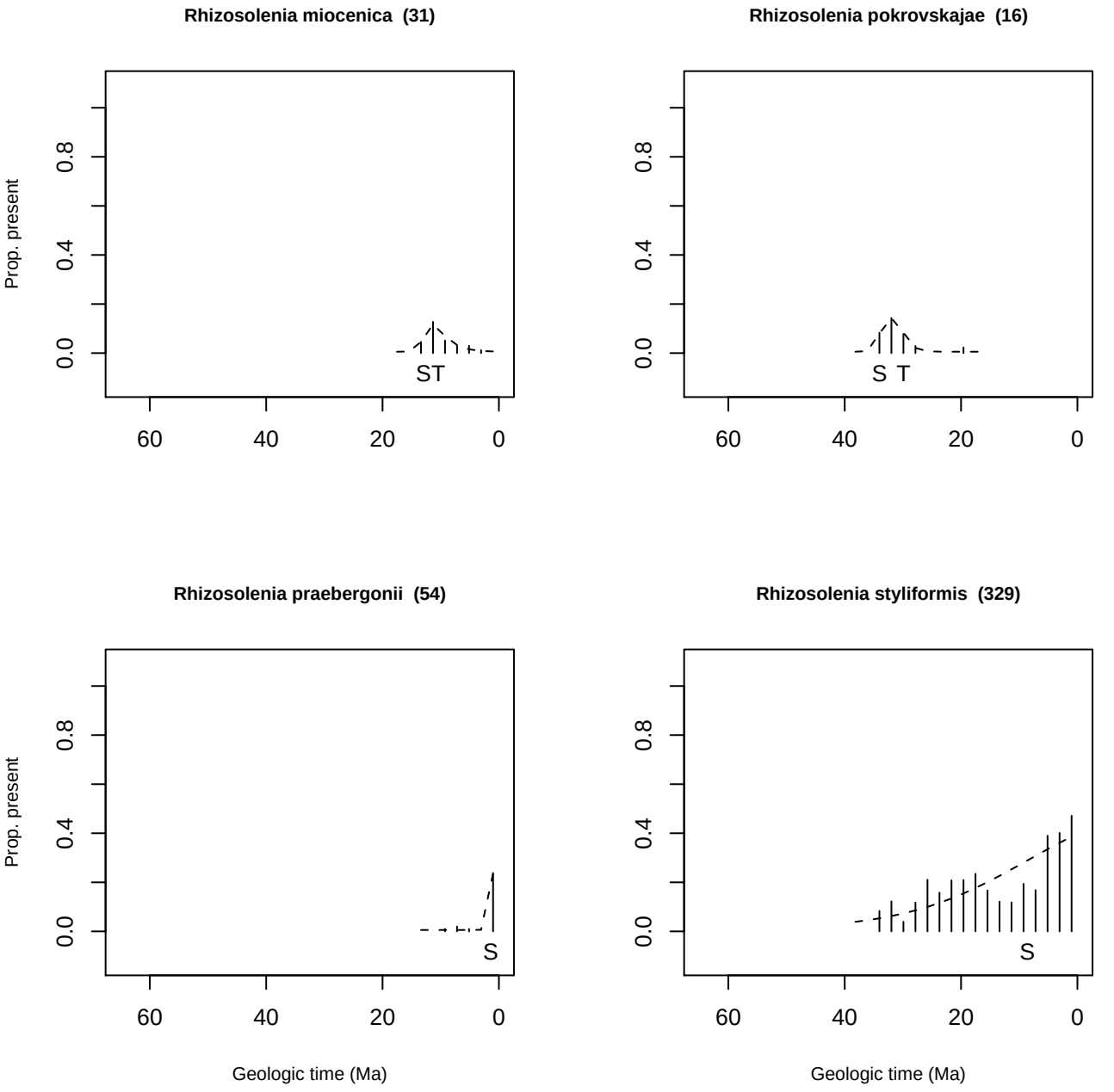

Rhaphoneis margaritalimbata (10)
Prop. present
0.0
0.4
0.8
S
T
60
40
20
0

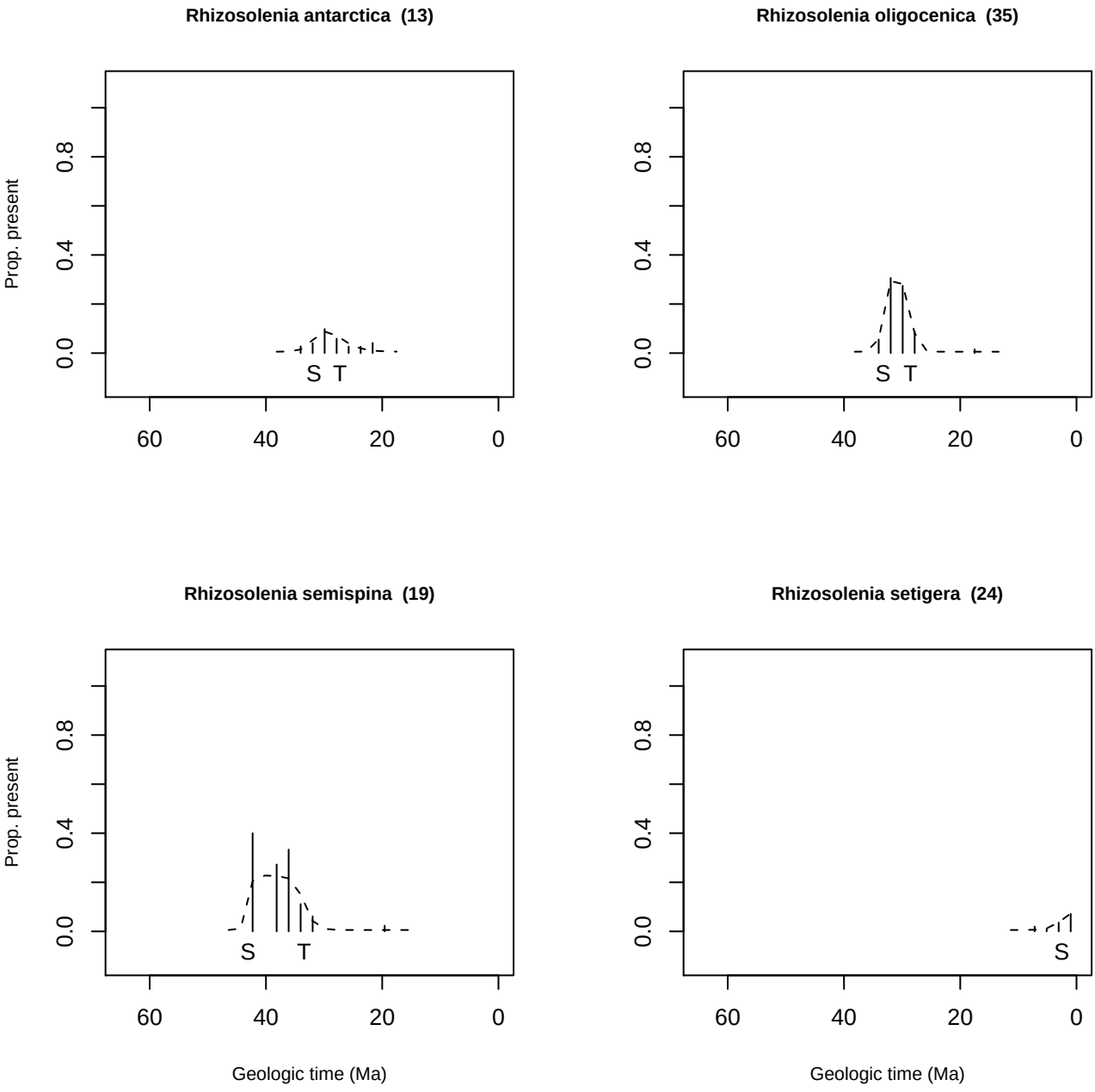

Rhizosolenia alata (44)
0.0
0.4
0.8
S
60
40
20
0

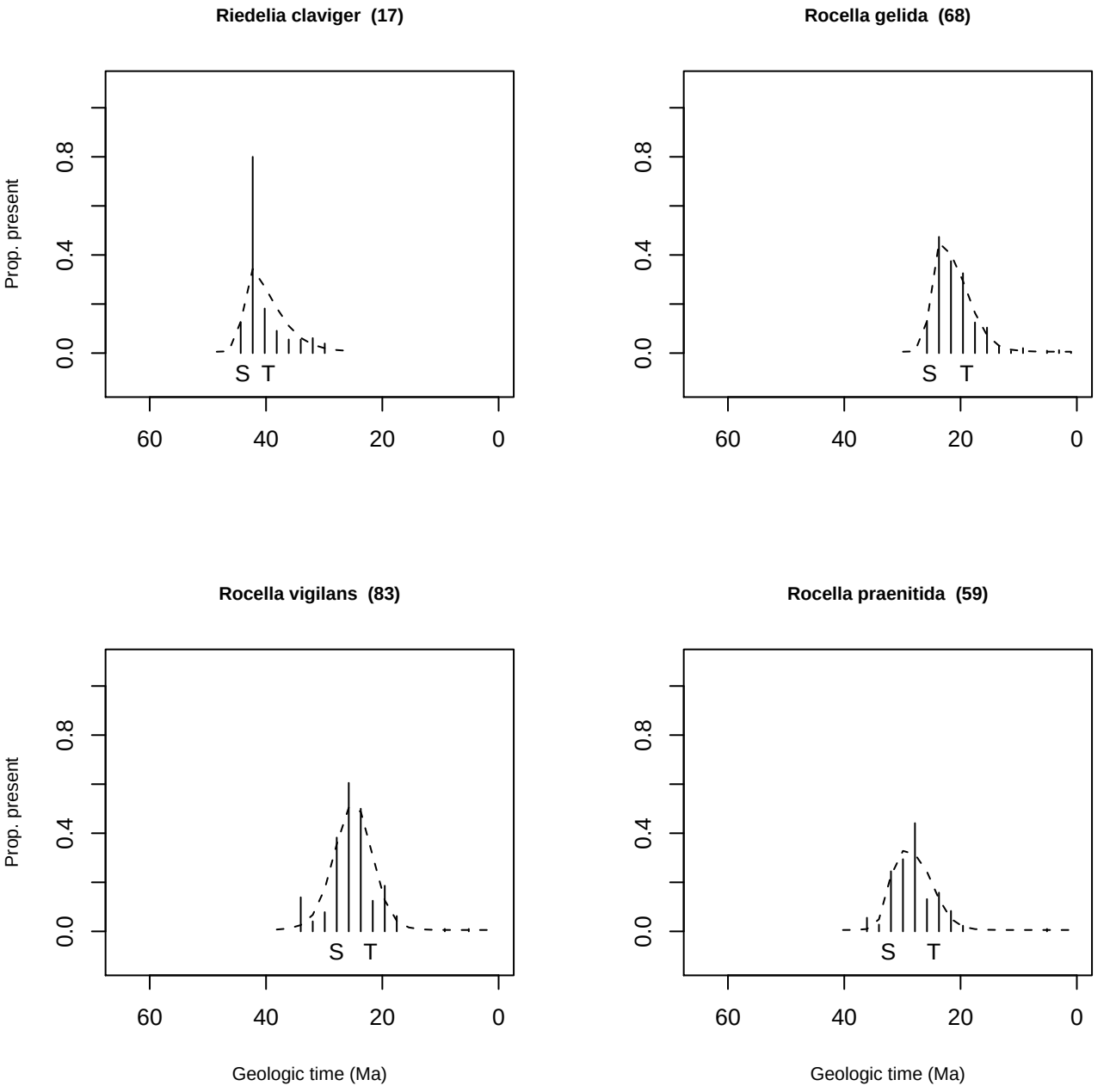

Rhizosolenia bergonii (119)
Prop. present
0.0
0.4
0.8
S
60
40
20
0
Geologic time (Ma)

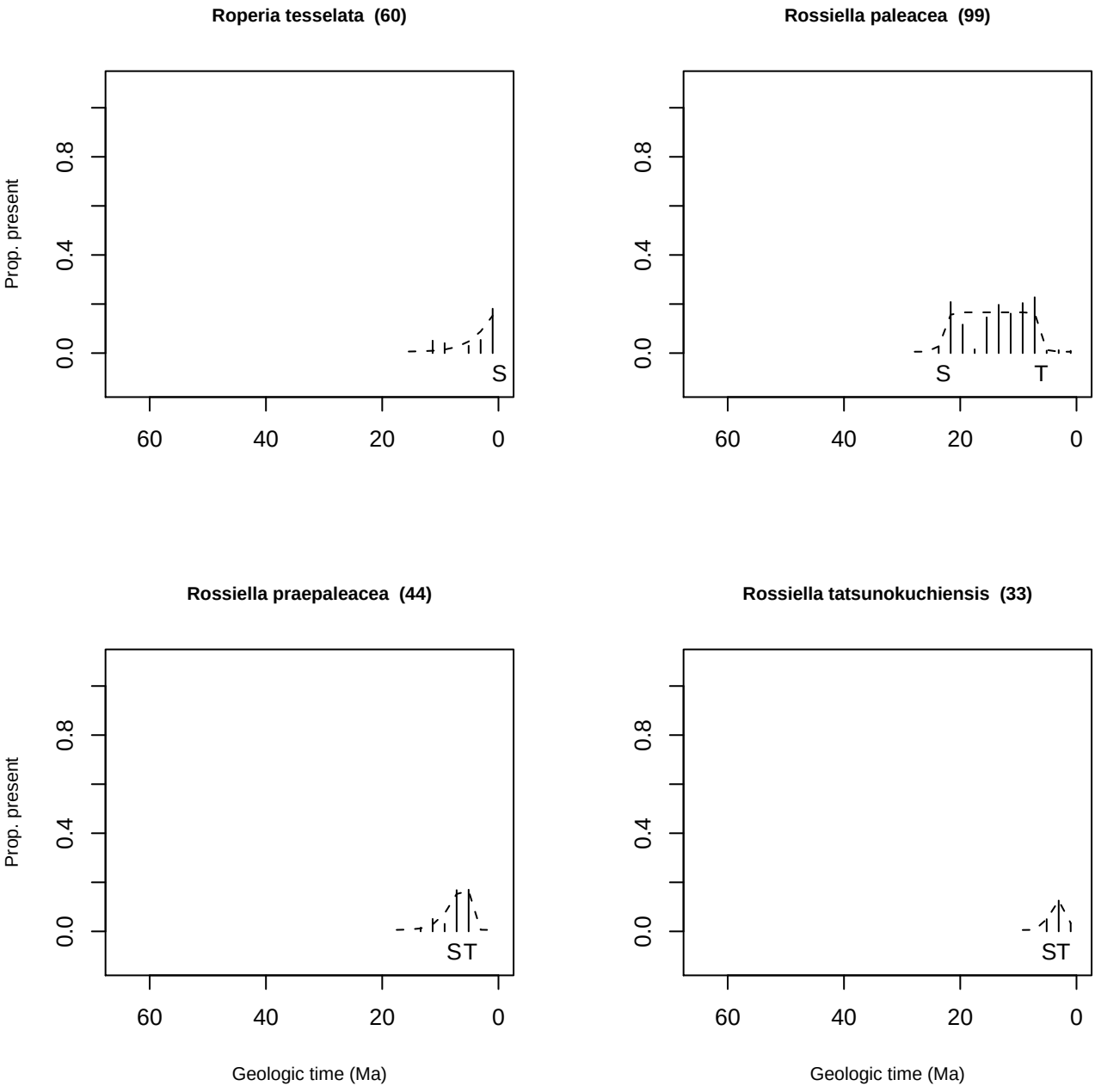

Rhizosolenia curvirostris (27)
0.0
0.4
0.8
S
60
40
20
0
Geologic time (Ma)

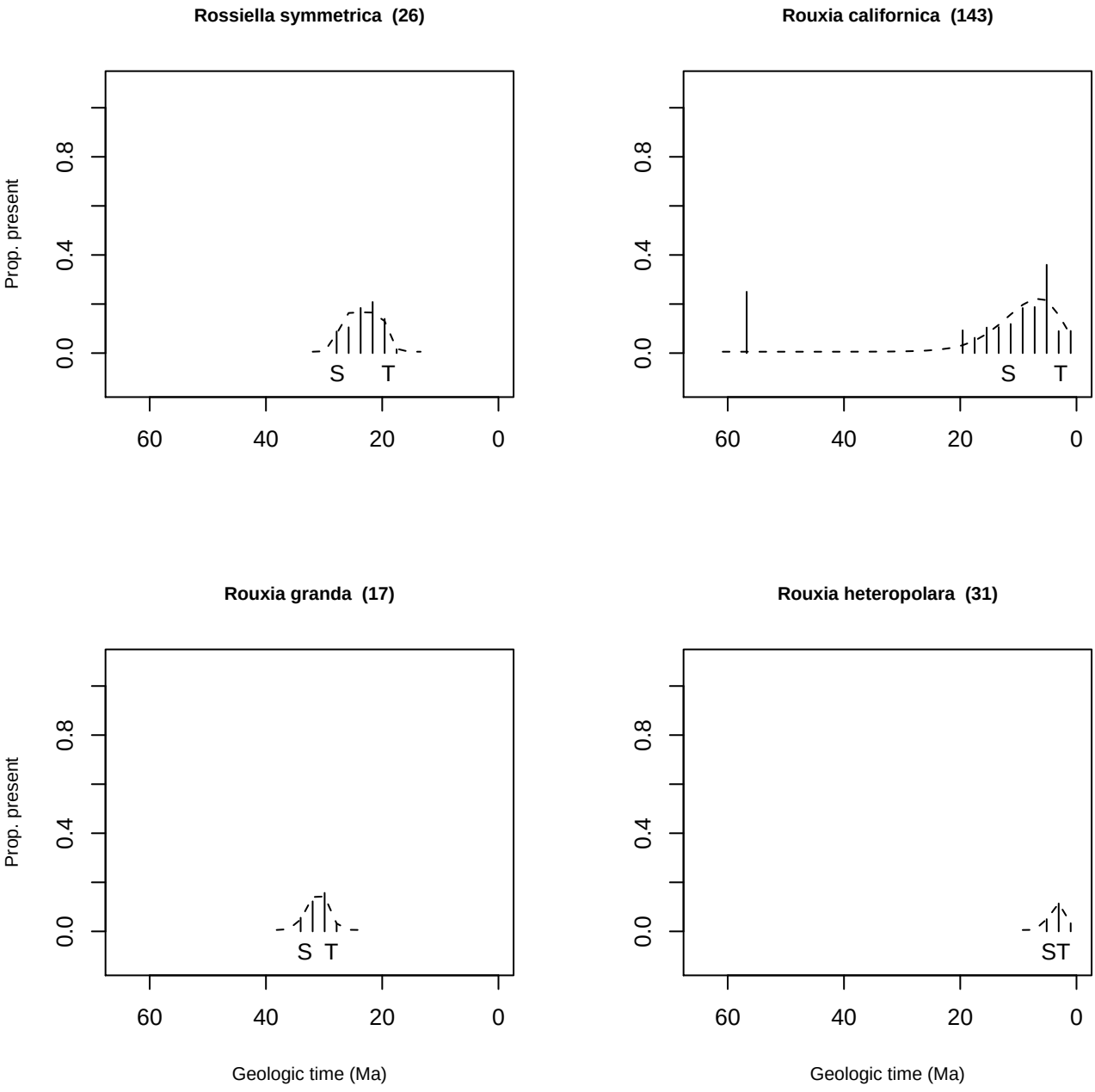

Rhizosolenia hebetata (146)
Rhizosolenia hebetata hiemalis (131)
Rhizosolenia hebetata subacuta (32)
Rhizosolenia interposita (29)
Prop. present
0.0
0.4
0.8
S
T
60
40
20
0
Geologic time (Ma)

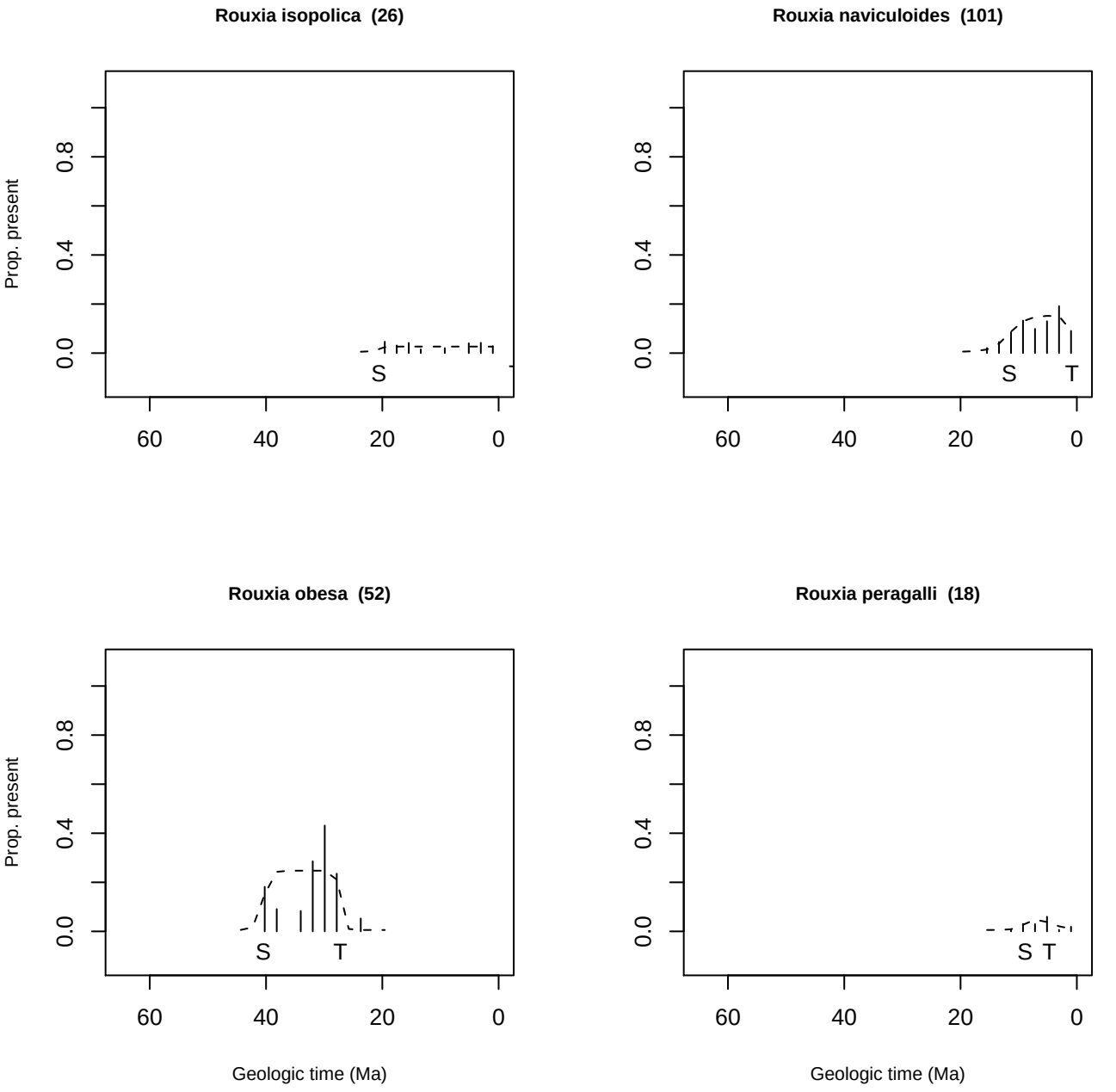

Rhizosolenia miocenica (31)
Rhizosolenia pokrovskajae (16)
Rhizosolenia praebergonii (54)
Rhizosolenia styliformis (329)
Prop. present
0.0
0.4
0.8
60
40
20
0
ST
S T
S
S
Geologic time (Ma)
Geologic time (Ma)

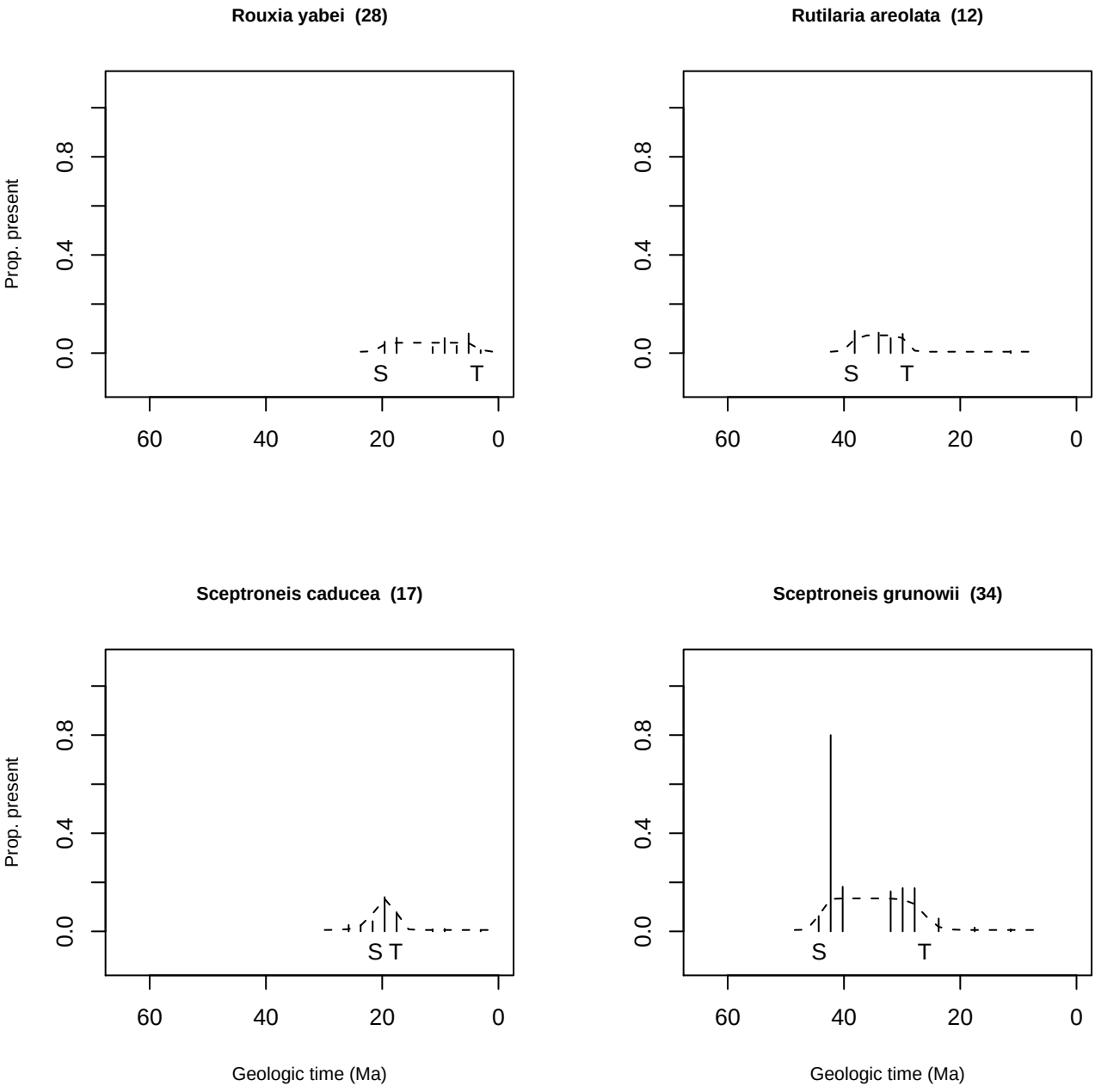

Rhizosolenia antarctica (13)
Rhizosolenia oligocenica (35)
Rhizosolenia semispina (19)
Rhizosolenia setigera (24)
Prop. present
0.0
0.4
0.8
60
40
20
0
S
T
Geologic time (Ma)

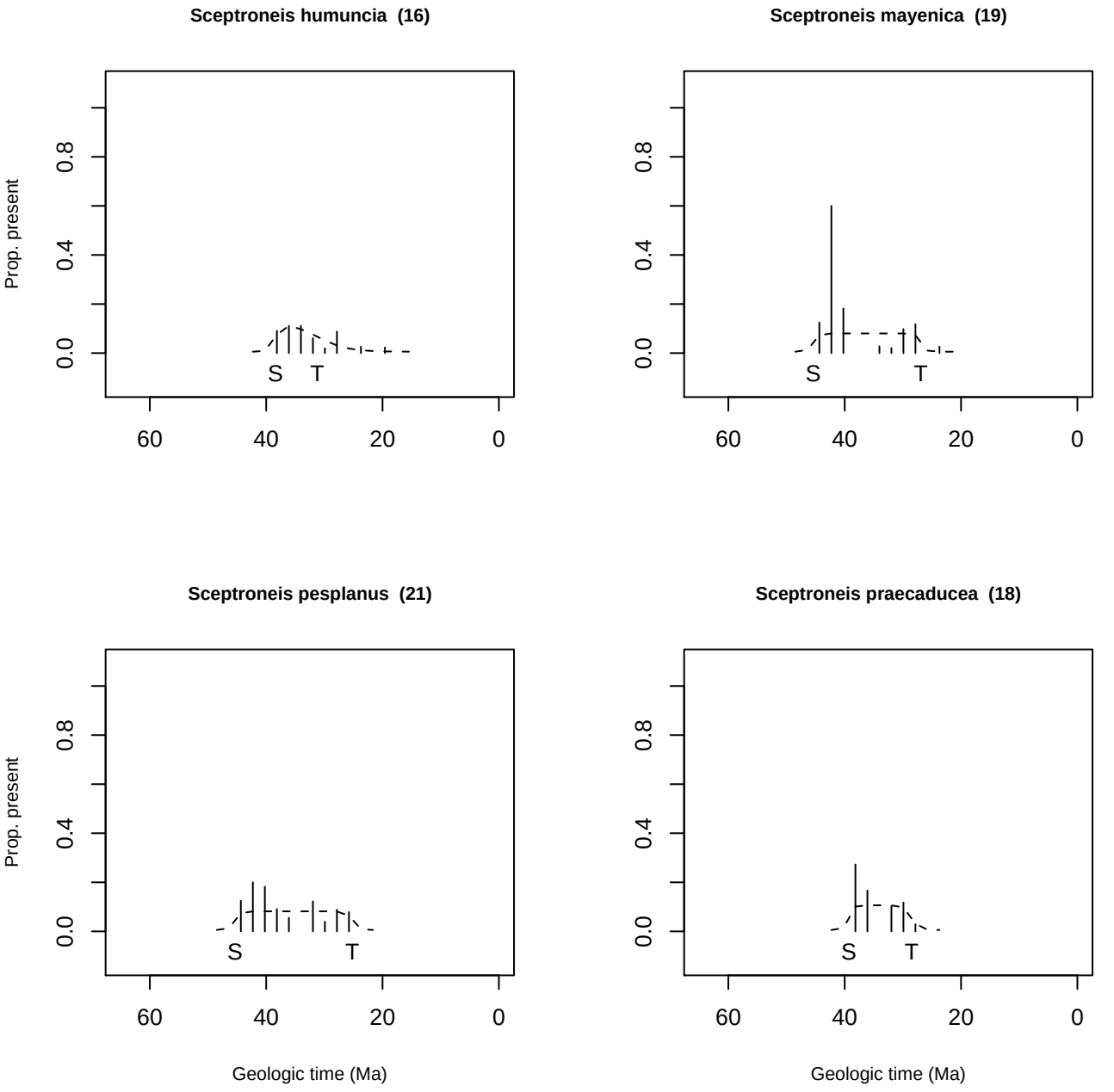

Riedelia claviger (17)
Rocella gelida (68)
Rocella vigilans (83)
Rocella praenitida (59)
Prop. present
0.0
0.4
0.8
S
T
60
40
20
0
Geologic time (Ma)

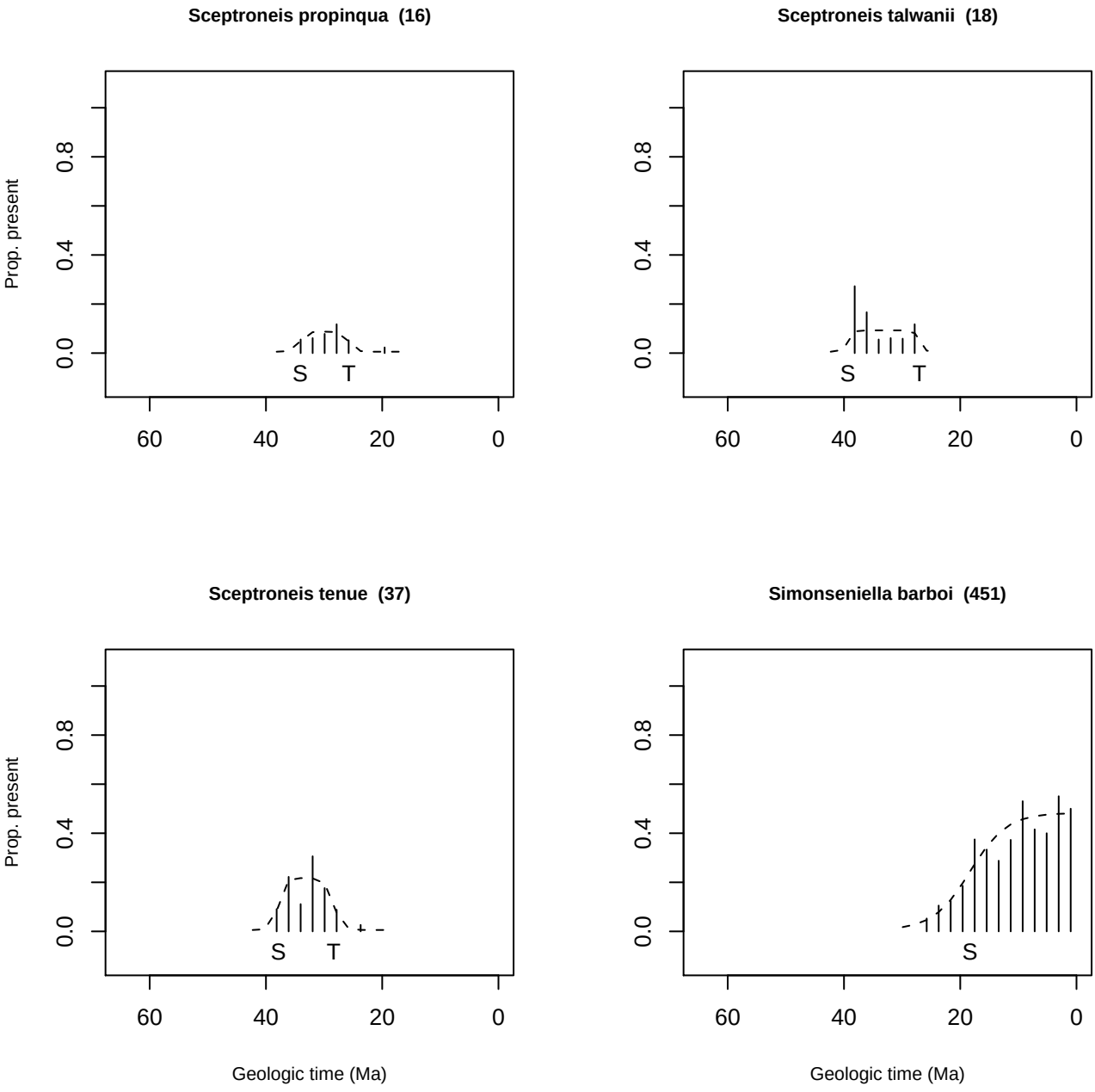

Roperia tesselata (60)
Rossiella paleacea (99)
Rossiella praepaleacea (44)
Rossiella tatsunokuchiensis (33)
Prop. present
0.0
0.4
0.8
60
40
20
0
S
T
ST
Geologic time (Ma)

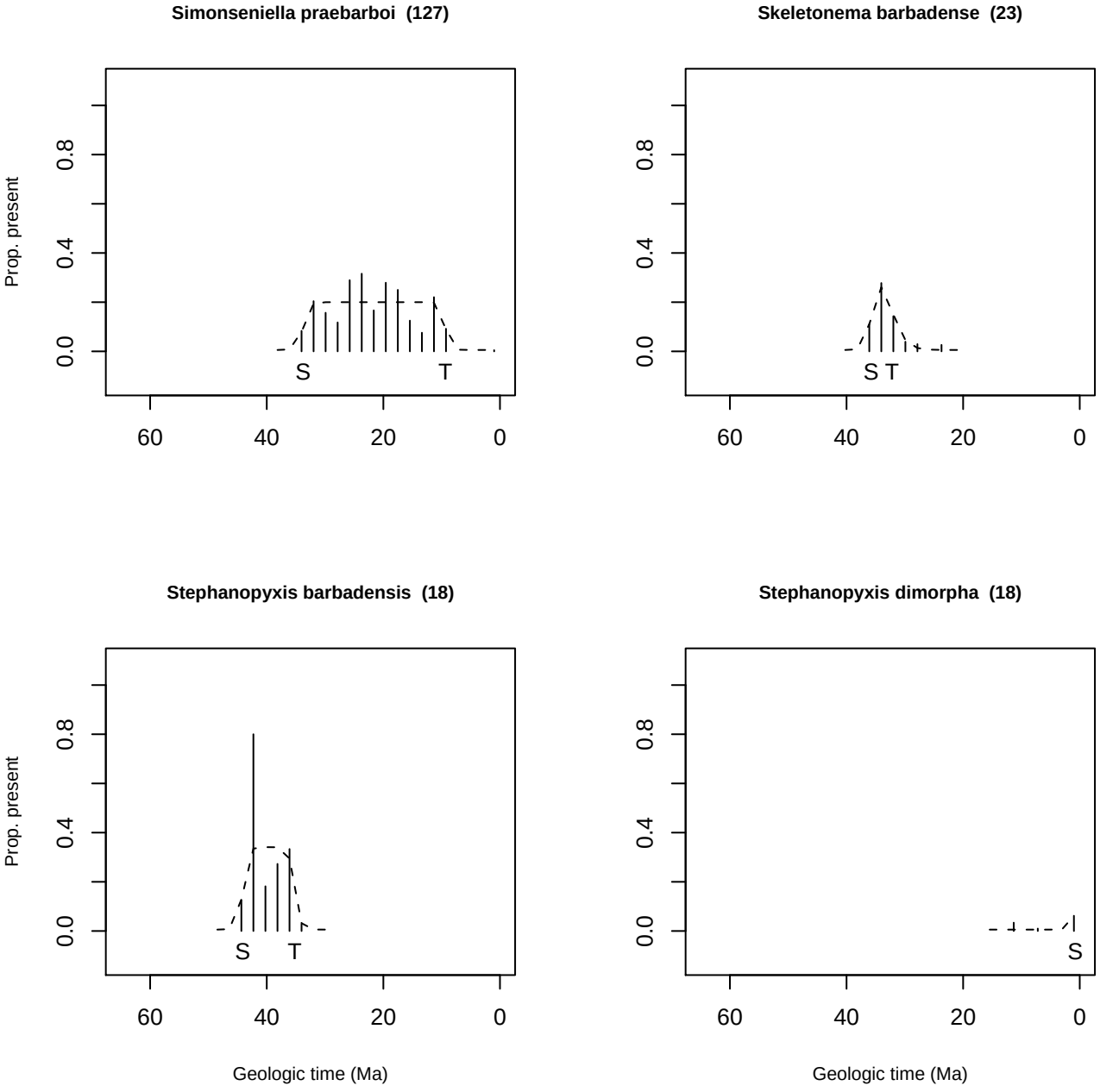

Rossiella symmetrica (26)
Rouxia californica (143)
Rouxia granda (17)
Rouxia heteropolara (31)
Prop. present
0.0
0.4
0.8
S
T
ST
60
40
20
0
Geologic time (Ma)

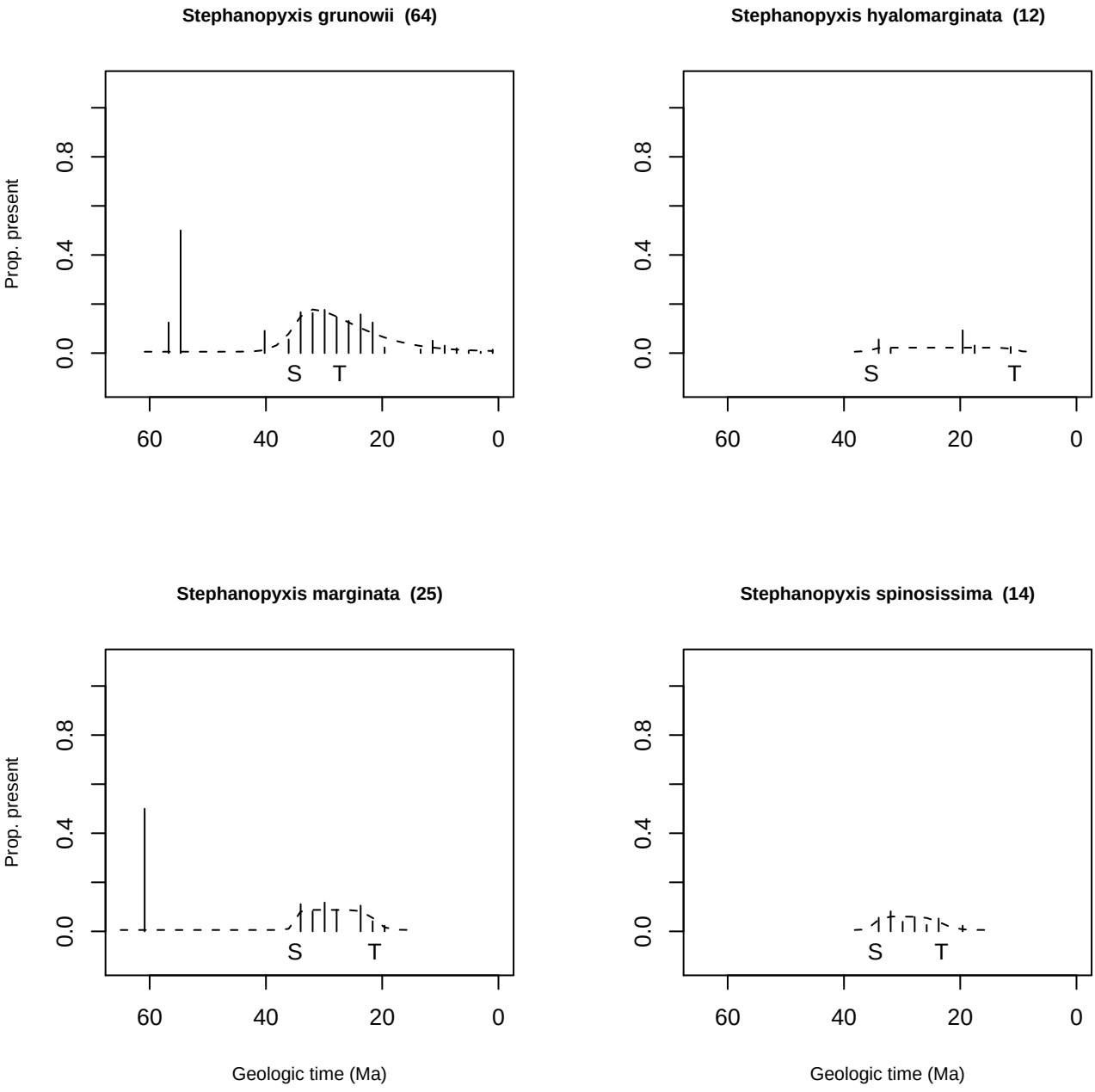

Rouxia isopolica (26)
Rouxia naviculoides (101)
Rouxia obesa (52)
Rouxia peragalli (18)
Prop. present
0.0
0.4
0.8
60
40
20
0
S
T
Geologic time (Ma)

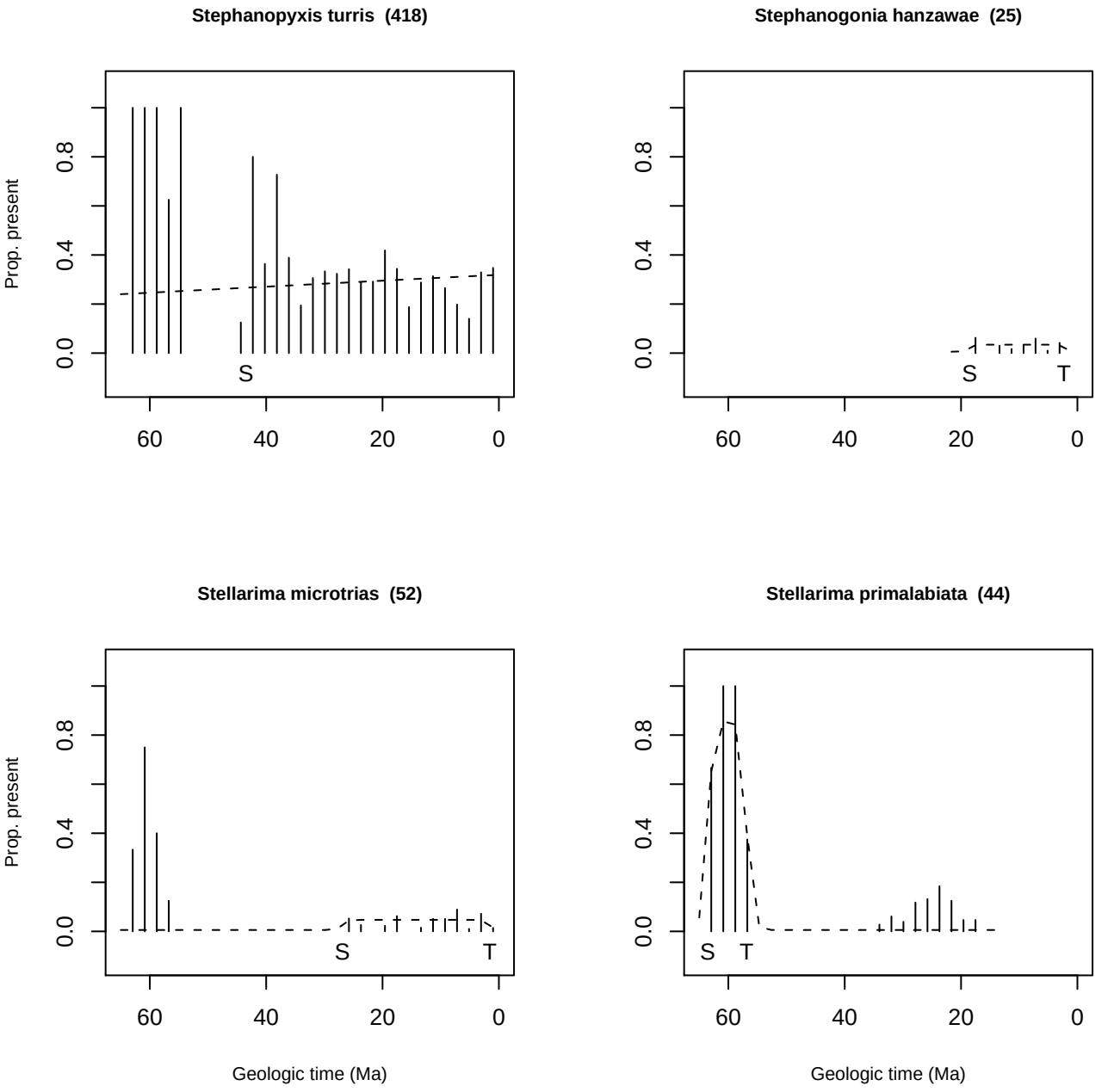

Rouxia yabei (28)
Rutilaria areolata (12)
Sceptroneis caducea (17)
Sceptroneis grunowii (34)
Prop. present
0.0
0.4
0.8
S
T
60
40
20
0
Geologic time (Ma)

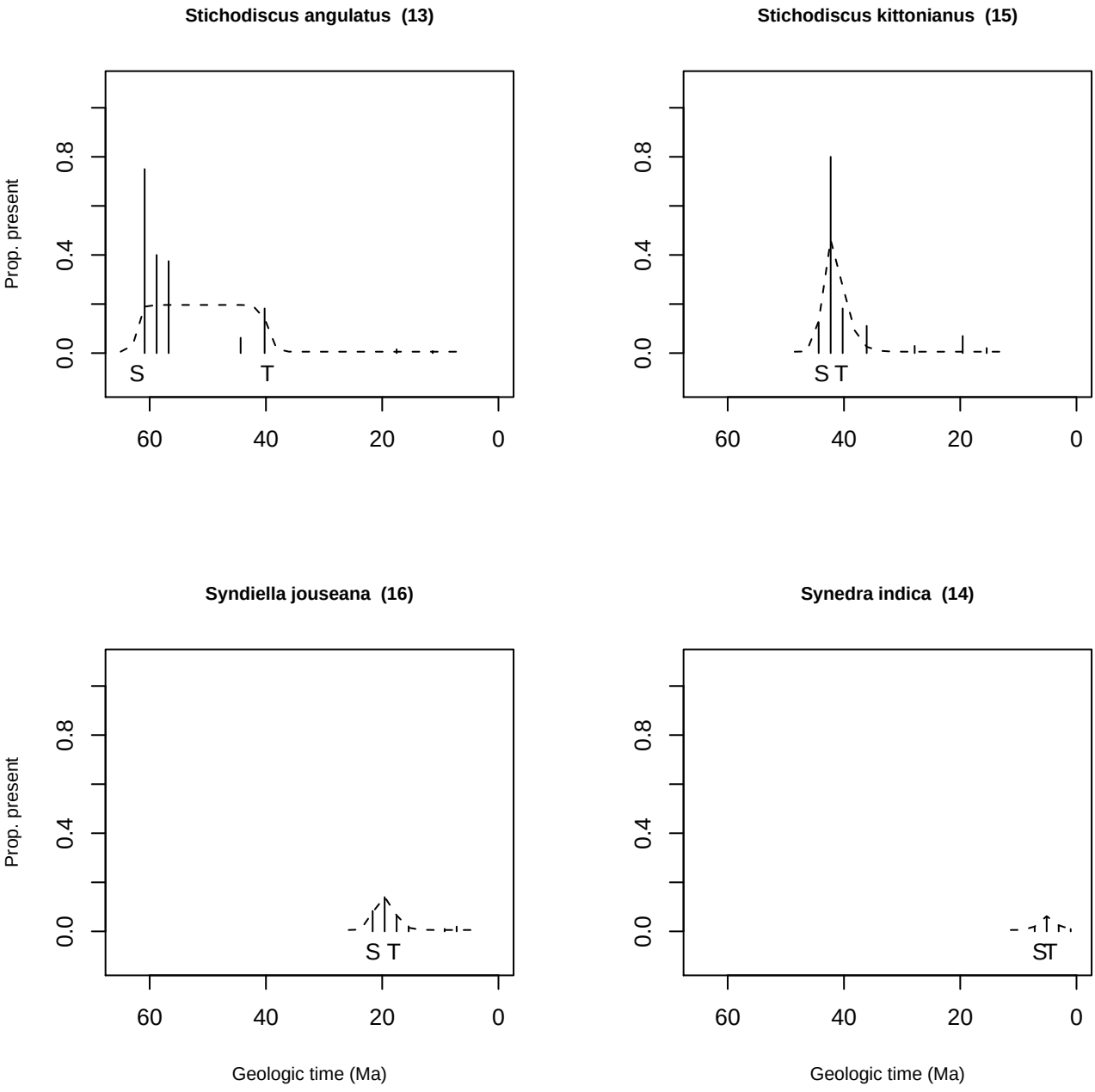

Sceptroneis humuncia (16)
Sceptroneis mayenica (19)
Sceptroneis pesplanus (21)
Sceptroneis praecaducea (18)
Prop. present
0.0
0.4
0.8
S
T
60
40
20
0
Geologic time (Ma)

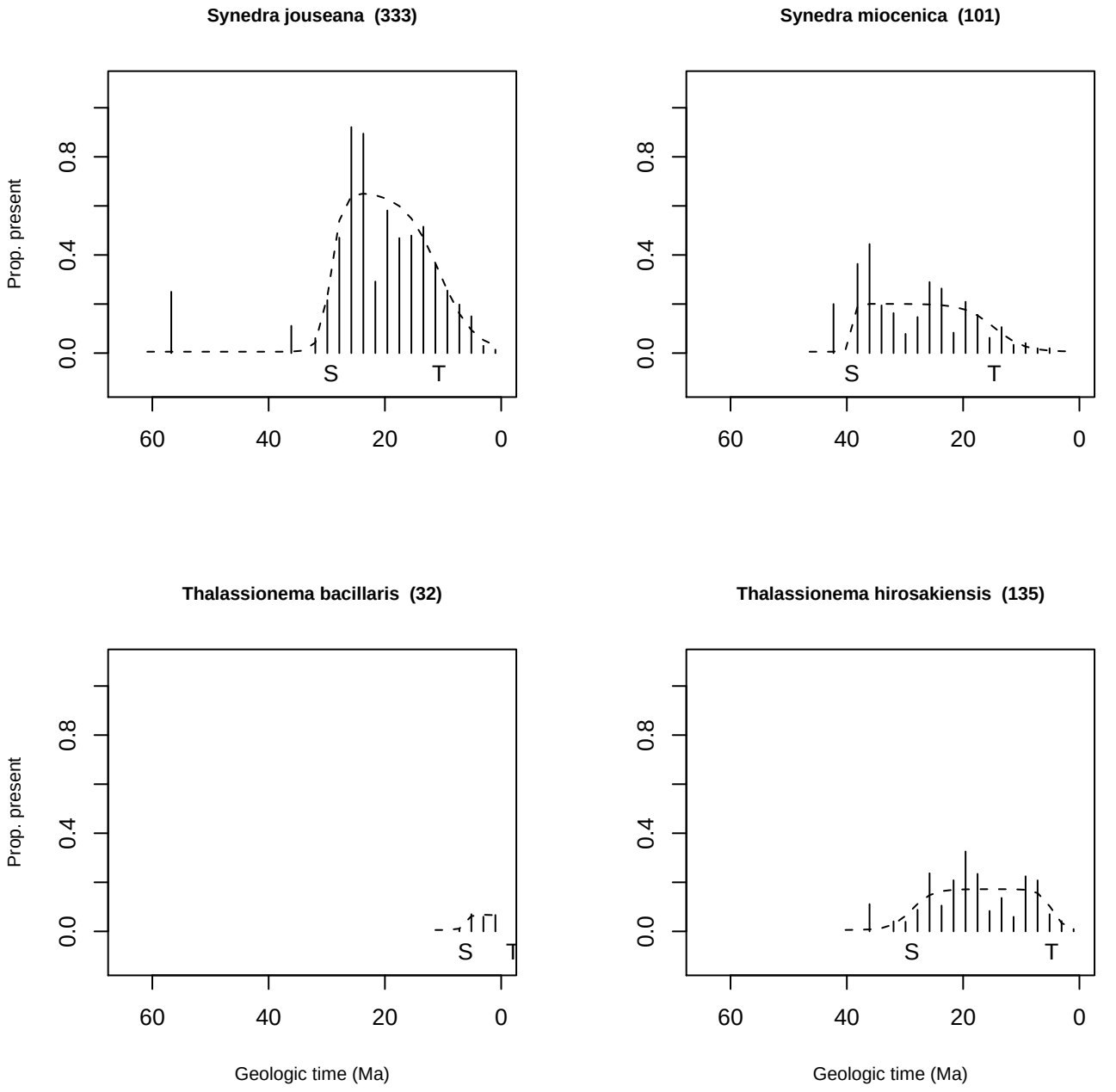

Sceptroneis propinqua (16)
Sceptroneis talwanii (18)
Sceptroneis tenue (37)
Simonseniella barboi (451)
Prop. present
0.0
0.4
0.8
S
T
60
40
20
0
Geologic time (Ma)

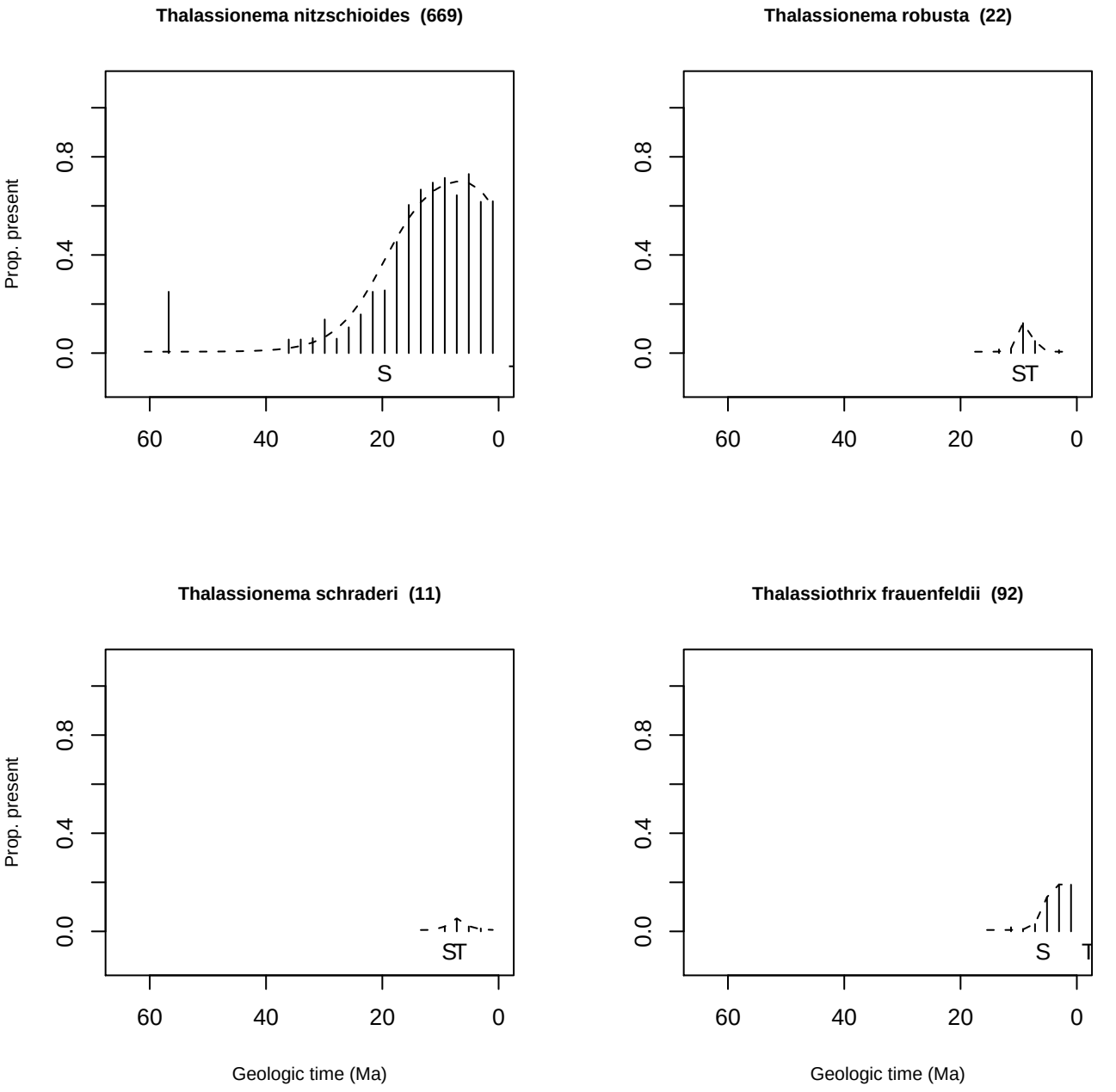

Simonseniella praebarboi (127)
Skeletonema barbadense (23)
Stephanopyxis barbadensis (18)
Stephanopyxis dimorpha (18)
Prop. present
0.0
0.4
0.8
S
T
60
40
20
0
Geologic time (Ma)

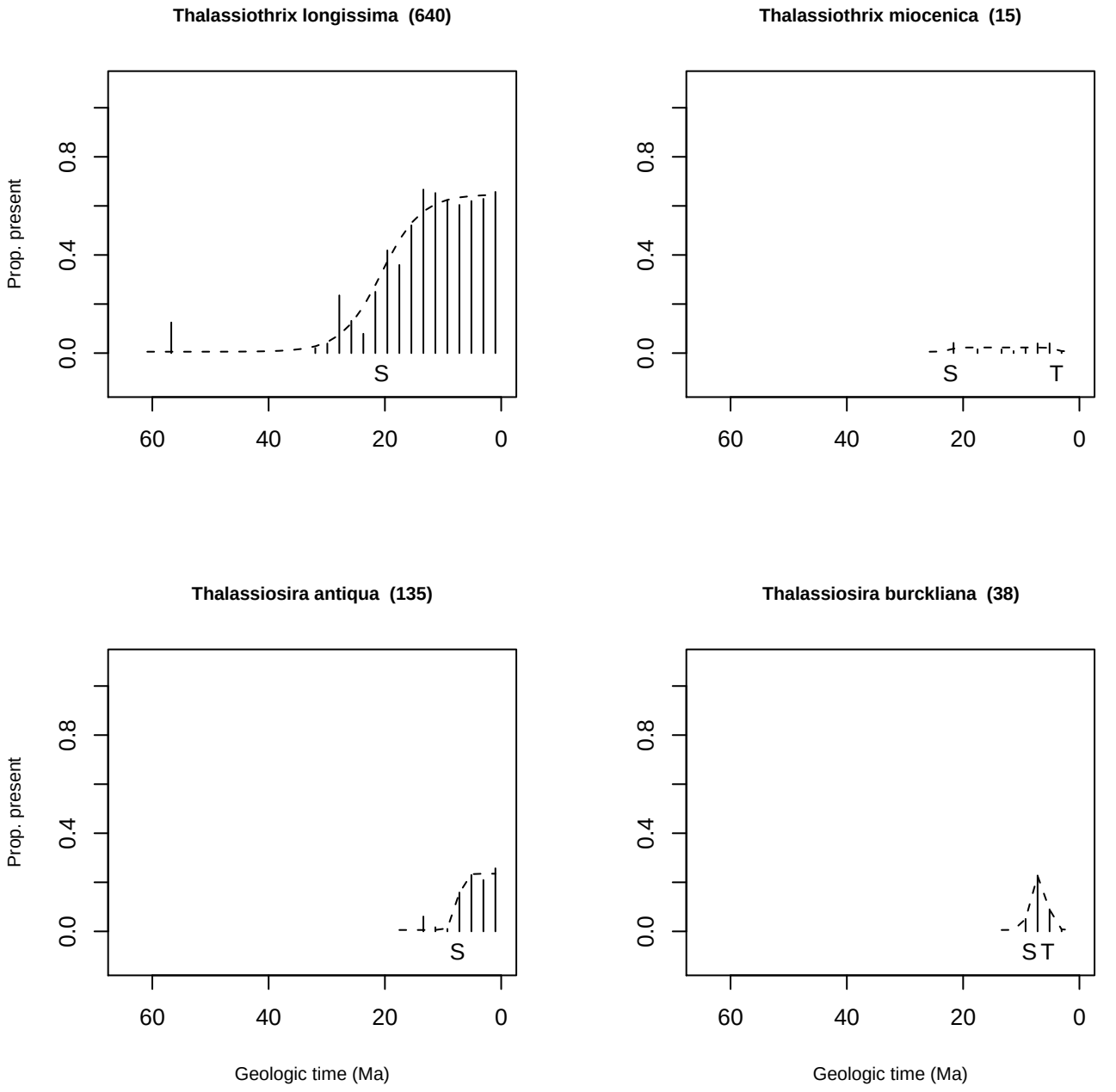

Stephanopyxis grunowii (64)
Stephanopyxis hyalomarginata (12)
Stephanopyxis marginata (25)
Stephanopyxis spinosissima (14)
Prop. present
0.0
0.4
0.8
S
T
60
40
20
0
Geologic time (Ma)

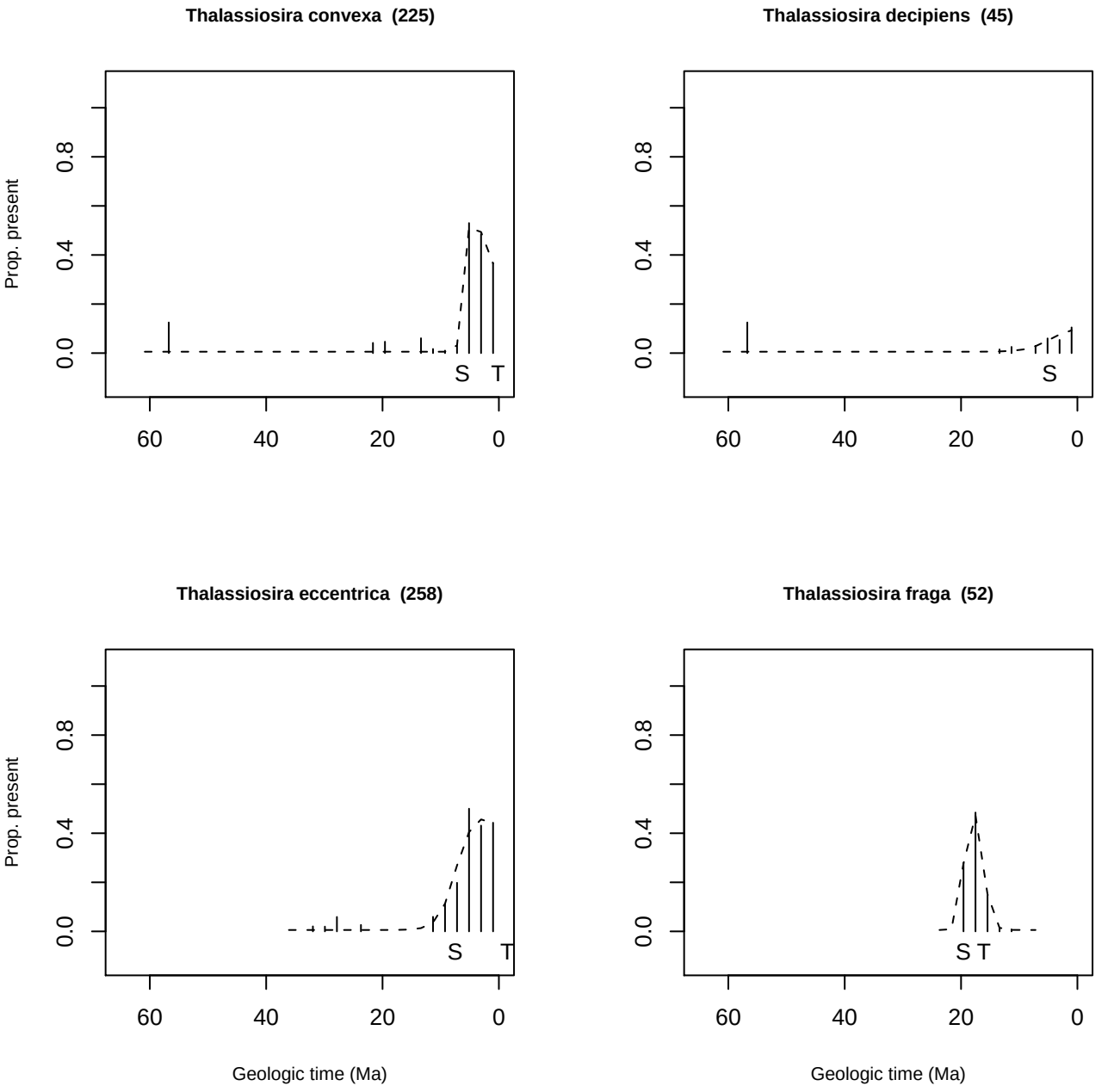

Stephanopyxis turris (418)
Stephanogonia hanzawae (25)
Stellarima microtrias (52)
Stellarima primalabiata (44)
Prop. present
0.0
0.4
0.8
60
40
20
0
S
T
Geologic time (Ma)

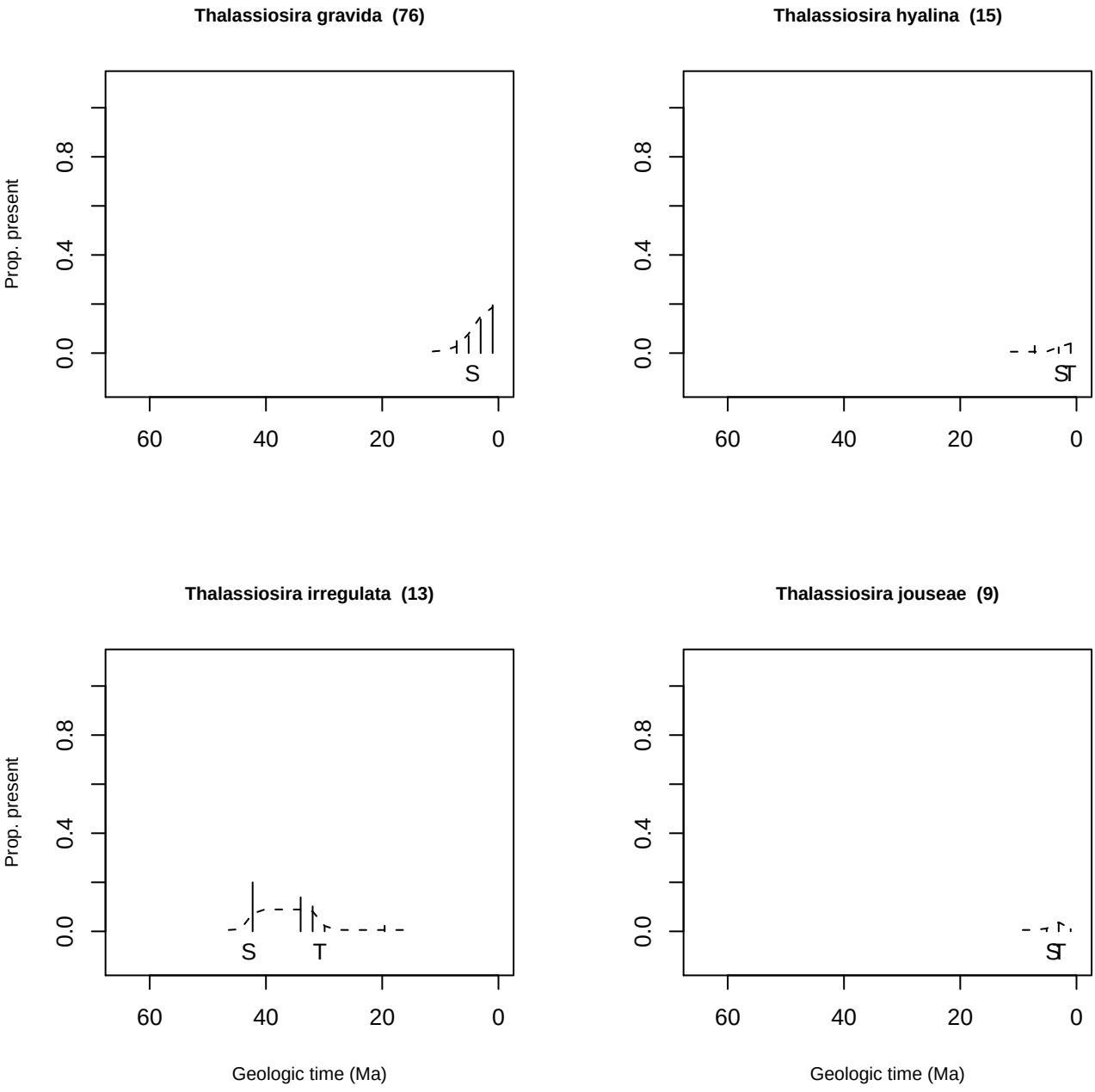

Stichodiscus angulatus (13)
Stichodiscus kittonianus (15)
Syndiella jouseana (16)
Synedra indica (14)
Prop. present
0.0
0.4
0.8
S
T
S T
ST
60
40
20
0
Geologic time (Ma)

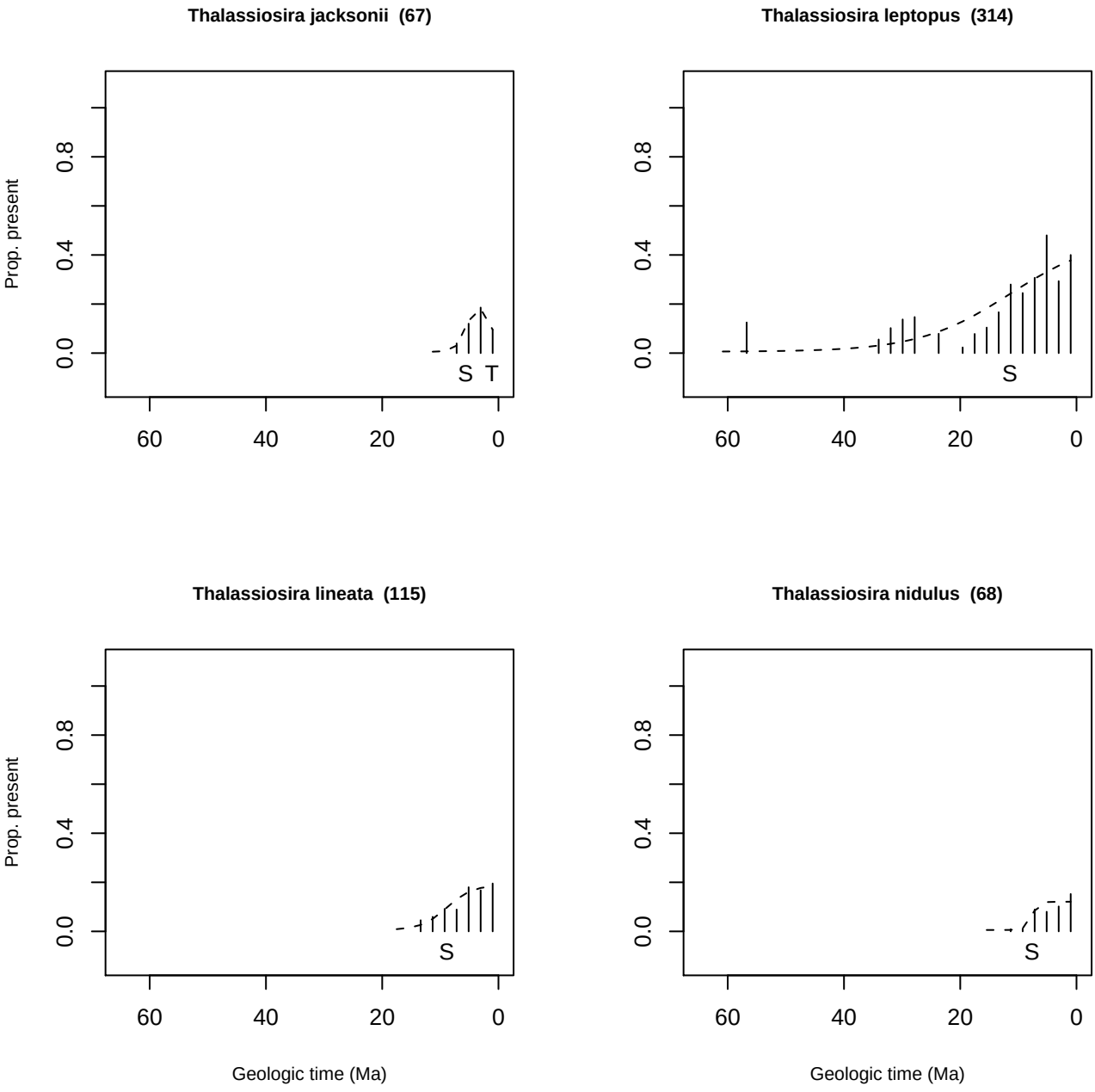

Synedra jouseana (333)
Synedra miocenica (101)
Thalassionema bacillaris (32)
Thalassionema hirosakiensis (135)
Prop. present
0.0
0.4
0.8
S
T
60
40
20
0
Geologic time (Ma)

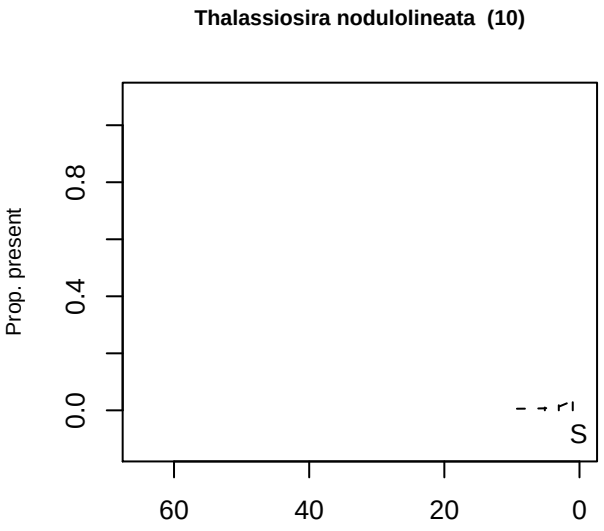

Thalassionema nitzschioides (669)
Thalassionema robusta (22)
Thalassionema schraderi (11)
Thalassiothrix frauenfeldii (92)
Prop. present
0.0
0.4
0.8
60
40
20
0
S
ST
T
Geologic time (Ma)

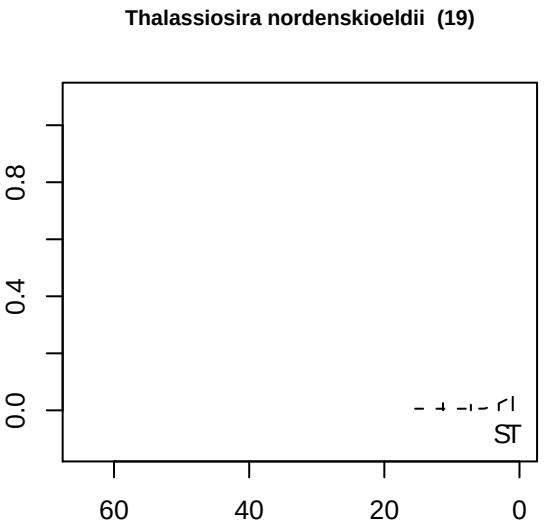

Thalassiothrix longissima (640)
Thalassiothrix miocenica (15)
Thalassiosira antiqua (135)
Thalassiosira burckliana (38)
Prop. present
0.0
0.4
0.8
60
40
20
0
S
T
Geologic time (Ma)

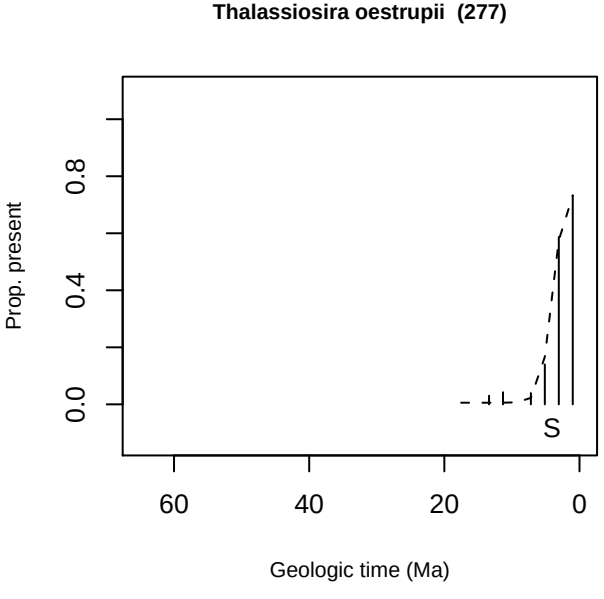

Thalassiosira convexa (225)
Thalassiosira decipiens (45)
Thalassiosira eccentrica (258)
Thalassiosira fraga (52)
Prop. present
0.0
0.4
0.8
60
40
20
0
S
T
Geologic time (Ma)

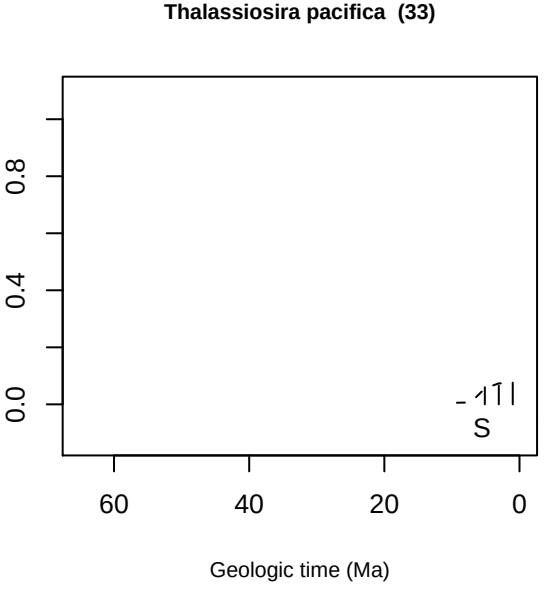

Thalassiosira gravida (76)
Thalassiosira hyalina (15)
Thalassiosira irregulata (13)
Thalassiosira jouseae (9)
Prop. present
0.0
0.4
0.8
60
40
20
0
S
T
Geologic time (Ma)

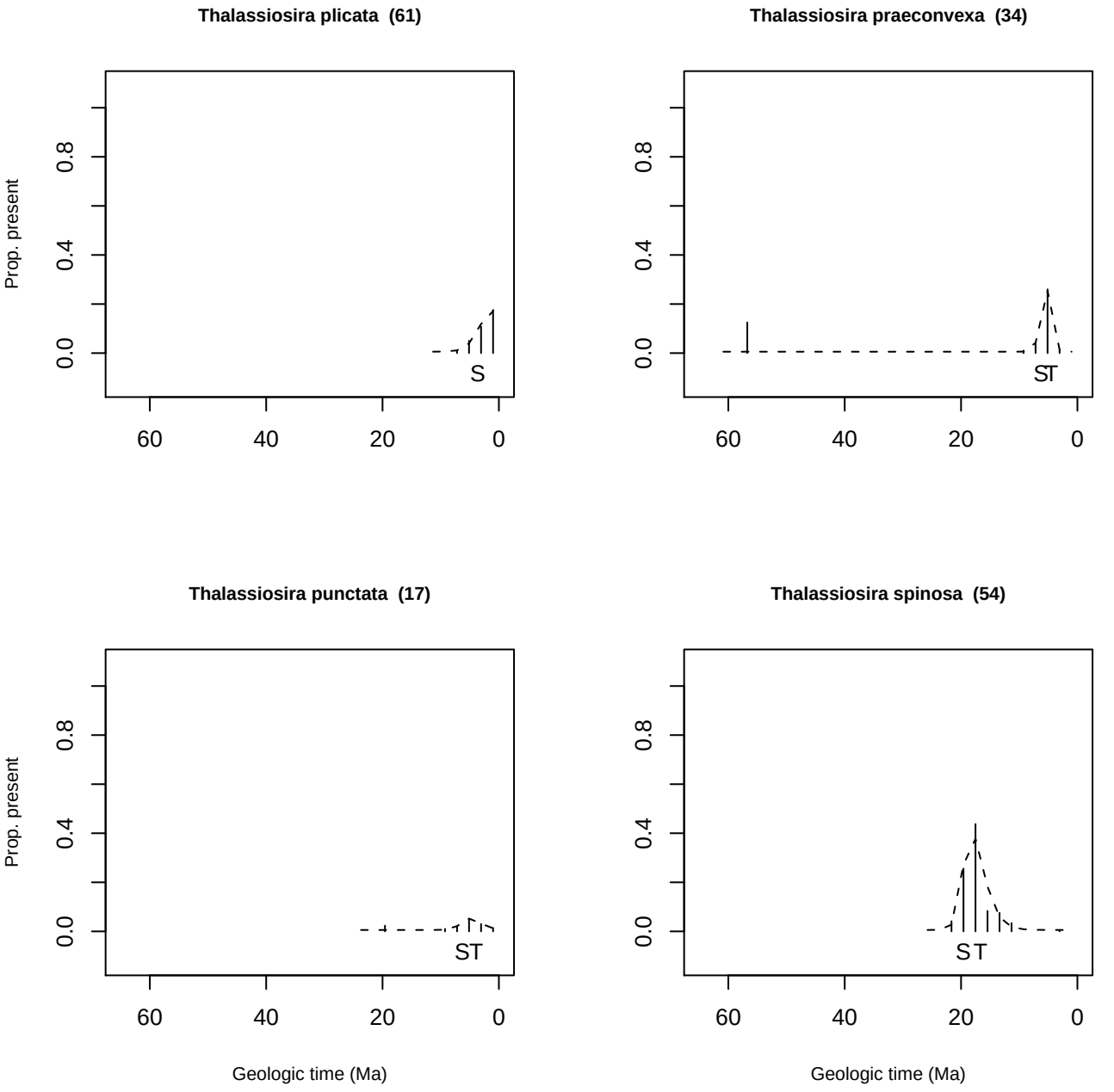

Thalassiosira jacksonii (67)
Thalassiosira leptopus (314)
Thalassiosira lineata (115)
Thalassiosira nidulus (68)
Prop. present
0.0
0.4
0.8
60
40
20
0
S
T
Geologic time (Ma)

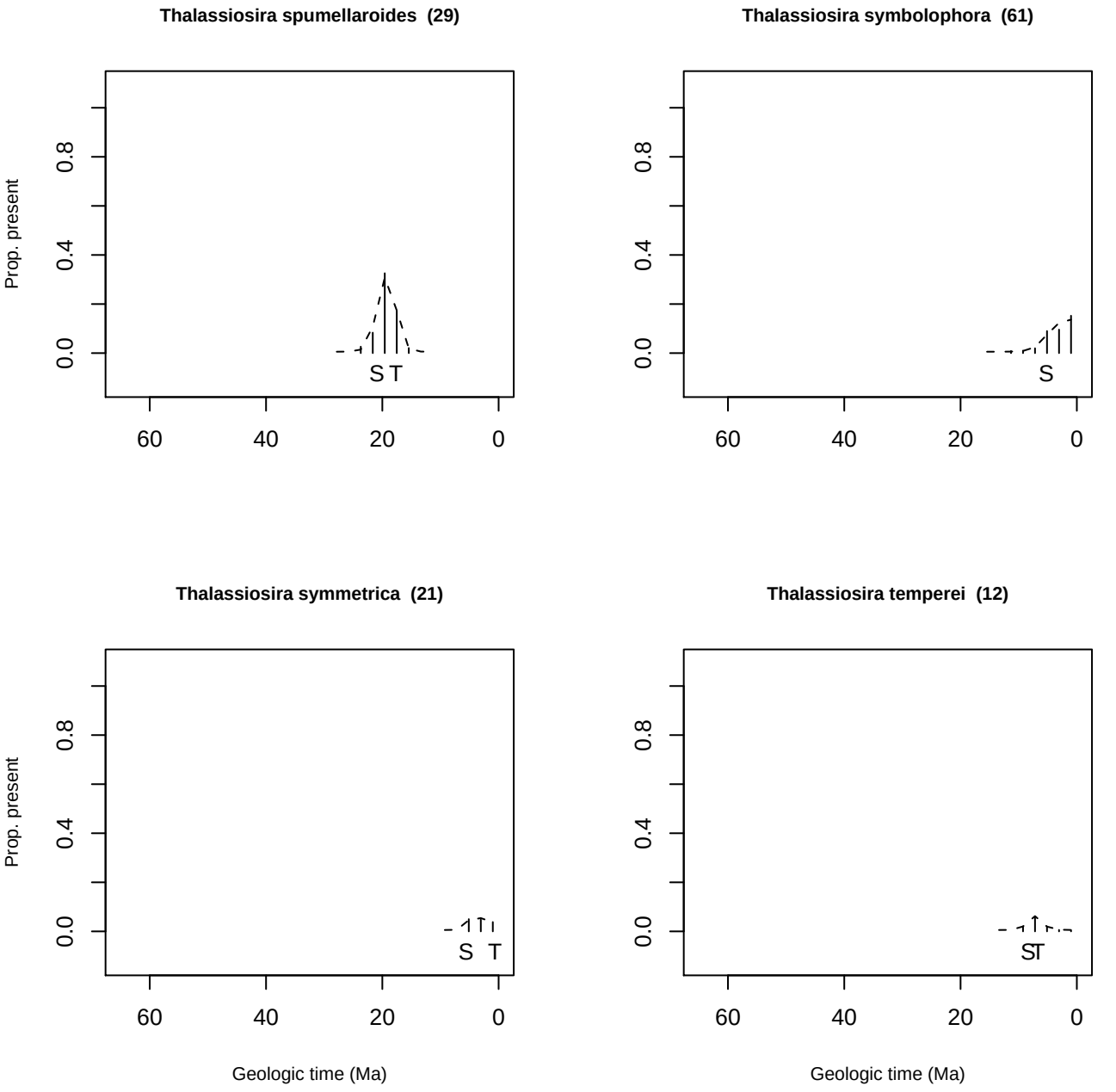

Thalassiosira nodulolineata (10)
Prop. present
0.0
0.4
0.8
60
40
20
0
S

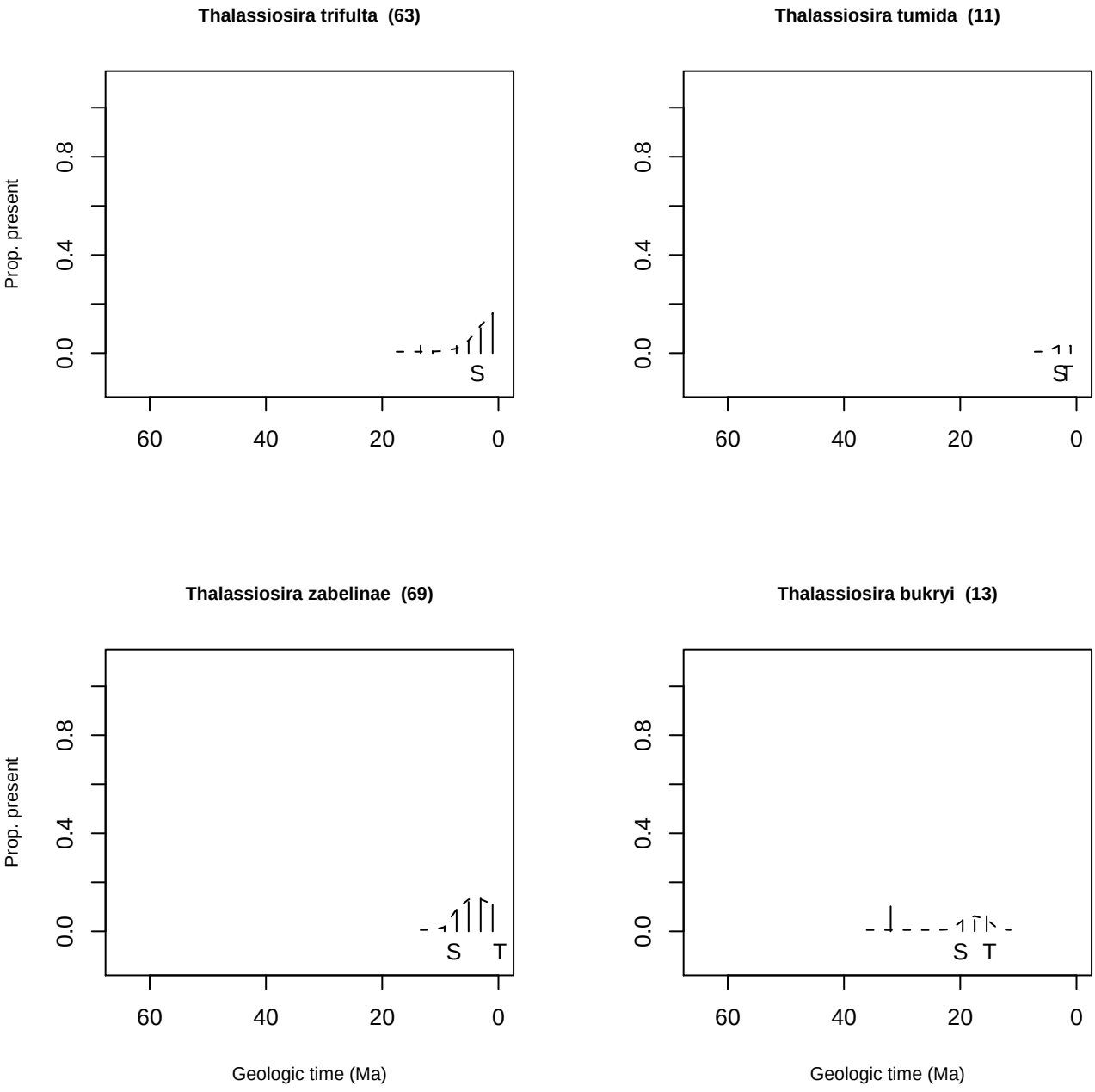

Thalassiosira nordenskioeldii (19)
0.0
0.4
0.8
60
40
20
0
ST

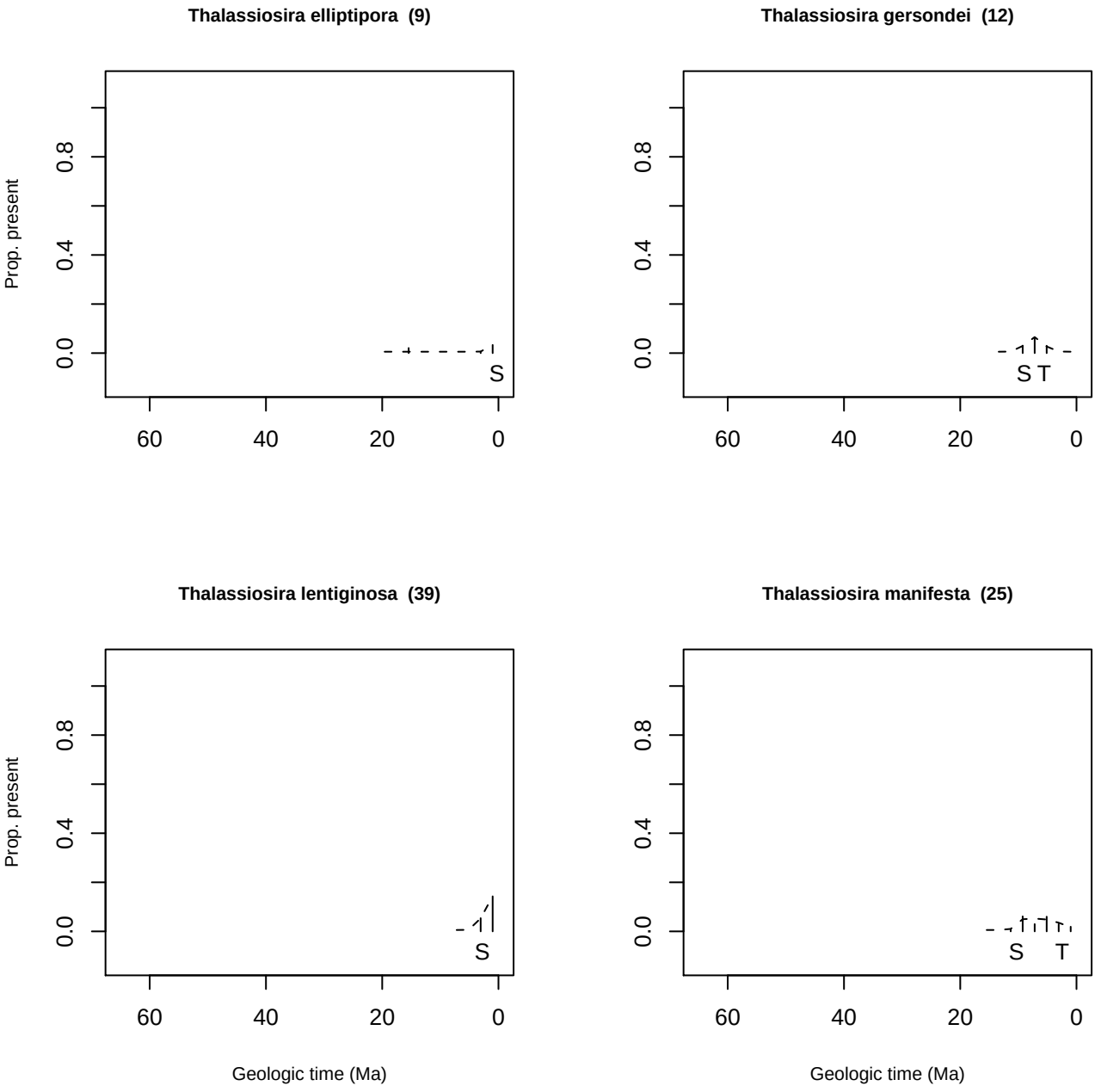

Thalassiosira oestrupii (277)
Prop. present
0.0
0.4
0.8
60
40
20
0
S
Geologic time (Ma)

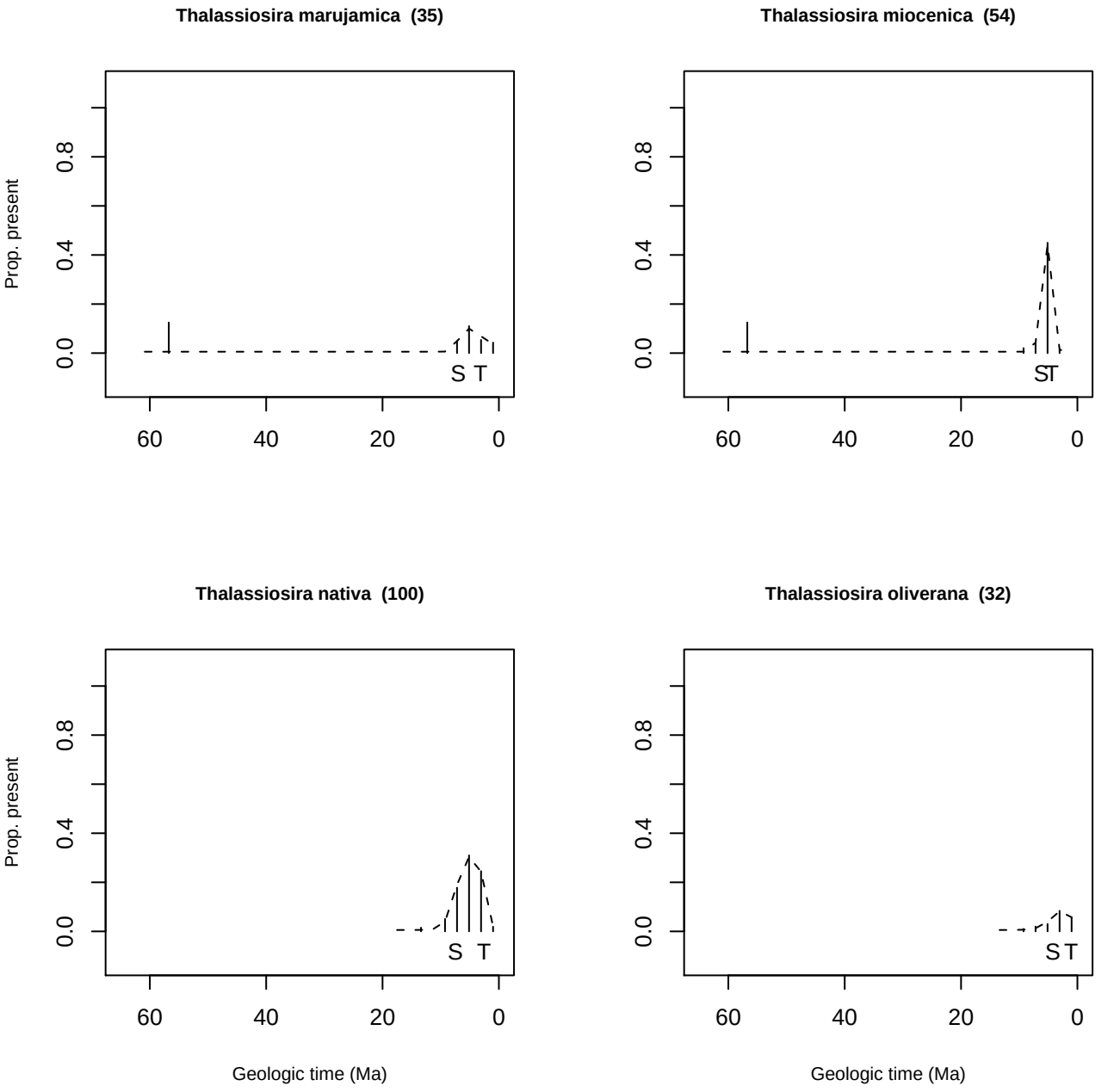

Thalassiosira pacifica (33)
0.0
0.4
0.8
60
40
20
0
S
Geologic time (Ma)

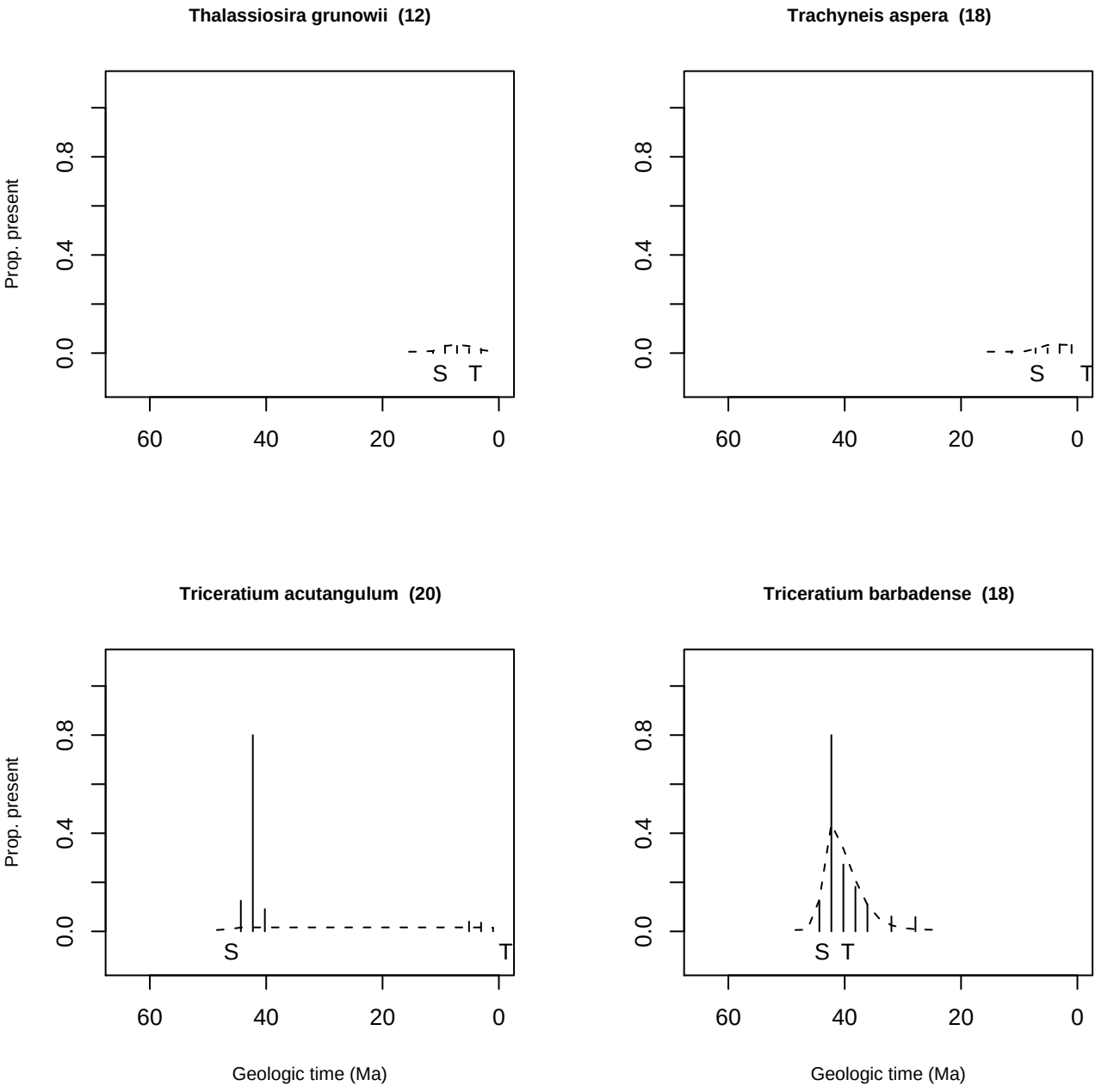

Thalassiosira plicata (61)
Thalassiosira praeconvexa (34)
Thalassiosira punctata (17)
Thalassiosira spinosa (54)
Prop. present
0.0
0.4
0.8
60
40
20
0
S
ST
Geologic time (Ma)

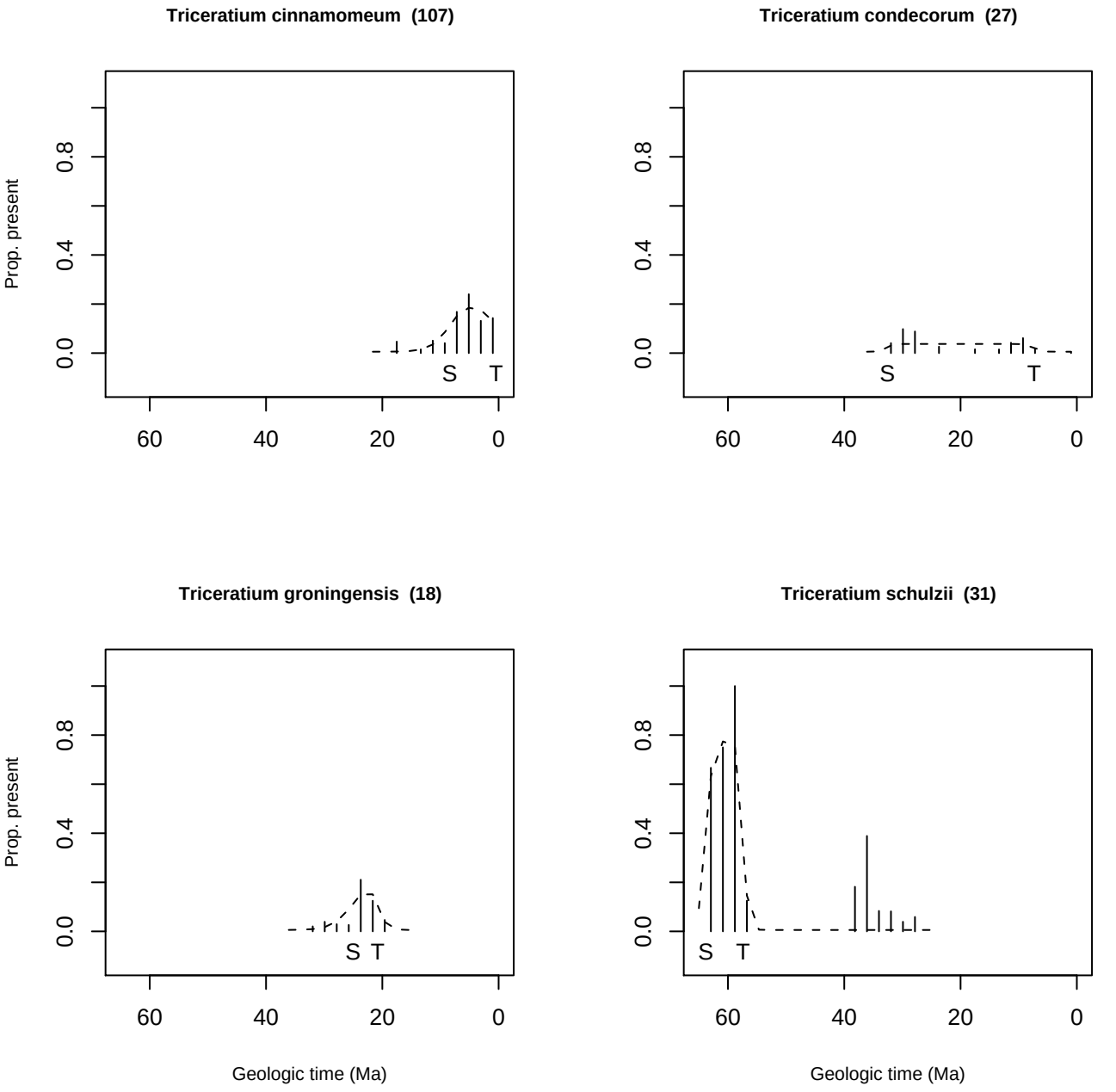

Thalassiosira spumellaroides (29)
Thalassiosira symbolophora (61)
Thalassiosira symmetrica (21)
Thalassiosira temperei (12)
Prop. present
0.0
0.4
0.8
60
40
20
0
S T
S
S T
ST
Geologic time (Ma)

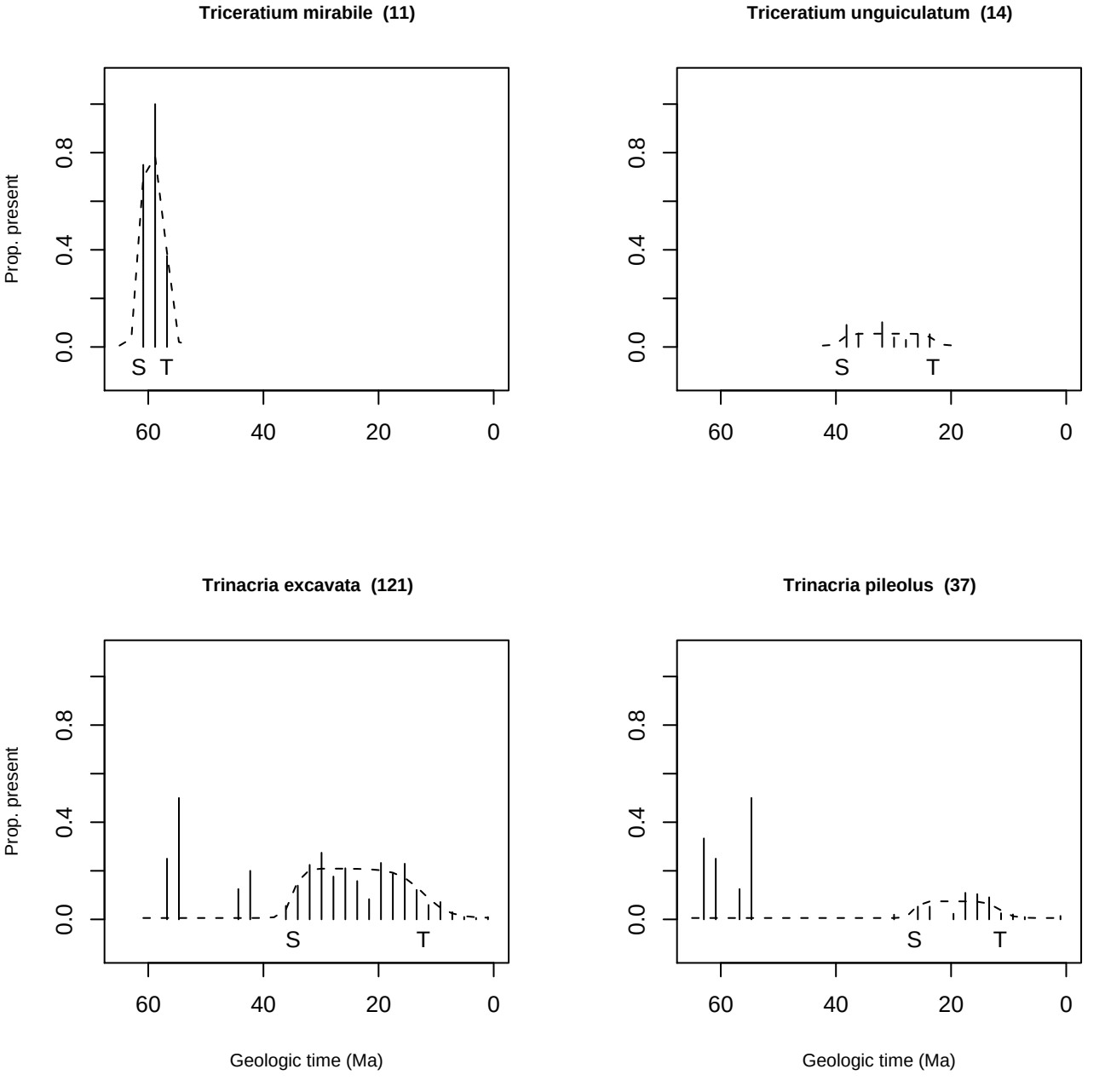

Thalassiosira trifulta (63)
Thalassiosira tumida (11)
Thalassiosira zabelinae (69)
Thalassiosira bukryi (13)
Prop. present
0.0
0.4
0.8
60
40
20
0
S
T
Geologic time (Ma)

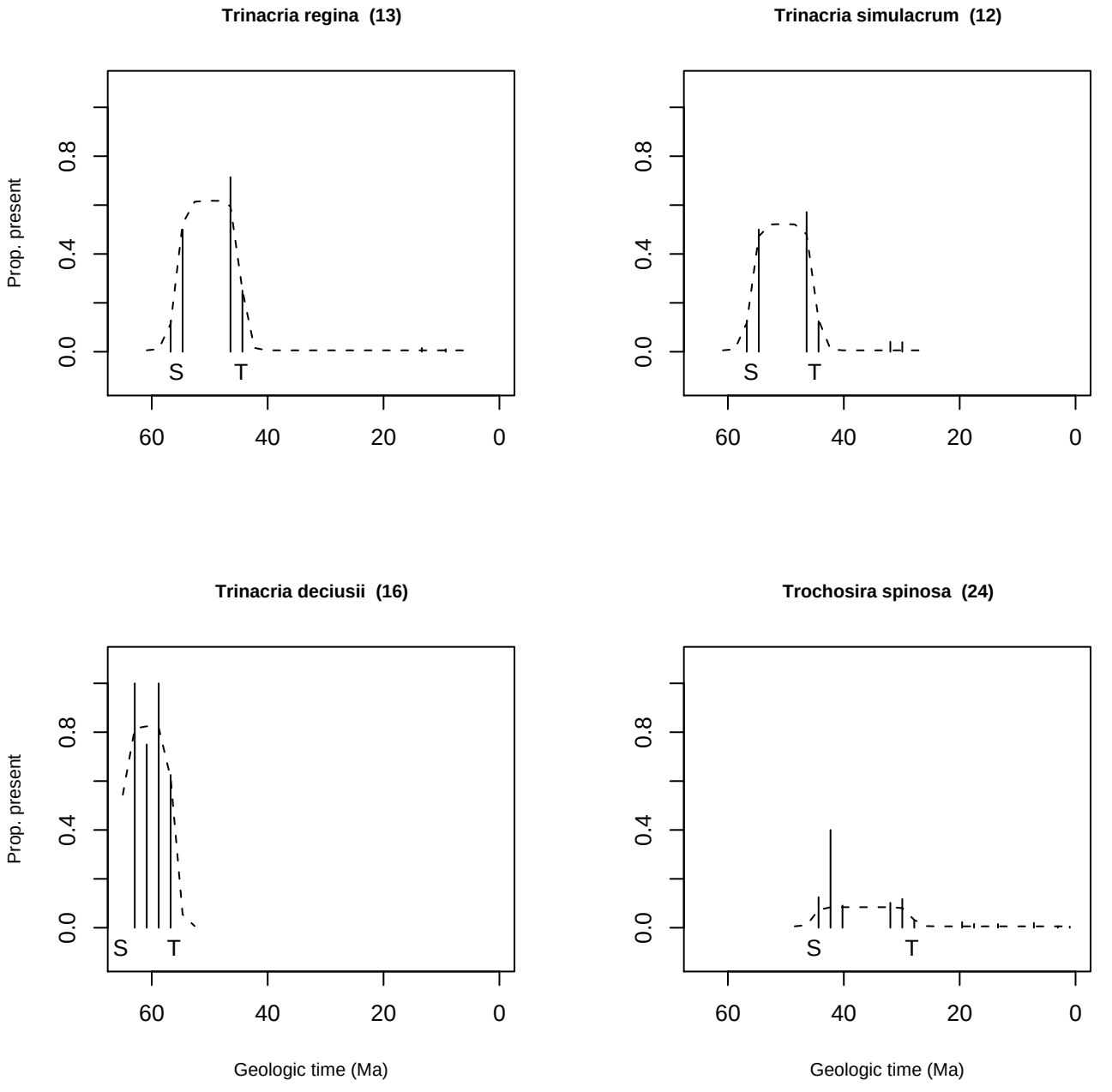

Thalassiosira elliptipora (9)
Thalassiosira gersondei (12)
Thalassiosira lentiginosa (39)
Thalassiosira manifesta (25)
Prop. present
0.0
0.4
0.8
60
40
20
0
S
T
Geologic time (Ma)

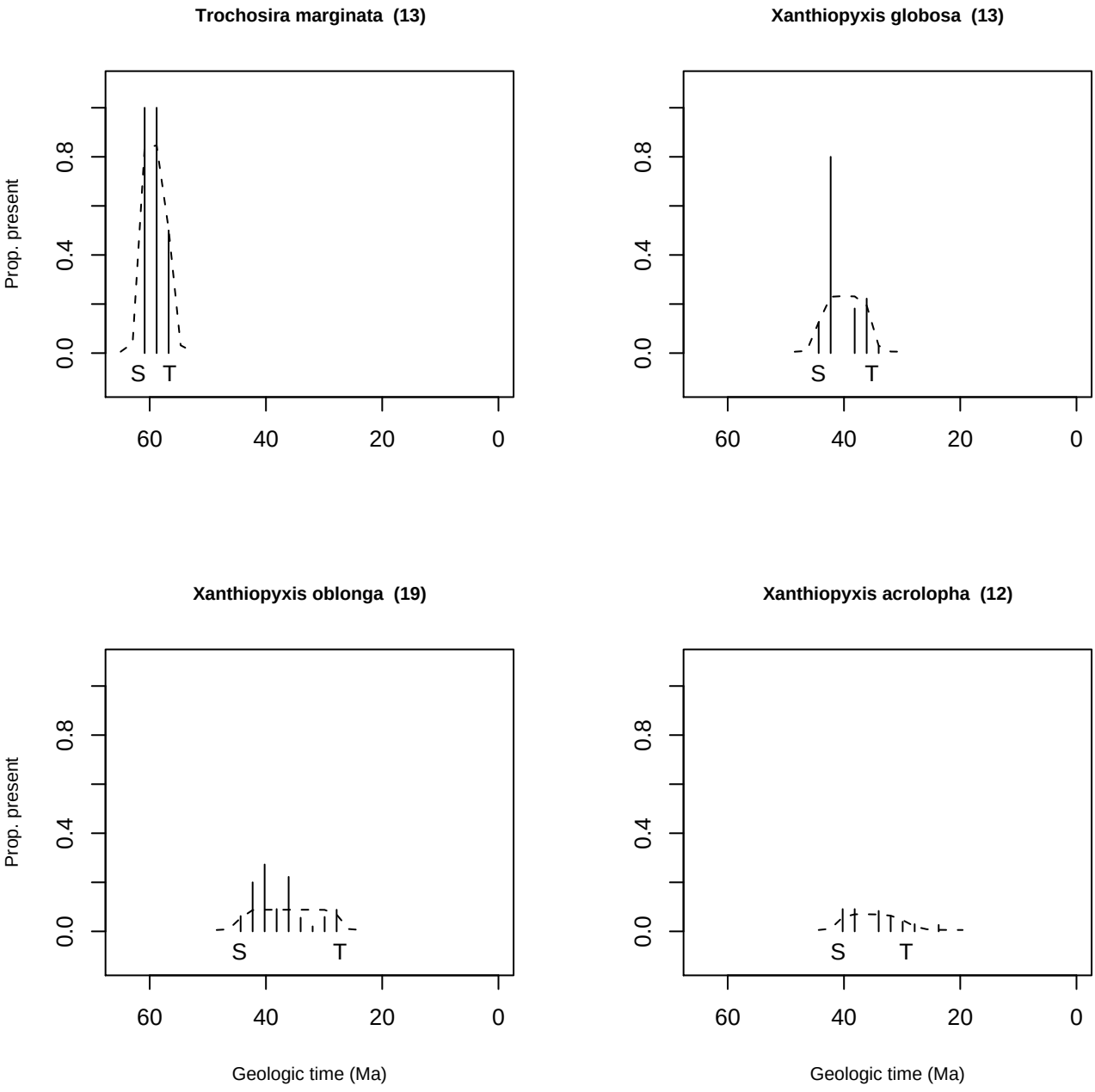

Thalassiosira marujamica (35)
Thalassiosira miocenica (54)
Thalassiosira nativa (100)
Thalassiosira oliverana (32)
Prop. present
0.0
0.4
0.8
60
40
20
0
S T
Geologic time (Ma)

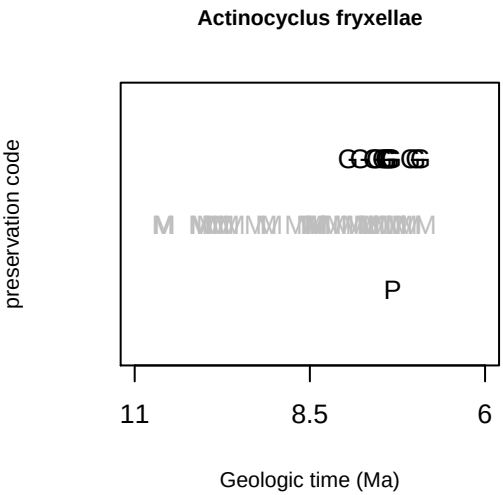

Thalassiosira grunowii (12)
Trachyneis aspera (18)
Triceratium acutangulum (20)
Triceratium barbadense (18)
Prop. present
0.0
0.4
0.8
S
T
60
40
20
0
Geologic time (Ma)

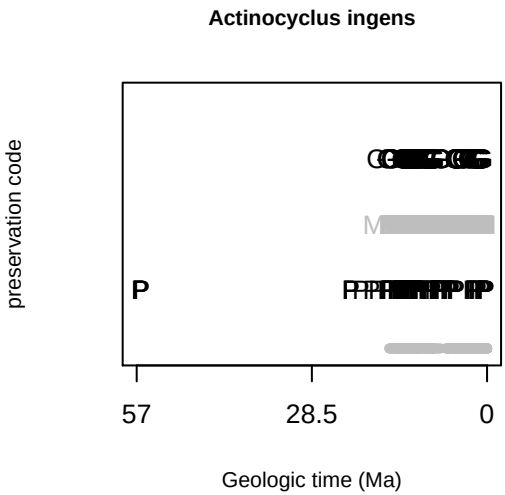

Triceratium cinnamomeum (107)
Triceratium condecorum (27)
Triceratium groningensis (18)
Triceratium schulzii (31)
Prop. present
0.0
0.4
0.8
S
T
60
40
20
0
Geologic time (Ma)

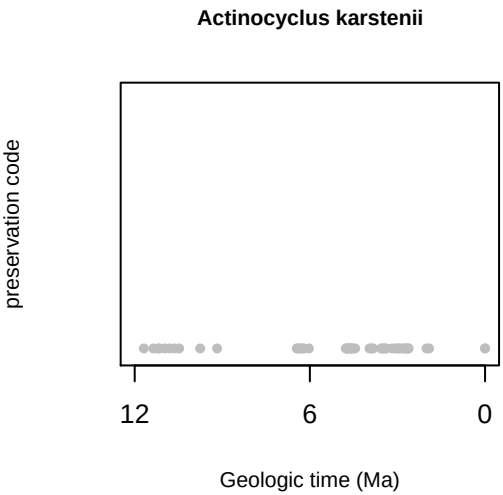

Triceratium mirabile (11)
Triceratium unguiculatum (14)
Trinacria excavata (121)
Trinacria pileolus (37)
Prop. present
0.0
0.4
0.8
S
T
60
40
20
0
Geologic time (Ma)

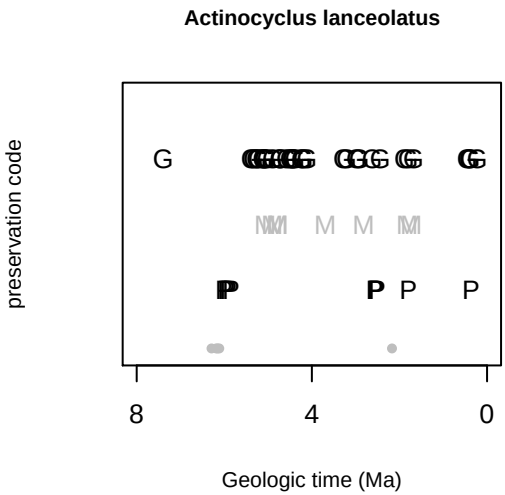

Trinacria regina (13)
Trinacria simulacrum (12)
Trinacria deciusii (16)
Trochosira spinosa (24)
Prop. present
0.0
0.4
0.8
S
T
60
40
20
0
Geologic time (Ma)

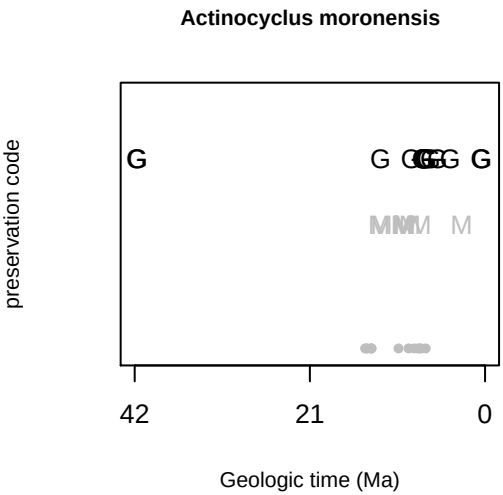

Trochosira marginata (13)
Xanthiopyxis globosa (13)
Xanthiopyxis oblonga (19)
Xanthiopyxis acrolopha (12)
Prop. present
0.0
0.4
0.8
S
T
60
40
20
0
Geologic time (Ma)

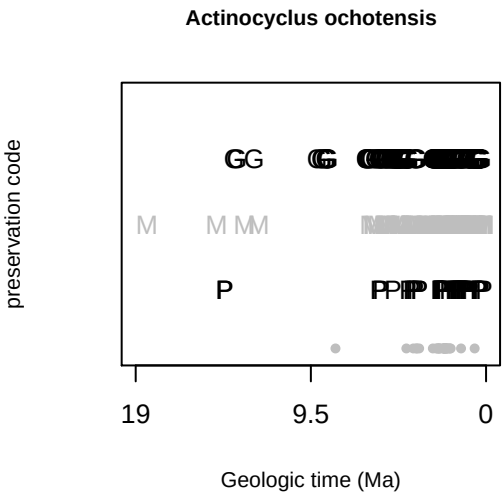

Actinocyclus fryxellae
preservation code
M
P
11
8.5
6
Geologic time (Ma)

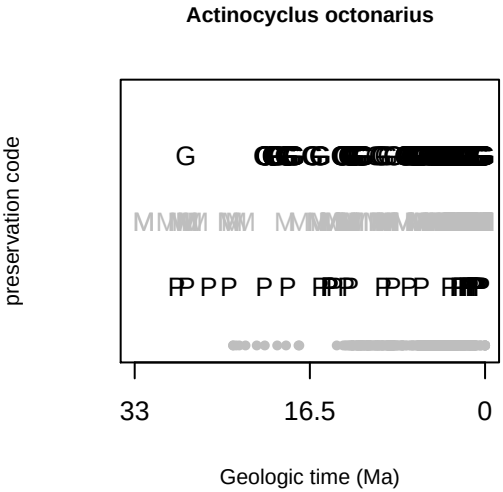

Actinocyclus ingens
preservation code
M
P
57
28.5
0
Geologic time (Ma)

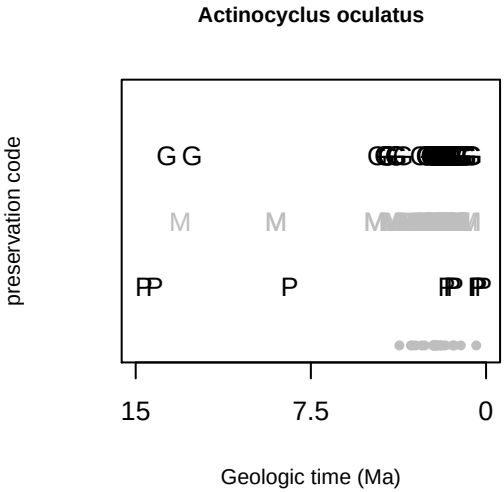

Actinocyclus karstenii
preservation code
12
6
0
Geologic time (Ma)

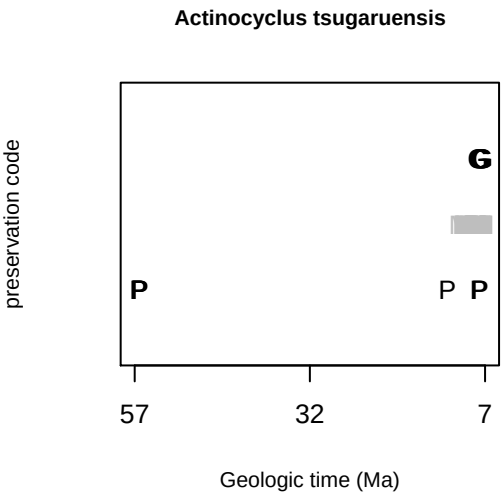

Actinocyclus lanceolatus
preservation code
G
M
P
8
4
0
Geologic time (Ma)

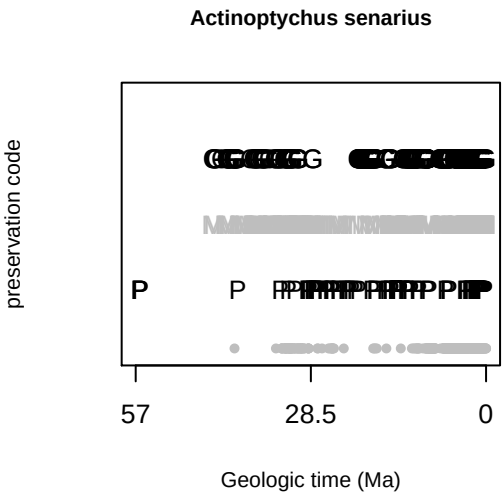

Actinocyclus moronensis
preservation code
42
21
0
Geologic time (Ma)

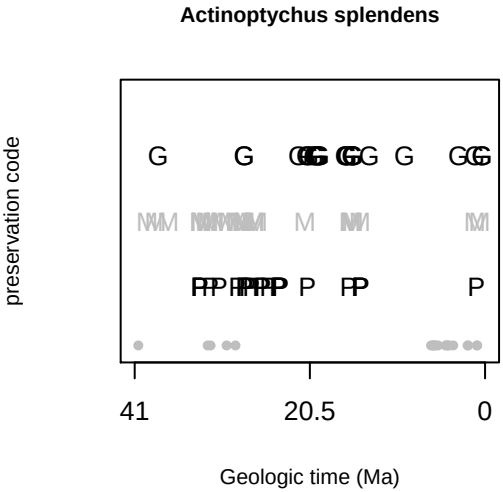

Actinocyclus ochotensis
preservation code
19
9.5
0
Geologic time (Ma)

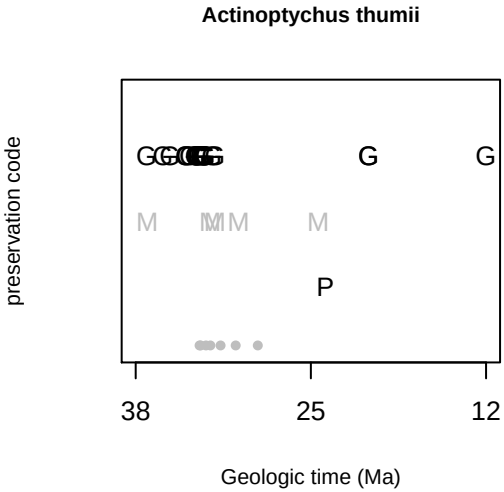

Actinocyclus octonarius
preservation code
33
16.5
0
Geologic time (Ma)

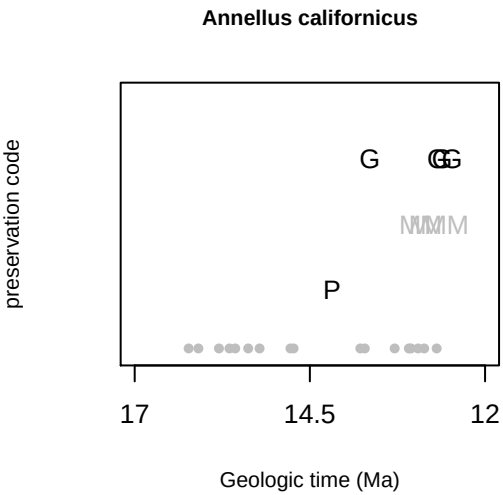

Actinocyclus oculatus
preservation code
15
7.5
0
Geologic time (Ma)

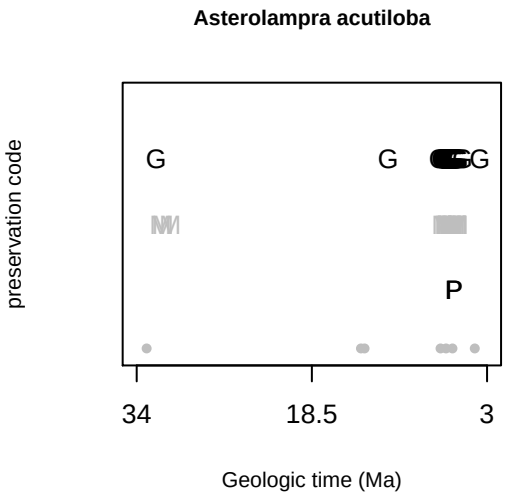

Actinocyclus tsugaruensis
preservation code
Geologic time (Ma)
57
32
7

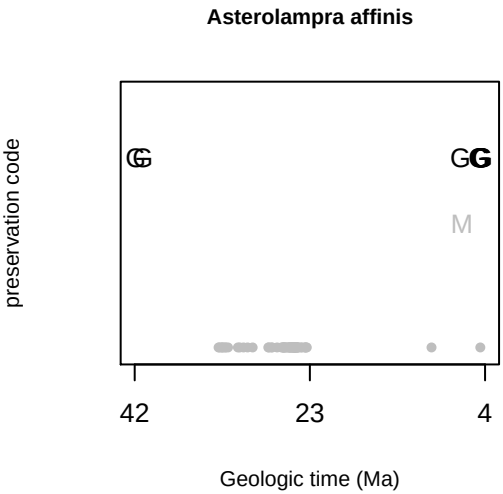

Actinoptychus senarius
preservation code
Geologic time (Ma)
57
28.5
0

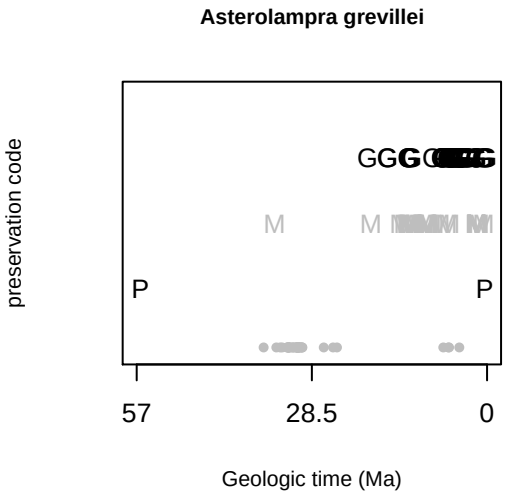

Actinoptychus splendens
preservation code
Geologic time (Ma)
41
20.5
0

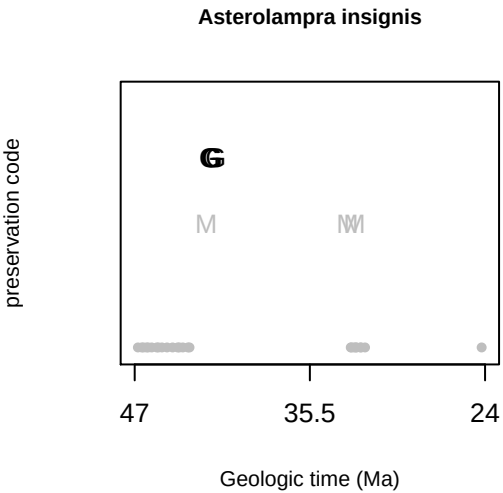

Actinoptychus thumii
preservation code
Geologic time (Ma)
38
25
12

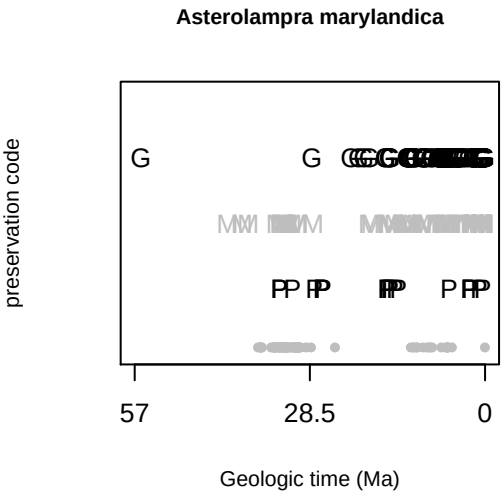

Annellus californicus
preservation code
G
P
17
14.5
12
Geologic time (Ma)

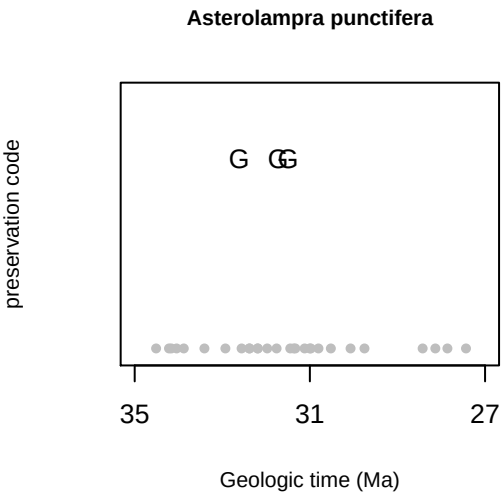

Asterolampra acutiloba
preservation code
G
P
34
18.5
3
Geologic time (Ma)

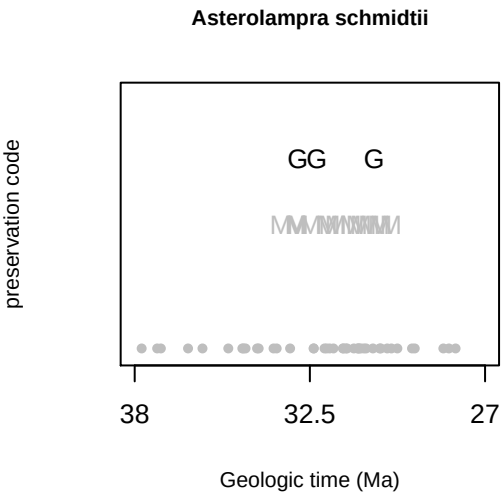

Asterolampra affinis
preservation code
G
M
42
23
4
Geologic time (Ma)

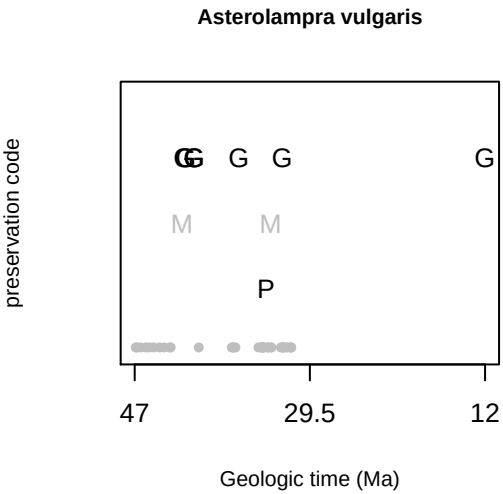

Asterolampra grevillei
preservation code
G
M
P
57
28.5
0
Geologic time (Ma)

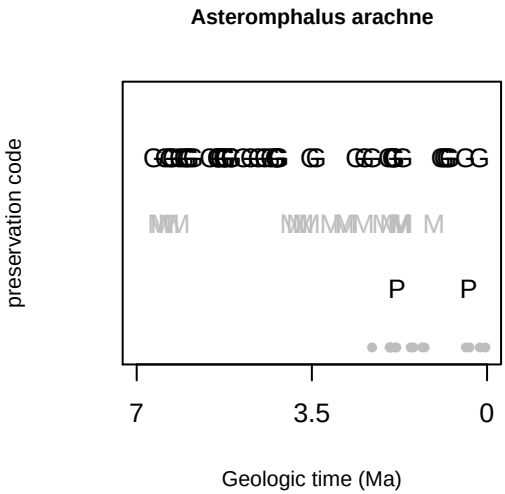

Asterolampra insignis
preservation code
47
35.5
24
Geologic time (Ma)

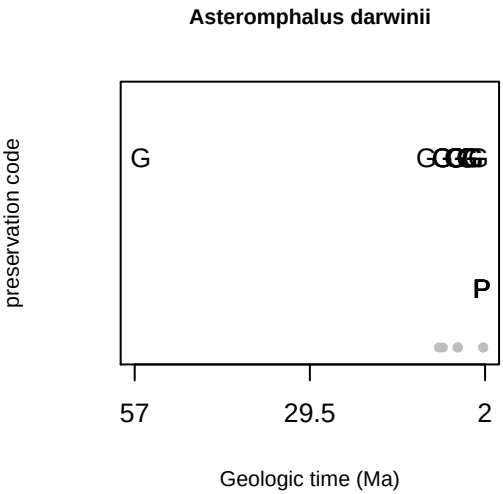

Asterolampra marylandica
preservation code
57
28.5
0
Geologic time (Ma)

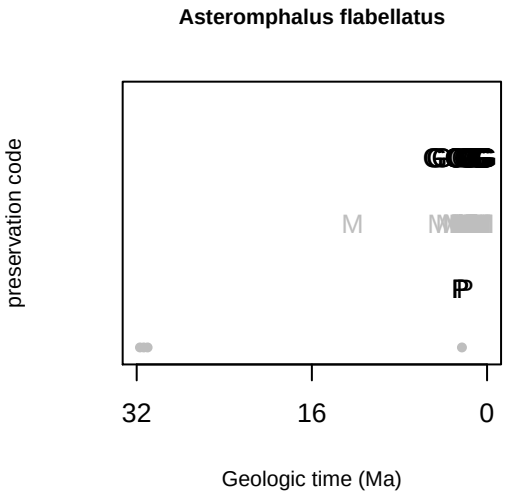

Asterolampra punctifera
preservation code
35
31
27
Geologic time (Ma)

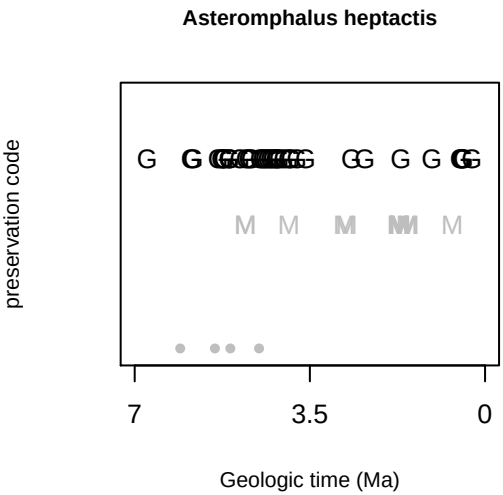

Asterolampra schmidtii
preservation code
38
32.5
27
Geologic time (Ma)

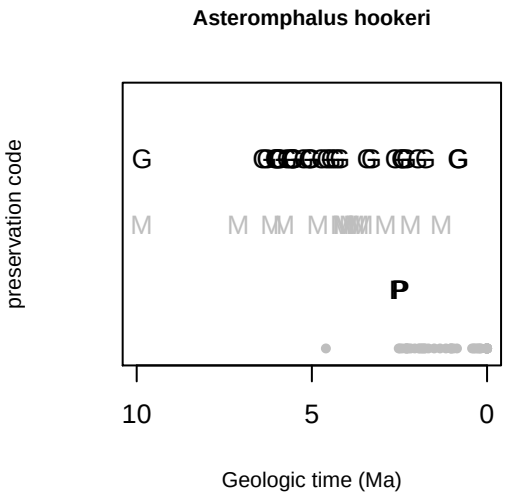

Asterolampra vulgaris
preservation code
G
G
G
G
M
M
P
47
29.5
12
Geologic time (Ma)

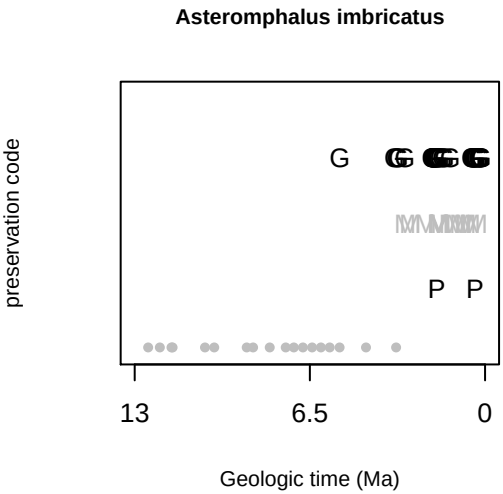

Asteromphalus arachne
preservation code
G
G
G
G
G
M
M
P
P
7
3.5
0
Geologic time (Ma)

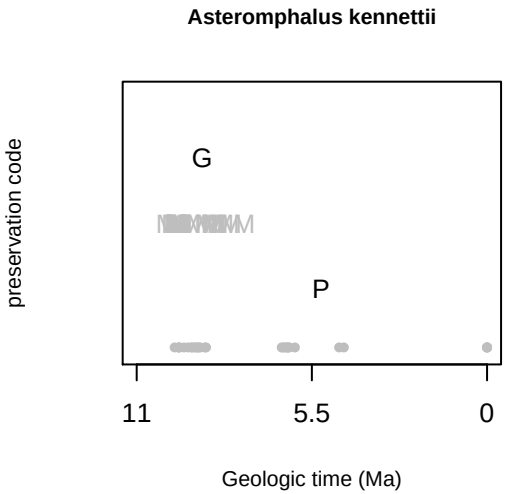

Asteromphalus darwinii
preservation code
G
G
P
57
29.5
2
Geologic time (Ma)

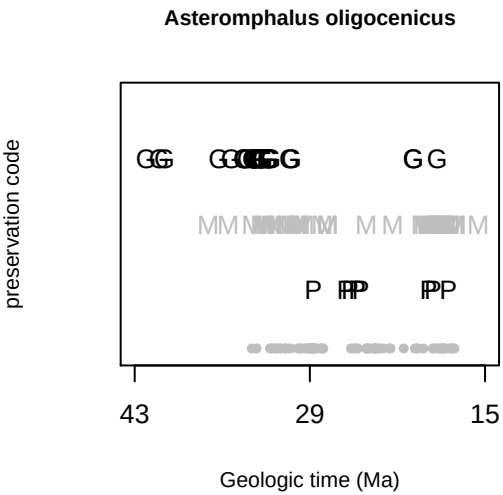

Asteromphalus flabellatus
preservation code
G
M
P
32
16
0
Geologic time (Ma)

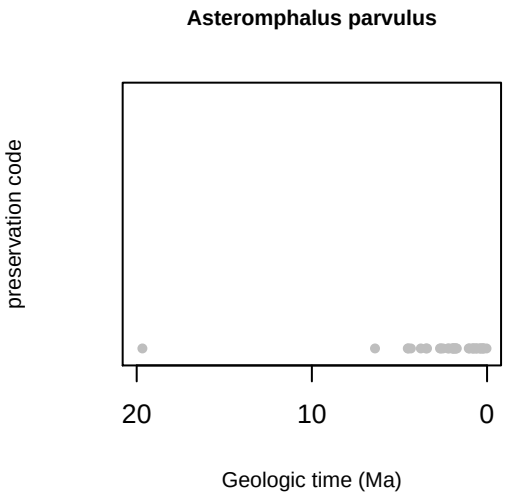

Asteromphalus heptactis
preservation code
G
M
7
3.5
0
Geologic time (Ma)

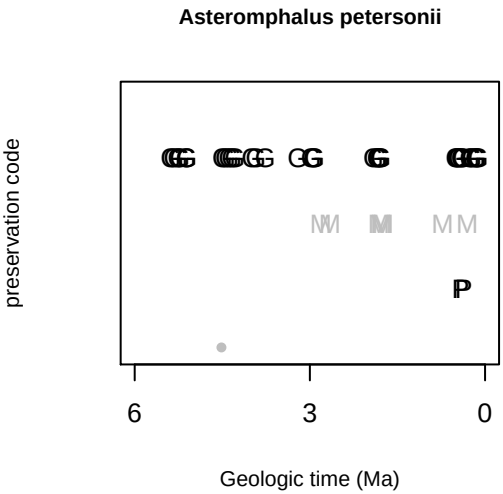

Asteromphalus hookeri
preservation code
G
M
P
10
5
0
Geologic time (Ma)

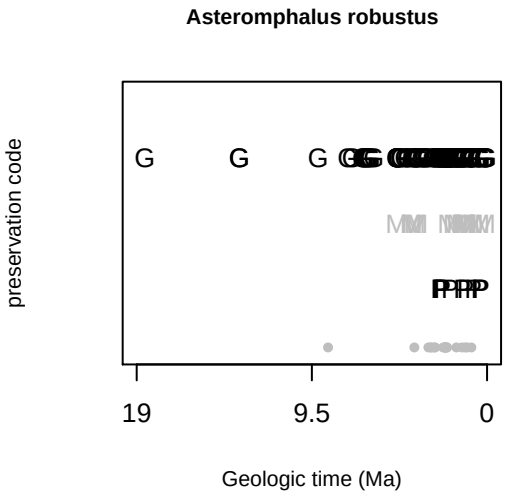

Asteromphalus imbricatus
preservation code
G
P
13
6.5
0
Geologic time (Ma)


Asteromphalus kennettii
preservation code
G
P
11
5.5
0
Geologic time (Ma)


Asteromphalus oligocenicus
preservation code
43
29
15
Geologic time (Ma)


Asteromphalus parvulus
preservation code
20
10
0
Geologic time (Ma)


Asteromphalus petersonii
preservation code
6
3
0
Geologic time (Ma)


Asteromphalus robustus
preservation code
19
9.5
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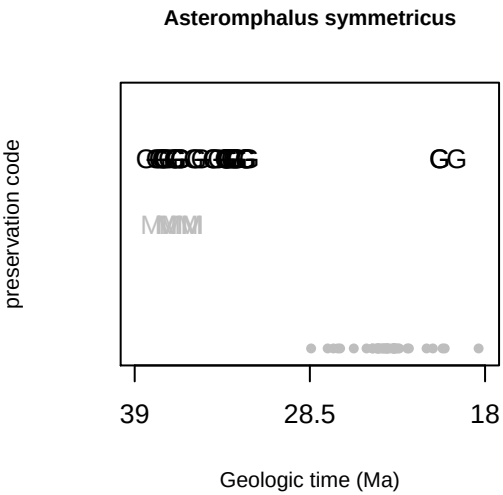
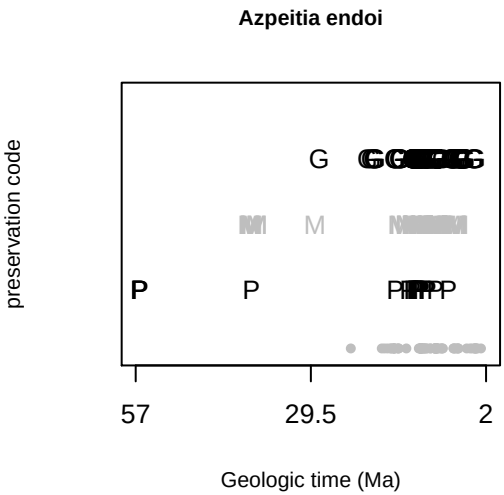
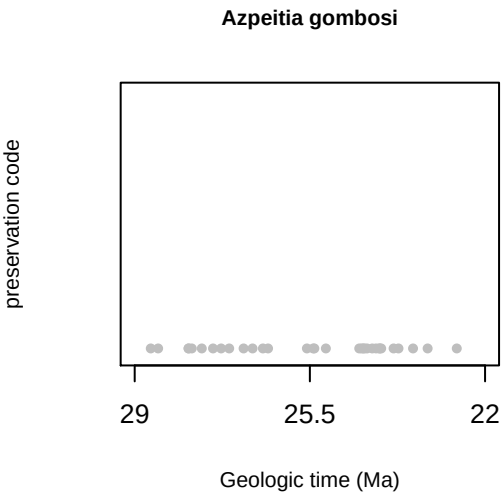
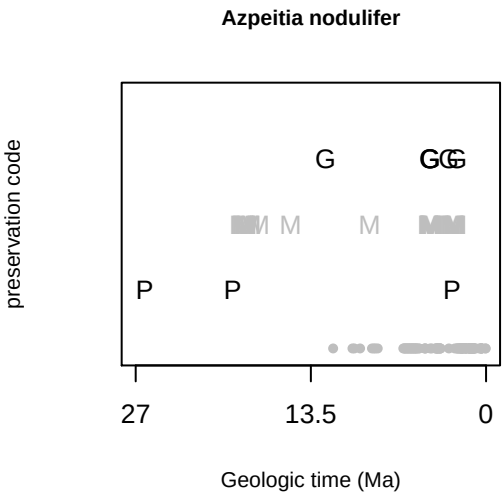
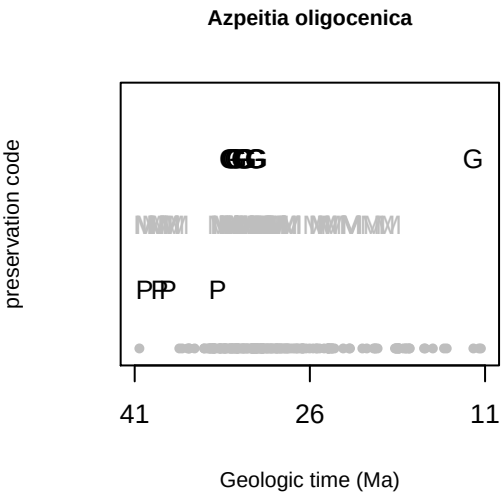
Geologic time (Ma)

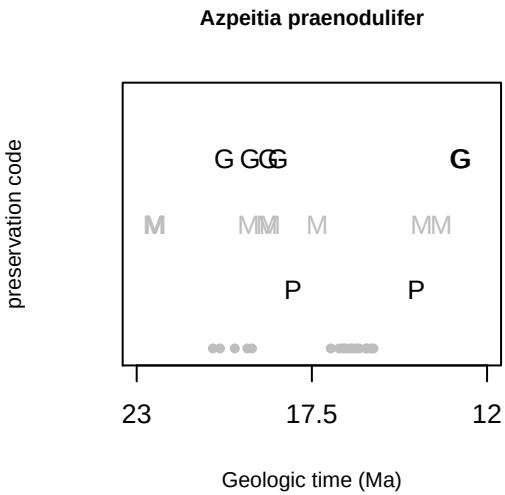

Asteromphalus symmetricus
preservation code
39
28.5
18
Geologic time (Ma)

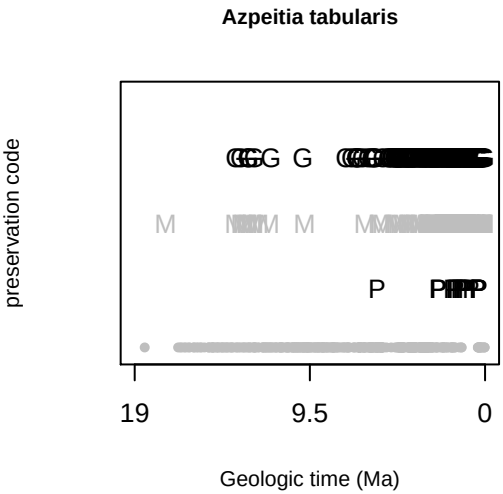

Azpeitia endoi
preservation code
57
29.5
2
Geologic time (Ma)

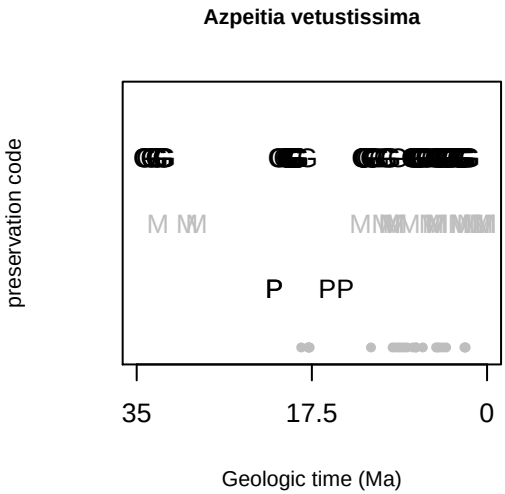

Azpeitia gombosi
preservation code
29
25.5
22
Geologic time (Ma)

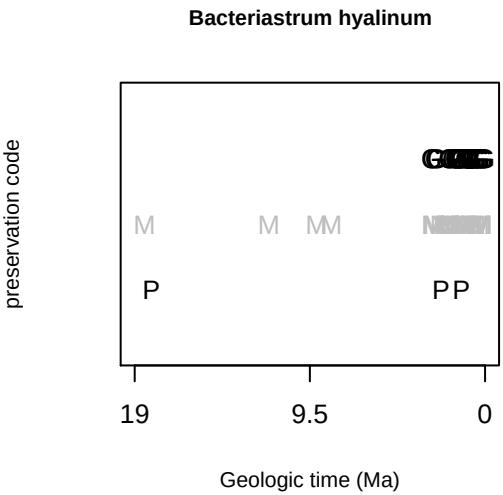

Azpeitia nodulifer
preservation code
27
13.5
0
Geologic time (Ma)

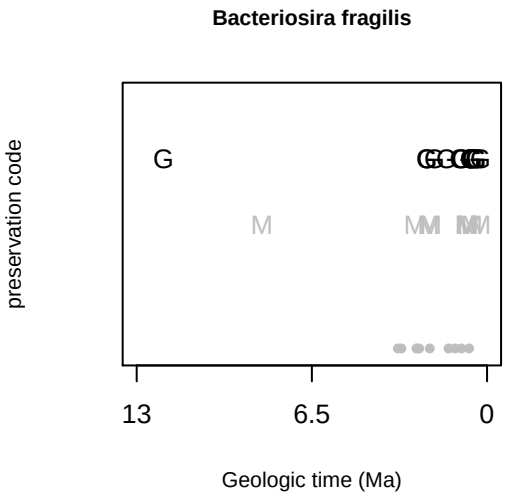

Azpeitia oligocenica
preservation code
G
P
41
26
11
Geologic time (Ma)

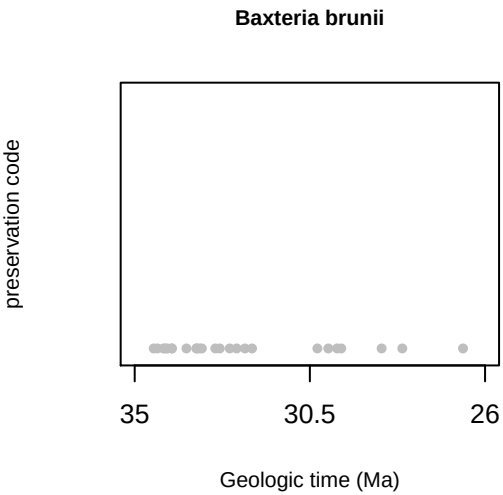

Azpeitia praenodulifer
preservation code
G
M
P
23
17.5
12
Geologic time (Ma)

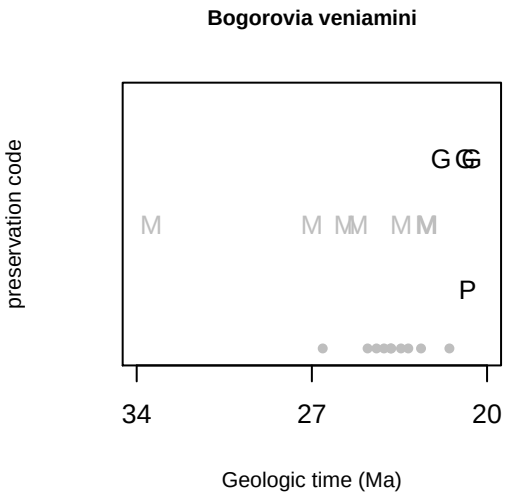

Azpeitia tabularis
preservation code
G
M
P
19
9.5
0
Geologic time (Ma)

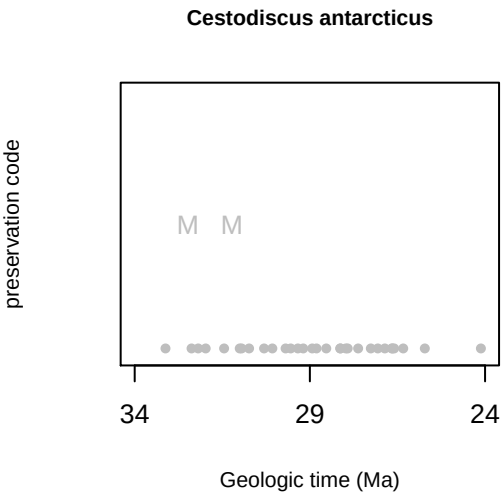

Azpeitia vetustissima
preservation code
M
P
35
17.5
0
Geologic time (Ma)

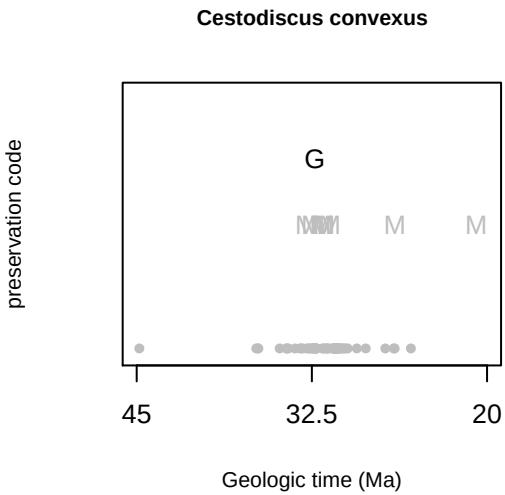

Bacteriastrum hyalinum
preservation code
M
M
MM
P
PP
19
9.5
0
Geologic time (Ma)

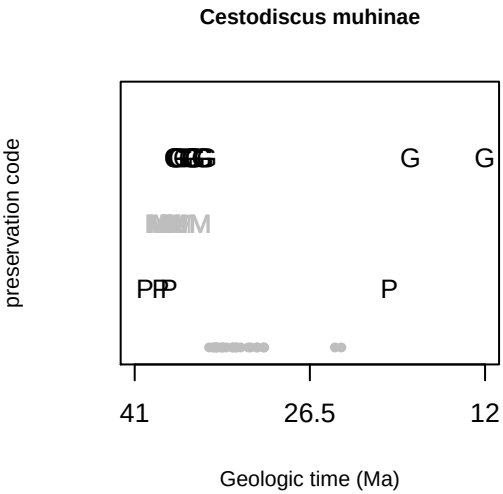

Bacteriosira fragilis
preservation code
G
M
13
6.5
0
Geologic time (Ma)

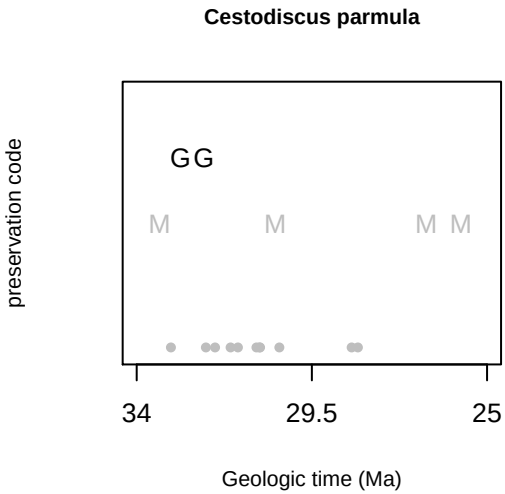

Baxteria brunii
preservation code
35
30.5
26
Geologic time (Ma)

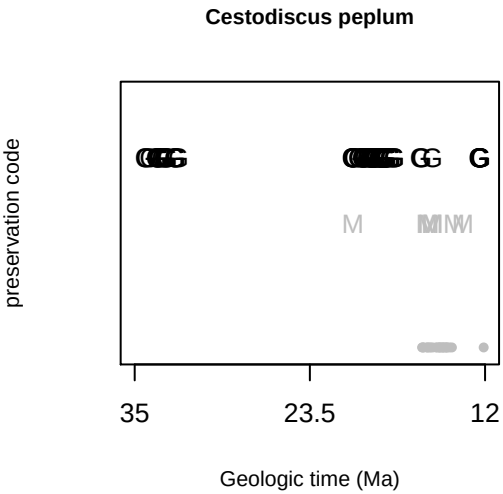

Bogorovia veniamini
preservation code
G
M
M
P
34
27
20
Geologic time (Ma)

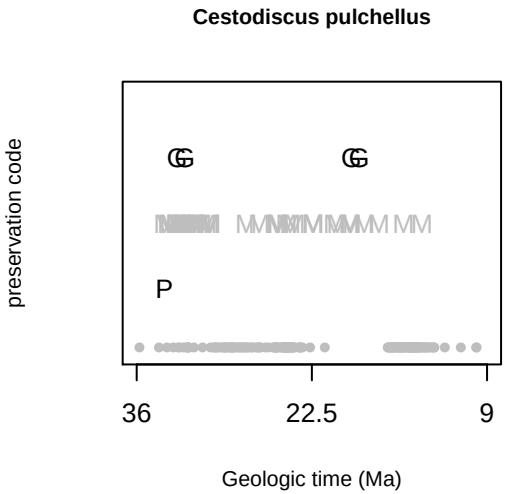

Cestodiscus antarcticus
preservation code
M M
34
29
24
Geologic time (Ma)

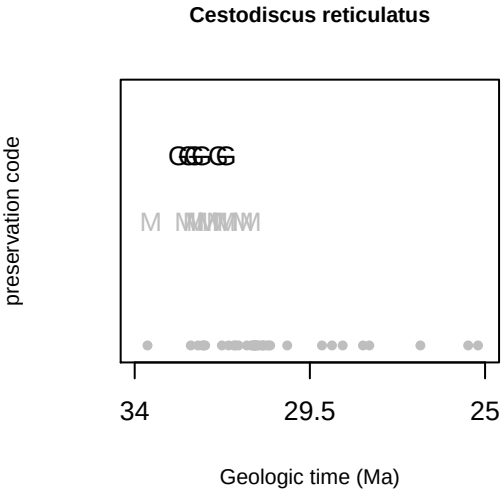

Cestodiscus convexus
preservation code
G
M
M
45
32.5
20
Geologic time (Ma)

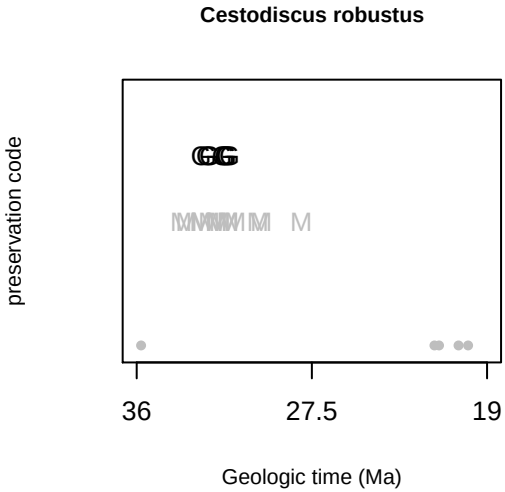

Cestodiscus muhinae
preservation code
G
G
M
P
P
P
41
26.5
12
Geologic time (Ma)

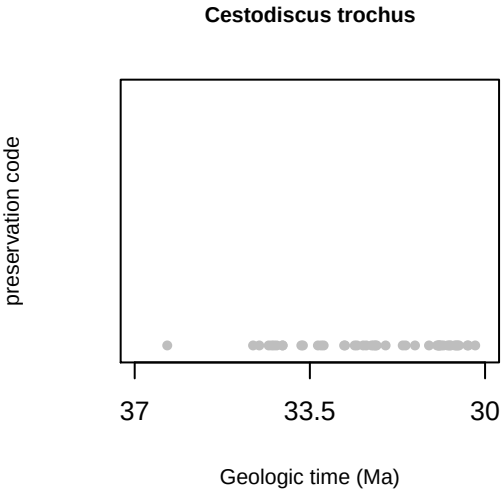

Cestodiscus parmula
preservation code
G G
M
M
M M
34
29.5
25
Geologic time (Ma)

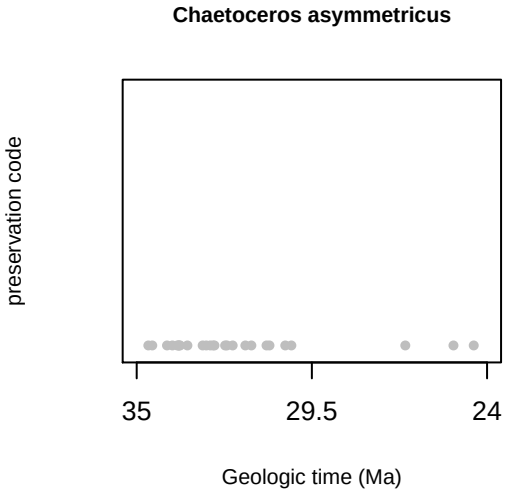

Cestodiscus peplum
preservation code
35
23.5
12
Geologic time (Ma)

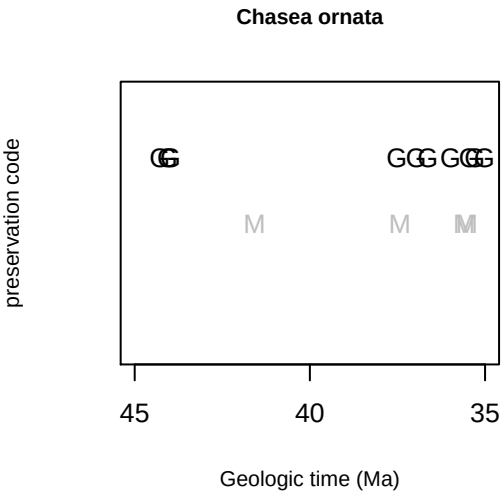

Cestodiscus pulchellus
preservation code
P
36
22.5
9
Geologic time (Ma)

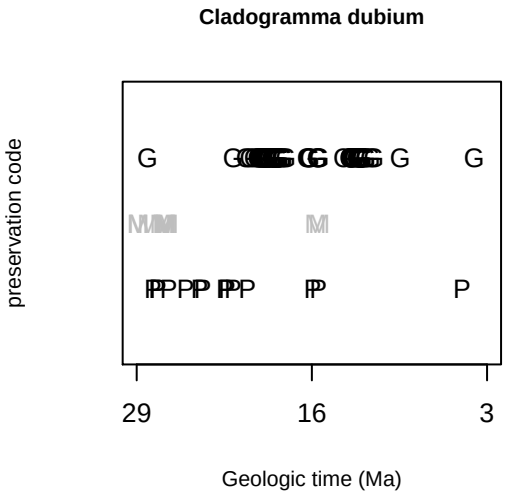

Cestodiscus reticulatus
preservation code
34
29.5
25
Geologic time (Ma)

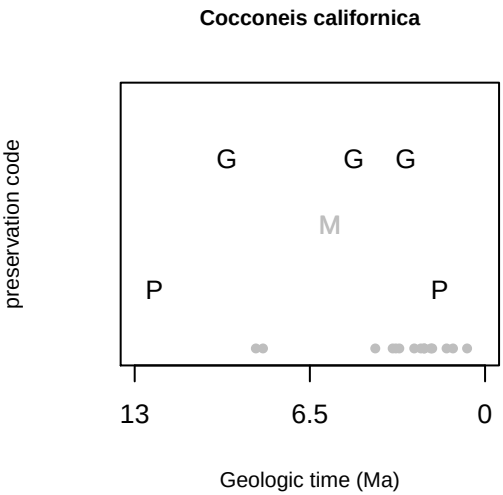

Cestodiscus robustus
preservation code
36
27.5
19
Geologic time (Ma)

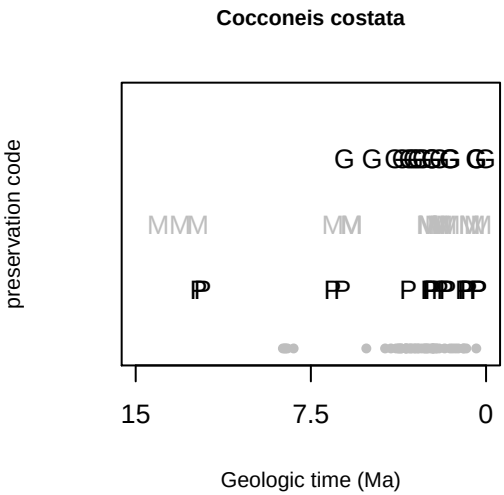

Cestodiscus trochus
preservation code
37
33.5
30
Geologic time (Ma)

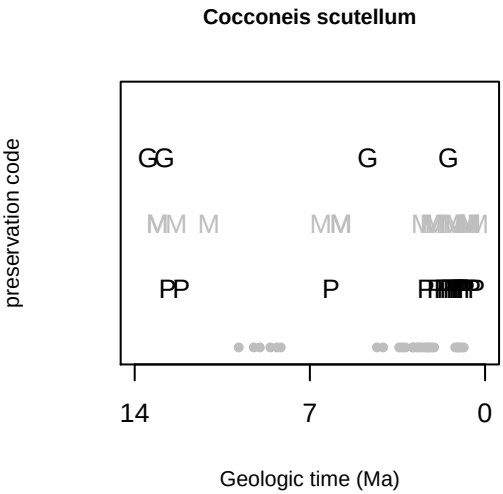

Chaetoceros asymmetricus
preservation code
35
29.5
24
Geologic time (Ma)

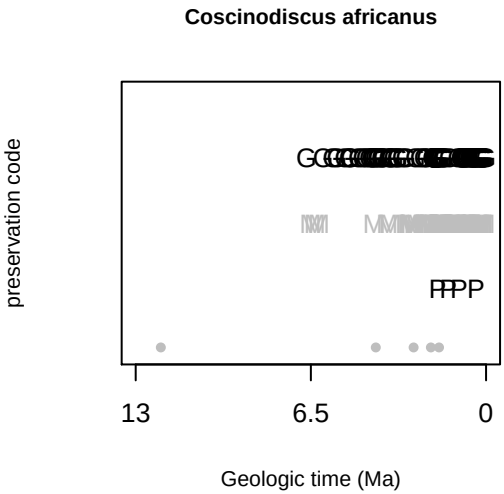

Chasea ornata
preservation code
45
40
35
Geologic time (Ma)

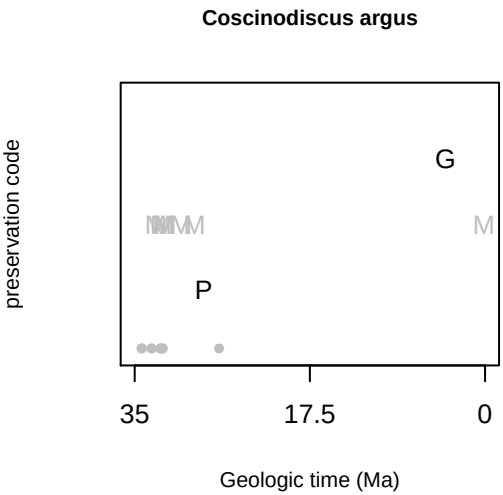

Cladogramma dubium
preservation code
29
16
3
Geologic time (Ma)

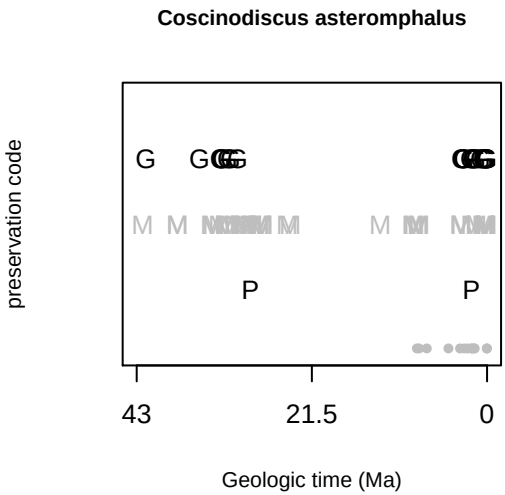

Cocconeis californica
preservation code
G
G
G
M
P
P
13
6.5
0
Geologic time (Ma)

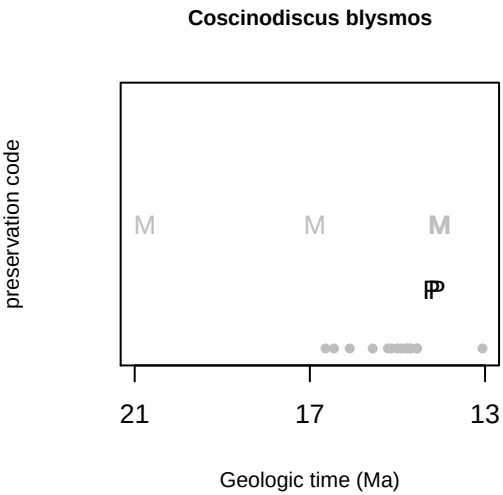

Cocconeis costata
preservation code
G
M
P
15
7.5
0
Geologic time (Ma)

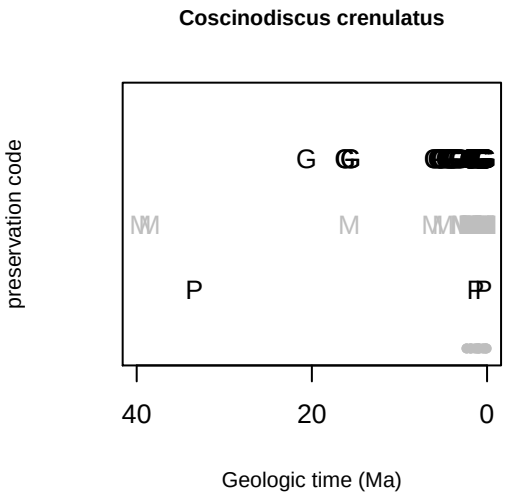

Cocconeis scutellum
preservation code
G
G
G
M
M
M
P
P
P
14
7
0
Geologic time (Ma)

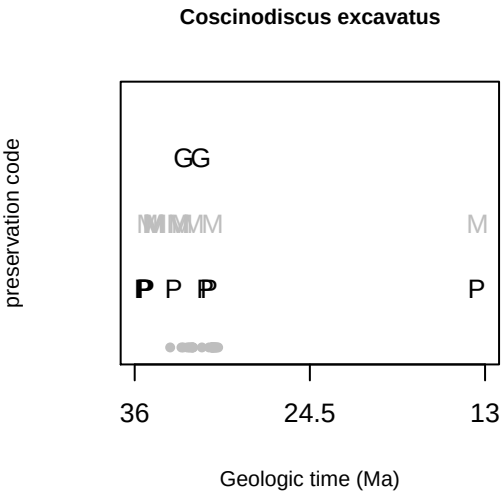

Coscinodiscus africanus
preservation code
G
M
P
13
6.5
0
Geologic time (Ma)

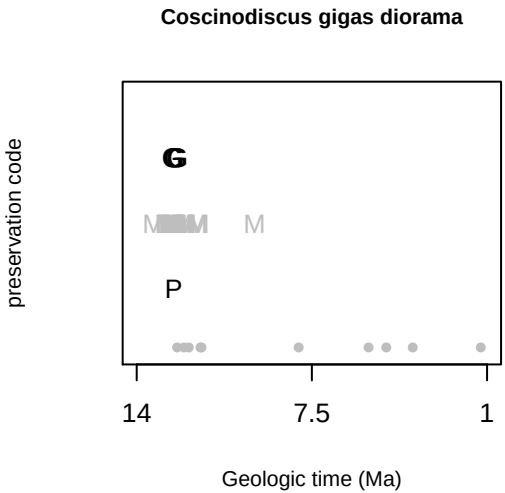

Coscinodiscus argus
preservation code
G
M
P
35
17.5
0
Geologic time (Ma)

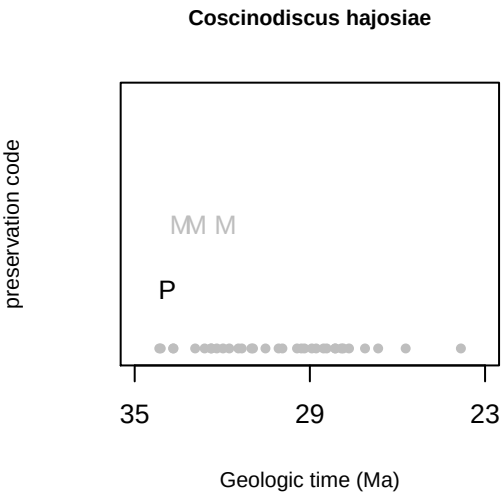

Coscinodiscus asteromphalus
preservation code
G
M
P
43
21.5
0
Geologic time (Ma)

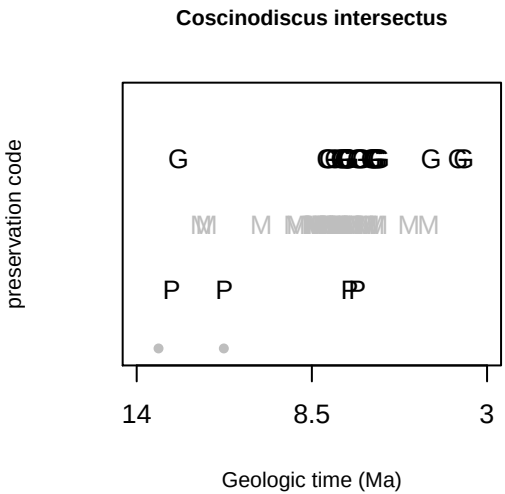

Coscinodiscus blysmos
preservation code
M
P
21
17
13
Geologic time (Ma)

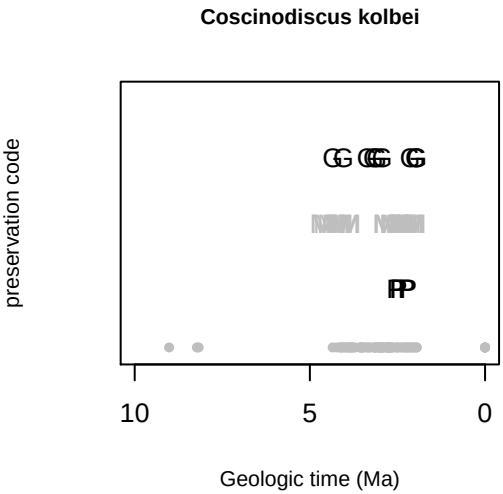

Coscinodiscus crenulatus
preservation code
G
M
P
40
20
0
Geologic time (Ma)

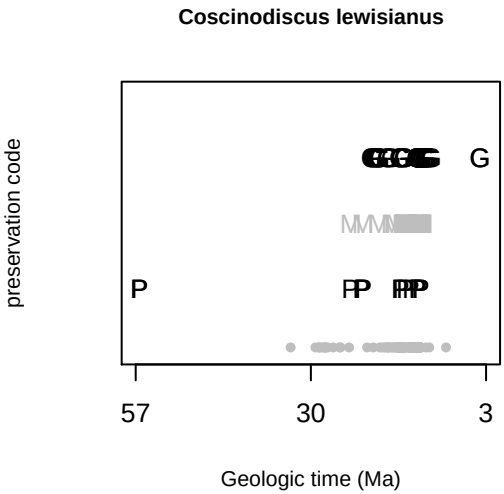

Coscinodiscus excavatus
preservation code
GG
M
P P P
P
36
24.5
13
Geologic time (Ma)

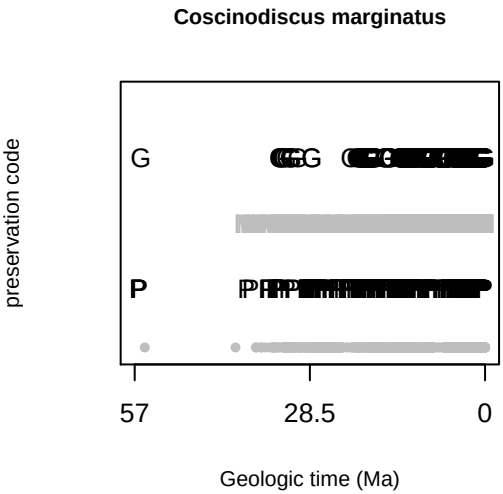

Coscinodiscus gigas diorama
preservation code
G
M M
P
14
7.5
1
Geologic time (Ma)

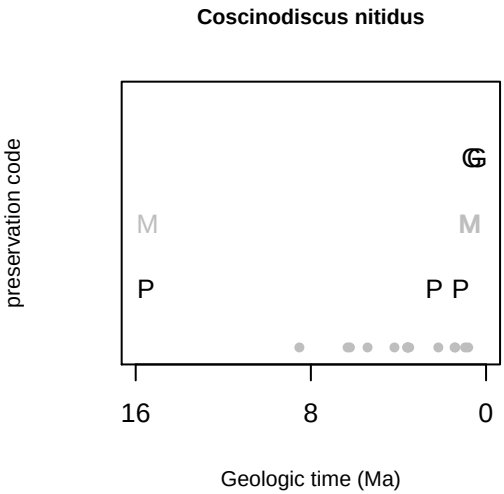

Coscinodiscus hajosiae
preservation code
M M
P
35
29
23
Geologic time (Ma)

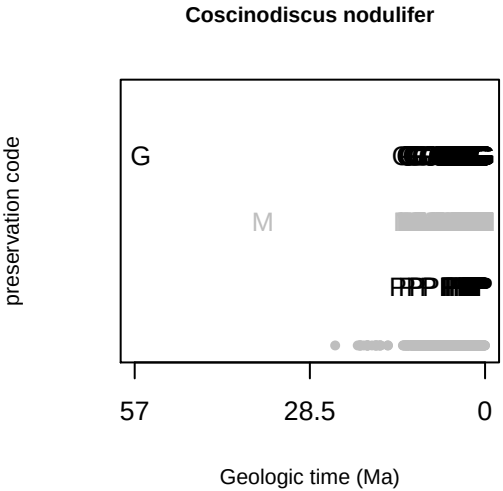

Coscinodiscus intersectus
preservation code
G G G
M M M M
P P P
14
8.5
3
Geologic time (Ma)

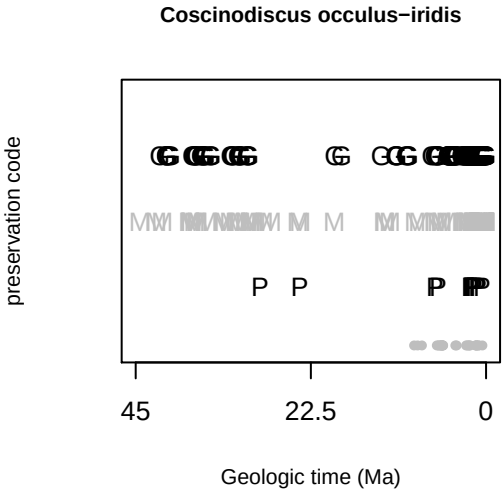

Coscinodiscus kolbei
preservation code
10
5
0
Geologic time (Ma)

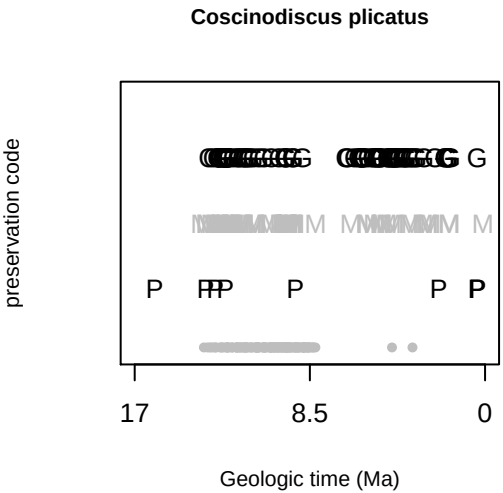

Coscinodiscus lewisianus
preservation code
G
P
57
30
3
Geologic time (Ma)

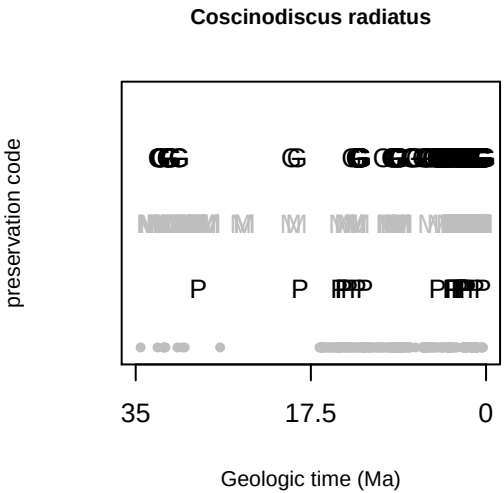

Coscinodiscus marginatus
preservation code
G
P
57
28.5
0
Geologic time (Ma)

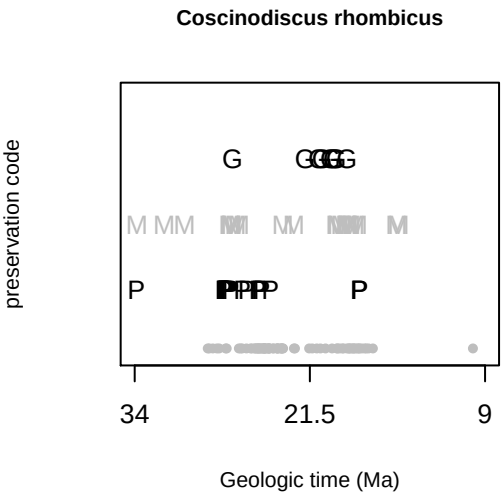

Coscinodiscus nitidus
preservation code
G
M
P
P P
16
8
0
Geologic time (Ma)

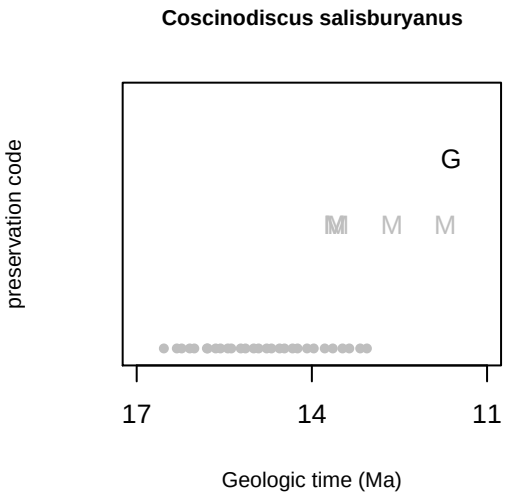

Coscinodiscus nodulifer
preservation code
G
M
P
57
28.5
0
Geologic time (Ma)

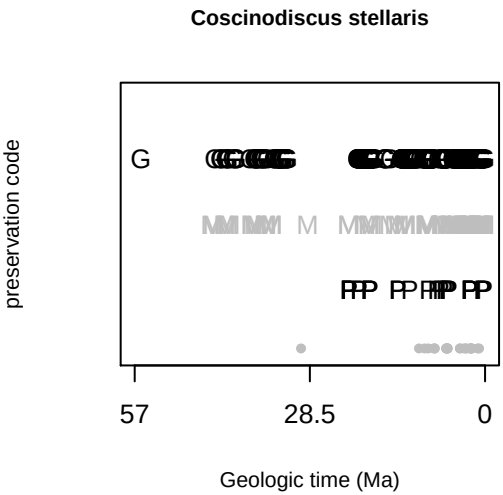

Coscinodiscus occulus−iridis
preservation code
G
M
P
45
22.5
0
Geologic time (Ma)

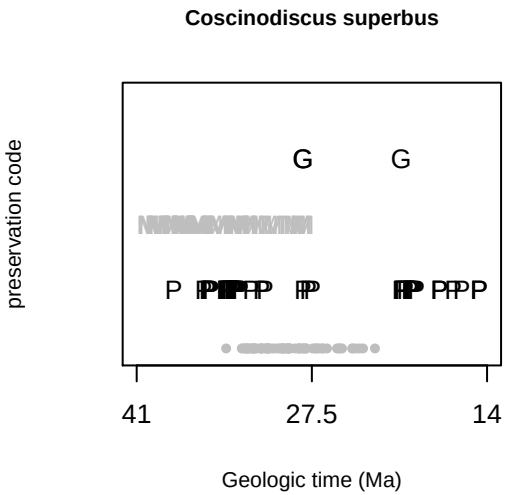

Coscinodiscus plicatus
preservation code
G
M
P
17
8.5
0
Geologic time (Ma)

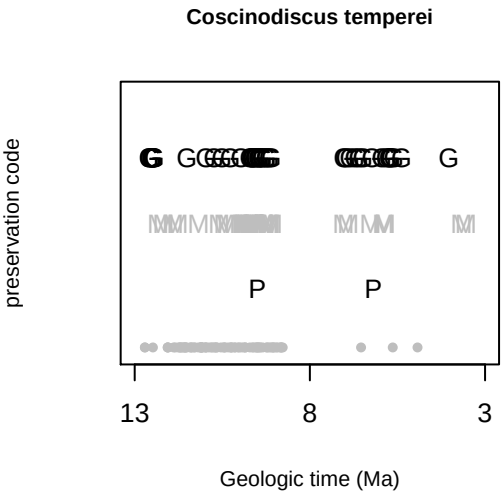

Coscinodiscus radiatus
preservation code
G
M
P
35
17.5
0
Geologic time (Ma)

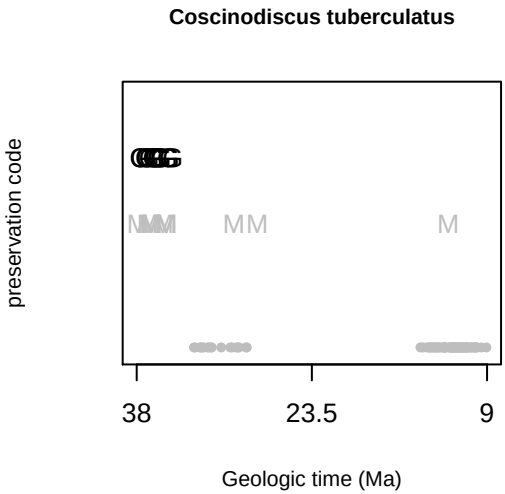

Coscinodiscus rhombicus
preservation code
G
M
P
34
21.5
9
Geologic time (Ma)

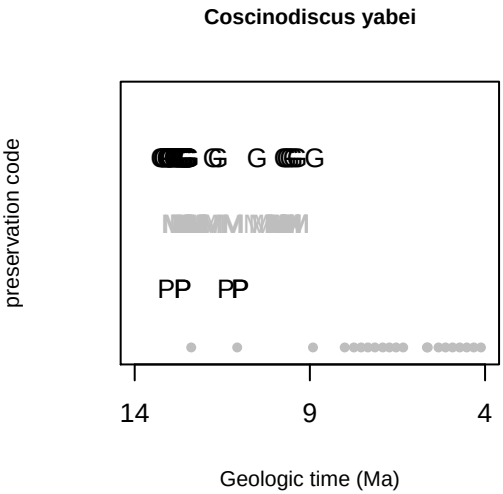

Coscinodiscus salisburyanus
preservation code
G
M
17
14
11
Geologic time (Ma)

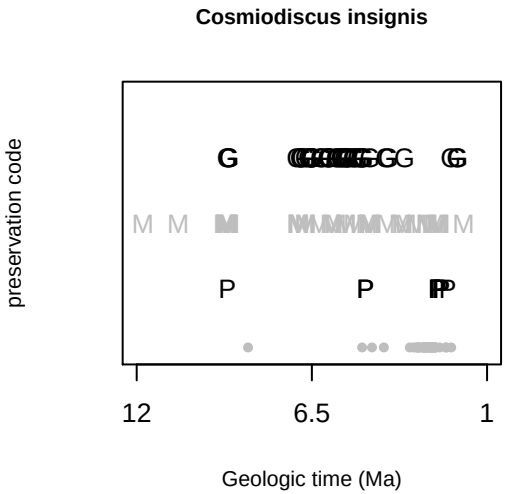

Coscinodiscus stellaris
preservation code
G
M
P
57
28.5
0
Geologic time (Ma)

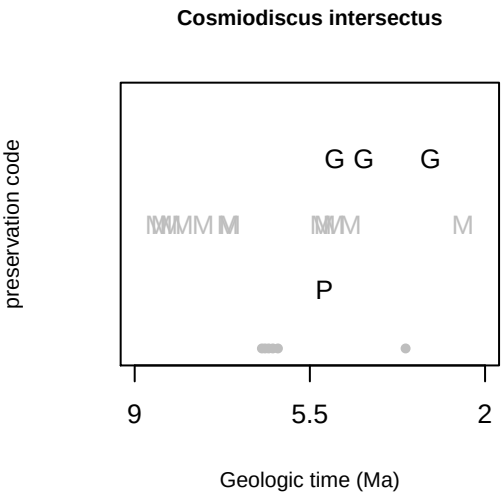

Coscinodiscus superbus
preservation code
G
P
41
27.5
14
Geologic time (Ma)

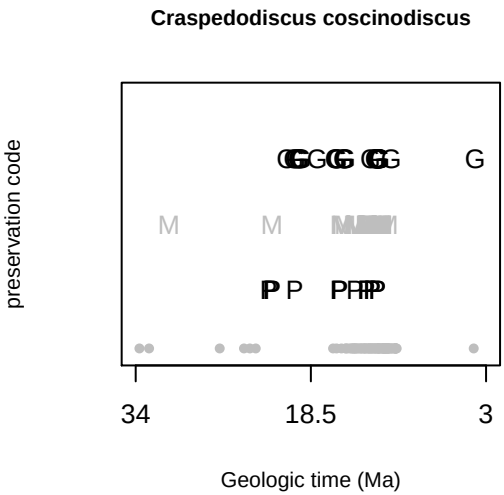

Coscinodiscus temperei
preservation code
13
8
3
Geologic time (Ma)

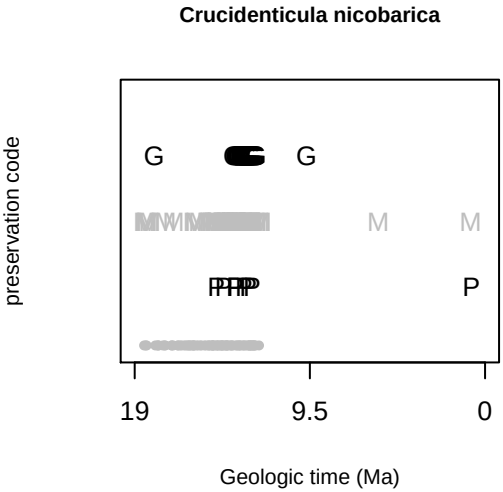

Coscinodiscus tuberculatus
preservation code
38
23.5
9
Geologic time (Ma)

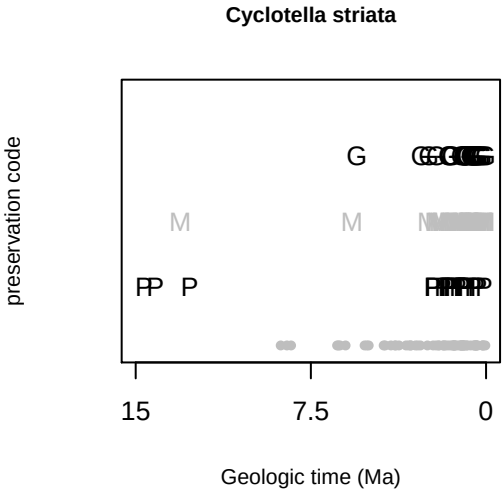

Coscinodiscus yabei
preservation code
14
9
4
Geologic time (Ma)

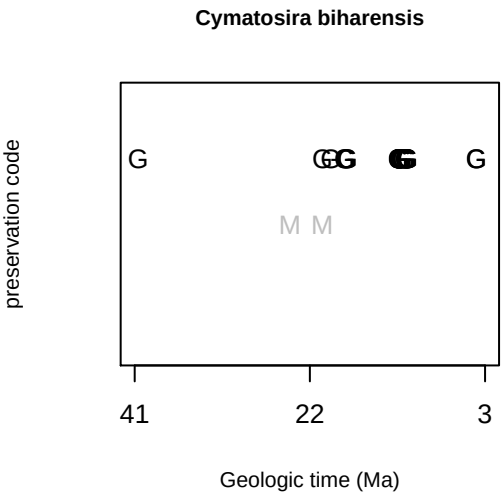

Cosmiodiscus insignis
preservation code
12
6.5
1
Geologic time (Ma)

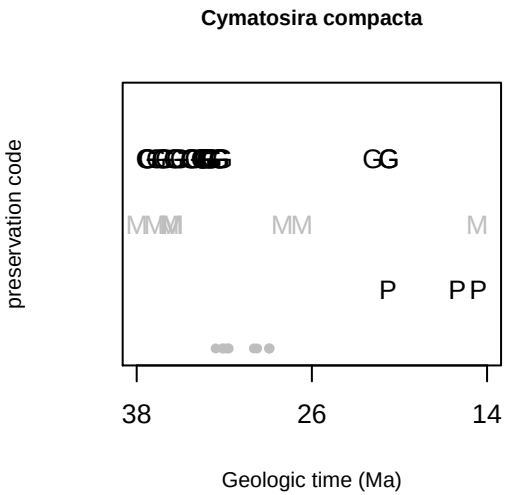

Cosmiodiscus intersectus
preservation code
G G G
M M M M M M
P
9
5.5
2
Geologic time (Ma)

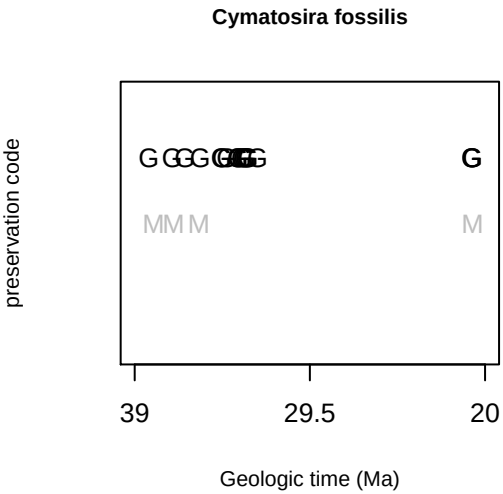

Craspedodiscus coscinodiscus
preservation code
G G G G G G G G G
M M M M M M
P P P P P P
34
18.5
3
Geologic time (Ma)

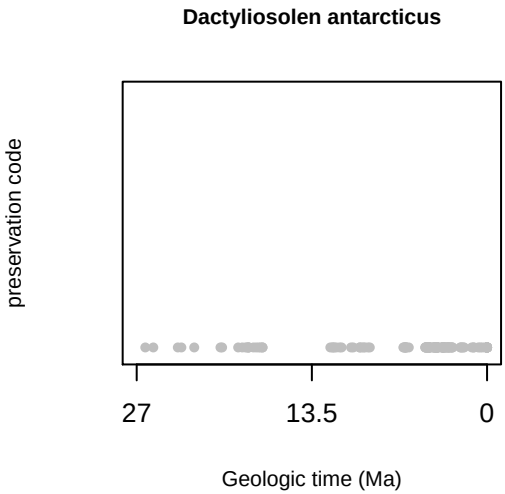

Crucidenticula nicobarica
preservation code
G G G
M M M M M M M M
M M
P P P P P P
P
19
9.5
0
Geologic time (Ma)

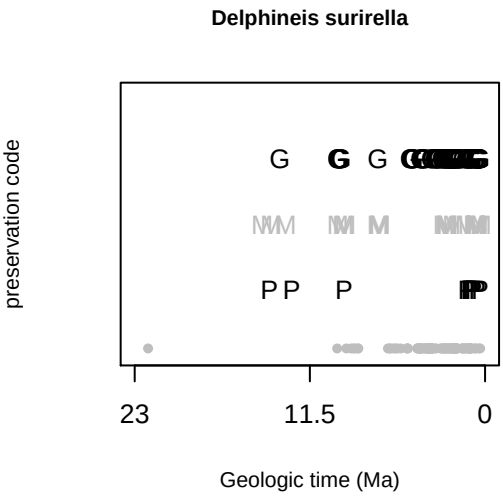

Cyclotella striata
preservation code
G G G G G G G G
M M M M M M M M M M M M
P P P P P P P P P P P P P P P P
15
7.5
0
Geologic time (Ma)

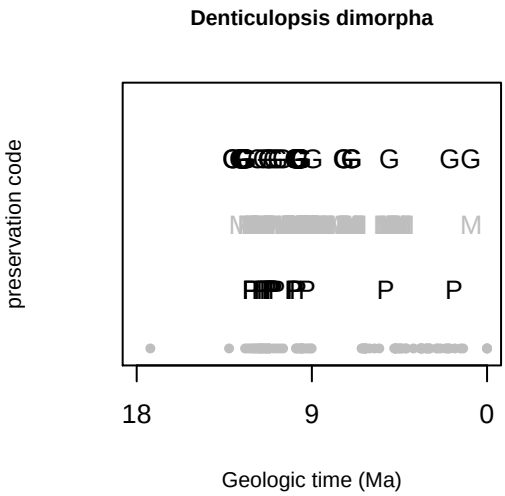

Cymatosira biharensis
preservation code
G
G G G
G
M M
41
22
3
Geologic time (Ma)

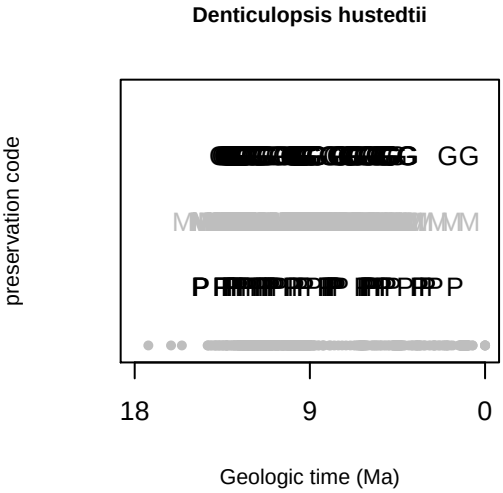

Cymatosira compacta
preservation code
G G
M M M
M M
M
P
P P
38
26
14
Geologic time (Ma)

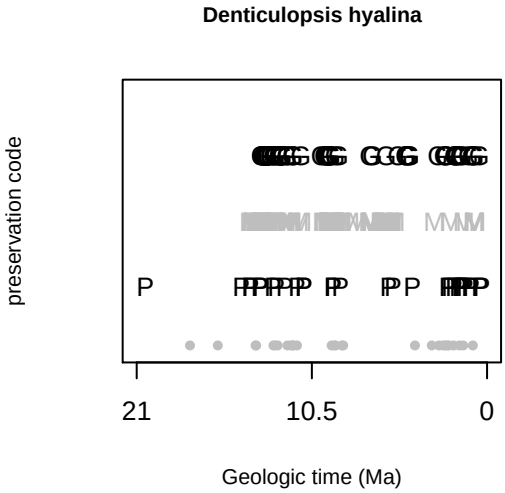

Cymatosira fossilis
preservation code
G G G G G
G
M M M
M
39
29.5
20
Geologic time (Ma)

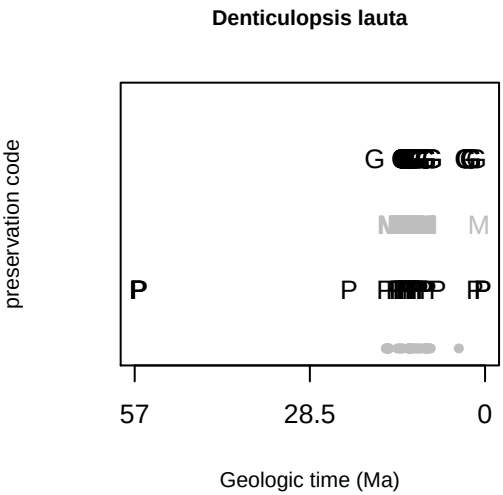

Dactyliosolen antarcticus
preservation code
27
13.5
0
Geologic time (Ma)

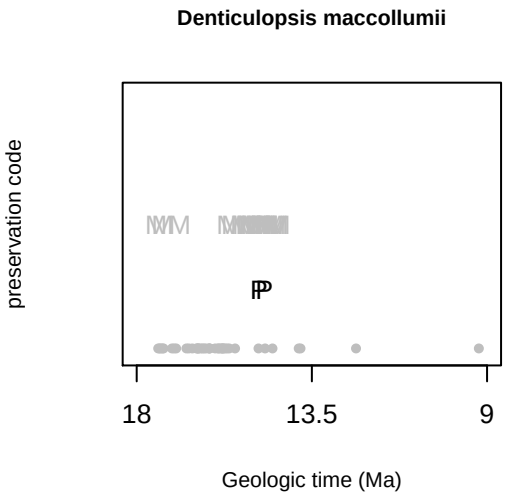

Delphineis surirella
preservation code
23
11.5
0
Geologic time (Ma)

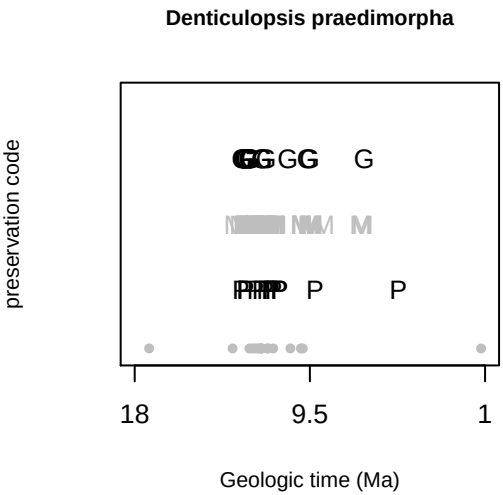

Denticulopsis dimorpha
preservation code
18
9
0
Geologic time (Ma)

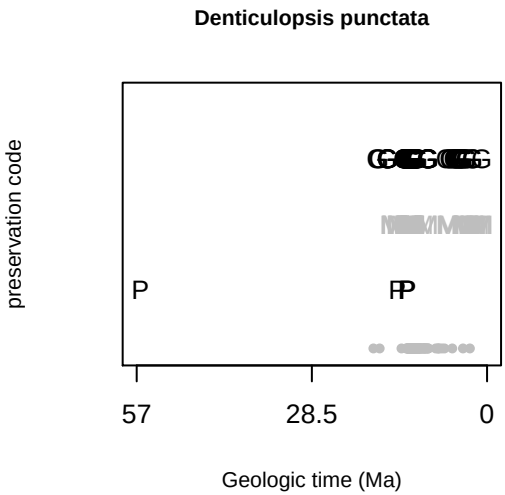

Denticulopsis hustedtii
preservation code
18
9
0
Geologic time (Ma)

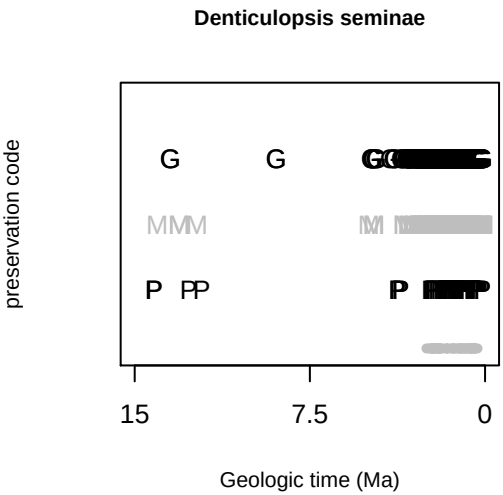

Denticulopsis hyalina
preservation code
21
10.5
0
Geologic time (Ma)

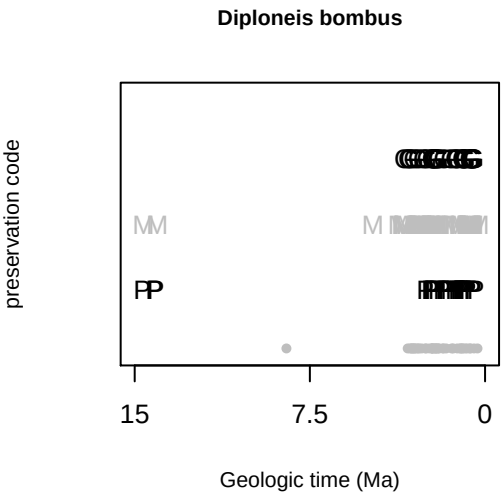

Denticulopsis lauta
preservation code
G
M
P
57
28.5
0
Geologic time (Ma)

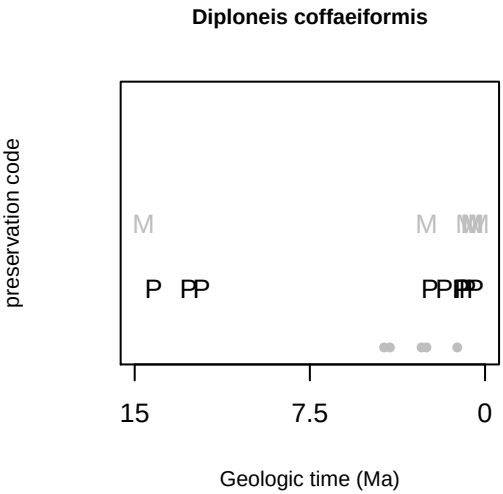

Denticulopsis maccollumii
preservation code
M
P
18
13.5
9
Geologic time (Ma)

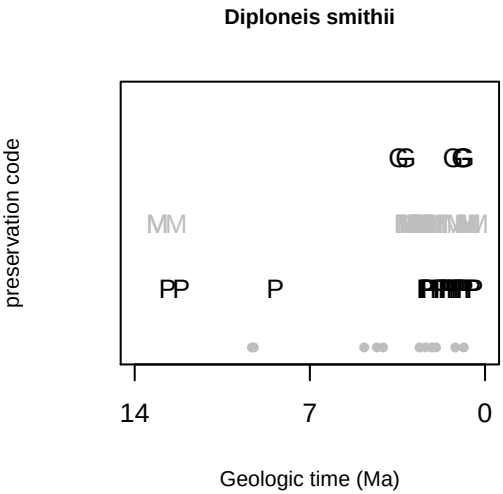

Denticulopsis praedimorpha
preservation code
G
M
P
18
9.5
1
Geologic time (Ma)

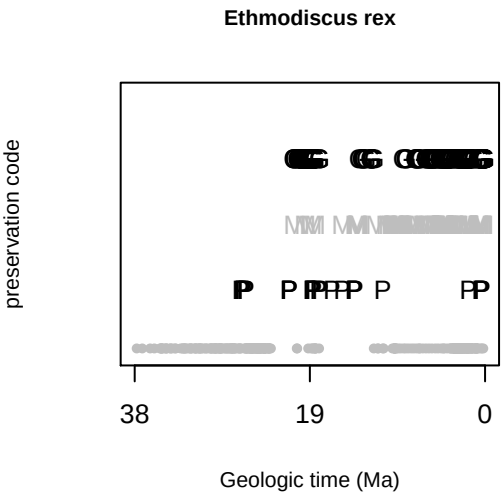

Denticulopsis punctata
preservation code
G
M
P
57
28.5
0
Geologic time (Ma)

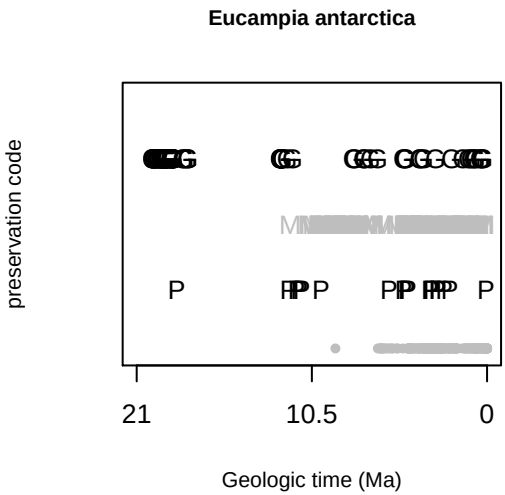

Denticulopsis seminae
preservation code
Geologic time (Ma)
15
7.5
0

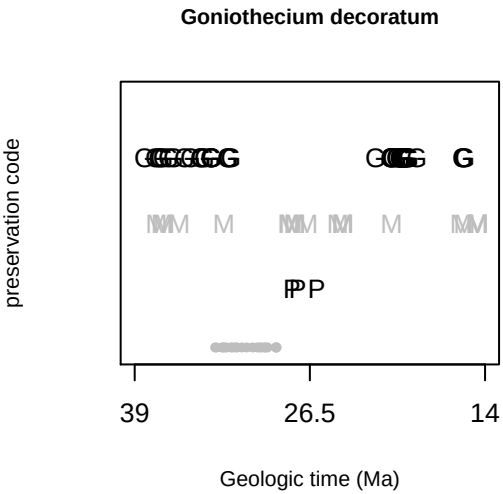

Diploneis bombus
preservation code
Geologic time (Ma)
15
7.5
0

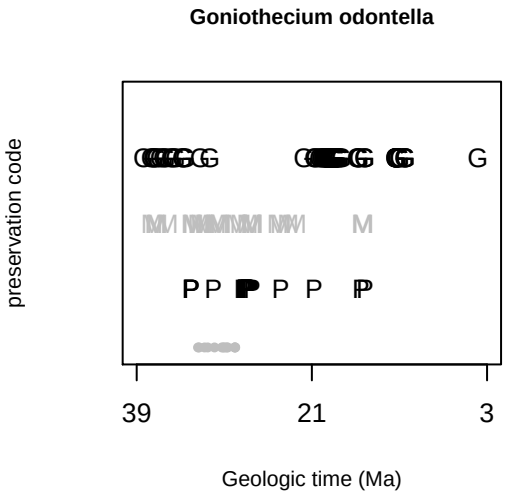

Diploneis coffaeiformis
preservation code
Geologic time (Ma)
15
7.5
0

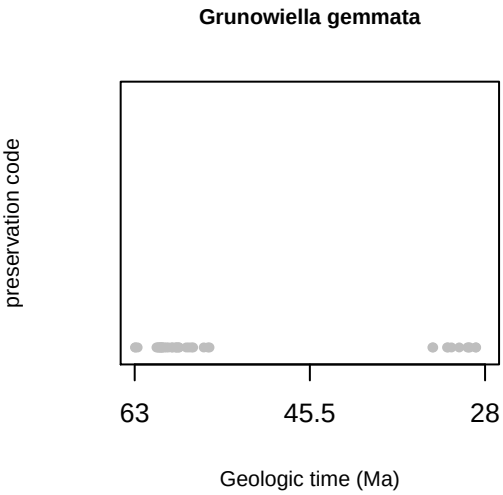

Diploneis smithii
preservation code
Geologic time (Ma)
14
7
0

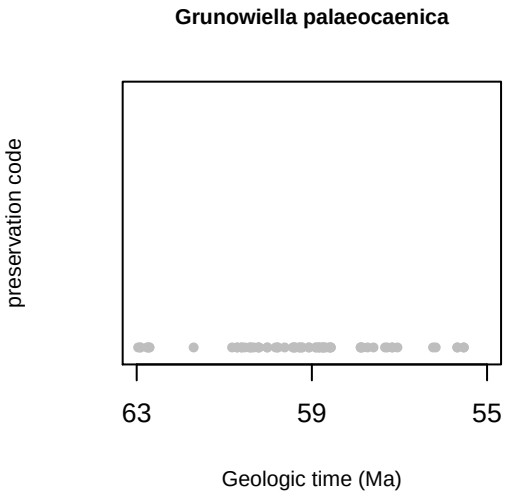

Ethmodiscus rex
preservation code
38
19
0
Geologic time (Ma)

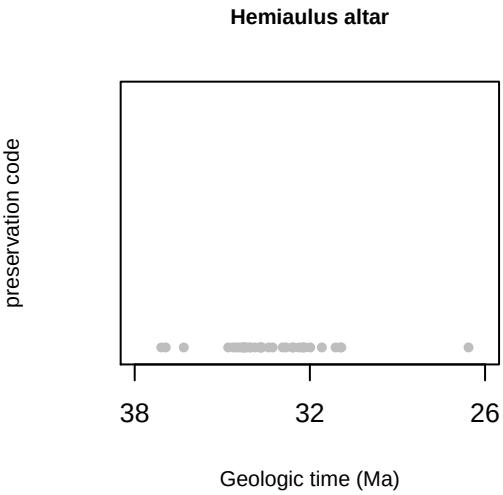

Eucampia antarctica
preservation code
21
10.5
0
Geologic time (Ma)

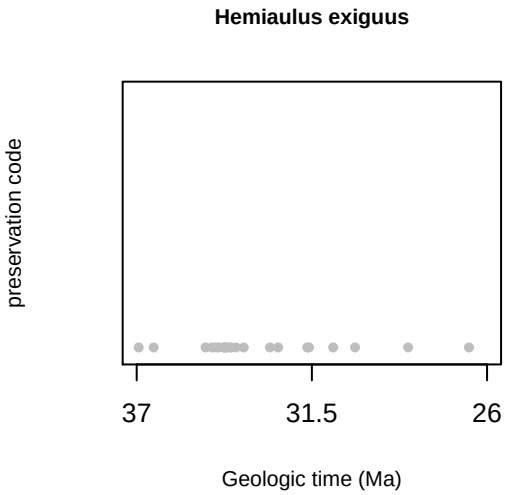

Goniothecium decoratum
preservation code
39
26.5
14
Geologic time (Ma)

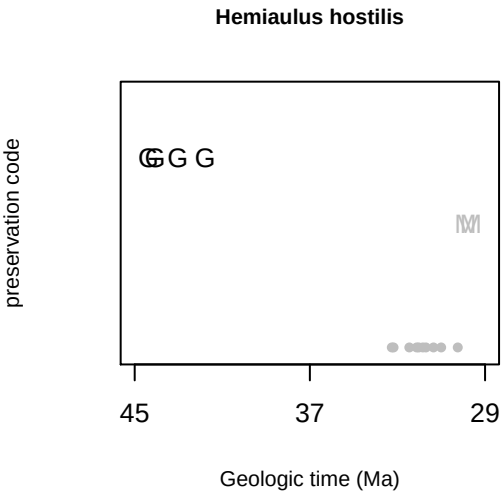

Goniothecium odontella
preservation code
39
21
3
Geologic time (Ma)

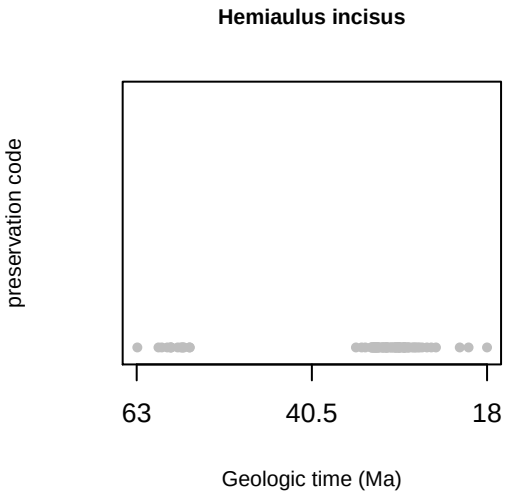

Grunowiella gemmata
preservation code
63
45.5
28
Geologic time (Ma)

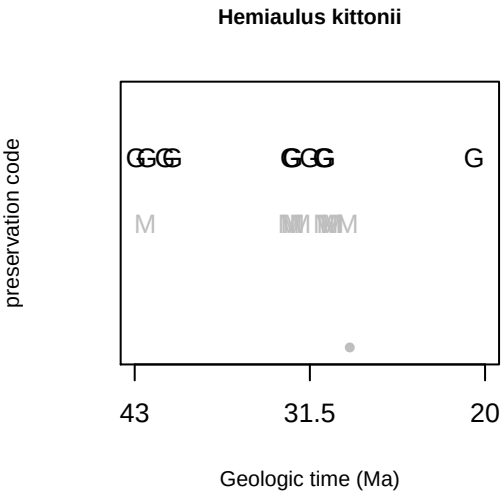

Grunowiella palaeocaenica
preservation code
63
59
55
Geologic time (Ma)

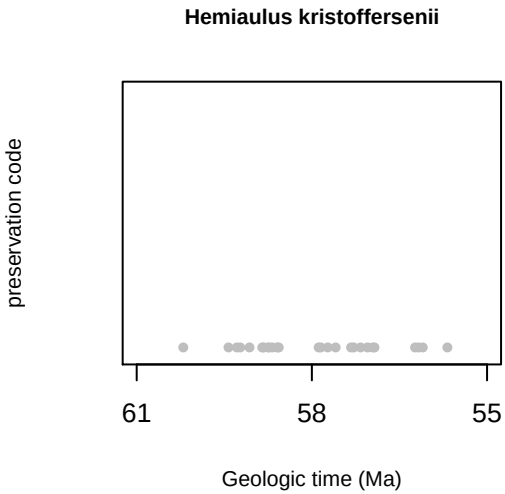

Hemiaulus altar
preservation code
38
32
26
Geologic time (Ma)

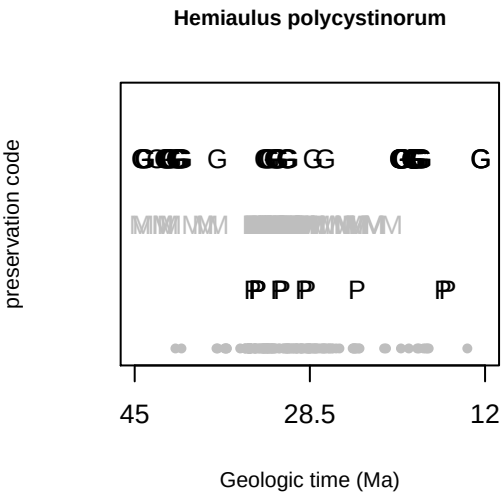

Hemiaulus exiguus
preservation code
37
31.5
26
Geologic time (Ma)

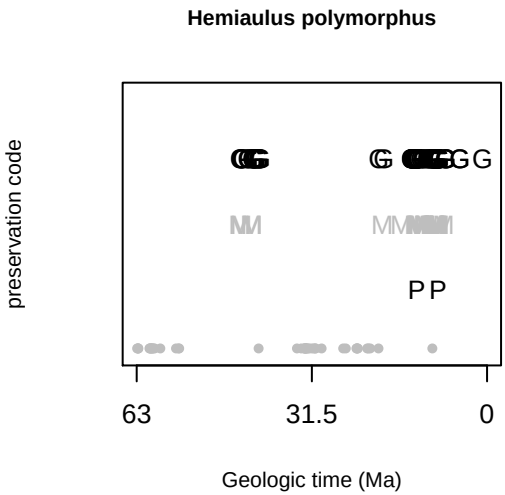

Hemiaulus hostilis
preservation code
G G G
M
45
37
29
Geologic time (Ma)

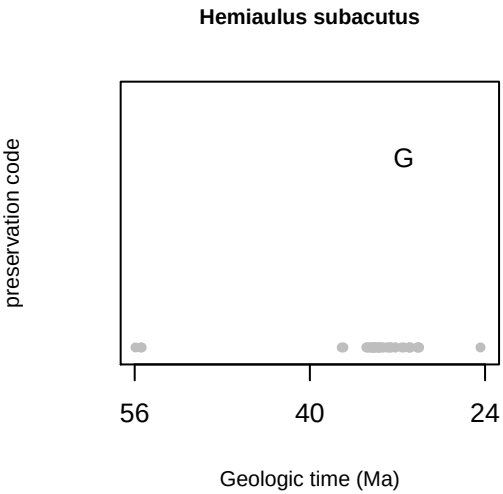

Hemiaulus incisus
preservation code
63
40.5
18
Geologic time (Ma)

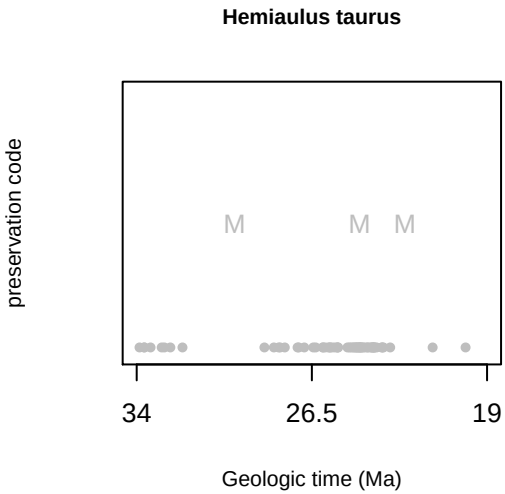

Hemiaulus kittonii
preservation code
G G G
G G G
G
M
M M M
43
31.5
20
Geologic time (Ma)

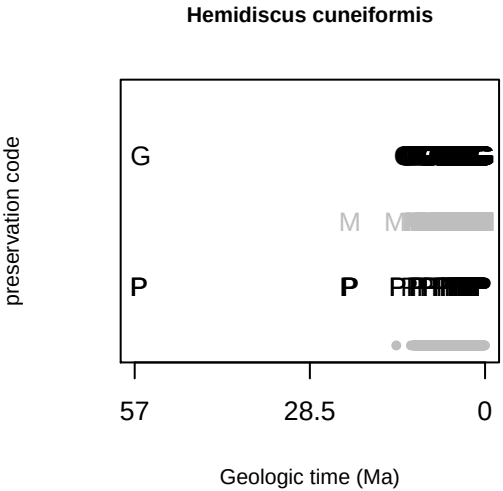

Hemiaulus kristoffersenii
preservation code
61
58
55
Geologic time (Ma)

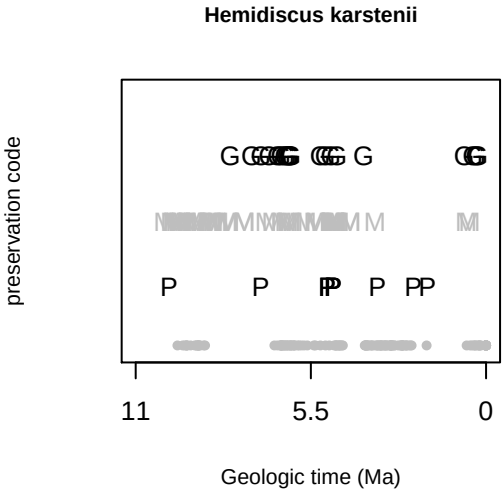

Hemiaulus polycystinorum
preservation code
45
28.5
12
Geologic time (Ma)

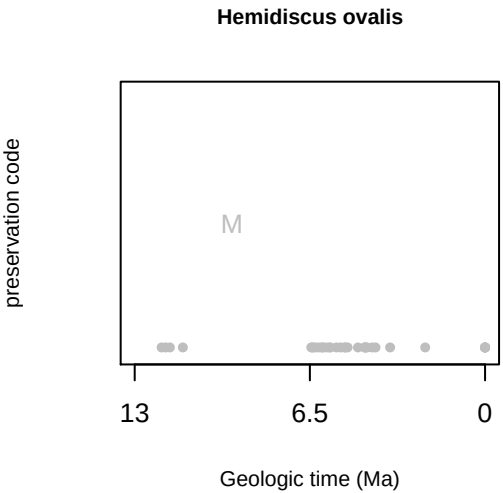

Hemiaulus polymorphus
preservation code
63
31.5
0
Geologic time (Ma)

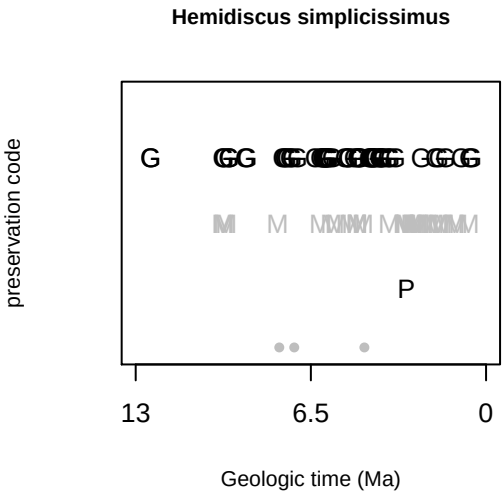

Hemiaulus subacutus
preservation code
56
40
24
Geologic time (Ma)

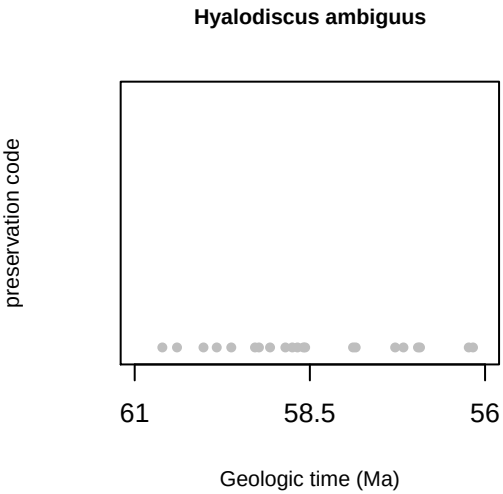

Hemiaulus taurus
preservation code
34
26.5
19
Geologic time (Ma)

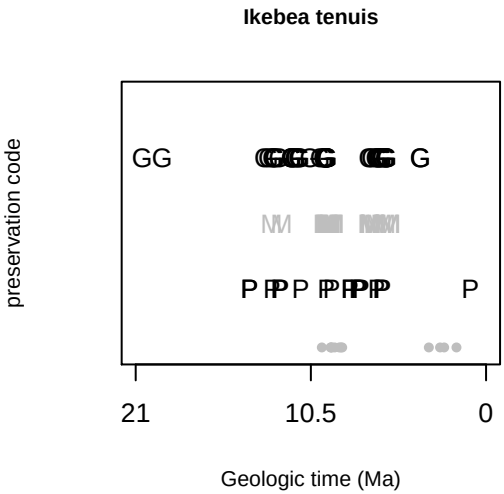

Hemidiscus cuneiformis
preservation code
G
M
P
57
28.5
0
Geologic time (Ma)

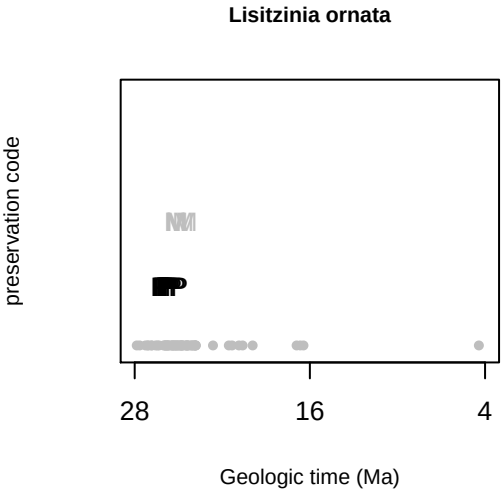

Hemidiscus karstenii
preservation code
G
M
P
11
5.5
0
Geologic time (Ma)

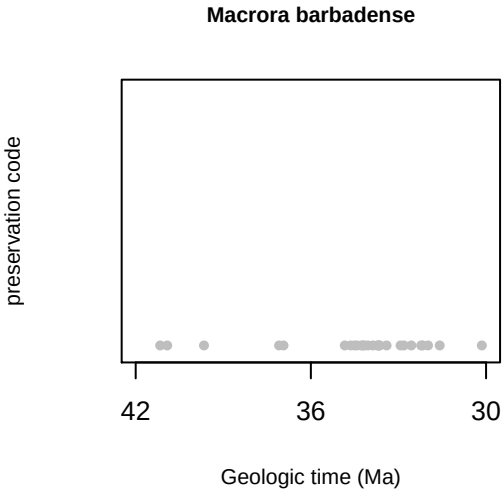

Hemidiscus ovalis
preservation code
M
13
6.5
0
Geologic time (Ma)

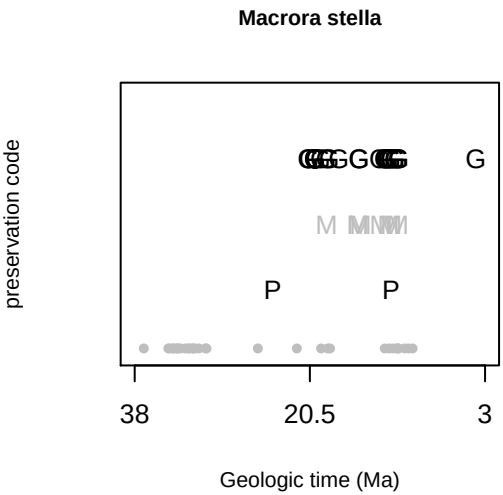

Hemidiscus simplicissimus
preservation code
G
M
P
13
6.5
0
Geologic time (Ma)

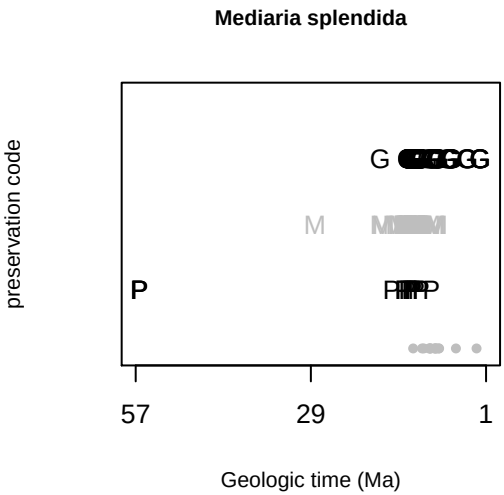

Hyalodiscus ambiguus
preservation code
61
58.5
56
Geologic time (Ma)

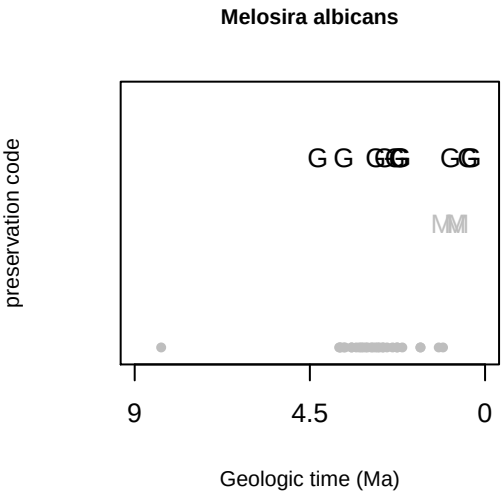

Ikebea tenuis
preservation code
GG
G
P
P
P
P
P
P
P
P
P
21
10.5
0
Geologic time (Ma)

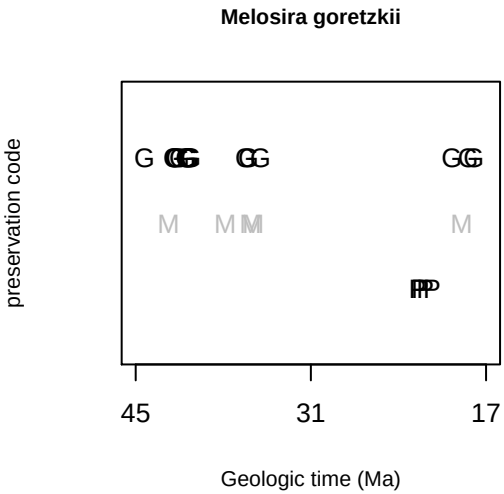

Lisitzinia ornata
preservation code
28
16
4
Geologic time (Ma)

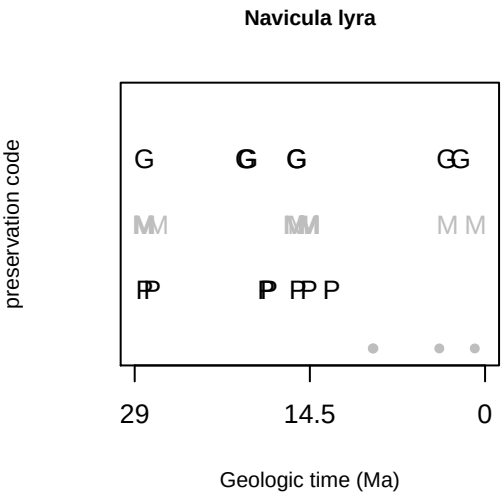

Macrora barbadense
preservation code
42
36
30
Geologic time (Ma)

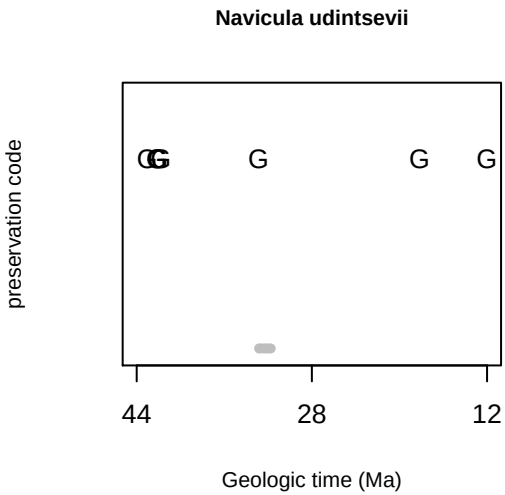

Macrora stella
preservation code
G
M
P
P
38
20.5
3
Geologic time (Ma)

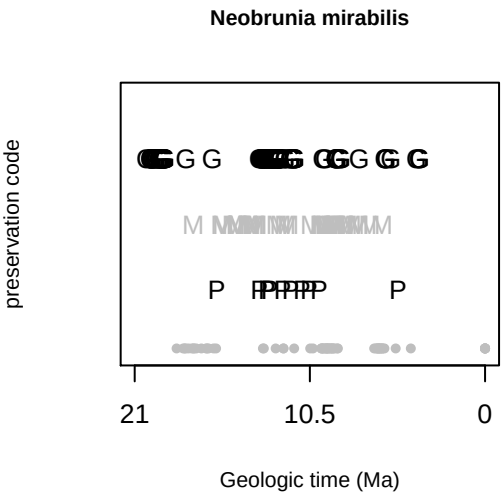

Mediaria splendida
preservation code
G
M
P
57
29
1
Geologic time (Ma)

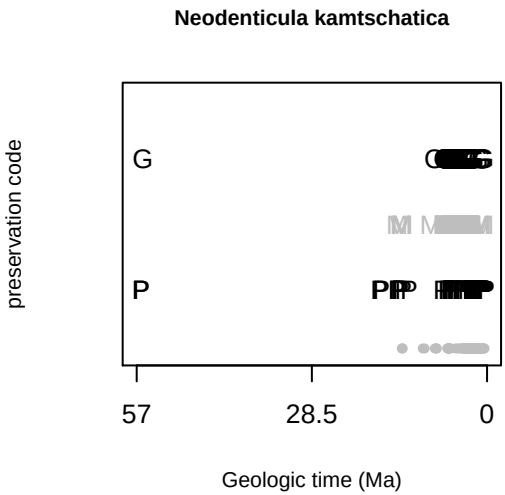

Melosira albicans
preservation code
G G
9
4.5
0
Geologic time (Ma)

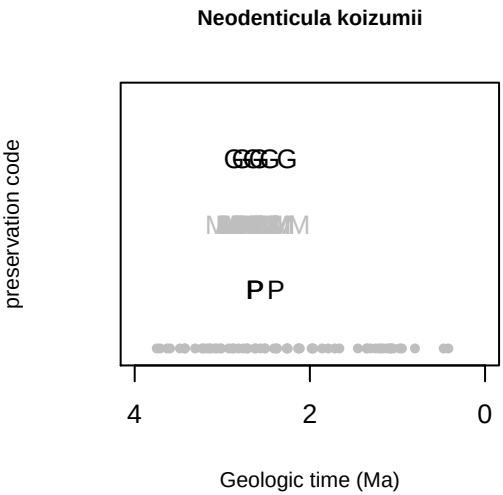

Melosira goretzkii
preservation code
G
M
M
P
45
31
17
Geologic time (Ma)

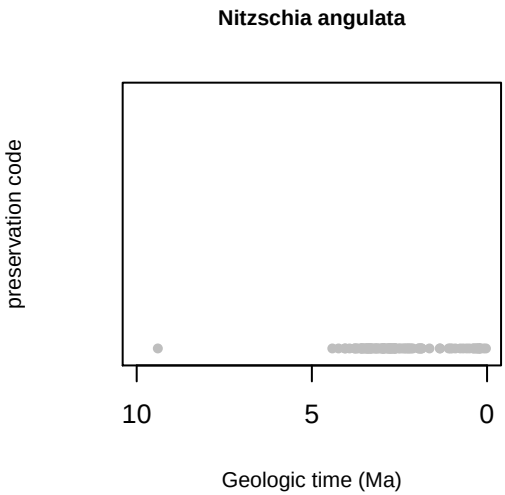

Navicula lyra
preservation code
G
M
P
29
14.5
0
Geologic time (Ma)

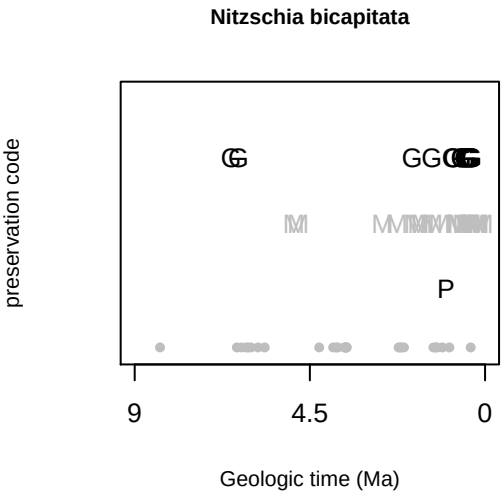

Navicula udintsevii
preservation code
G
44
28
12
Geologic time (Ma)

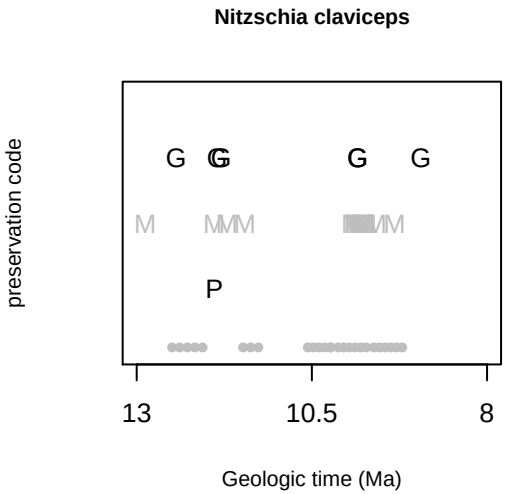

Neobrunia mirabilis
preservation code
G
M
P
21
10.5
0
Geologic time (Ma)

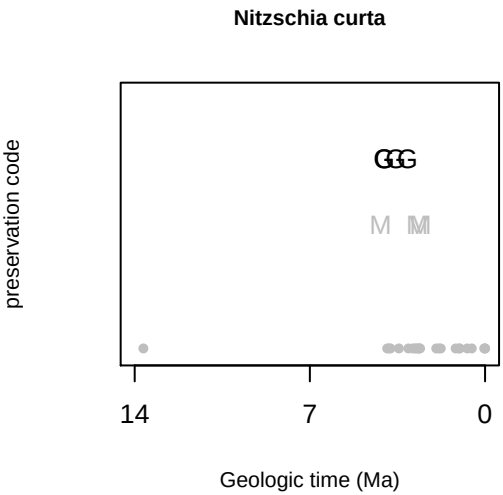

Neodenticula kamtschatica
preservation code
G
M
P
57
28.5
0
Geologic time (Ma)

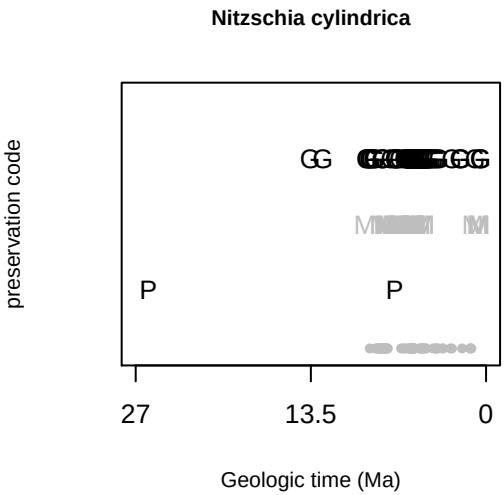

Neodenticula koizumii
preservation code
Geologic time (Ma)
4
2
0

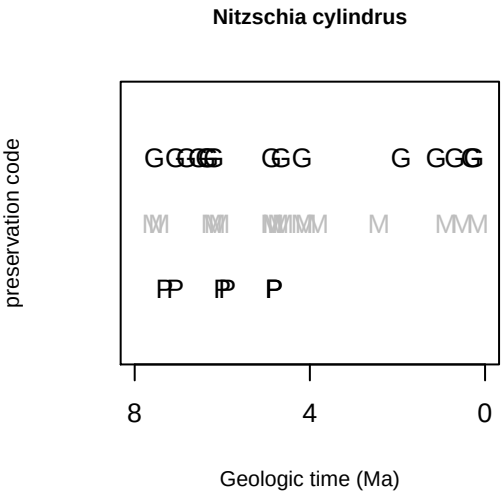

Nitzschia angulata
preservation code
Geologic time (Ma)
10
5
0

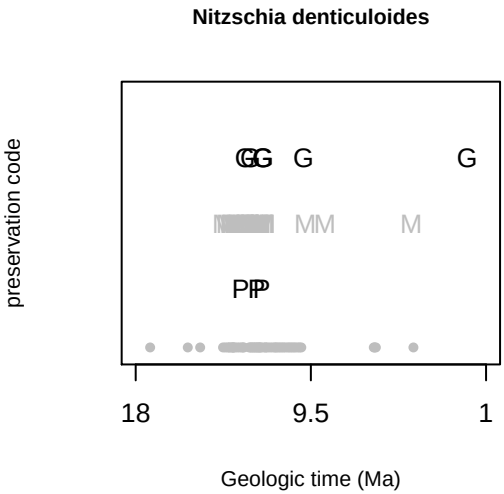

Nitzschia bicapitata
preservation code
Geologic time (Ma)
9
4.5
0

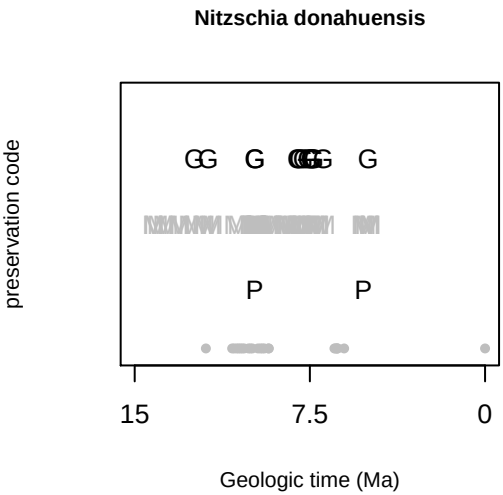

Nitzschia claviceps
preservation code
Geologic time (Ma)
13
10.5
8

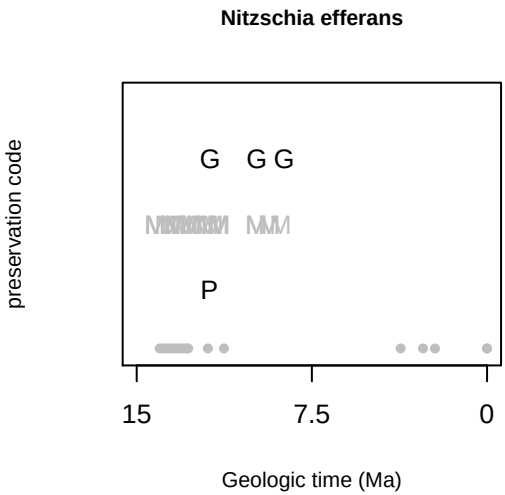

Nitzschia curta
preservation code
14
7
0
Geologic time (Ma)

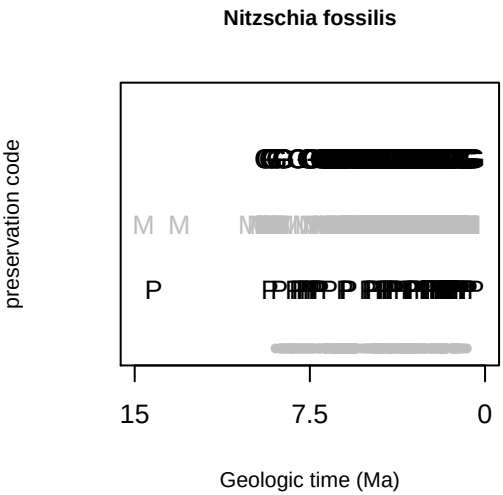

Nitzschia cylindrica
preservation code
P
P
27
13.5
0
Geologic time (Ma)

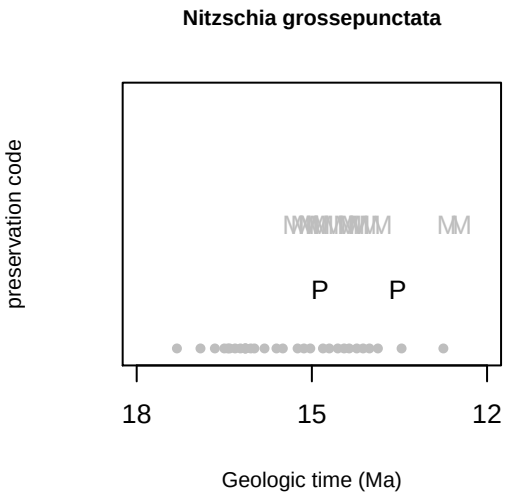

Nitzschia cylindrus
preservation code
8
4
0
Geologic time (Ma)

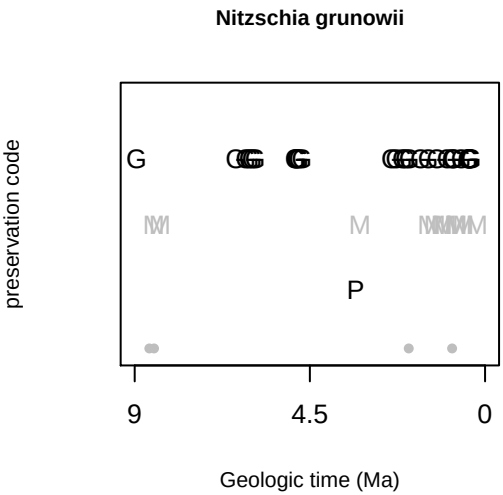

Nitzschia denticuloides
preservation code
18
9.5
1
Geologic time (Ma)

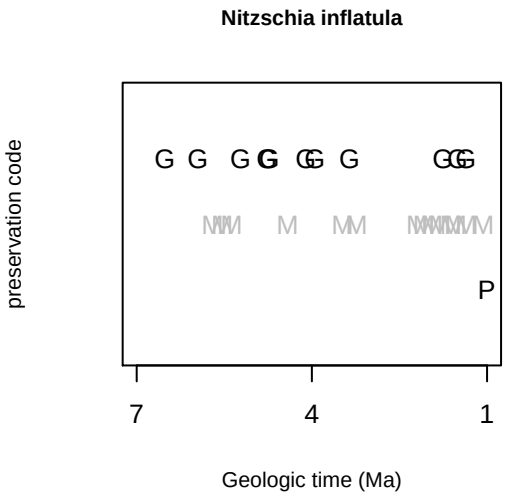

Nitzschia donahuensis
preservation code
Geologic time (Ma)
15
7.5
0

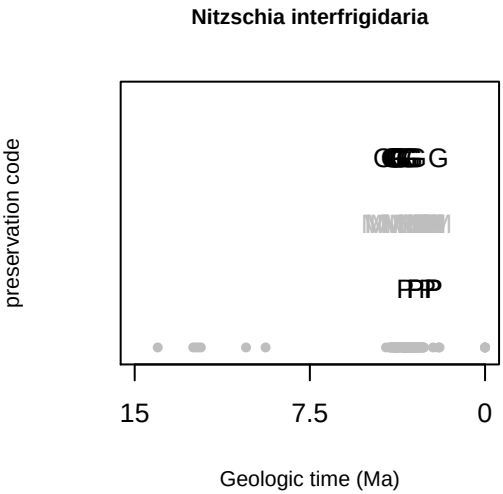

Nitzschia efferans
preservation code
Geologic time (Ma)
15
7.5
0

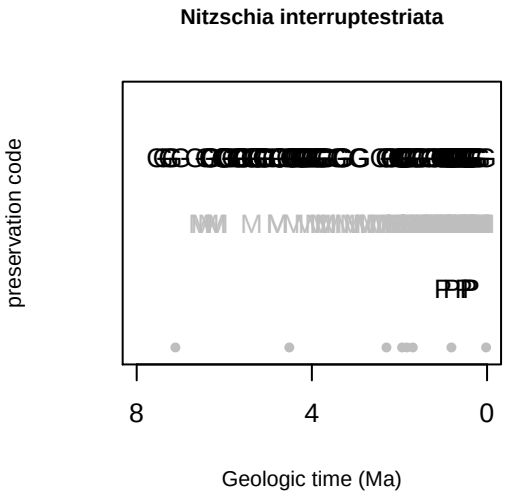

Nitzschia fossilis
preservation code
Geologic time (Ma)
15
7.5
0

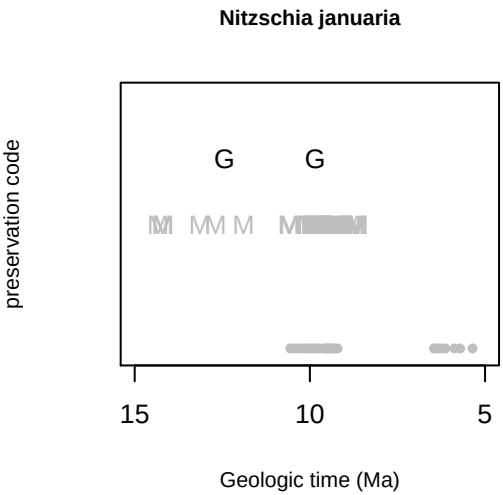

Nitzschia grossepunctata
preservation code
Geologic time (Ma)
18
15
12

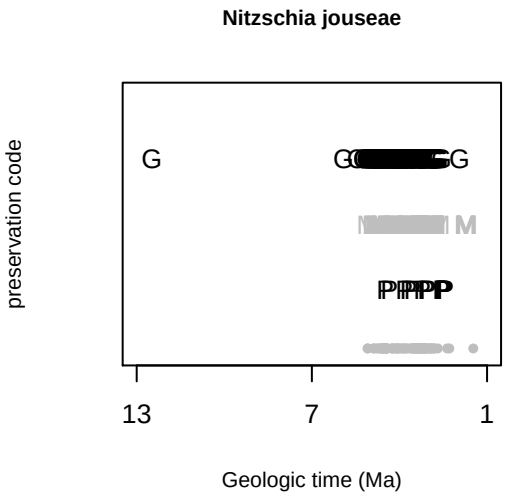

Nitzschia grunowii
preservation code
G
M
P
9
4.5
0
Geologic time (Ma)

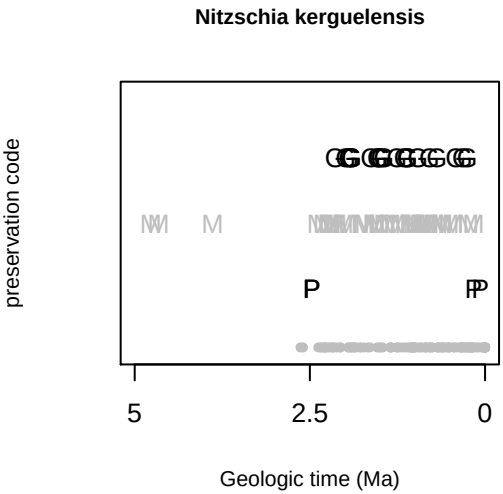

Nitzschia inflatula
preservation code
G
M
P
7
4
1
Geologic time (Ma)

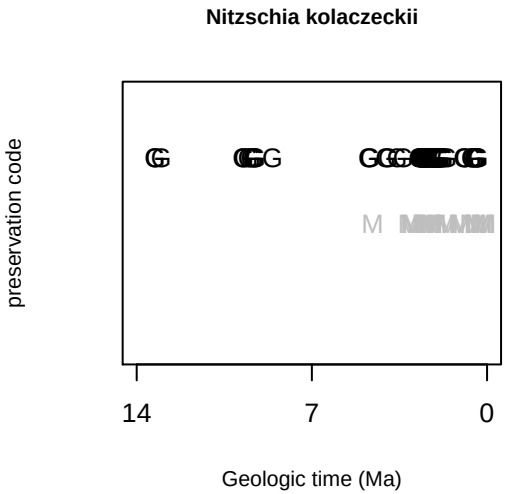

Nitzschia interfrigidaria
preservation code
G
M
P
15
7.5
0
Geologic time (Ma)

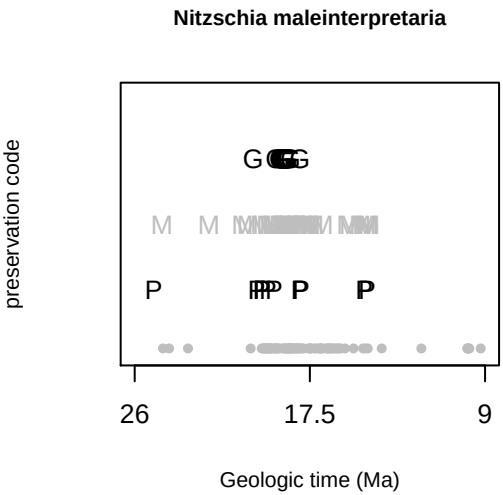

Nitzschia interruptestriata
preservation code
G
M
P
8
4
0
Geologic time (Ma)

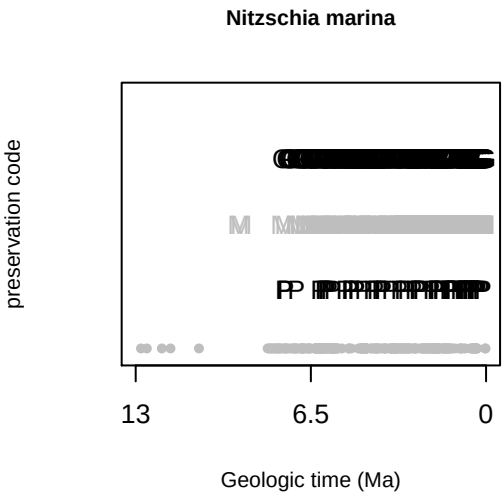

Nitzschia januaria
preservation code
G
G
M
M
M
M
M
15
10
5
Geologic time (Ma)

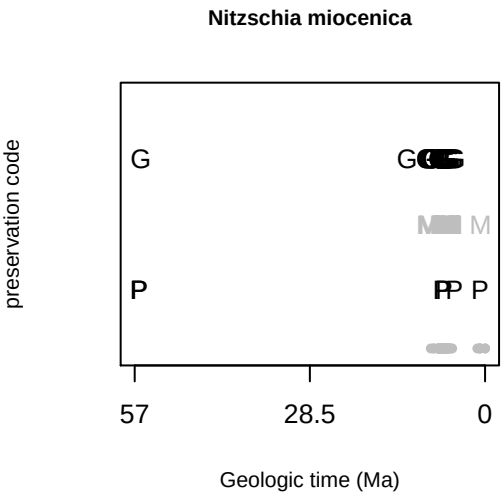

Nitzschia jouseae
preservation code
G
G
G
M
M
P
P
P
P
13
7
1
Geologic time (Ma)

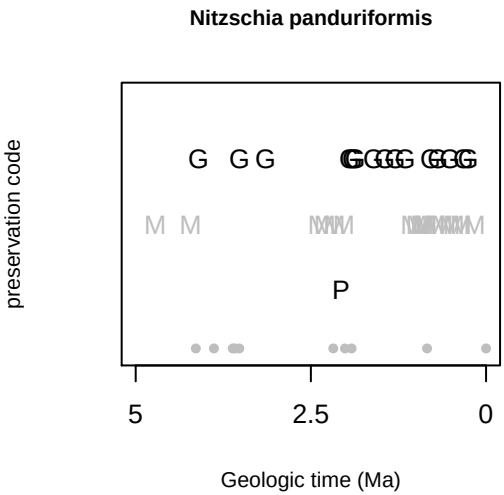

Nitzschia kerguelensis
preservation code
G
G
G
G
G
G
G
G
M
M
M
M
M
M
M
M
M
M
M
M
P
P
5
2.5
0
Geologic time (Ma)

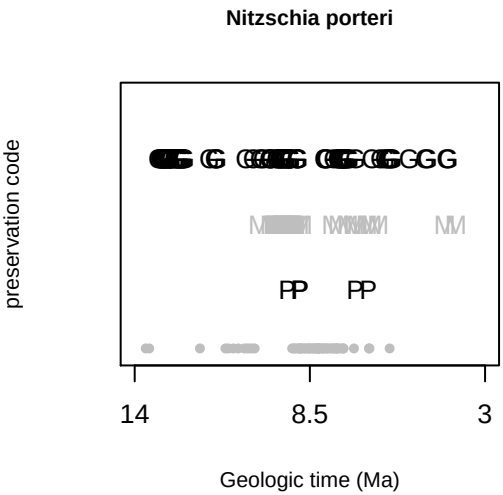

Nitzschia kolaczeckii
preservation code
G
G
G
G
G
G
G
G
G
G
M
M
M
M
M
M
M
M
M
M
14
7
0
Geologic time (Ma)

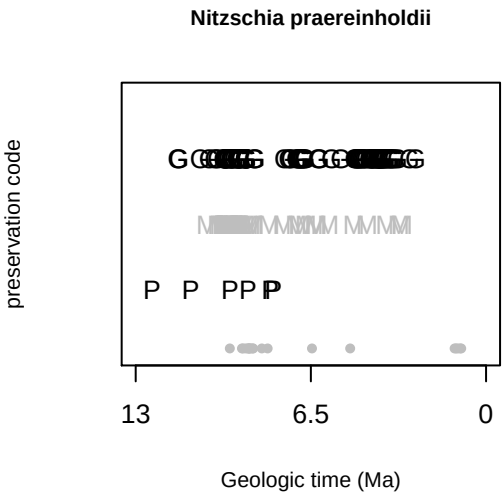

Nitzschia maleinterpretaria
preservation code
G
M
P
26
17.5
9
Geologic time (Ma)

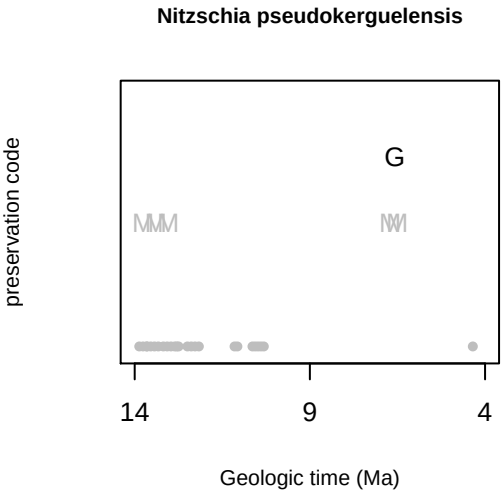

Nitzschia marina
preservation code
M
P
13
6.5
0
Geologic time (Ma)

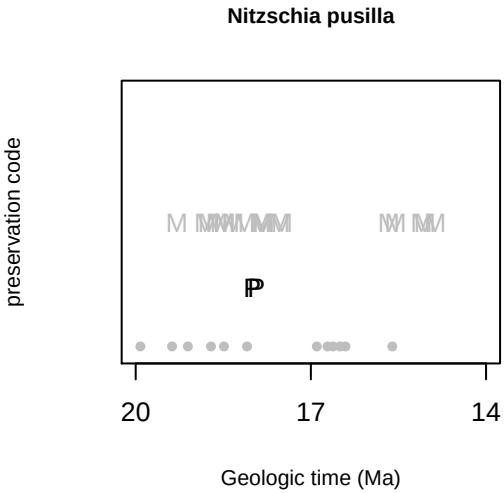

Nitzschia miocenica
preservation code
G
M
P
57
28.5
0
Geologic time (Ma)

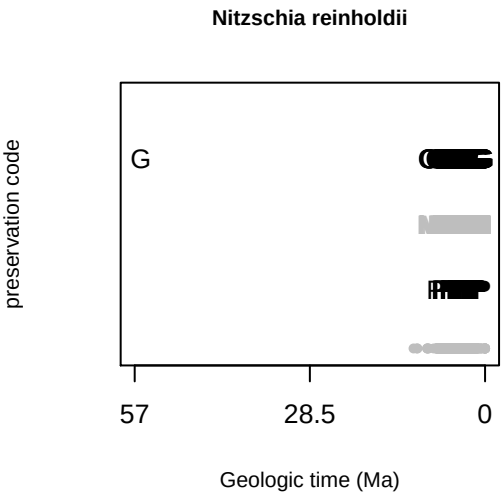

Nitzschia panduriformis
preservation code
G
M
P
5
2.5
0
Geologic time (Ma)

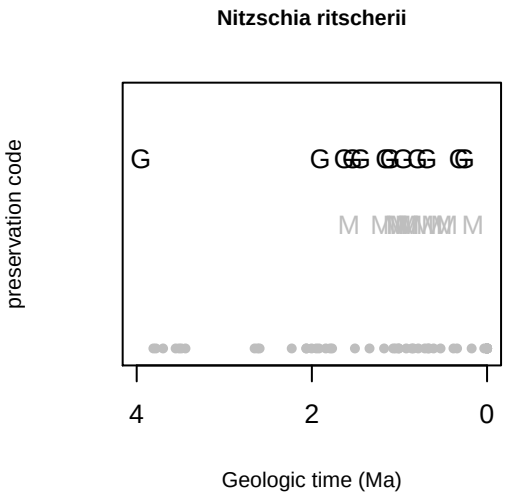

Nitzschia porteri
preservation code
14
8.5
3
Geologic time (Ma)

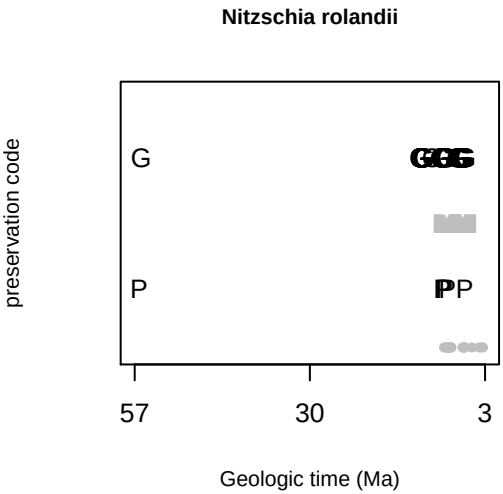

Nitzschia praereinholdii
preservation code
13
6.5
0
Geologic time (Ma)

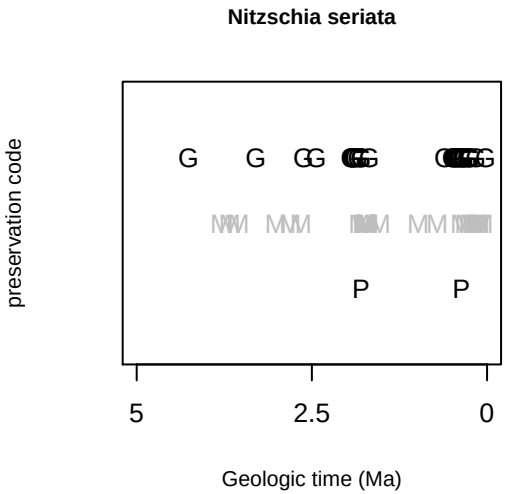

Nitzschia pseudokerguelensis
preservation code
14
9
4
Geologic time (Ma)

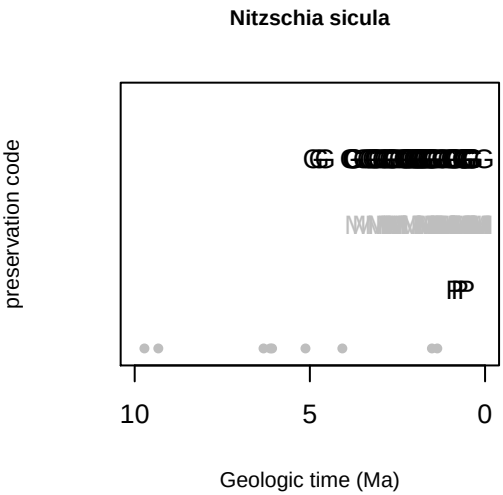

Nitzschia pusilla
preservation code
20
17
14
Geologic time (Ma)

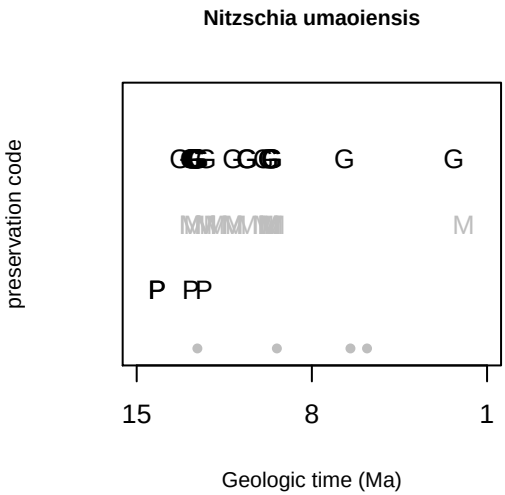

Nitzschia reinholdii
preservation code
G
57
28.5
0
Geologic time (Ma)

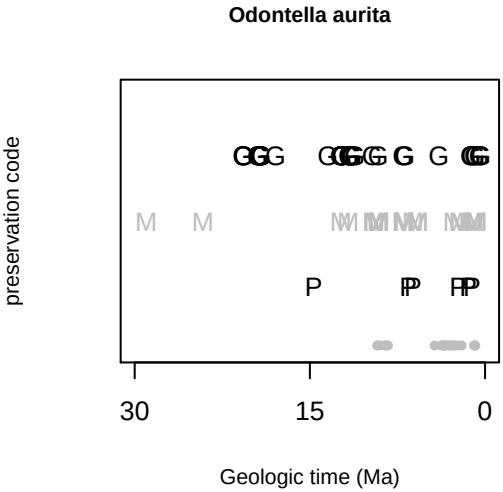

Nitzschia ritscherii
preservation code
G
M
4
2
0
Geologic time (Ma)

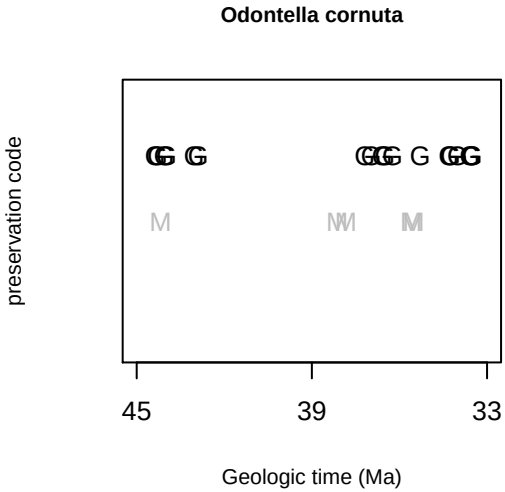

Nitzschia rolandii
preservation code
G
P
57
30
3
Geologic time (Ma)

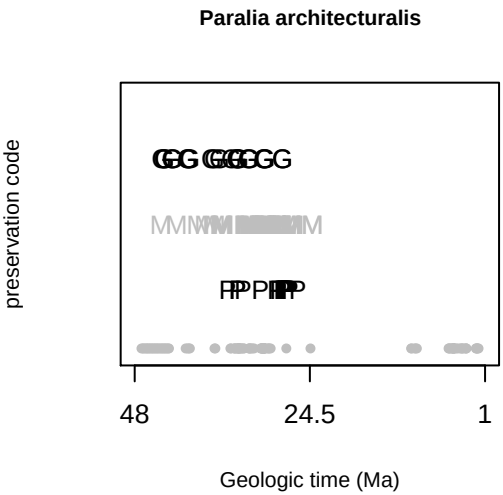

Nitzschia seriata
preservation code
G
M
P
5
2.5
0
Geologic time (Ma)

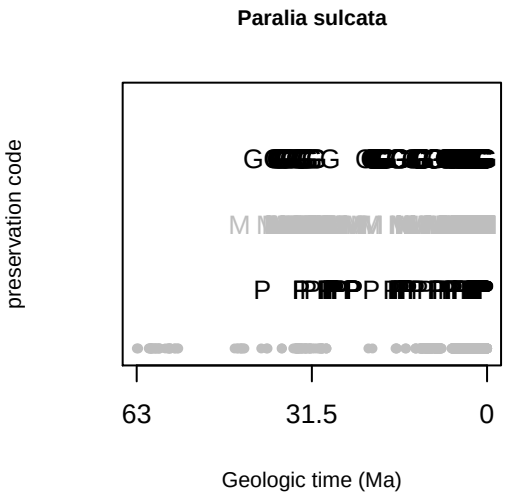

Nitzschia sicula
preservation code
10
5
0
Geologic time (Ma)

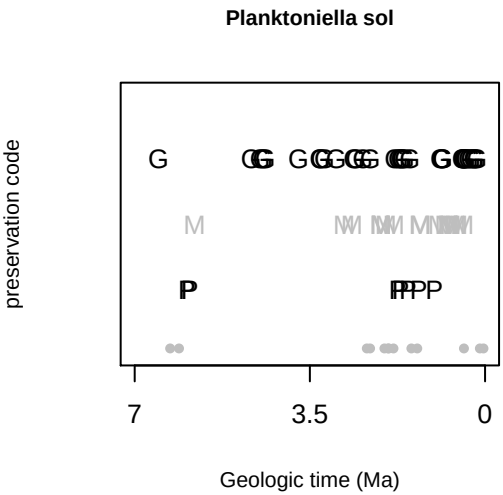

Nitzschia umaoiensis
preservation code
15
8
1
Geologic time (Ma)

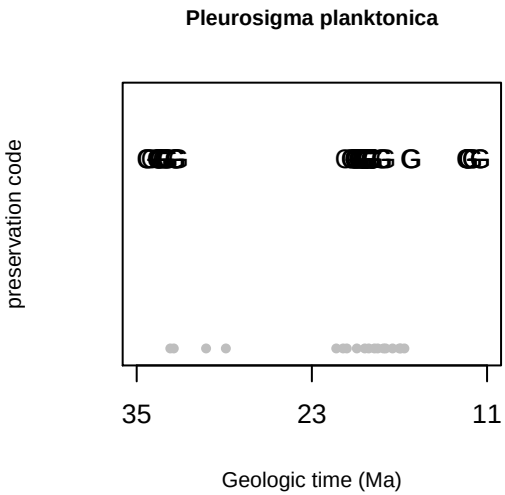

Odontella aurita
preservation code
30
15
0
Geologic time (Ma)

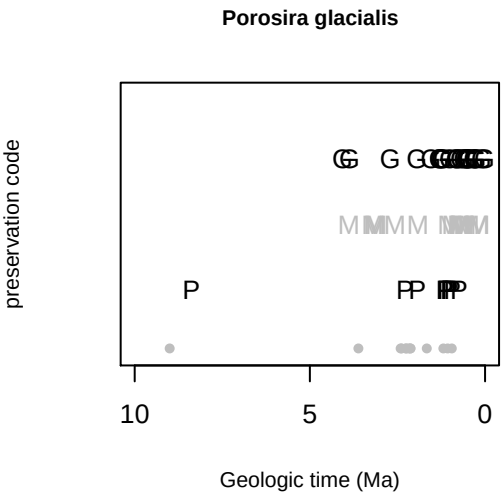

Odontella cornuta
preservation code
45
39
33
Geologic time (Ma)

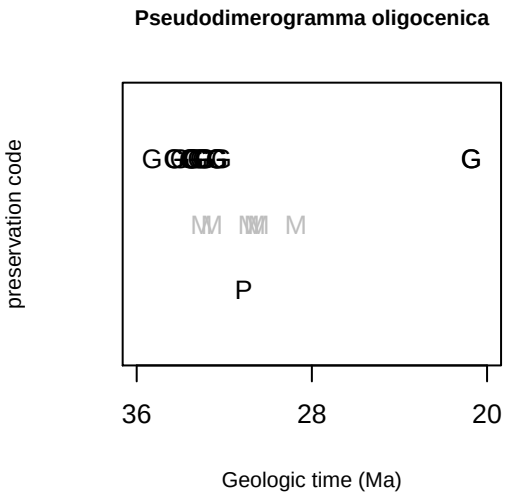

Paralia architecturalis
preservation code
48
24.5
1
Geologic time (Ma)

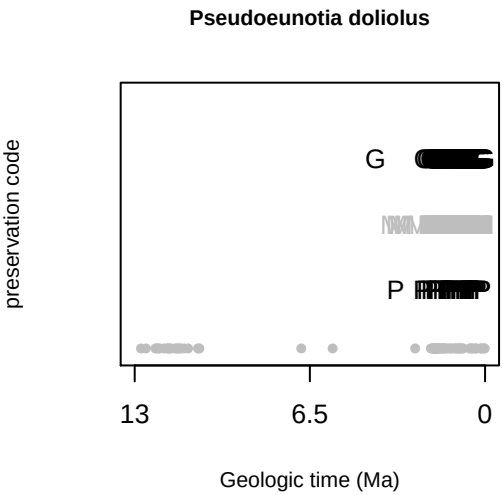

Paralia sulcata
preservation code
63
31.5
0
Geologic time (Ma)

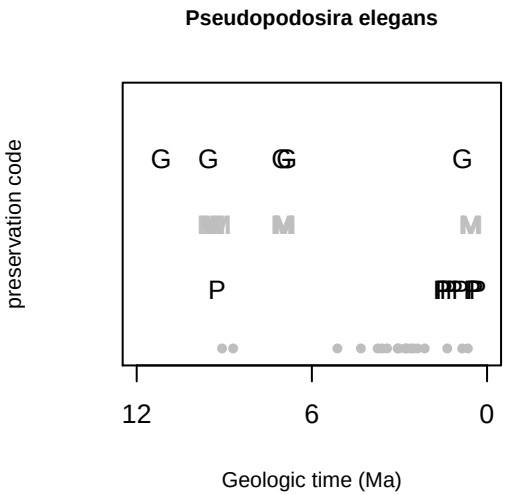

Planktoniella sol
preservation code
7
3.5
0
Geologic time (Ma)

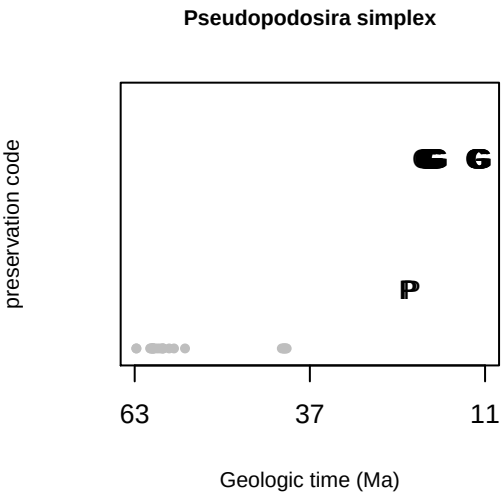

Pleurosigma planktonica
preservation code
35
23
11
Geologic time (Ma)

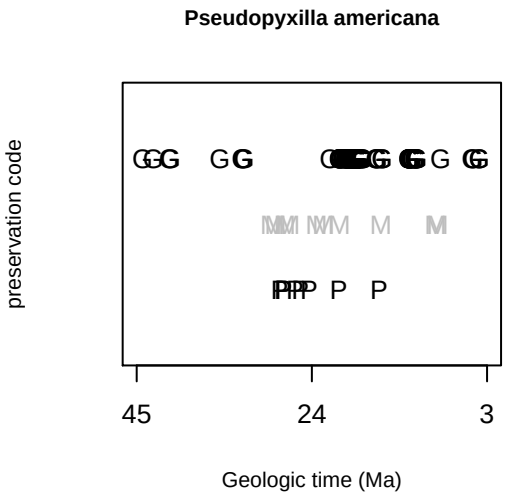

Porosira glacialis
preservation code
G
M
P
10
5
0
Geologic time (Ma)

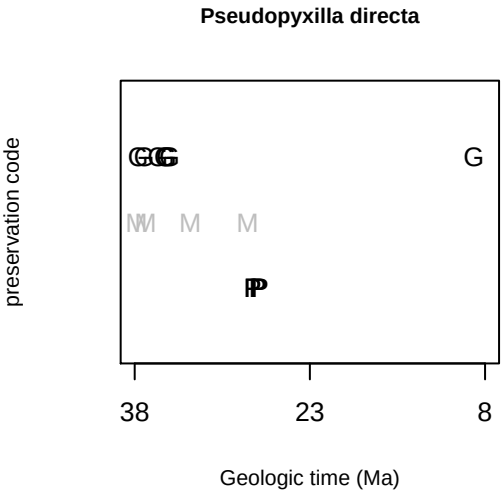

Pseudodimerogramma oligocenica
preservation code
G
M
P
36
28
20
Geologic time (Ma)

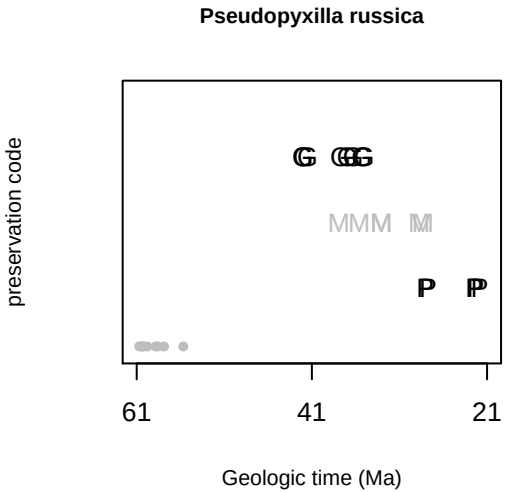

Pseudoeunotia doliolus
preservation code
G
M
P
13
6.5
0
Geologic time (Ma)

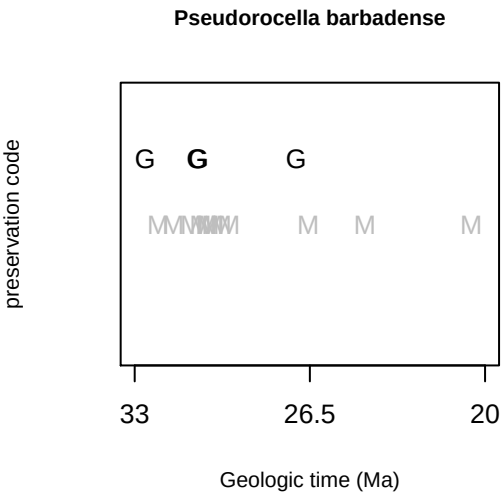

Pseudopodosira elegans
preservation code
G
M
P
12
6
0
Geologic time (Ma)

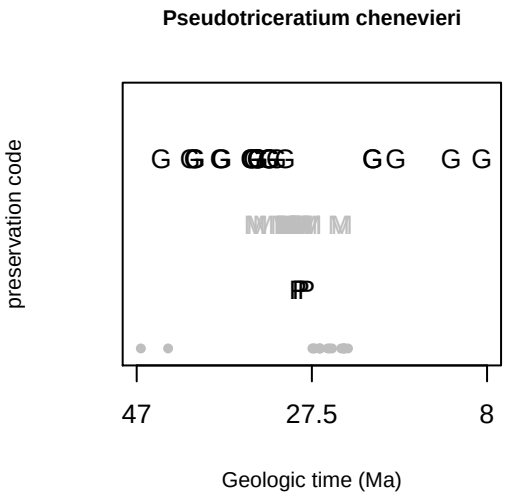

Pseudopodosira simplex
preservation code
63
37
11
Geologic time (Ma)

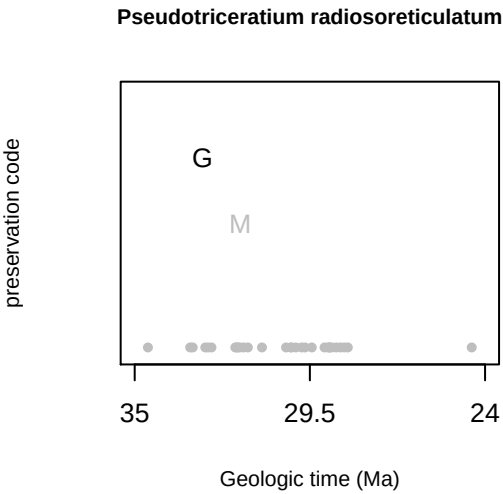

Pseudopyxilla americana
preservation code
45
24
3
Geologic time (Ma)

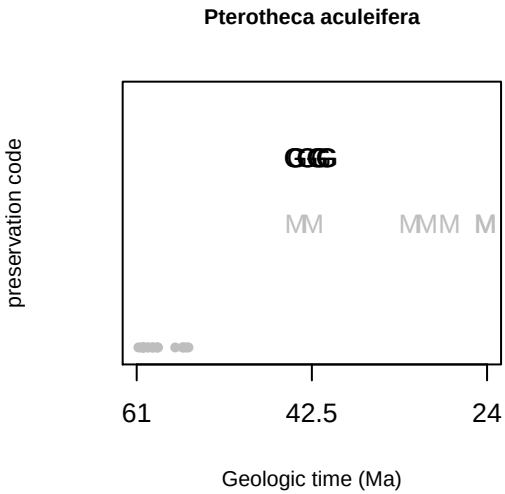

Pseudopyxilla directa
preservation code
38
23
8
Geologic time (Ma)

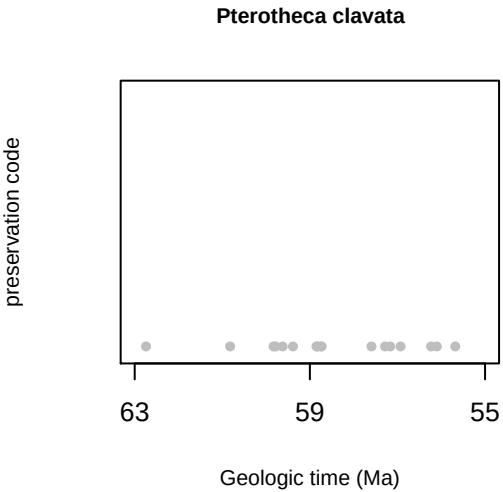

Pseudopyxilla russica
preservation code
61
41
21
Geologic time (Ma)

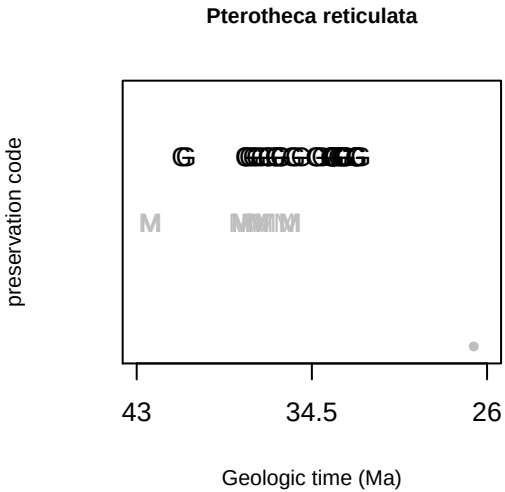

Pseudorocella barbadense
preservation code
G G G
M M M M
33
26.5
20
Geologic time (Ma)

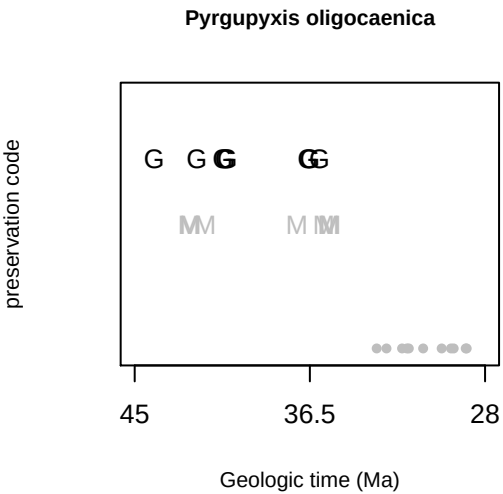

Pseudotriceratium chenevieri
preservation code
G G G G G G G G G
M M
47
27.5
8
Geologic time (Ma)

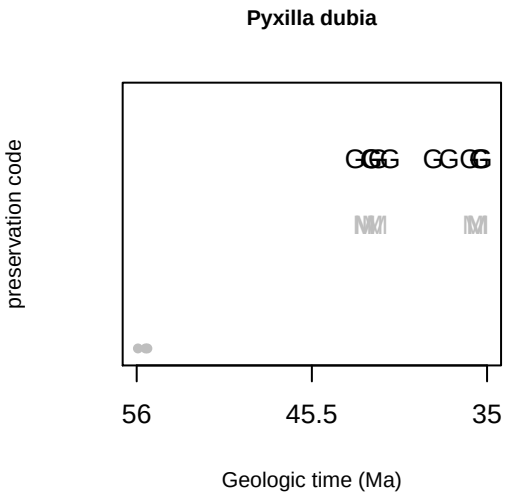

Pseudotriceratium radiosoreticulatum
preservation code
G
M
35
29.5
24
Geologic time (Ma)

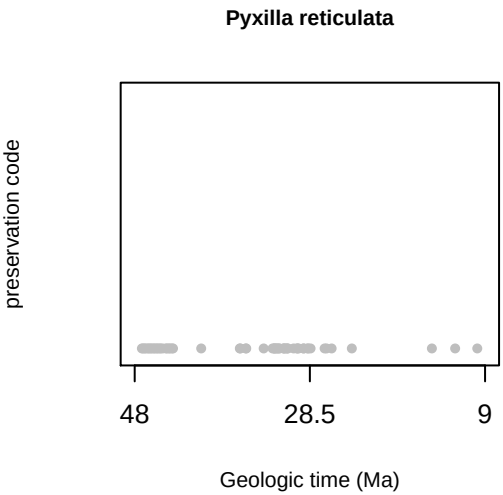

Pterotheca aculeifera
preservation code
G G G
M M M M M
61
42.5
24
Geologic time (Ma)

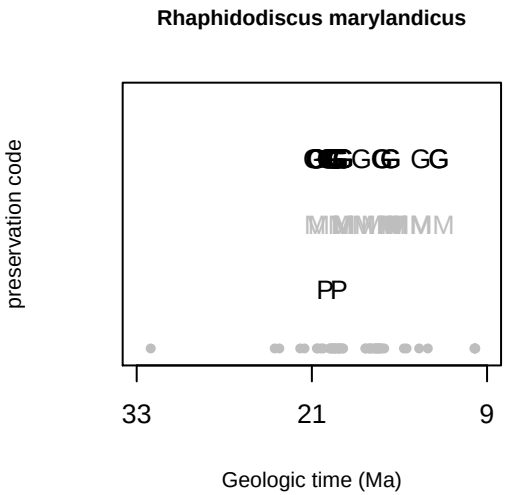

Pterotheca clavata
preservation code
63
59
55
Geologic time (Ma)

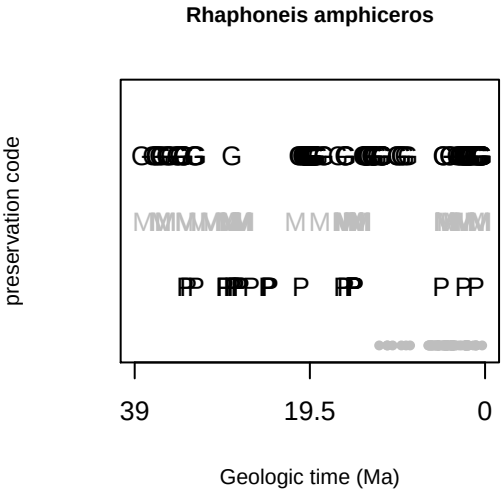

Pterotheca reticulata
preservation code
43
34.5
26
Geologic time (Ma)

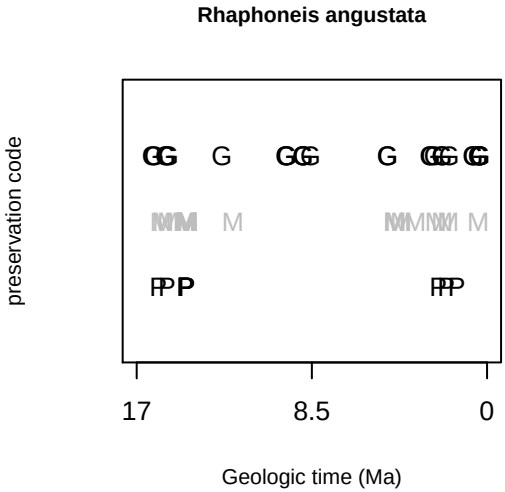

Pyrgupyxis oligocaenica
preservation code
45
36.5
28
Geologic time (Ma)

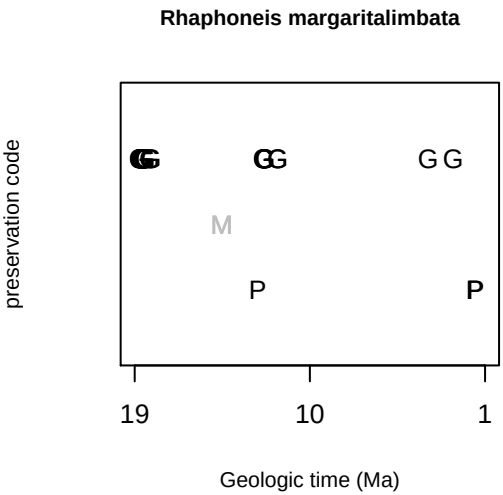

Pyxilla dubia
preservation code
56
45.5
35
Geologic time (Ma)

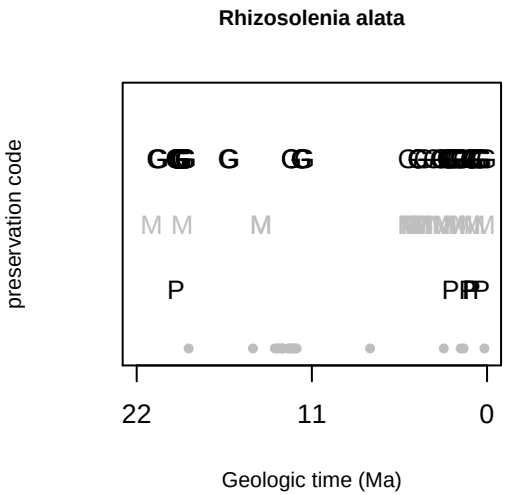

Pyxilla reticulata
preservation code
48
28.5
9
Geologic time (Ma)

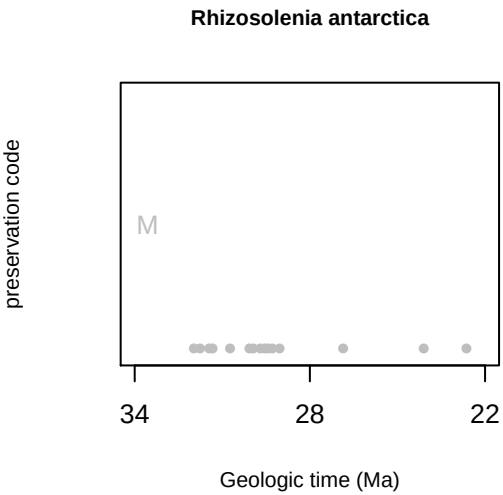

Rhaphidodiscus marylandicus
preservation code
33
21
9
Geologic time (Ma)

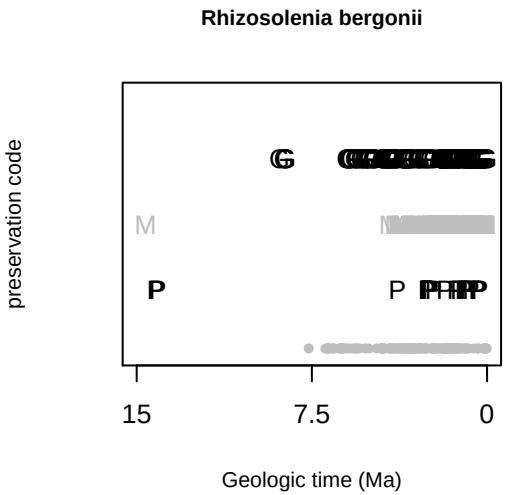

Rhaphoneis amphiceros
preservation code
39
19.5
0
Geologic time (Ma)

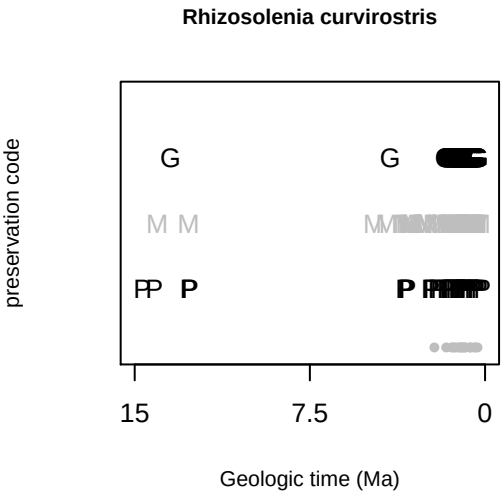

Rhaphoneis angustata
preservation code
17
8.5
0
Geologic time (Ma)

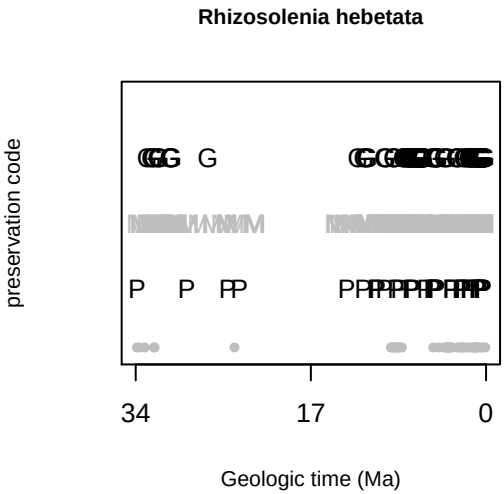

Rhaphoneis margaritalimbata
preservation code
G G G G G
M
P P
19
10
1
Geologic time (Ma)

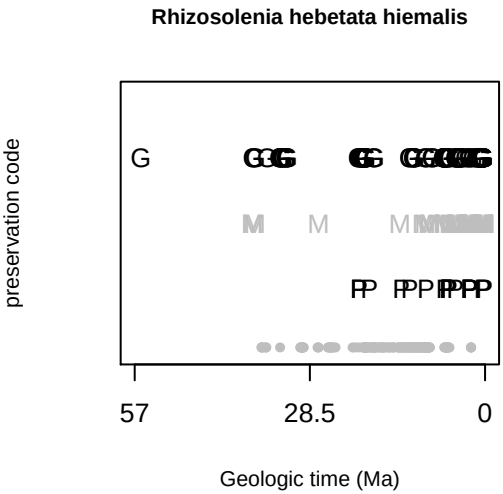

Rhizosolenia alata
preservation code
G G G G G
M M M
P P P
22
11
0
Geologic time (Ma)

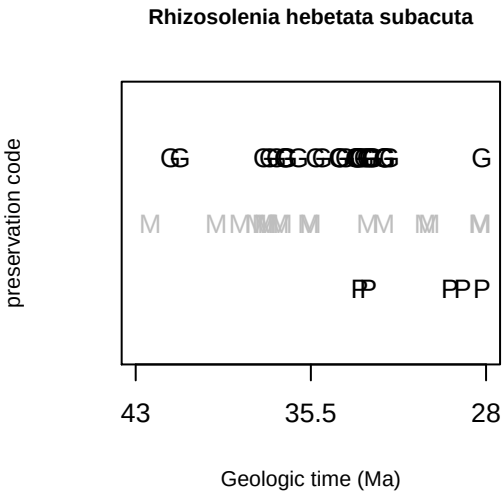

Rhizosolenia antarctica
preservation code
M
34
28
22
Geologic time (Ma)

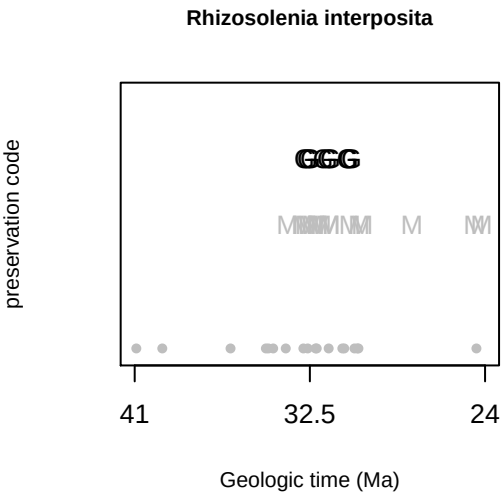

Rhizosolenia bergonii
preservation code
G
M
P P
15
7.5
0
Geologic time (Ma)

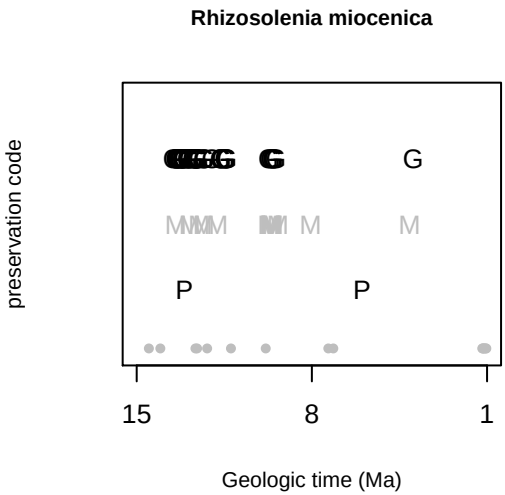

Rhizosolenia curvirostris
preservation code
G
G
M M
M
PP P
P
15
7.5
0
Geologic time (Ma)

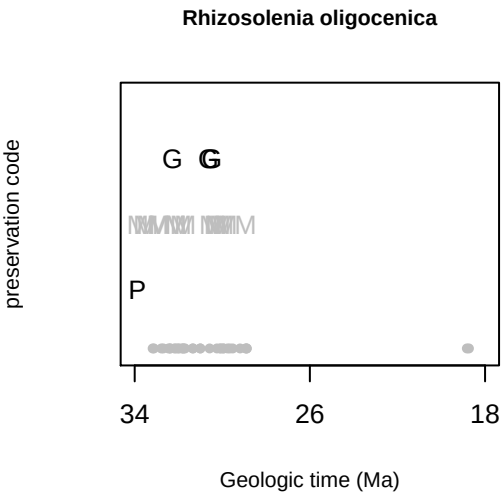

Rhizosolenia hebetata
preservation code
G
P P PP
PP
34
17
0
Geologic time (Ma)

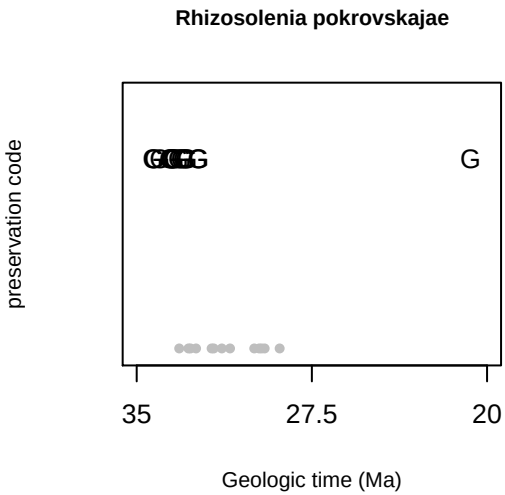

Rhizosolenia hebetata hiemalis
preservation code
G
M M
M
PP PPP
57
28.5
0
Geologic time (Ma)

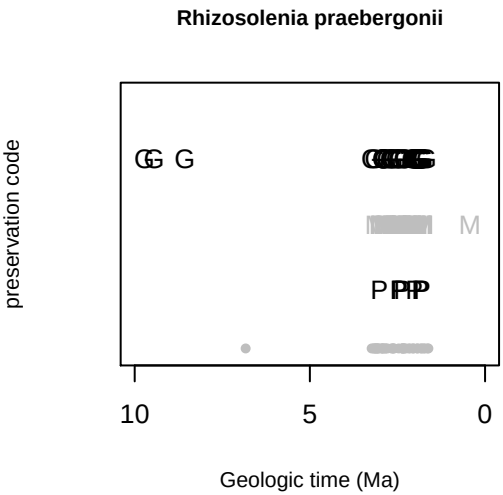

Rhizosolenia hebetata subacuta
preservation code
G
G
M M
M
PP
PP P
43
35.5
28
Geologic time (Ma)

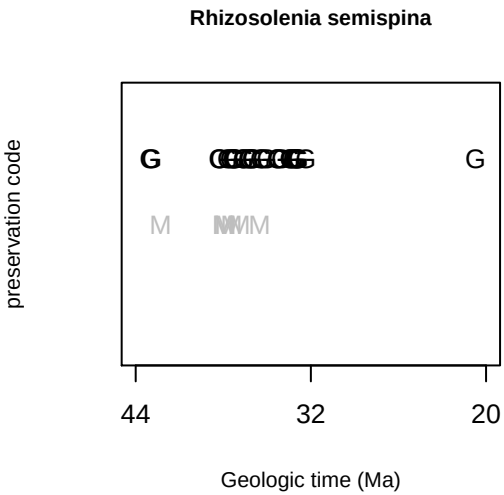

Rhizosolenia interposita
preservation code
41
32.5
24
Geologic time (Ma)

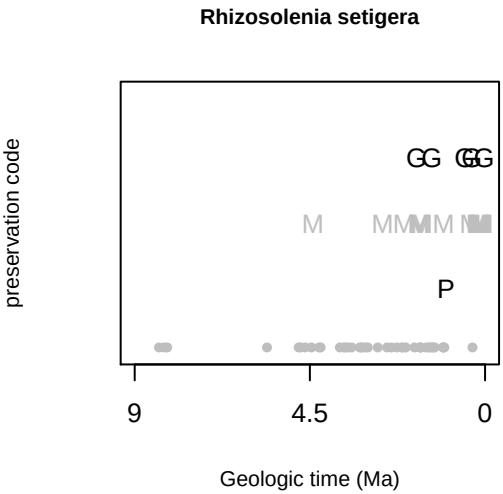

Rhizosolenia miocenica
preservation code
15
8
1
Geologic time (Ma)

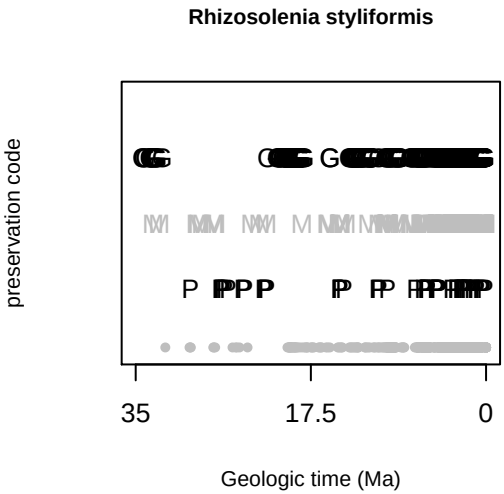

Rhizosolenia oligocenica
preservation code
34
26
18
Geologic time (Ma)

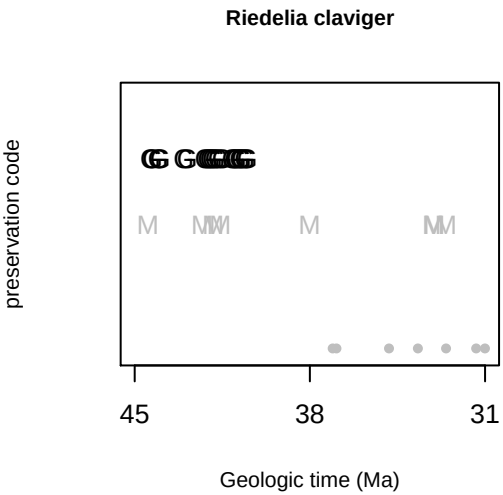

Rhizosolenia pokrovskajae
preservation code
35
27.5
20
Geologic time (Ma)

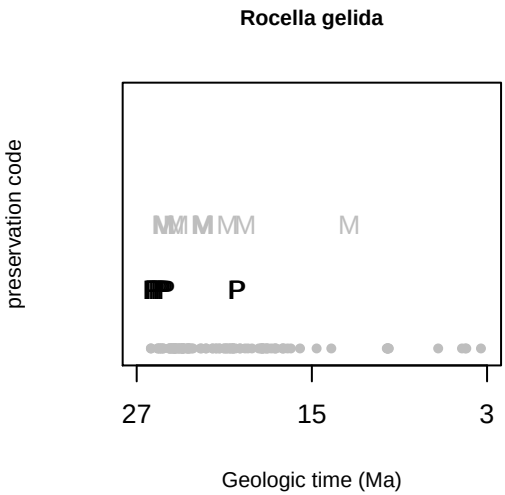

Rhizosolenia praebergonii
preservation code
Geologic time (Ma)
10
5
0

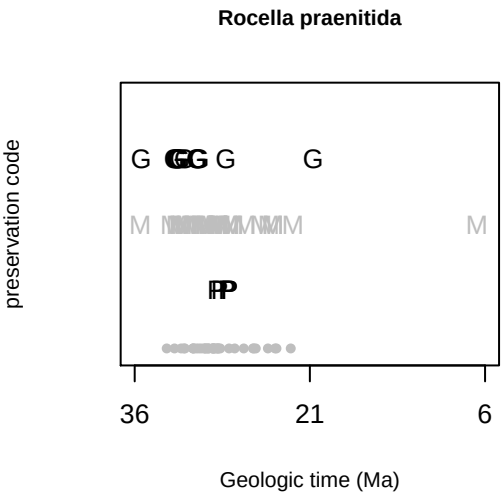

Rhizosolenia semispina
preservation code
Geologic time (Ma)
44
32
20

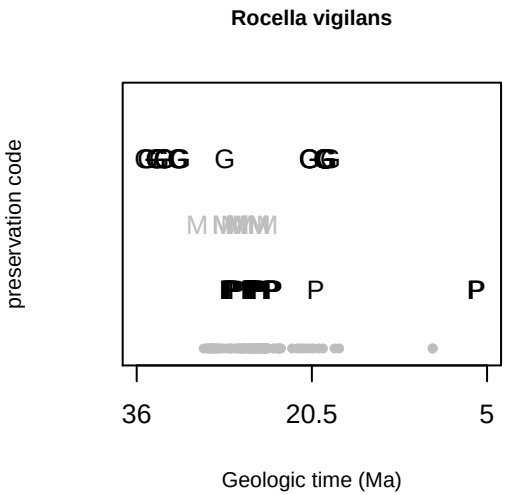

Rhizosolenia setigera
preservation code
Geologic time (Ma)
9
4.5
0


Rhizosolenia styliformis
preservation code
Geologic time (Ma)
35
17.5
0

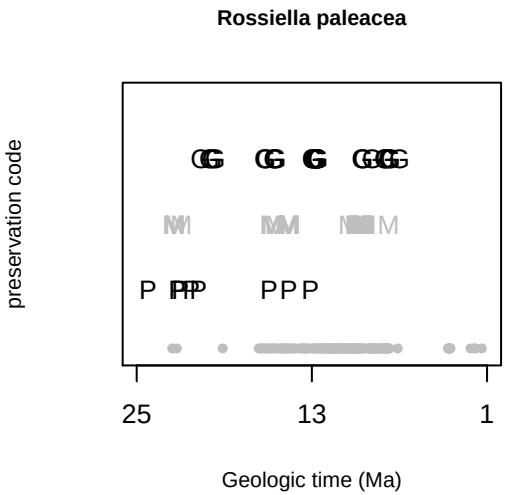

Riedelia claviger
preservation code
45
38
31
Geologic time (Ma)

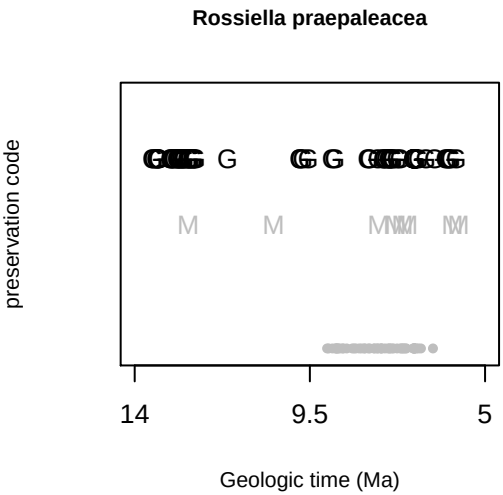

Rocella gelida
preservation code
27
15
3
Geologic time (Ma)

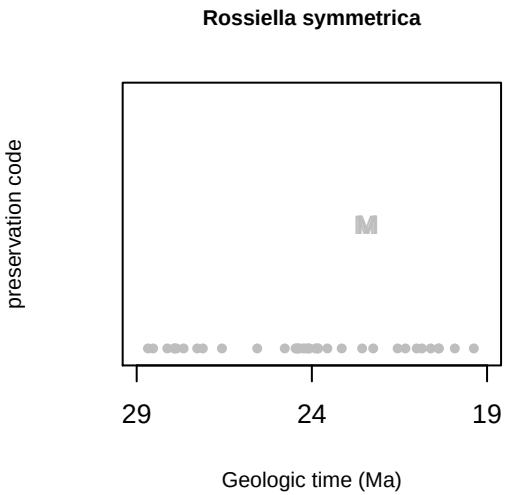

Rocella praenitida
preservation code
36
21
6
Geologic time (Ma)

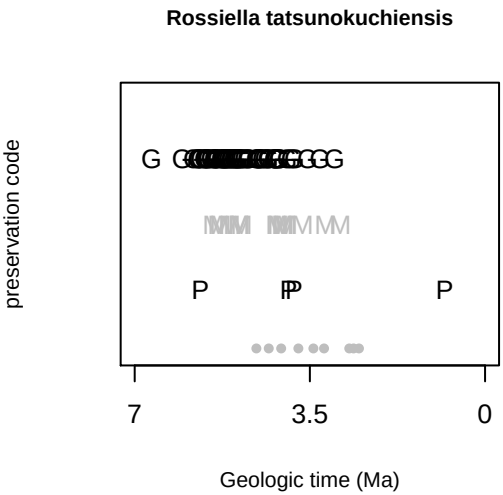

Rocella vigilans
preservation code
36
20.5
5
Geologic time (Ma)

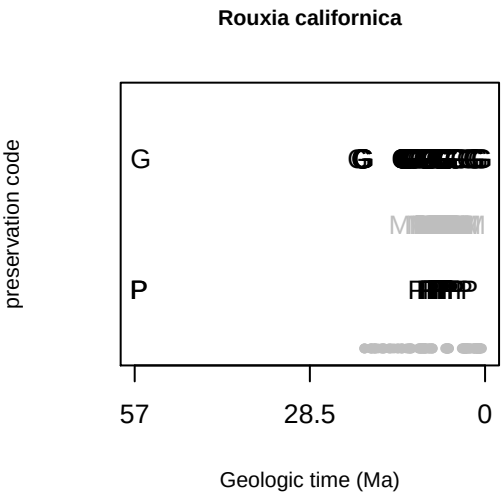
Roperia tesselata
preservation code
13
6.5
0
Geologic time (Ma)

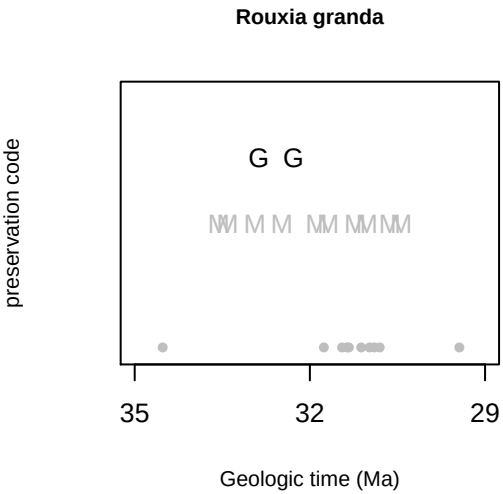

Rossiella paleacea
preservation code
25
13
1
Geologic time (Ma)

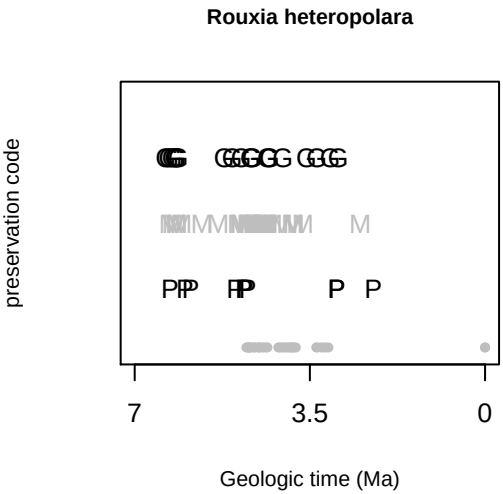

Rossiella praepaleacea
preservation code
14
9.5
5
Geologic time (Ma)

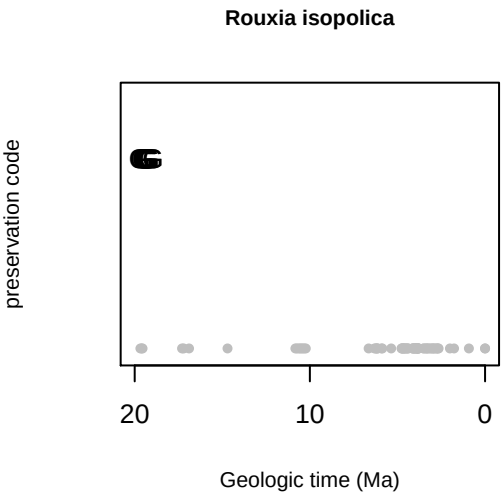

Rossiella symmetrica
preservation code
29
24
19
Geologic time (Ma)

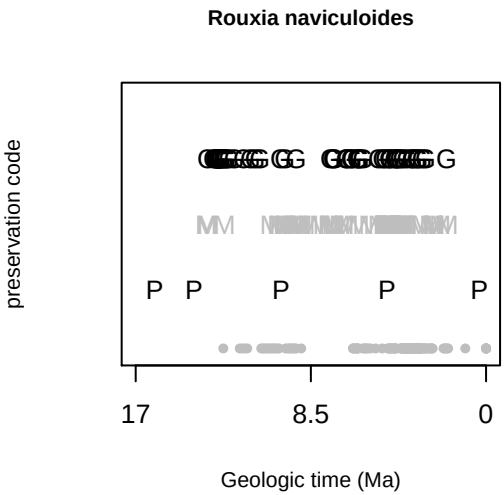

Rossiella tatsunokuchiensis
preservation code
G
M
P
7
3.5
0
Geologic time (Ma)

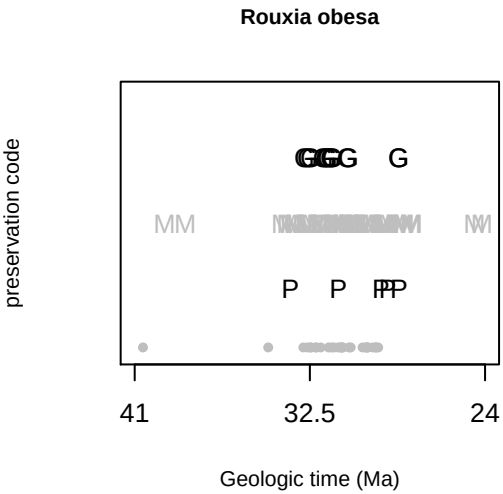

Rouxia californica
preservation code
G
M
P
57
28.5
0
Geologic time (Ma)

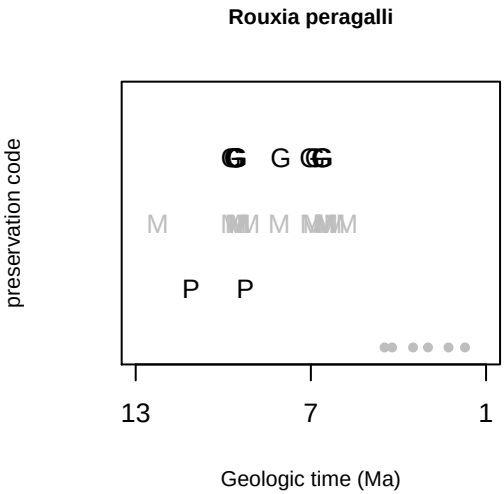

Rouxia granda
preservation code
G
M
35
32
29
Geologic time (Ma)

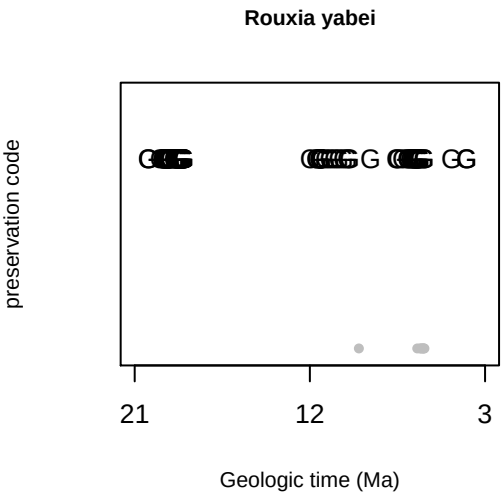

Rouxia heteropolara
preservation code
G
M
P
7
3.5
0
Geologic time (Ma)

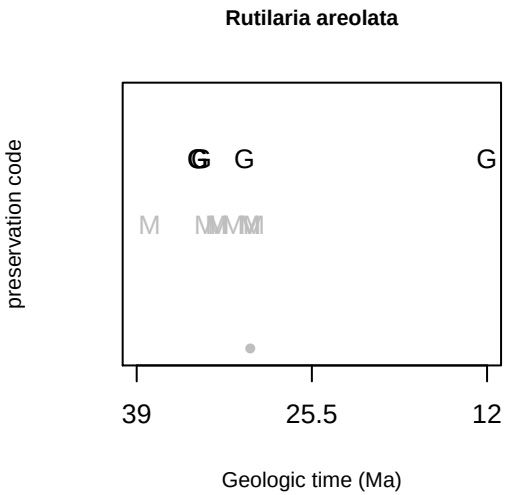

Rouxia isopolica
preservation code
20
10
0
Geologic time (Ma)

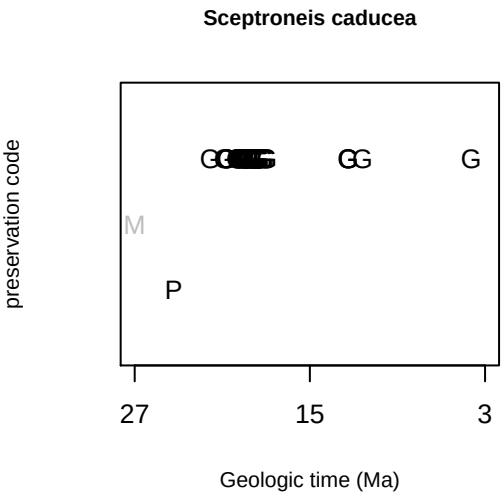

Rouxia naviculoides
preservation code
P P P P P
17
8.5
0
Geologic time (Ma)

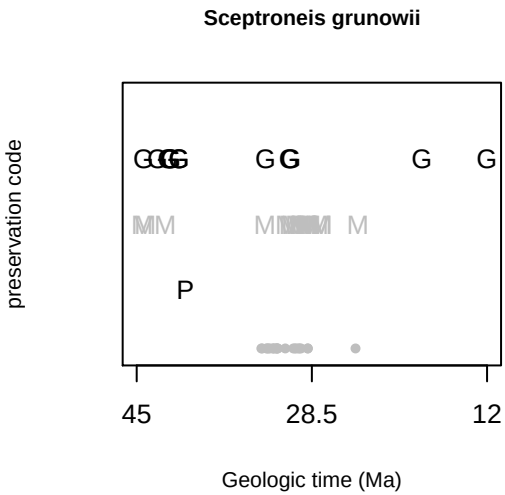

Rouxia obesa
preservation code
G
MM
P P P
41
32.5
24
Geologic time (Ma)

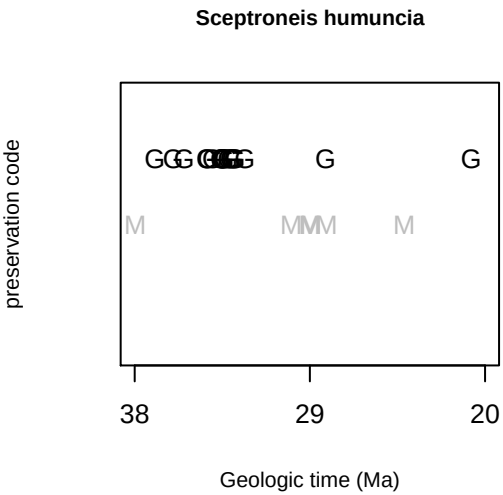

Rouxia peragalli
preservation code
G G
M M
P P
13
7
1
Geologic time (Ma)

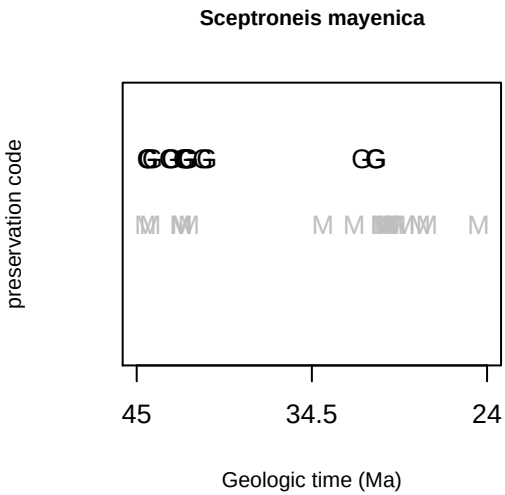

Rouxia yabei
preservation code
21
12
3
Geologic time (Ma)

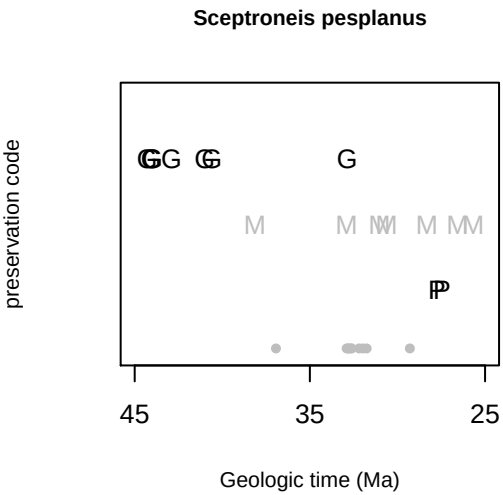

Rutilaria areolata
preservation code
G
G
G
M
39
25.5
12
Geologic time (Ma)

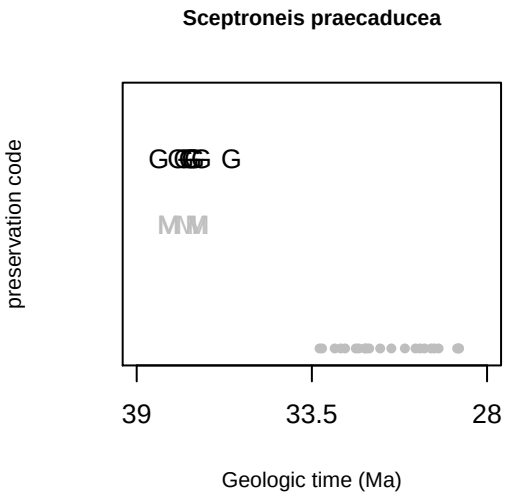

Sceptroneis caducea
preservation code
G
M
P
27
15
3
Geologic time (Ma)

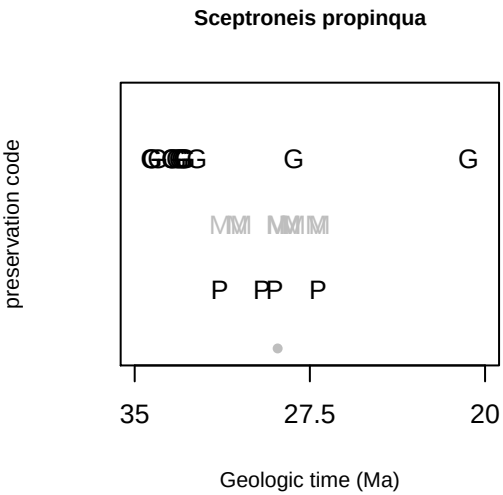

Sceptroneis grunowii
preservation code
G
G
G
G
M
P
45
28.5
12
Geologic time (Ma)

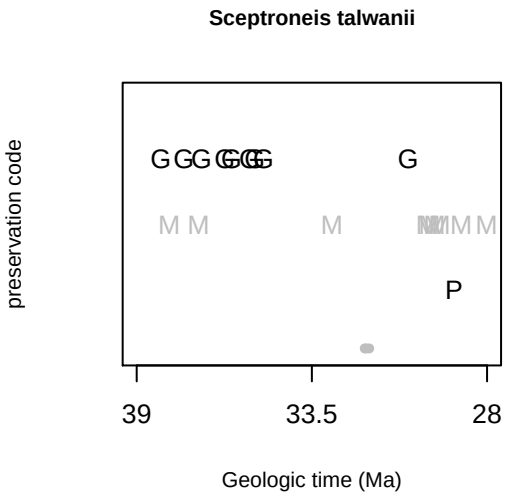

Sceptroneis humuncia
preservation code
38
29
20
Geologic time (Ma)


Sceptroneis mayenica
preservation code
45
34.5
24
Geologic time (Ma)


Sceptroneis pesplanus
preservation code
45
35
25
Geologic time (Ma)


Sceptroneis praecaducea
preservation code
39
33.5
28
Geologic time (Ma)


Sceptroneis propinqua
preservation code
G
G
M
P
35
27.5
20
Geologic time (Ma)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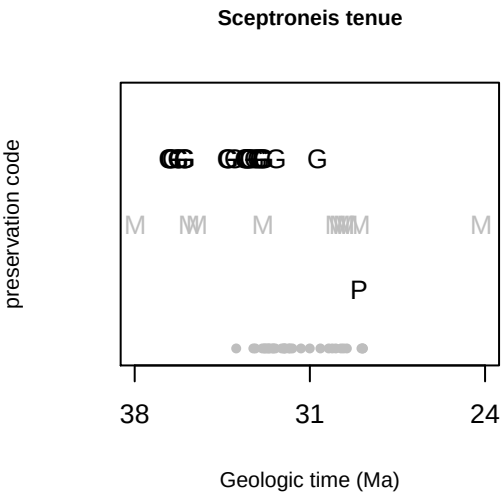
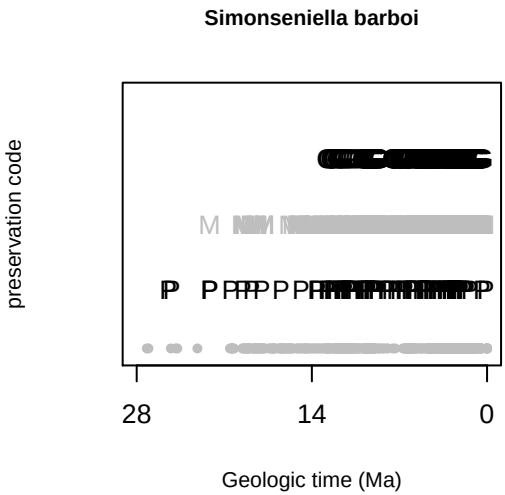
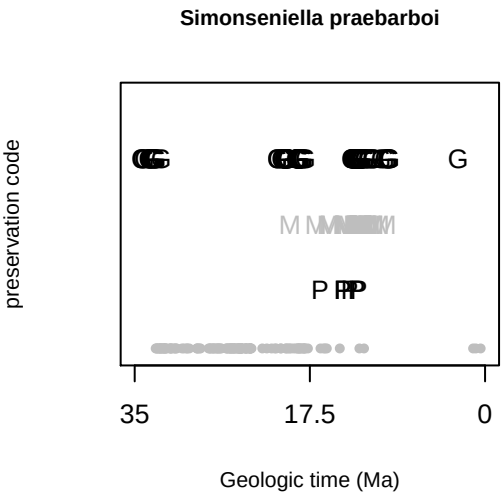
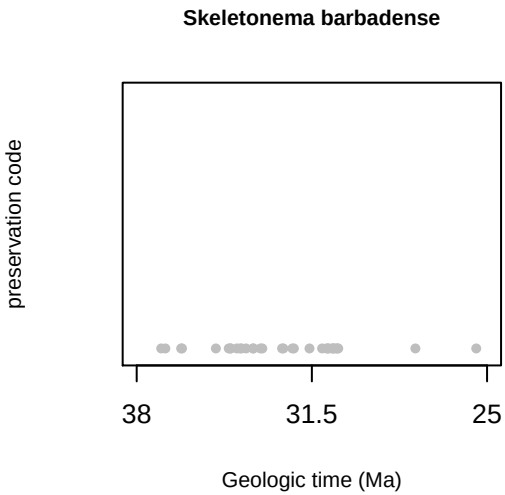
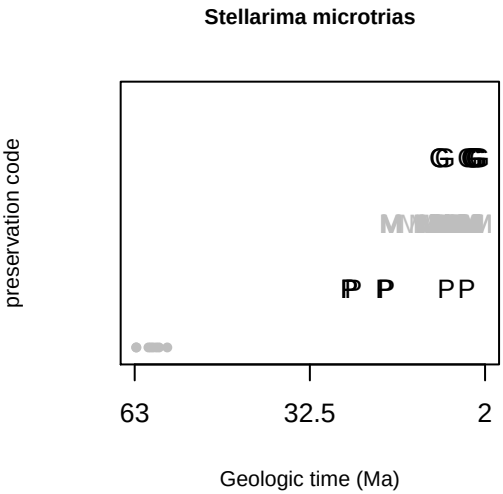
M
P
39
33.5
28
Geologic time (Ma)

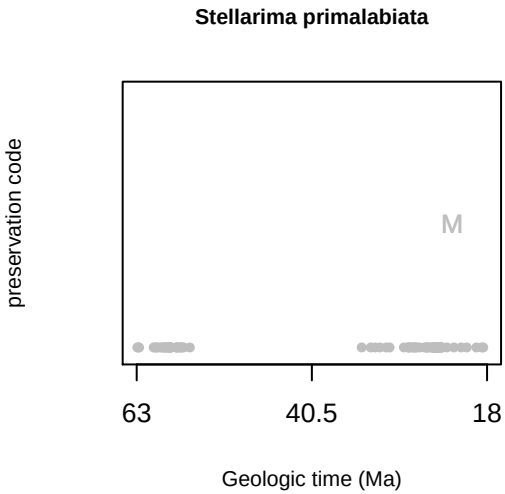

Sceptroneis tenue
preservation code
G
M
P
38
31
24
Geologic time (Ma)

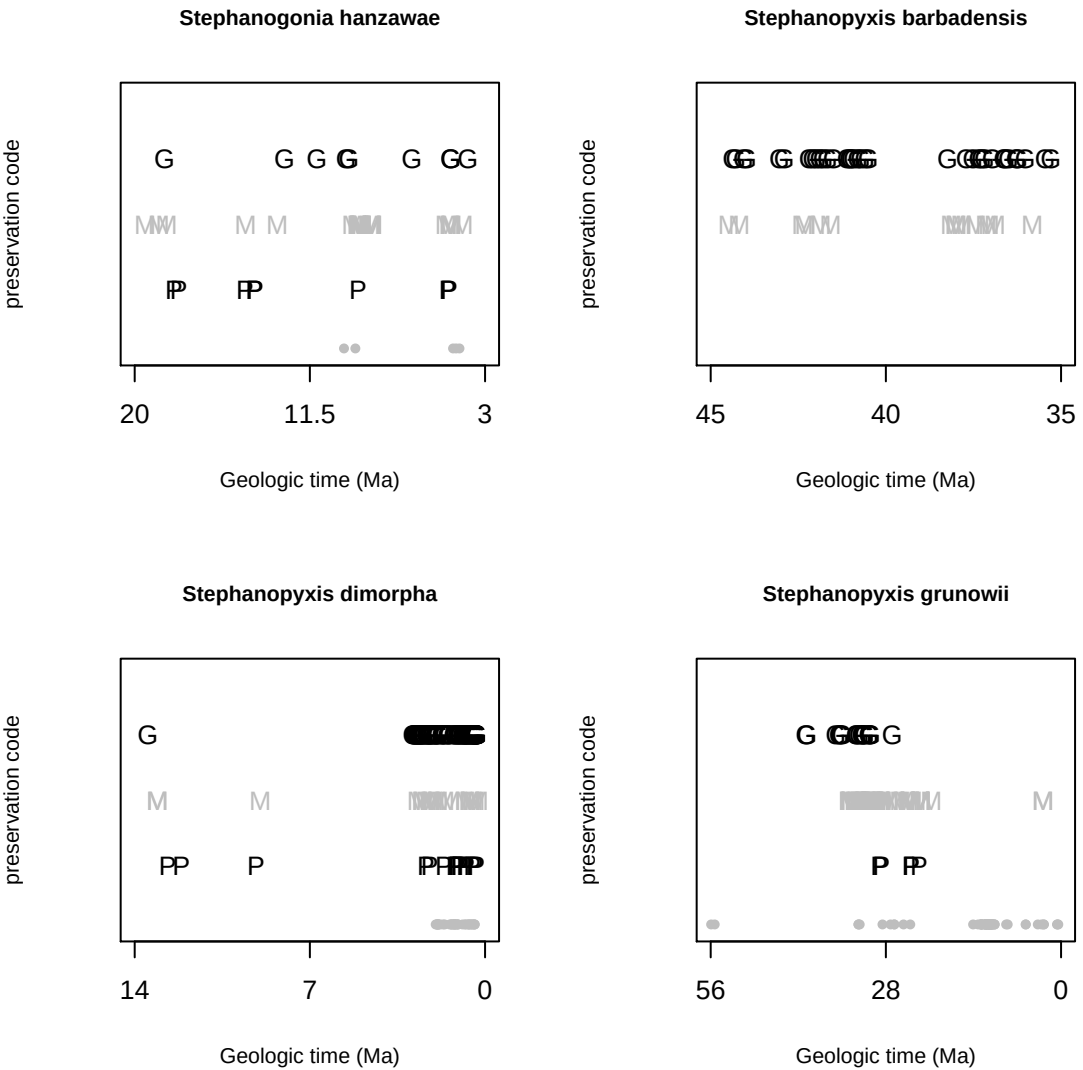

Simonseniella barboi
preservation code
M
P
28
14
0
Geologic time (Ma)

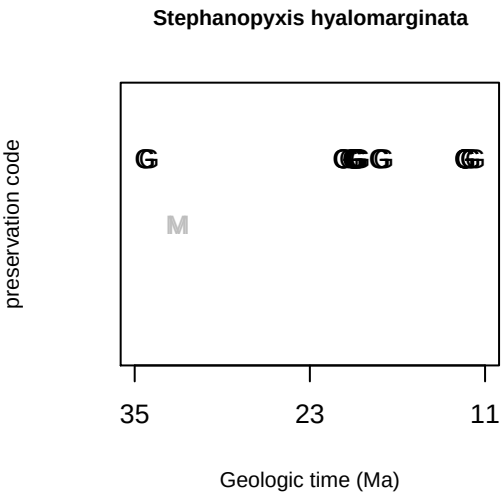

Simonseniella praebarboi
preservation code
G
M
P
35
17.5
0
Geologic time (Ma)

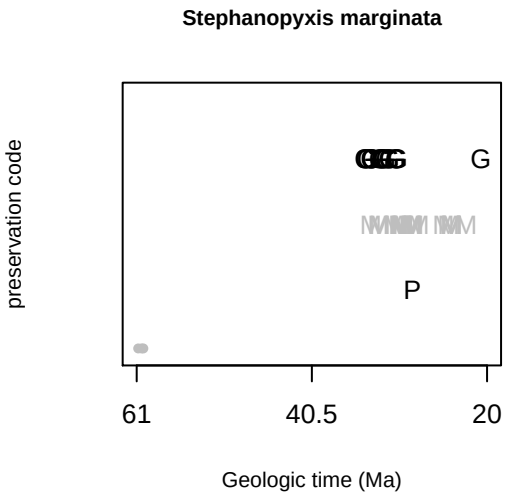

Skeletonema barbadense
preservation code
38
31.5
25
Geologic time (Ma)

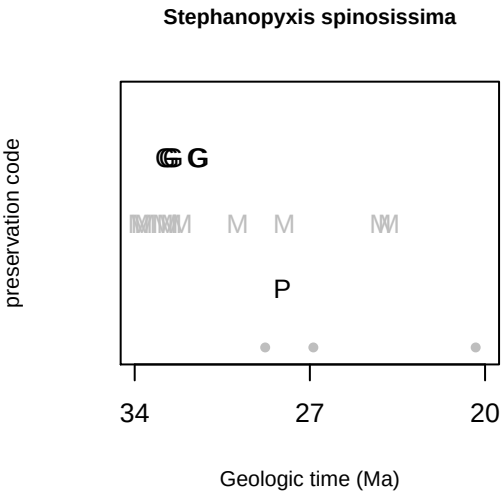

Stellarima microtrias
preservation code
G
M
P
63
32.5
2
Geologic time (Ma)


Stellarima primalabiata
preservation code
M
63
40.5
18
Geologic time (Ma)


Stephanogonia hanzawae
preservation code
Geologic time (Ma)
20
11.5
3
Stephanopyxis barbadensis
preservation code
Geologic time (Ma)
45
40
35
Stephanopyxis dimorpha
preservation code
Geologic time (Ma)
14
7
0
Stephanopyxis grunowii
preservation code
Geologic time (Ma)
56
28
0


Stephanopyxis hyalomarginata
preservation code
G
M
35
23
11
Geologic time (Ma)


Stephanopyxis marginata
preservation code
G
M
P
61
40.5
20
Geologic time (Ma)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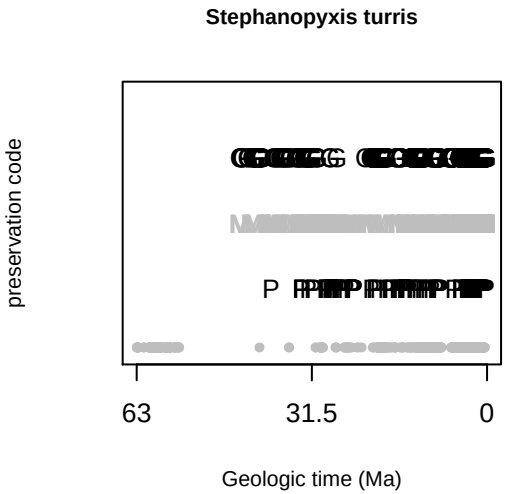
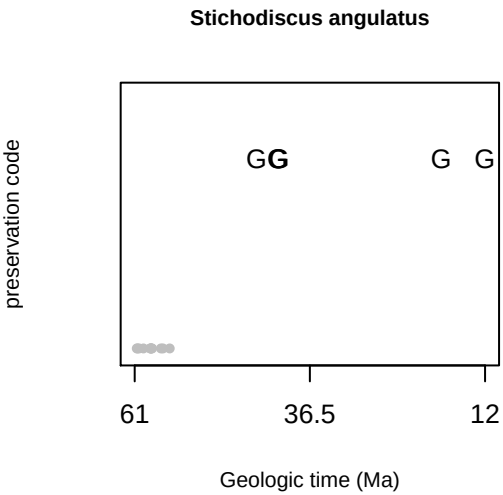
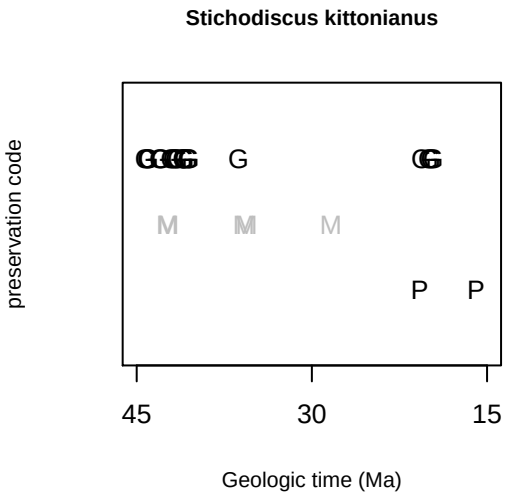
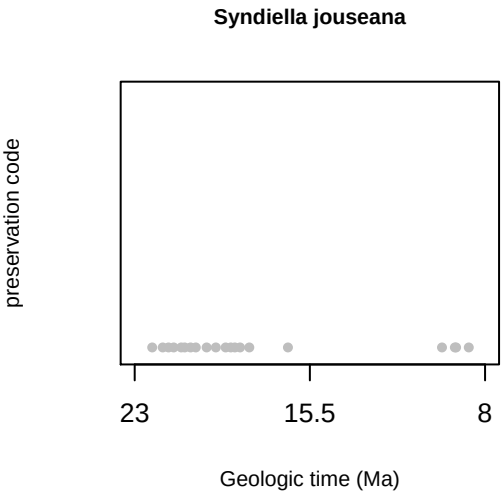
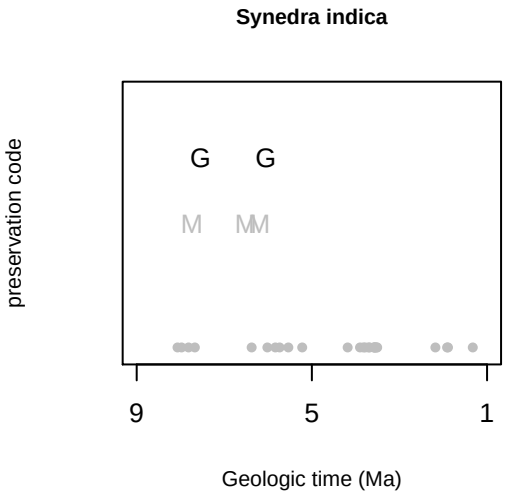
preservation code
G
M
P
34
27
20
Geologic time (Ma)

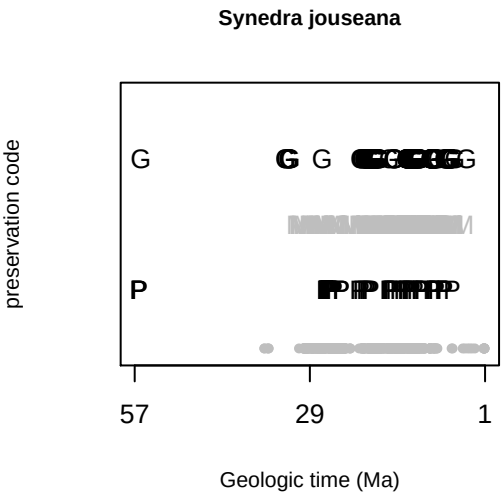

Stephanopyxis turris
preservation code
G
M
P
63
31.5
0
Geologic time (Ma)

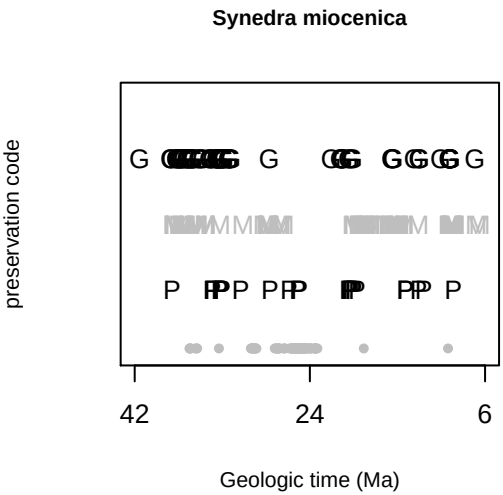

Stichodiscus angulatus
preservation code
G G G G
61
36.5
12
Geologic time (Ma)

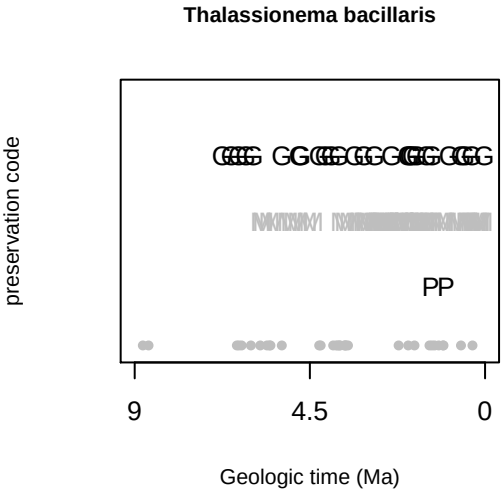

Stichodiscus kittonianus
preservation code
G G
M M M
P P
45
30
15
Geologic time (Ma)

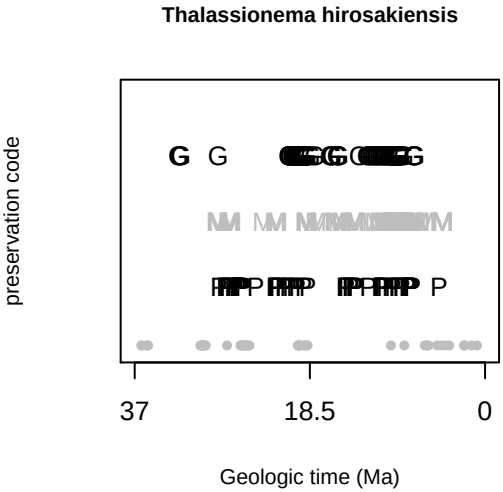

Syndiella jouseana
preservation code
23
15.5
8
Geologic time (Ma)


Synedra indica
preservation code
G G
M M
9
5
1
Geologic time (Ma)


Synedra jouseana
preservation code
G
P
57
29
1
Geologic time (Ma)


Synedra miocenica
preservation code
G
P
42
24
6
Geologic time (Ma)


Thalassionema bacillaris
preservation code
PP
9
4.5
0
Geologic time (Ma)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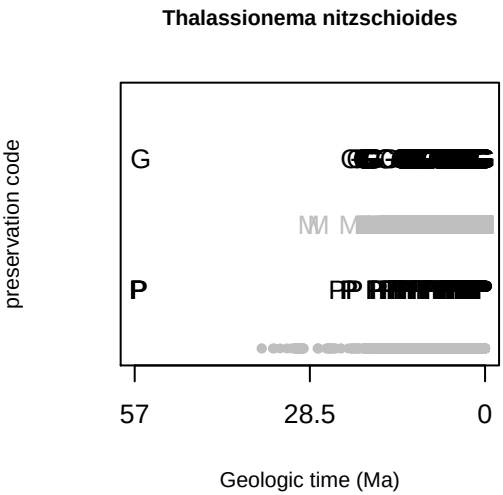
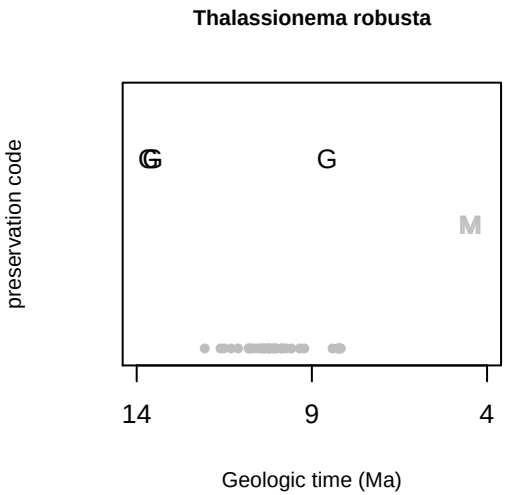
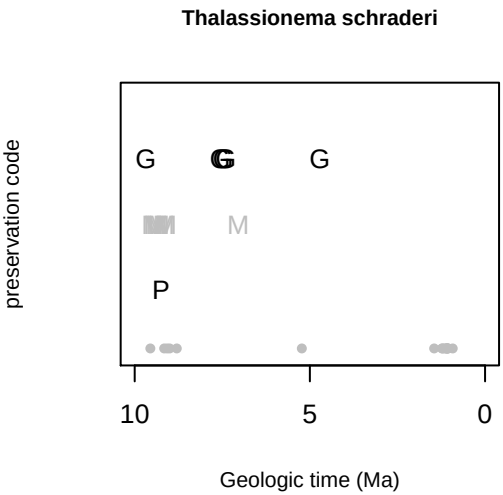
preservation code
G
P
37
18.5
0
Geologic time (Ma)


Thalassionema nitzschioides
preservation code
G
M
P
57
28.5
0
Geologic time (Ma)


Thalassionema robusta
preservation code
G
M
14
9
4
Geologic time (Ma)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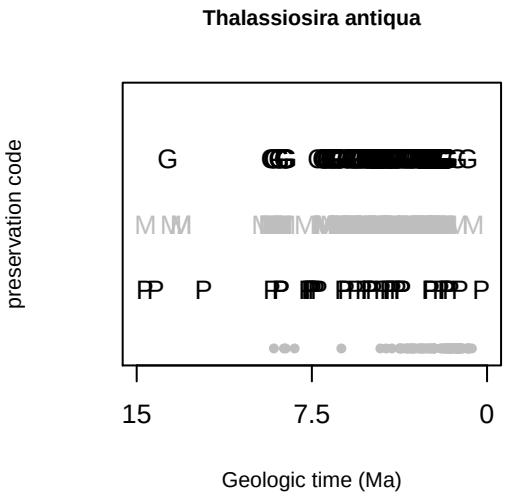
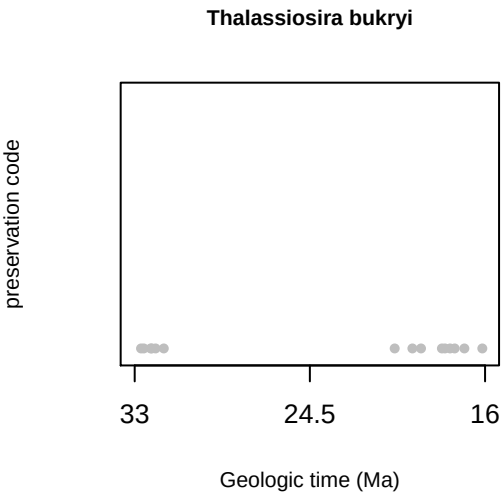
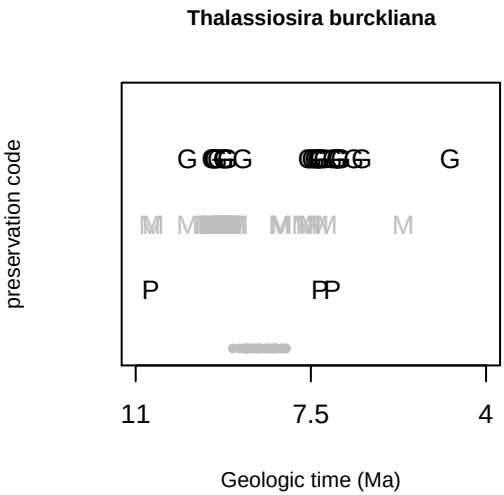
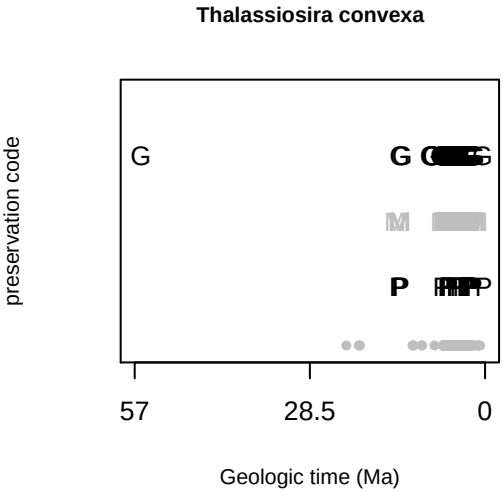
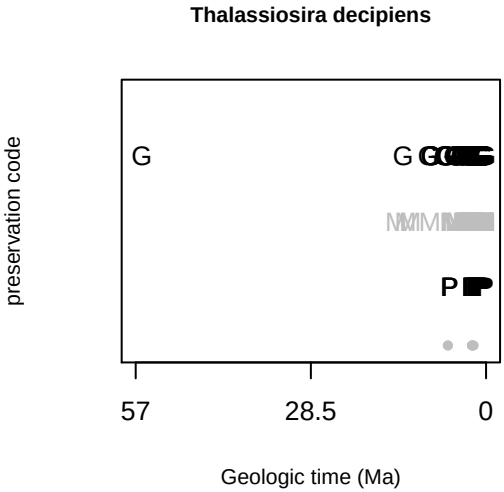
preservation code
G
M
P
10
5
0
Geologic time (Ma)


Thalassiosira antiqua
preservation code
G
M
P
15
7.5
0
Geologic time (Ma)


Thalassiosira bukryi
preservation code
33
24.5
16
Geologic time (Ma)


Thalassiosira burckliana
preservation code
G
M
P
11
7.5
4
Geologic time (Ma)


Thalassiosira convexa
preservation code
G
M
P
57
28.5
0
Geologic time (Ma)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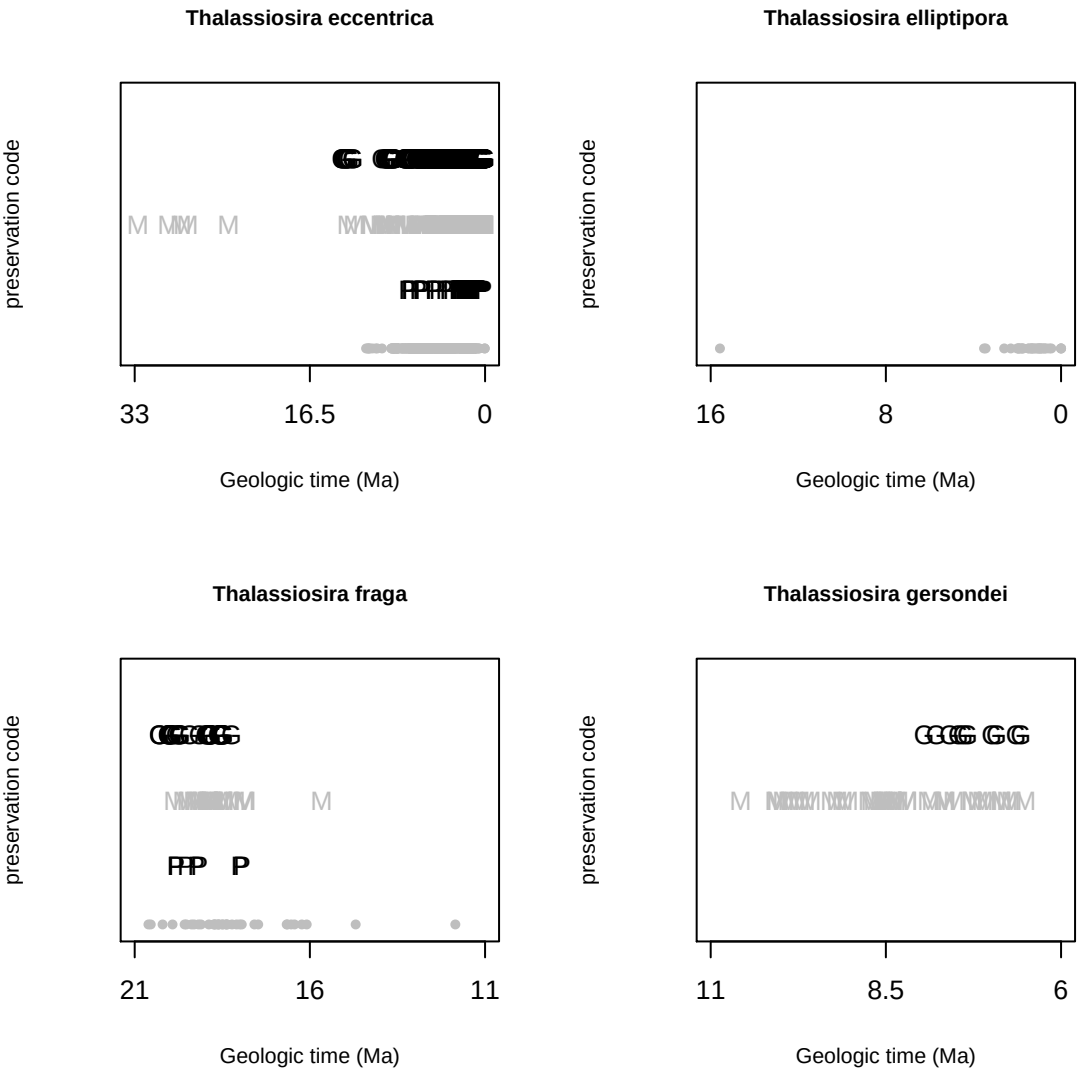
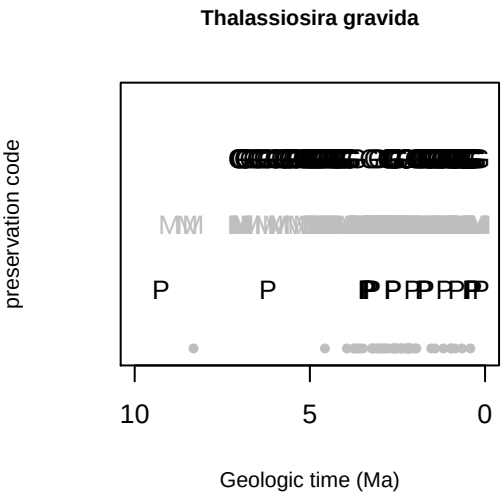
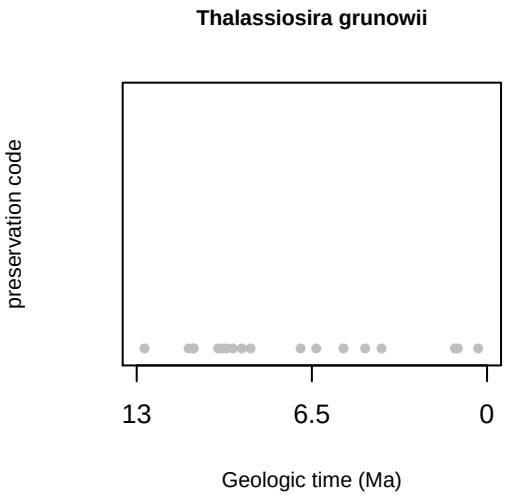
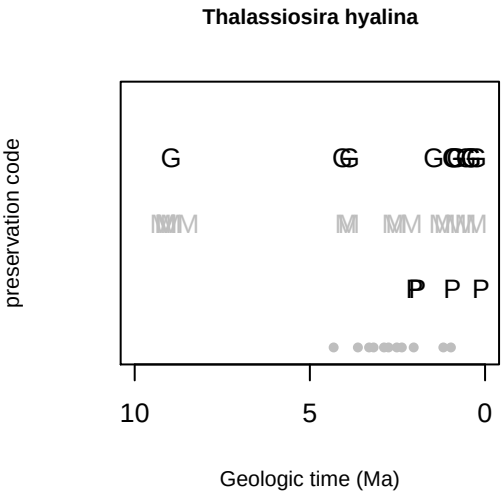
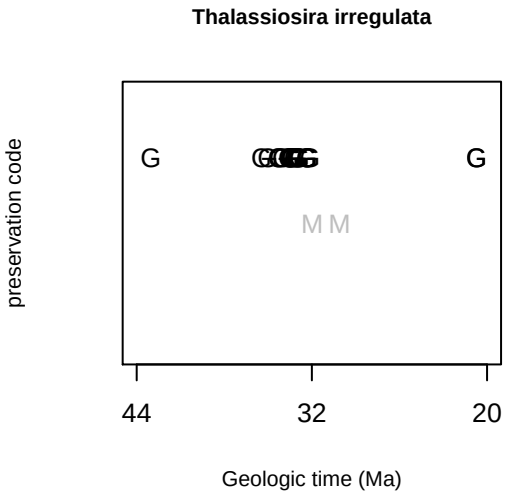
preservation code
G
M
P
57
28.5
0
Geologic time (Ma)


Thalassiosira eccentrica
preservation code
33
16.5
0
Geologic time (Ma)
Thalassiosira elliptipora
preservation code
16
8
0
Geologic time (Ma)
Thalassiosira fraga
preservation code
21
16
11
Geologic time (Ma)
Thalassiosira gersondei
preservation code
11
8.5
6
Geologic time (Ma)


Thalassiosira gravida
preservation code
10
5
0
Geologic time (Ma)


Thalassiosira grunowii
preservation code
13
6.5
0
Geologic time (Ma)


Thalassiosira hyalina
preservation code
10
5
0
Geologic time (Ma)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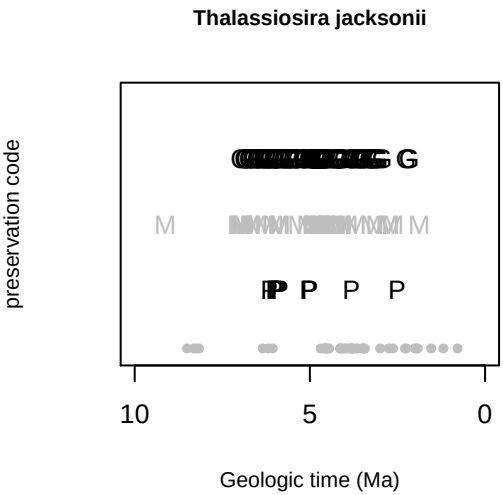
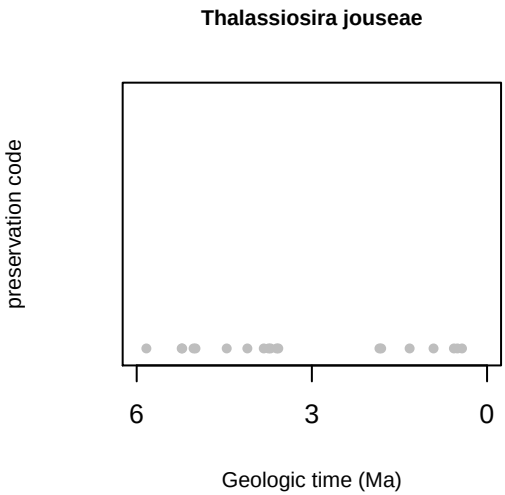
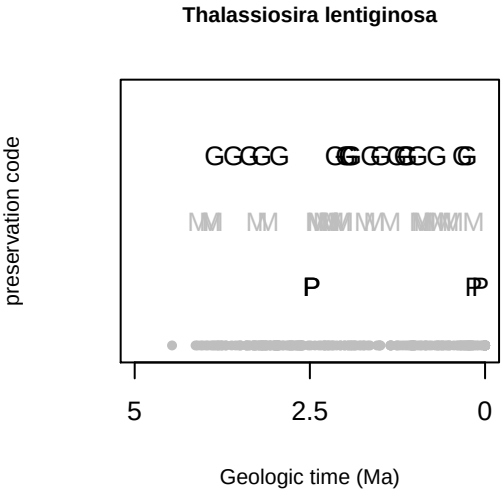
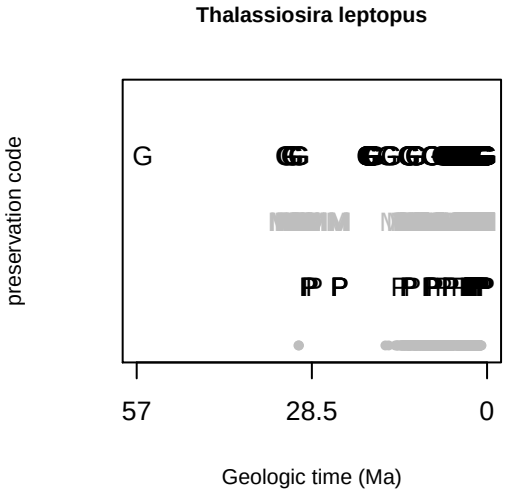
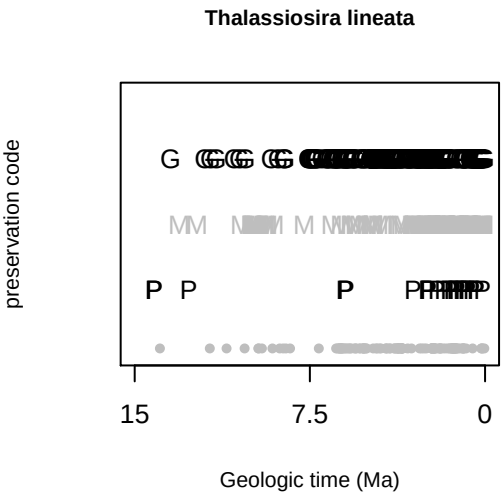
preservation code
44
32
20
Geologic time (Ma)

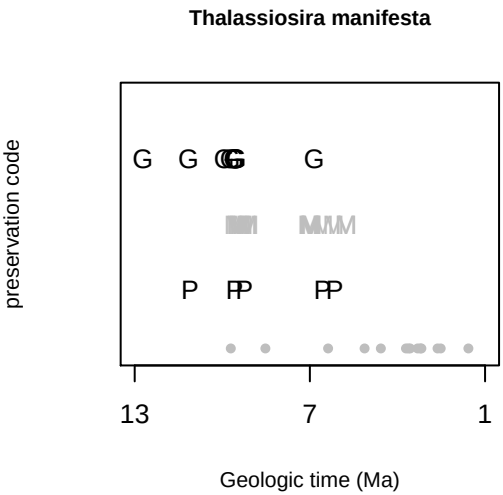

Thalassiosira jacksonii
preservation code
Geologic time (Ma)
10
5
0

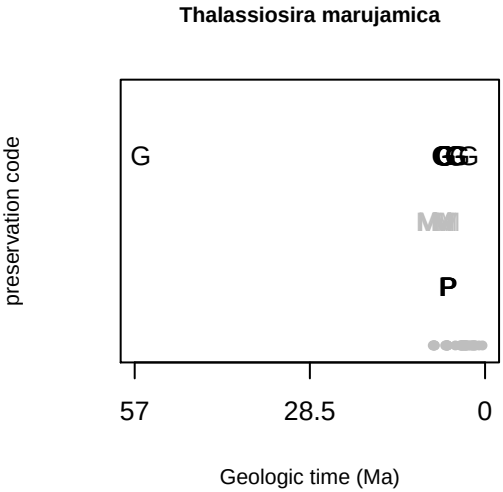

Thalassiosira jouseae
preservation code
Geologic time (Ma)
6
3
0

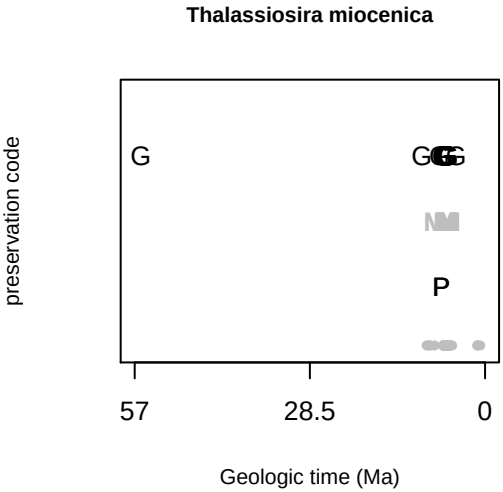

Thalassiosira lentiginosa
preservation code
Geologic time (Ma)
5
2.5
0

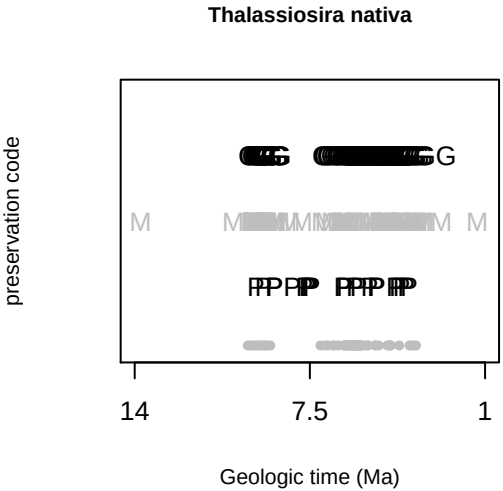

Thalassiosira leptopus
preservation code
Geologic time (Ma)
57
28.5
0

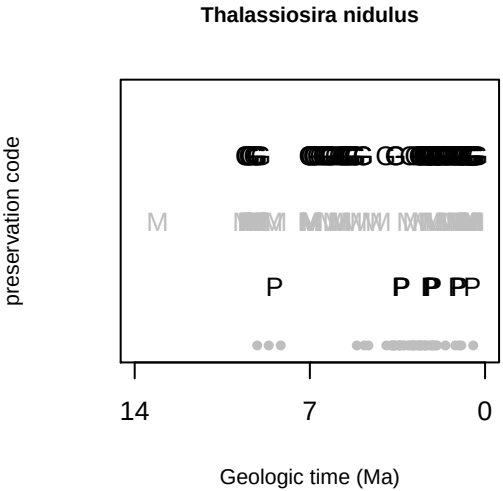

Thalassiosira lineata
preservation code
G
M
P
15
7.5
0
Geologic time (Ma)

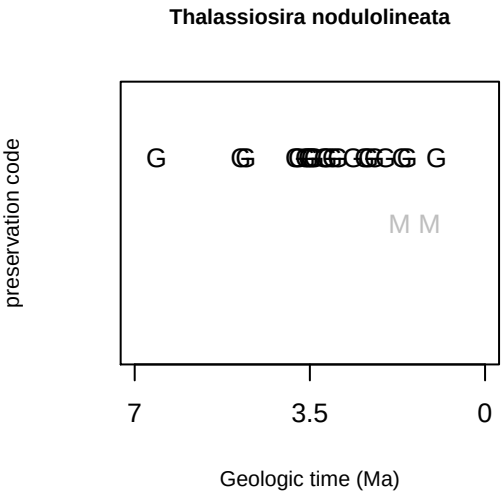

Thalassiosira manifesta
preservation code
G
M
P
13
7
1
Geologic time (Ma)

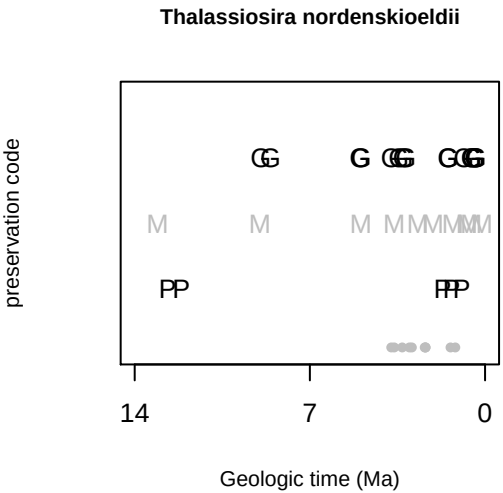

Thalassiosira marujamica
preservation code
G
M
P
57
28.5
0
Geologic time (Ma)

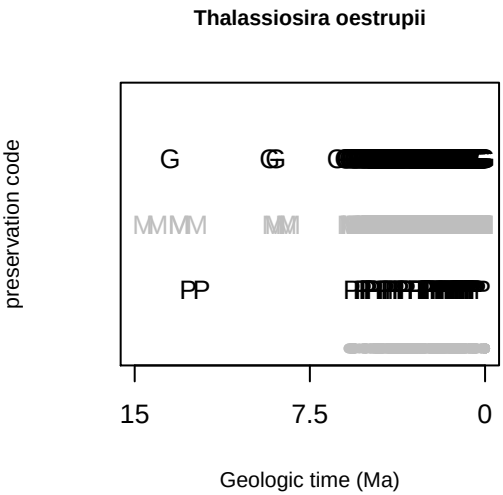

Thalassiosira miocenica
preservation code
G
M
P
57
28.5
0
Geologic time (Ma)

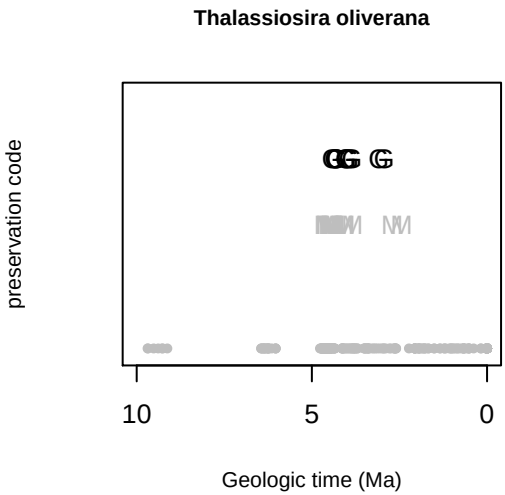

Thalassiosira nativa
preservation code
14
7.5
1
Geologic time (Ma)

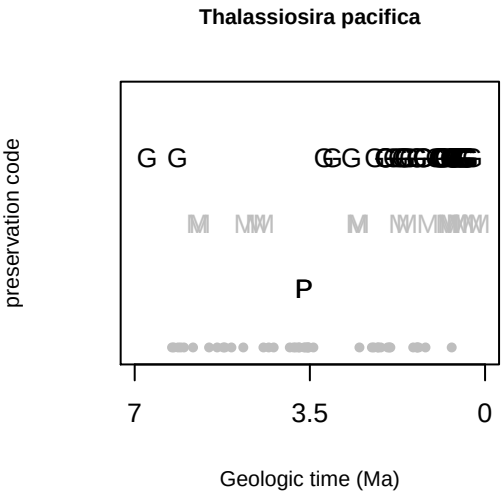

Thalassiosira nidulus
preservation code
14
7
0
Geologic time (Ma)

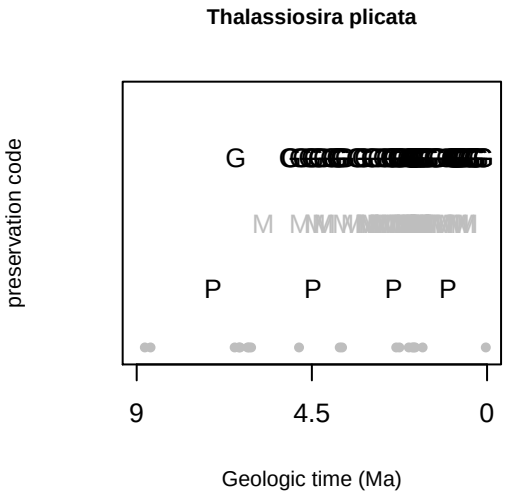

Thalassiosira nodulolineata
preservation code
7
3.5
0
Geologic time (Ma)

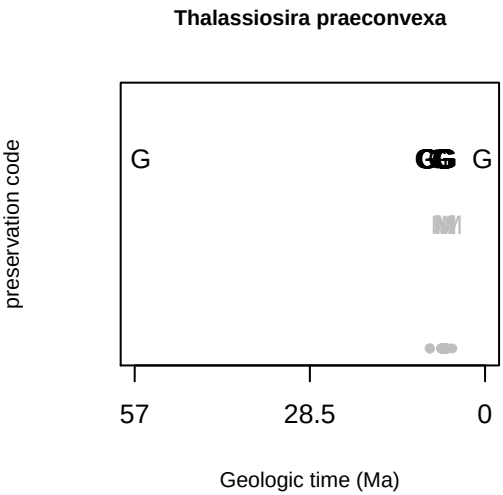

Thalassiosira nordenskioeldii
preservation code
14
7
0
Geologic time (Ma)

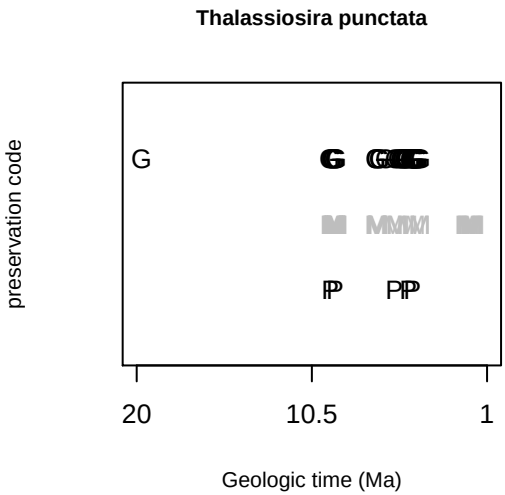

Thalassiosira oestrupii
preservation code
G
P
15
7.5
0
Geologic time (Ma)

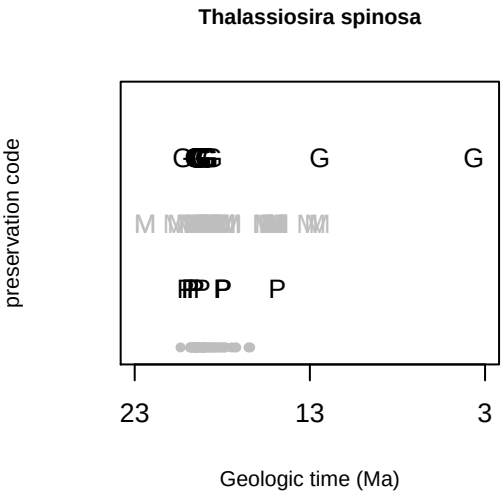

Thalassiosira oliverana
preservation code
10
5
0
Geologic time (Ma)

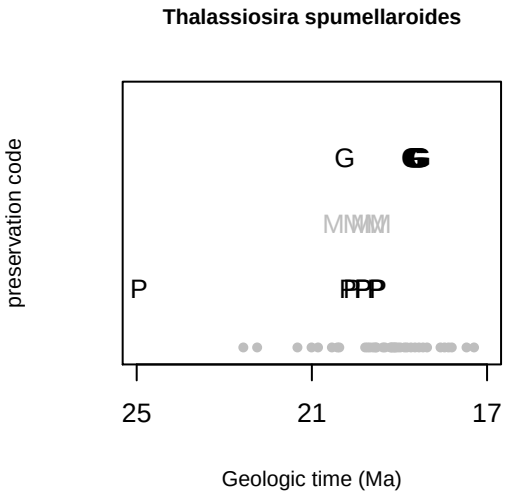

Thalassiosira pacifica
preservation code
G G
P
7
3.5
0
Geologic time (Ma)

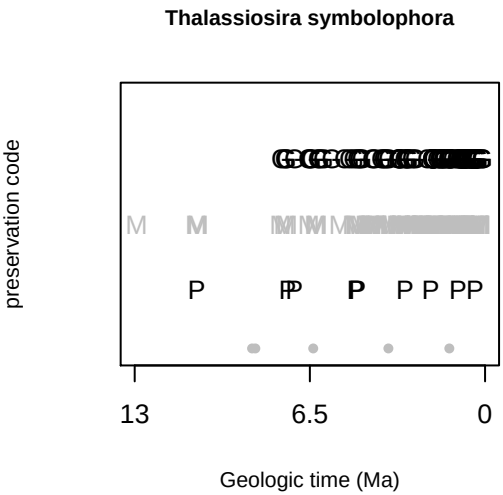

Thalassiosira plicata
preservation code
G
P P P P
9
4.5
0
Geologic time (Ma)

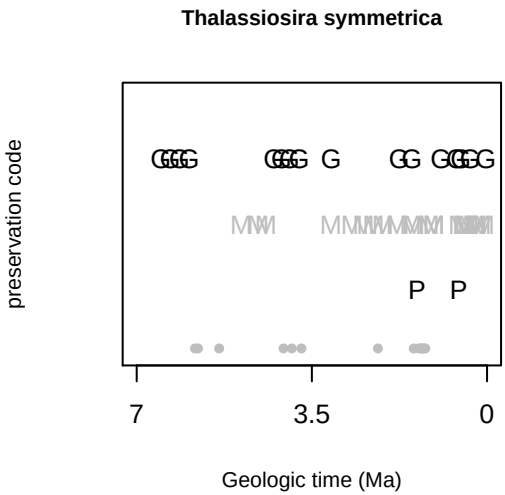

Thalassiosira praeconvexa
preservation code
G
G
57
28.5
0
Geologic time (Ma)

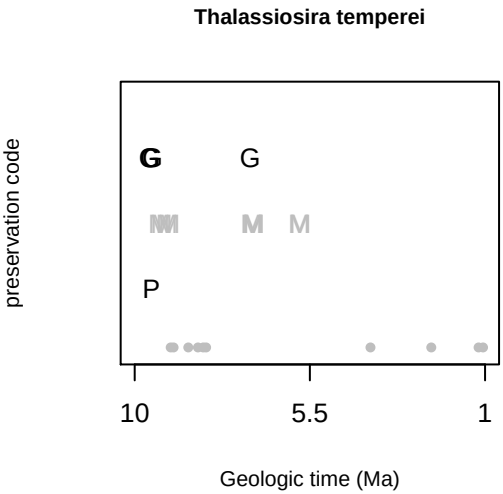

Thalassiosira punctata
preservation code
G
20
10.5
1
Geologic time (Ma)

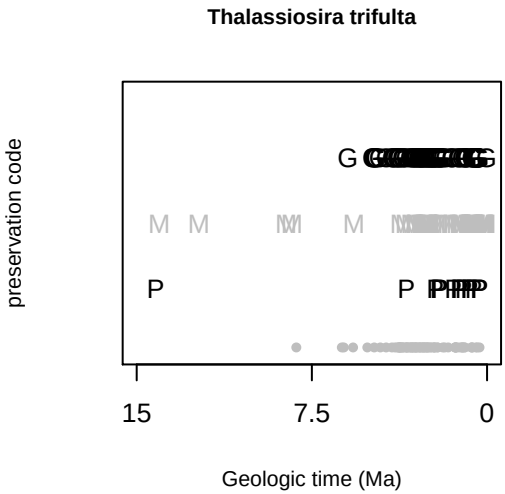

Thalassiosira spinosa
preservation code
G
G
P
23
13
3
Geologic time (Ma)

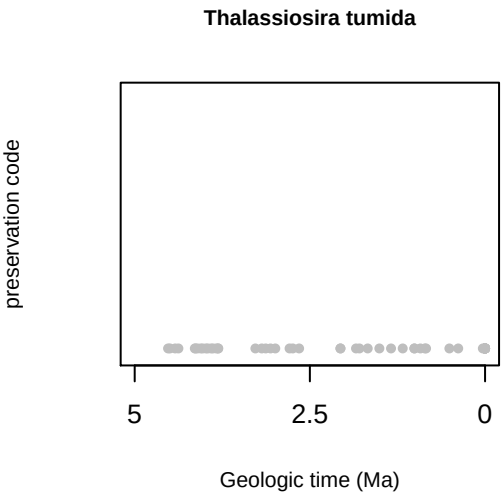

Thalassiosira spumellaroides
preservation code
G
P
25
21
17
Geologic time (Ma)

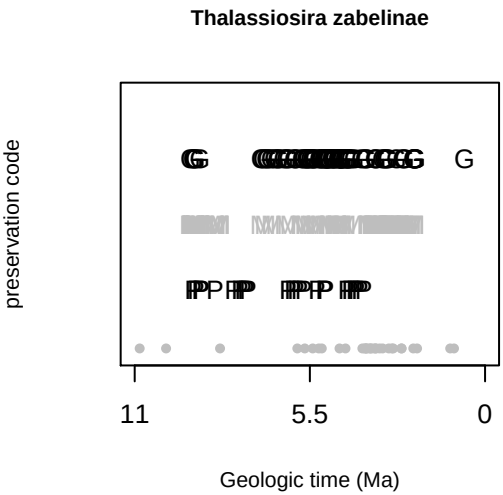

Thalassiosira symbolophora
preservation code
Geologic time (Ma)
13
6.5
0

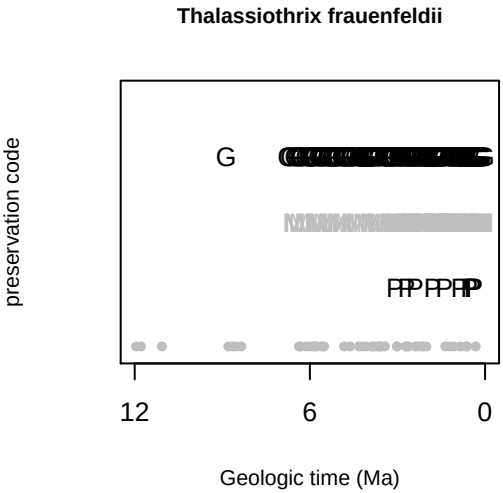

Thalassiosira symmetrica
preservation code
Geologic time (Ma)
7
3.5
0

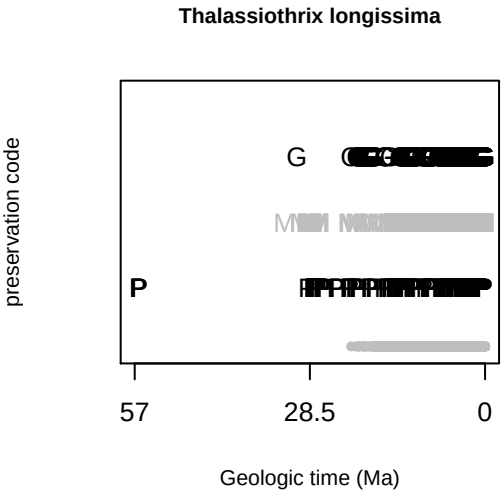

Thalassiosira temperei
preservation code
Geologic time (Ma)
10
5.5
1

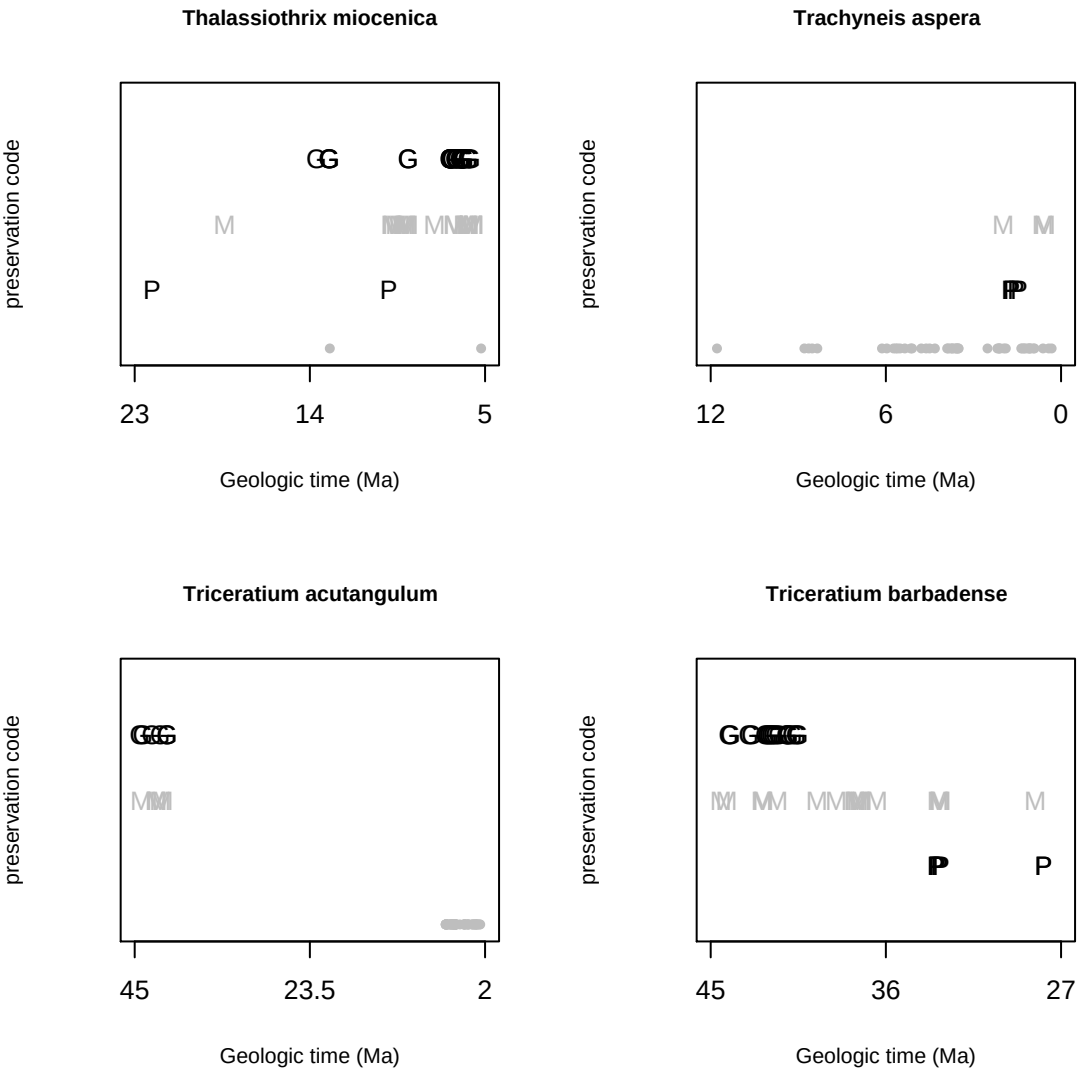

Thalassiosira trifulta
preservation code
Geologic time (Ma)
15
7.5
0

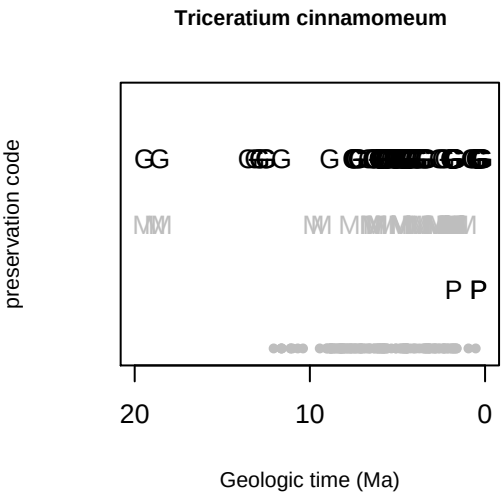

Thalassiosira tumida
preservation code
5
2.5
0
Geologic time (Ma)

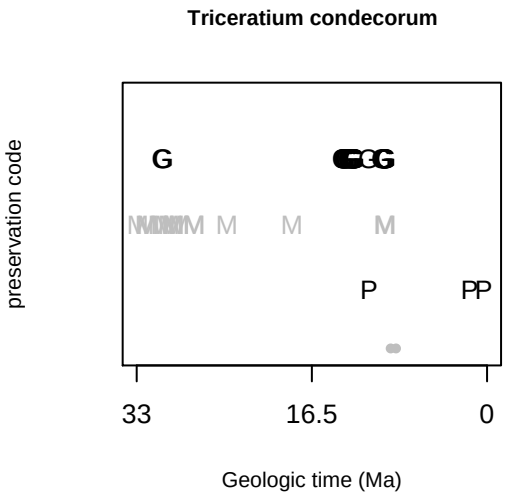

Thalassiosira zabelinae
preservation code
G
G
11
5.5
0
Geologic time (Ma)

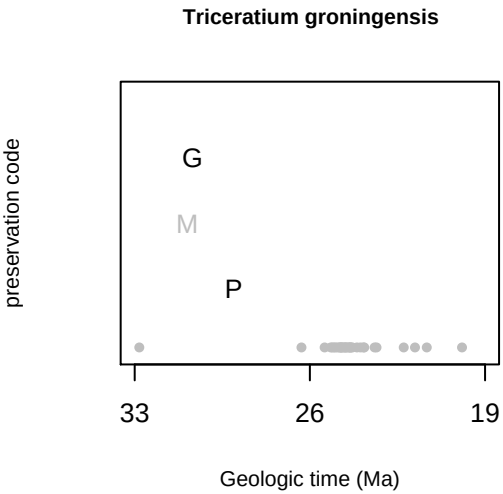

Thalassiothrix frauenfeldii
preservation code
G
12
6
0
Geologic time (Ma)

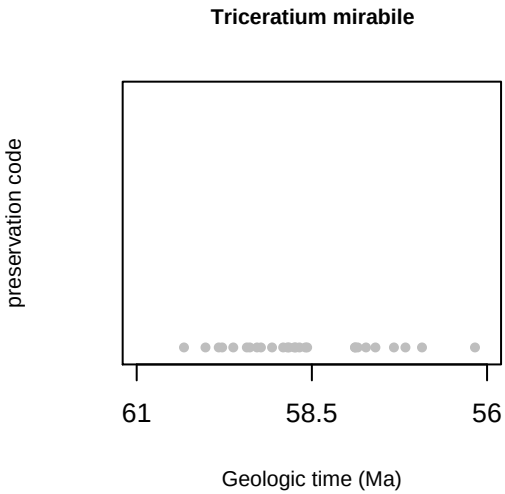

Thalassiothrix longissima
preservation code
G
P
57
28.5
0
Geologic time (Ma)

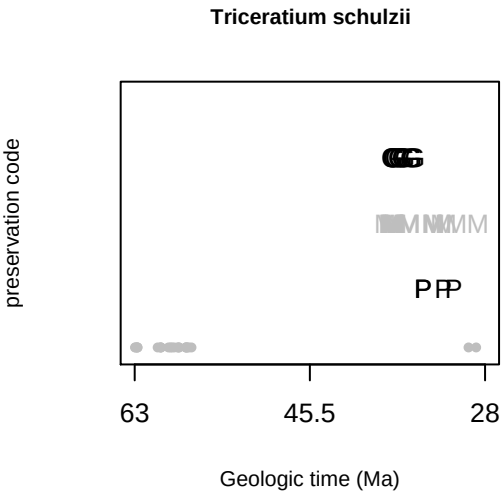

Thalassiothrix miocenica
preservation code
23
14
5
Geologic time (Ma)
Trachyneis aspera
preservation code
12
6
0
Geologic time (Ma)
Triceratium acutangulum
preservation code
45
23.5
2
Geologic time (Ma)
Triceratium barbadense
preservation code
45
36
27
Geologic time (Ma)

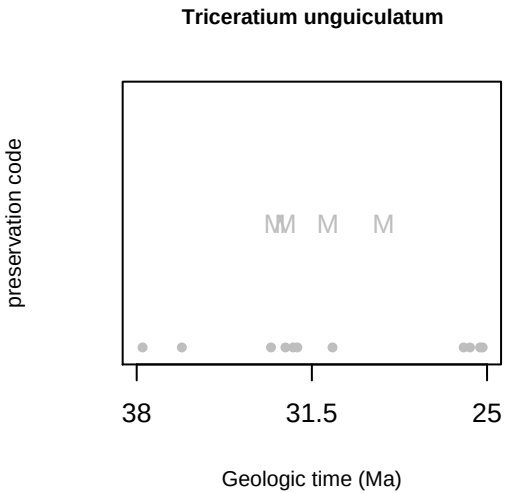

Triceratium cinnamomeum
preservation code
Geologic time (Ma)
20
10
0

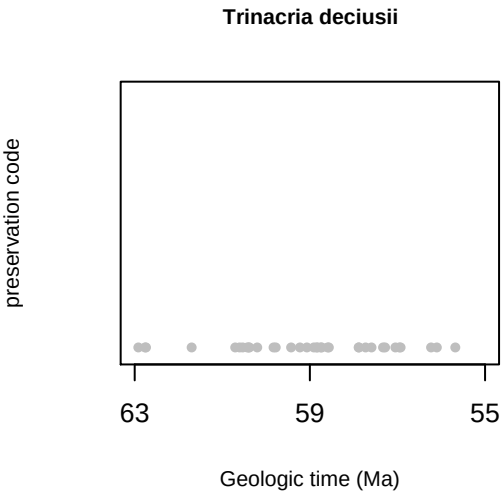

Triceratium condecorum
preservation code
Geologic time (Ma)
33
16.5
0

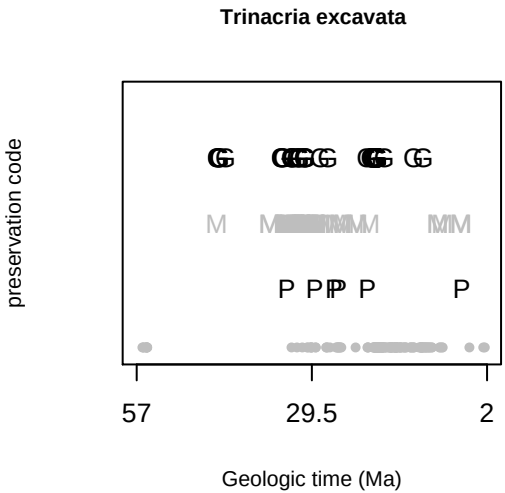

Triceratium groningensis
preservation code
Geologic time (Ma)
33
26
19

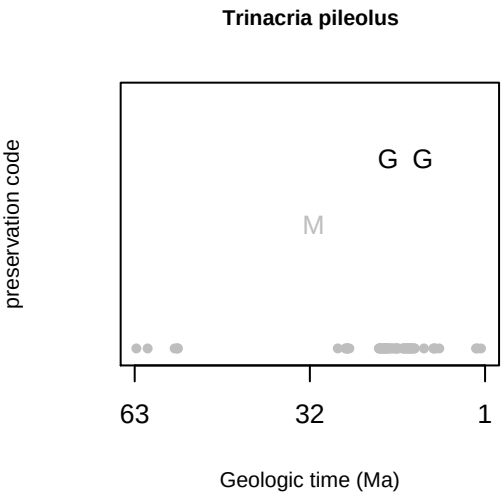

Triceratium mirabile
preservation code
Geologic time (Ma)
61
58.5
56

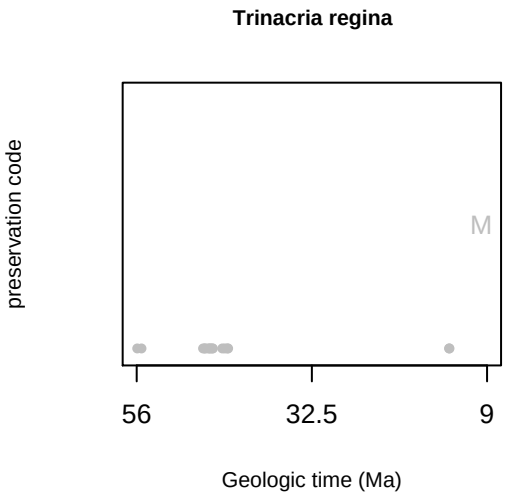

Triceratium schulzii
preservation code
63
45.5
28
Geologic time (Ma)

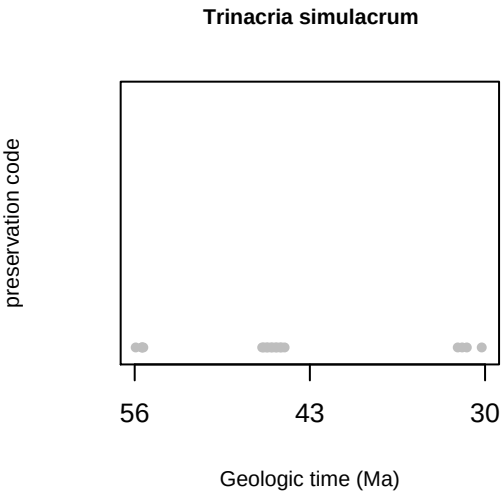

Triceratium unguiculatum
preservation code
38
31.5
25
Geologic time (Ma)

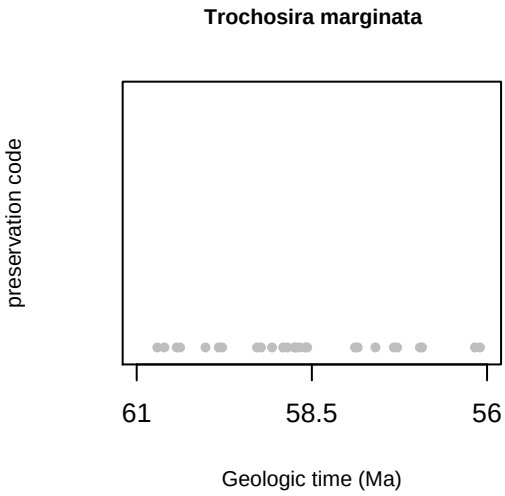

Trinacria deciusii
preservation code
63
59
55
Geologic time (Ma)

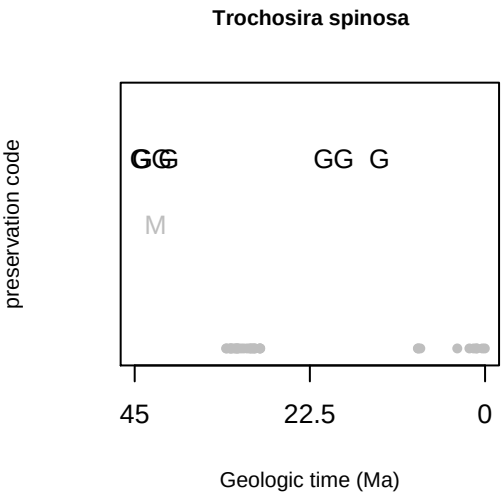

Trinacria excavata
preservation code
57
29.5
2
Geologic time (Ma)

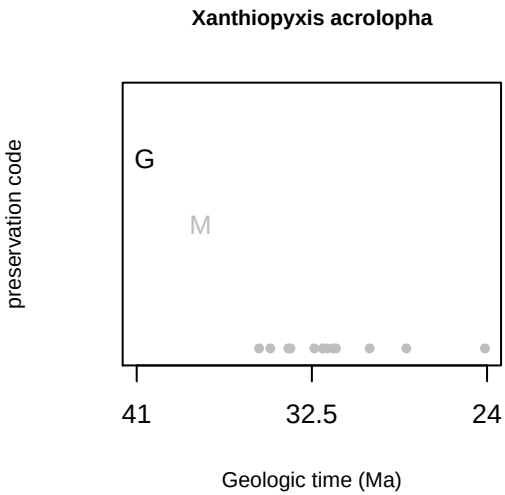

Trinacria pileolus
preservation code
G G
M
63
32
1
Geologic time (Ma)

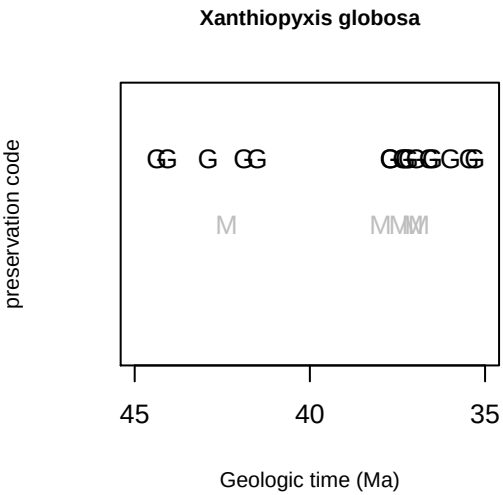

Trinacria regina
preservation code
M
56
32.5
9
Geologic time (Ma)

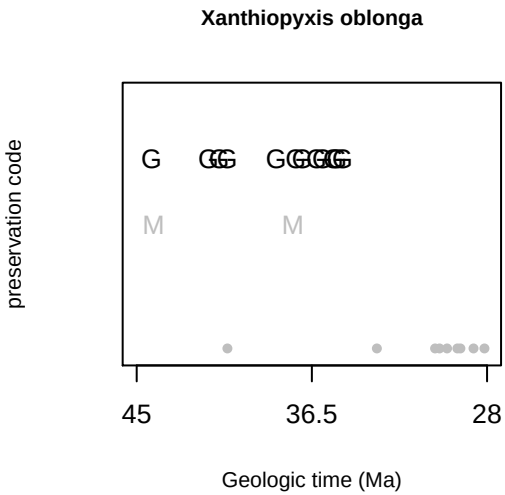

Trinacria simulacrum
preservation code
56
43
30
Geologic time (Ma)


Trochosira marginata
preservation code
61
58.5
56
Geologic time (Ma)


Trochosira spinosa
preservation code
GGG
GG G
M
45
22.5
0
Geologic time (Ma)


Xanthiopyxis acrolopha
preservation code
G
M
41
32.5
24
Geologic time (Ma)


Xanthiopyxis globosa
preservation code
GG G GG
M
45
40
35
Geologic time (Ma)


Xanthiopyxis oblonga
preservation code
G
M
45
36.5
28
Geologic time (Ma)