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Supplementary Information for

Dead clades walking are a pervasive macroevolutionary pattern

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Tables S1 to S4 (not allowed for Brief Reports)
SI References

Supplementary Information

Comparative DCW identification through Shareholders Quorum Subsampling standardization. Diversity metrics were calculated as the number of unique genera occurring within each stage (in-bin genus richness), standardized using the Shareholder Quorum Subsampling method (SQS; (1, 2)). This approach corrects for samples and stages in which fossil genera have uneven abundances, which could distort diversity estimates, by subsampling to achieve the same relative coverage (e.g., (3, 4)). SQS calculations were performed using S. M. Holland's R code (strata.uga.edu/8370/rtips/shareholderQuorumSubsampling.html), with quorum = 0.75, i.e. the highest coverage value which still permits the standardization of all orders. Theoretically, shifting the quorum value should not degrade the relative diversity trends through time so long as the value is maintained in all analyses (4). Each occurrence was then assigned to stage bins based on their "max_ma" and "min_ma" age fields in the PBDB. First and last appearance data (FAD/LAD) for genera were then calculated from the lower and upper ages of their stage bins, respectively. Genera were not assumed to range-through, i.e. be present in every stage between their FAD and LAD without a genus occurrence in the PBDB, when calculating the SQS-standardized genus richness.

All other methods were conducted identically to the main text. The SQS-genus richness idetnified DCWs are featured in Fig. S4.

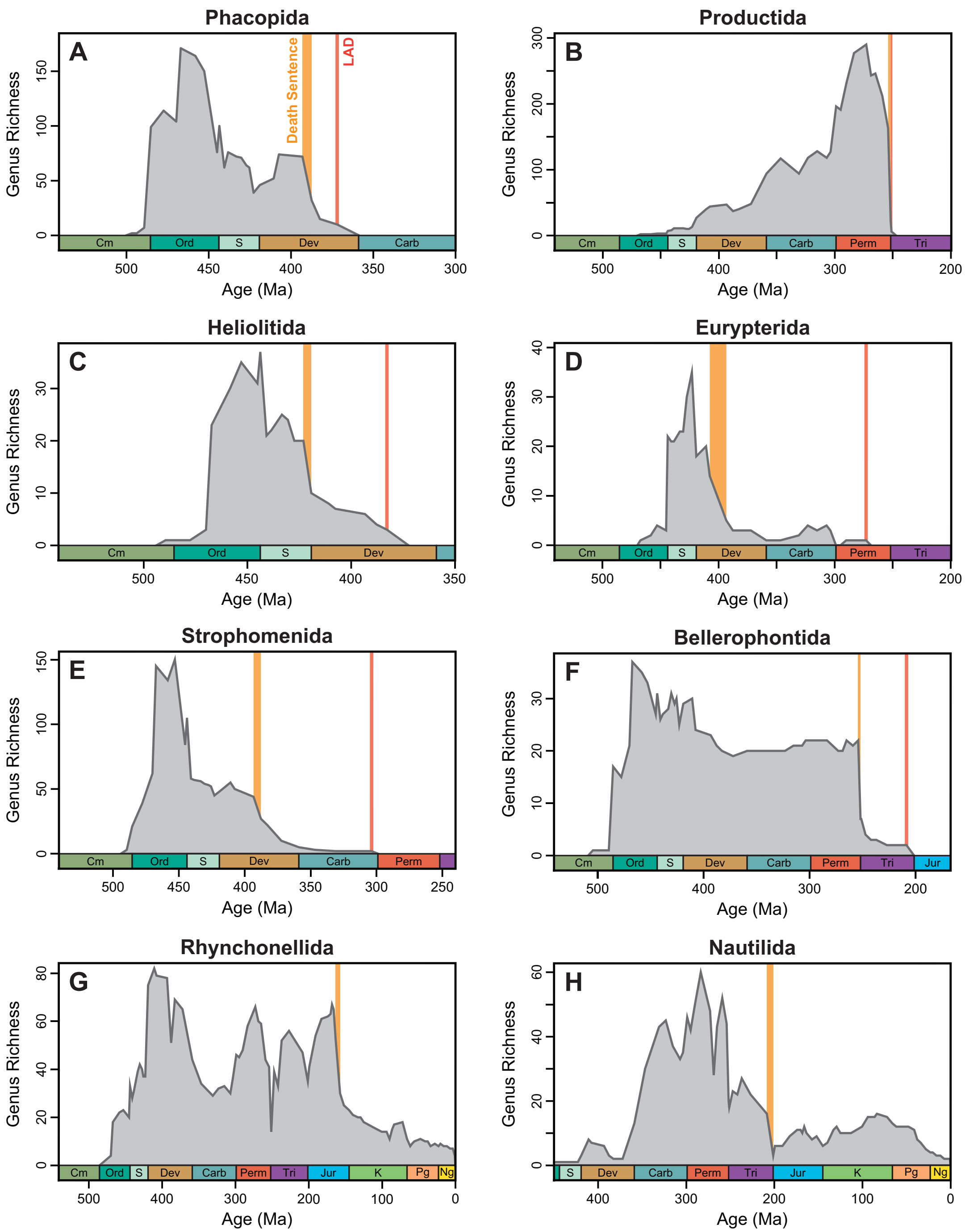

Fig. S1. Examples of different DCW diversity patterns in time. All genus richness data has been standardized by shareholder quorum subsampling. Orange and red bars mark the upper boundary of the death sentence and LAD stages, respectively. (A) Arthropod order Phacopida (DCW range: Frasnian–Famennian). (B) Brachiopod order Productida (Induan–Olenekian). (C) Cnidarian order Heliolitida (Lochkovian–Frasnian). (D) Arthropod order Eurypterida (Eifelian–Wuchiapingian). (E) Brachiopod order Strophomenida (Givetian–Gzhelian). (F) Gastropod order Bellerophontida (Induan–Rhaetian). (G) Brachiopod order Rhynchonellida (Kimmeridgian–Recent). (H) Cephalopod order Nautilida (Hettangian–Recent).

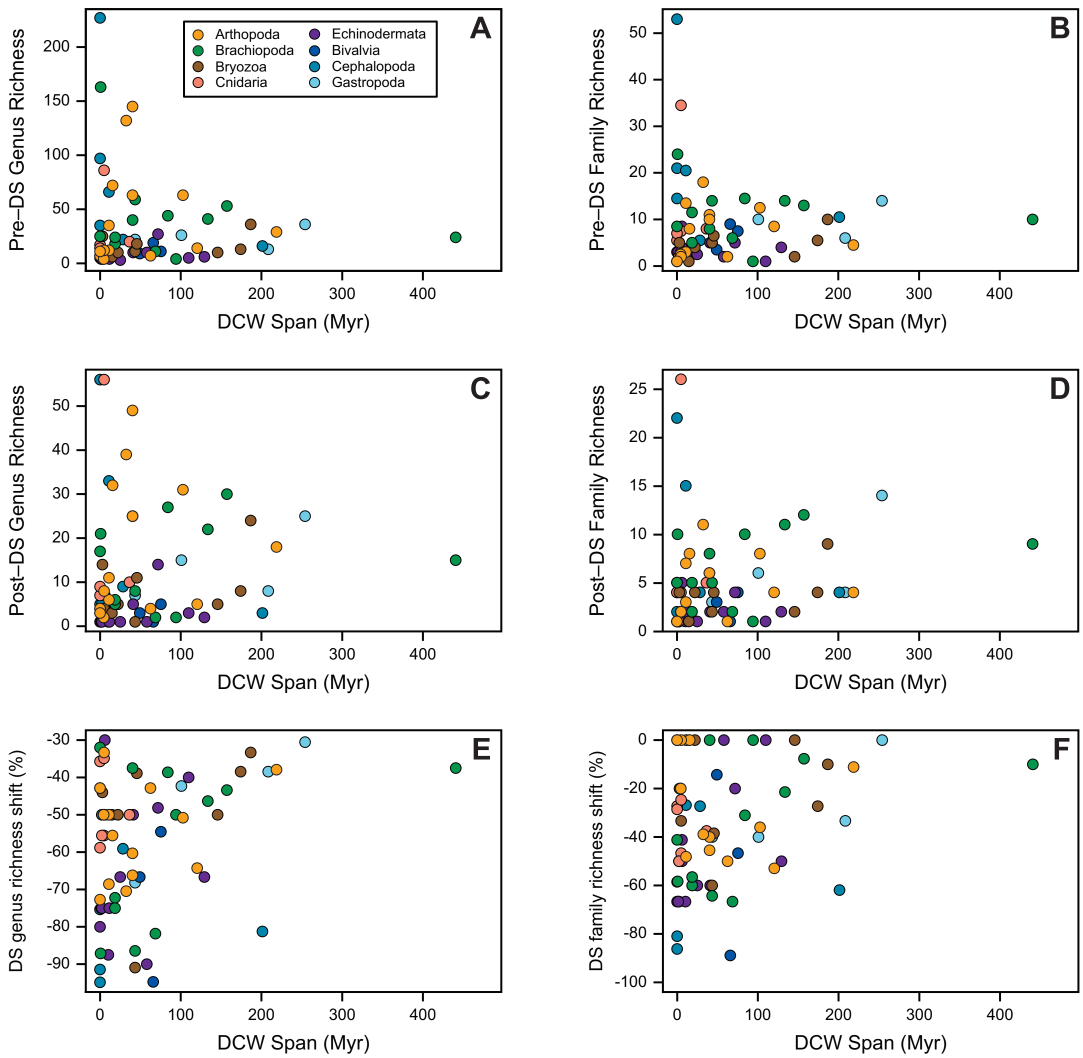

Fig. S2. Crossplots of death sentence genus and family richness metrics by DCW span length (Myr). Point colors correspond to phylum/class as in legend in B. (A) Mean genus richness in the two stages prior to death sentence by span. (B) Mean family richness in the two stages prior to death sentence vs. span. (C) Mean genus richness in the two stages after death sentence vs. span. (D) Mean family richness in the two stages after death sentence vs. span. (E) Proportional shift in genus richness across the death sentence stage vs. span. (F) Proportional shift in genus richness across the death sentence stage vs. span.

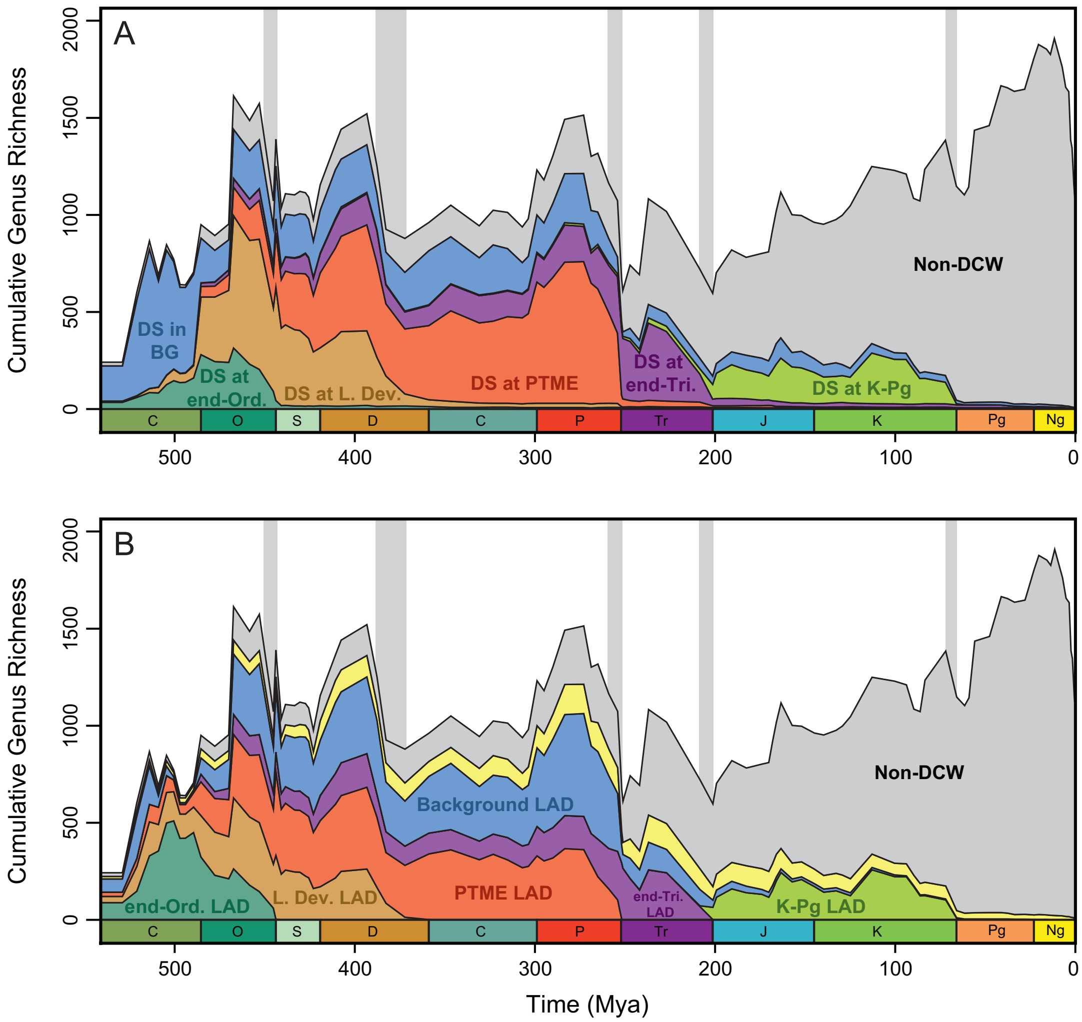

Fig. S3. Cumulative genus richness of all DCW and non-DCW orders over the Phanerozoic. (A) Cumulative genus richness trends in DCWs grouped by their death sentence associations. (B) Cumulative genus richness trends in DCWs grouped by their LAD associations. Gray bars mark the stages associated with the Big Five mass extinction in this study. DS, death sentence; LAD, last appearance datum; PTME, Permian–Triassic Mass Extinction; K-Pg, Cretaceous-Paleogene mass extinction.

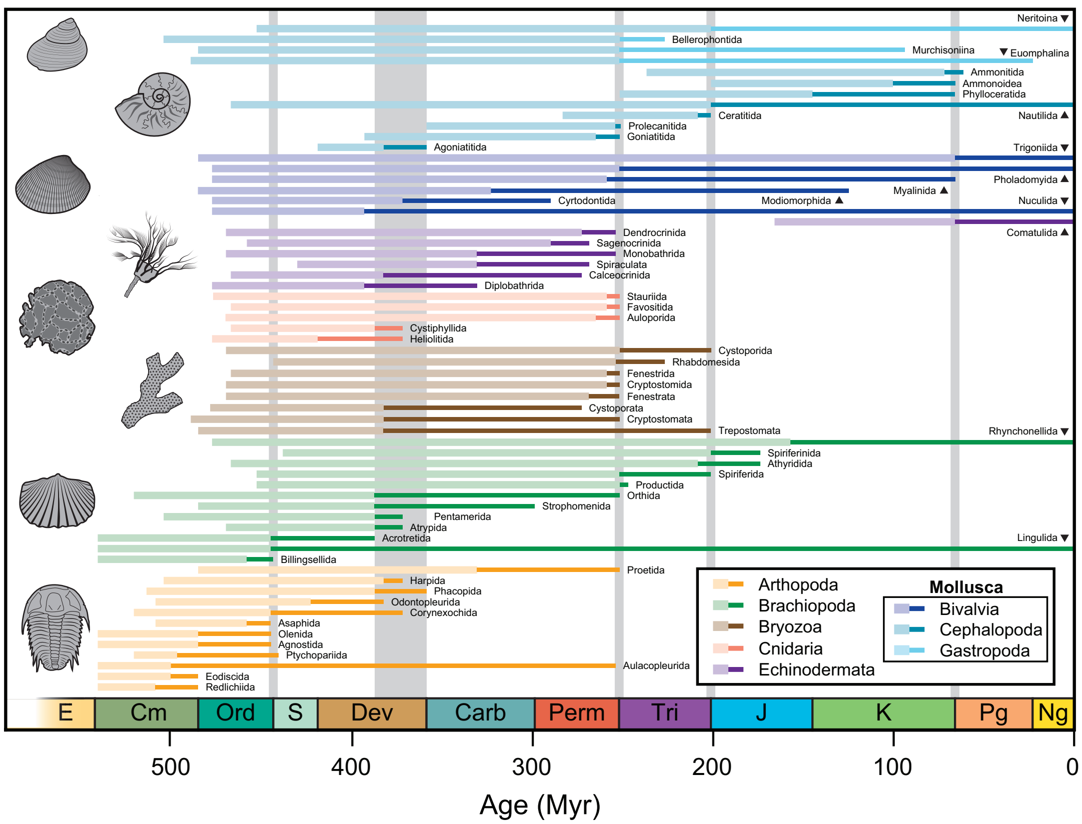

Fig. S4. Ranges of 62 order-level Dead Clades Walking determined from Shareholder's Quorum Subsampling standardization of in-bin genus richness (Supplementary Information). Thick lines represent DCW span, from death sentence to LAD; thin lines extend from each clade's first appearance. Gray bars mark the stages associated with Big Five mass extinction events in this study.

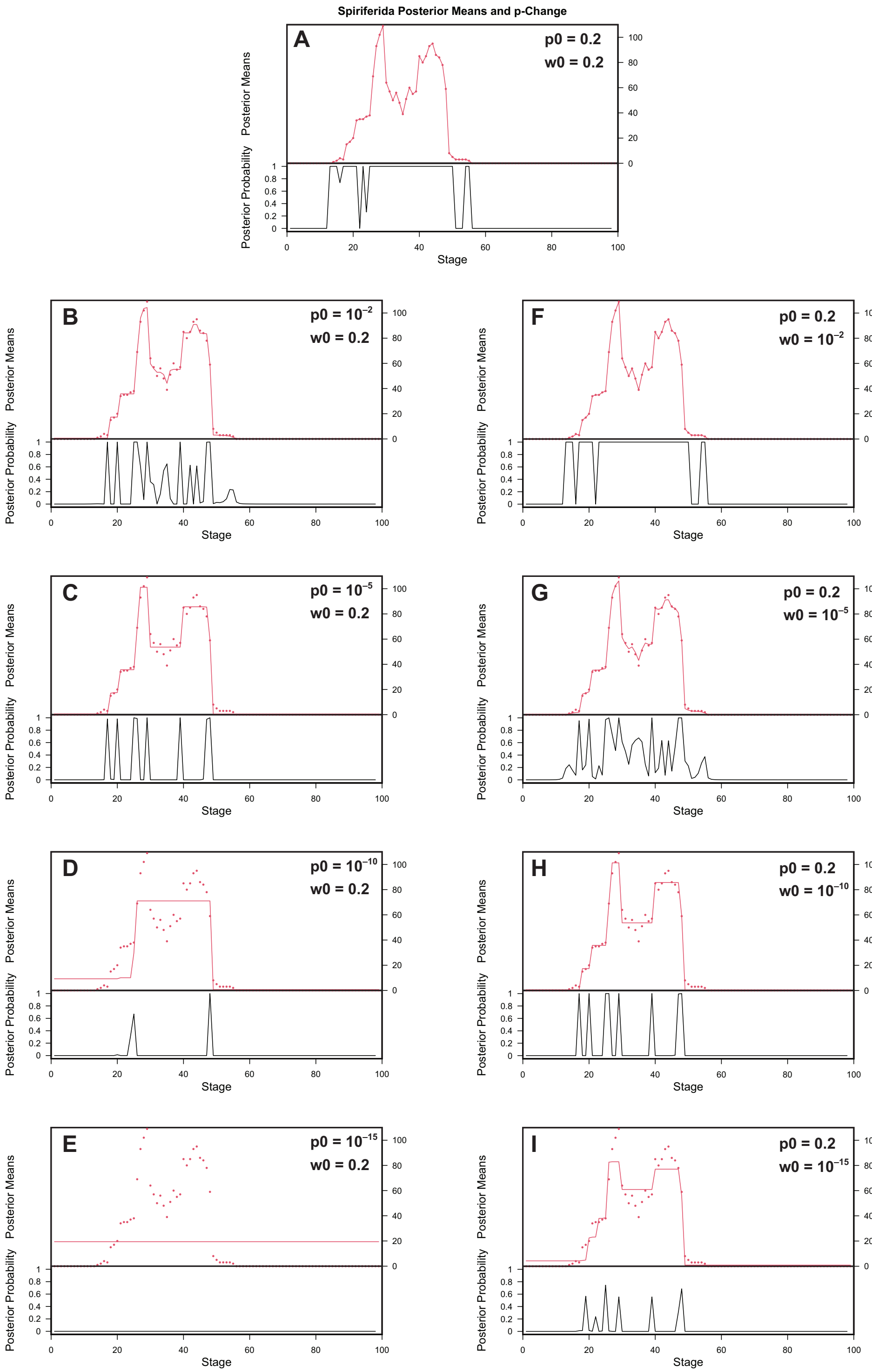

Fig. S5. Bayesian change point analysis output for Spiriferida range-through genus richness data (Fig. 1) for different values of hyperparameters p0 and w0 (5). (A) Default values (p0 = 0.2, w0 = 0.2). (B) p0 = 10^{-2}. (C) p0 = 10^{-5}. (D) p0 = 10^{-10}. (E) p0 = 10^{-15}. Note that decreasing values for p0 drive the posterior mean output (red line) to identify fewer contiguous blocks of constant value (5). (F) w0 = 10^{-2}. (F) w0 = 10^{-5}. (H) w0 = 10^{-10}. (I) w0 = 10^{-15}. Note that decreasing values for w0 drive the posterior probability output (black line) to identify fewer significant change points corresponding to greater absolute shifts in the posterior mean (5).

Table S1. List of all DCW orders, their higher taxonomic classification, and assigned death sentence and LAD stages.

Order	Class	Phylum	Death Sentence Stage	LAD Stage
Acrotretida	Lingulata	Brachiopoda	Aeronian	Famennian
Agnostida	Trilobita	Arthropoda	Tremadocian	Hirnantian
Agoniatitida	Cephalopoda	Mollusca	Famennian	Famennian
Ammonitida	Cephalopoda	Mollusca	Danian	Danian
Ammonoidea	Cephalopoda	Mollusca	Cenomanian	Maastrichtian
Ampelocrinida	Crinoidea	Echinodermata	Capitanian	Wuchiapingian
Asaphida	Trilobita	Arthropoda	Hirnantian	Hirnantian
Athyridida	Rhynchonellata	Brachiopoda	Hettangian	Toarcian
Atrypida	Rhynchonellata	Brachiopoda	Frasnian	Frasnian
Aulacopleurida	Trilobita	Arthropoda	Floian	Wuchiapingian
Auloporida	Anthozoa	Cnidaria	Wuchiapingian	Changhsingian
Bellerophontida	Gastropoda	Mollusca	Induan	Rhaetian
Calceocrinida	Crinoidea	Echinodermata	Eifelian	Kungurian
Ceratitida	Cephalopoda	Mollusca	Rhaetian	Rhaetian
Corynexochida	Trilobita	Arthropoda	Tremadocian	Frasnian
Craniopsida	Craniata	Brachiopoda	Aeronian	Visean
Cryptostomata	Stenolaemata	Bryozoa	Aeronian	Changhsingian
Cryptostomida	Stenolaemata	Bryozoa	Wuchiapingian	Changhsingian
Cyathocrinida	Crinoidea	Echinodermata	Changhsingian	Changhsingian
Cyrtocrinida	Crinoidea	Echinodermata	Barremian	Extant
Cyrtodontida	Bivalvia	Mollusca	Tournaisian	Kungurian
Cystiphyllida	Anthozoa	Cnidaria	Frasnian	Frasnian
Cystoporata	Stenolaemata	Bryozoa	Frasnian	Carnian
Cystoporida	Stenolaemata	Bryozoa	Induan	Rhaetian
Dendrocrinida	Crinoidea	Echinodermata	Capitanian	Wuchiapingian
Diplobathrida	Crinoidea	Echinodermata	Givetian	Visean
Eodiscida	Trilobita	Arthropoda	Guzhangian	Stage 10
Euomphalina	Gastropoda	Mollusca	Changhsingian	Extant
Eurypterida		Arthropoda	Eifelian	Roadian
Favositida	Anthozoa	Cnidaria	Changhsingian	Changhsingian
Fenestrata	Stenolaemata	Bryozoa	Wordian	Changhsingian
Fenestrida	Stenolaemata	Bryozoa	Changhsingian	Olenekian
Goniatitida	Cephalopoda	Mollusca	Capitanian	Changhsingian
Harpida	Trilobita	Arthropoda	Hirnantian	Frasnian
Heliolitida	Anthozoa	Cnidaria	Lochkovian	Frasnian
Homocrinida	Crinoidea	Echinodermata	Aeronian	Homerian
Hybocrinida	Crinoidea	Echinodermata	Hirnantian	Rhuddanian
Lichenariida	Anthozoa	Cnidaria	Aeronian	Telychian
Lichida	Trilobita	Arthropoda	Givetian	Givetian
Lingulida	Lingulata	Brachiopoda	Aeronian	Extant
Megalodontida	Bivalvia	Mollusca	Hettangian	Tithonian
Monobathrida	Crinoidea	Echinodermata	Serpukhovian	Wuchiapingian
Murchisoniina	Gastropoda	Mollusca	Hettangian	Cenomanian
Myelodactylida	Crinoidea	Echinodermata	Aeronian	Telychian
Nautilida	Cephalopoda	Mollusca	Hettangian	Extant
Neritoina	Gastropoda	Mollusca	Rhaetian	Extant
Obolellida	Obolellata	Brachiopoda	Wuliuan	Drumian
Odontopleurida	Trilobita	Arthropoda	Givetian	Frasnian
Olenida	Trilobita	Arthropoda	Tremadocian	Hirnantian
Orthida	Rhynchonellata	Brachiopoda	Givetian	Changhsingian
Pentamerida	Rhynchonellata	Brachiopoda	Pridoli	Frasnian
Phacopida	Trilobita	Arthropoda	Givetian	Famennian
Productida	Strophomenata	Brachiopoda	Induan	Olenekian
Proetida	Trilobita	Arthropoda	Serpukhovian	Changhsingian
Prolecanitida	Cephalopoda	Mollusca	Changhsingian	Induan
Ptychopariida	Trilobita	Arthropoda	Tremadocian	Katian
Redlichiida	Trilobita	Arthropoda	Guzhangian	Stage 10
Rhabdomesida	Stenolaemata	Bryozoa	Wuchiapingian	Carnian
Rhynchonellida	Rhynchonellata	Brachiopoda	Kimmeridgian	Extant

Sagenocrinida	Crinoidea	Echinodermata	Artinskian	Capitanian
Siphonotretida	Lingulata	Brachiopoda	Hirnantian	Hirnantian
Spiraculata		Echinodermata	Serpukhovian	Roadian
Spiriferida	Rhynchonellata	Brachiopoda	Induan	Rhaetian
Spiriferinida	Rhynchonellata	Brachiopoda	Hettangian	Toarcian
Stauriida	Anthozoa	Cnidaria	Wuchiapingian	Changhsingian
Strophomenida	Strophomenata	Brachiopoda	Givetian	Gzhelian
Taxocrinida	Crinoidea	Echinodermata	Moscovian	Gzhelian
Trepostomata	Stenolaemata	Bryozoa	Frasnian	Rhaetian
Trepostomida	Stenolaemata	Bryozoa	Changhsingian	Rhaetian
Trigoniida	Bivalvia	Mollusca	Danian	Extant

Table S2. Diversity and longevity statistics for DCWs, organized by associated major mass extinction (ME) event or background (BG) stages. GR, genus richness; FR, family richness.

ME	Death Sentences					LADs	
	Δ GR (%)[a]	Δ FR (%)[a]	Sust. GR[b]	Sust. FR[B]	DCW span (Myr)[c]	Sust. GR[d]	Sust. FR[d]
Ord	-52.2	-43.2	3.50	1.00	0.70	12.0	2.14
Dev	-50.0	-27.3	5.50	3.12	15.5	6.33	2.62
Perm	-50.0	-39.2	4.00	2.86	4.96	7.00	3.69
Tri	-72.2	-56.5	6.50	3.68	49.2	3.93	3.27
Cret	-94.8*	-84.9*	3.17*	2.50*	32.9*	4.92*	2.92*
BG	-52.7	-31.6	4.67	2.27	40.2	2.50	2.00

[a] Calculated as the median proportional change from the genus and family richness of the stage prior to the death sentence to the stage following the death sentence.

[b] Sustained diversity following the DCWs' death sentence at a ME or BG stage, calculated from the median genus and family richness in all bins from death sentence to LAD.

[c] Calculated as the median duration from the top of the death sentence stage to the top of the LAD stage.

[d] Sustained diversity prior to the DCWs' LAD at a ME or BG stage, calculated from the median genus and family richness in all bins from death sentence to LAD.

* Number of data < 3

Table S3. Diversity and longevity statistics for DCWs, organized by phylum and class. GR, genus richness; FR, family richness.

Phylum / *Class*	# of DCW orders[a]	Δ GR (%)[b]	Δ FR (%)[b]	Sust. GR[c]	Sust. FR[c]	DCW span (Myr)[d]
Arthropoda	14/14	-61.0	-36.2	10.0	2.78	36.3
Brachiopoda	14/26	-48.2	-26.2	6.87	4.23	41.9
Bryozoa	9/12	-50.0	-20.0	2.75	2.00	43.4
Cnidaria	6/9	-52.8	-33.0	6.67	4.25	3.63
Echinodermata	13/20	-66.7	-50.0	1.50	1.50	11.5
Mollusca	14/53	-62.9	-43.3	4.42	2.64	46.3
Bivalvia	3/27	-66.7	-46.7	2.45	2.00	65.9
Cephalopoda	7/9	-75.3	-61.9	5.00	3.68	2.24
Gastropoda	4/17	-40.4	-36.7	5.86	3.89	155

[a] Note that the total numbers of orders (denominator) represent only the orders which were analyzed for significant change points, and thus exclude orders whose maximum genus richness < 5.

[b] Calculated as the proportional change from the median genus and family richness in the stage preceding the death sentence to the stage following the death sentence.

[c] Sustained diversity following the DCWs' death sentence at a ME or BG stage, calculated from the median genus and family richness in all bins from death sentence to LAD.

[d] Calculated as the median duration from the bottom of the death sentence stage, to the top of the LAD stage.

Table S4. Canonical order LADs and references.

Order	Class	Phylum	LAD stage	References
Acrotretida	Lingulata	Brachiopoda	U. Dev.	(6)
Actiniaria	Anthozoa	Cnidaria	Rec.	(7)
Actinodontida	Bivalvia	Mollusca	U. Perm.	(8, 9)
Aethocrinida	Crinoidea	Echinodermata	M. Ord.	(10)
Afghanodesmatida	Bivalvia	Mollusca	Darriwilian	(11)
Agnostida	Trilobita	Arthropoda	Hirnantian	(12)
Agoniatitida	Cephalopoda	Mollusca	Famennian	(13, 14)
Alcyonacea	Anthozoa	Cnidaria	Rec.	(12)
Allogastropoda	Gastropoda	Mollusca	Rec.	(12)
Ammonitida	Cephalopoda	Mollusca	Danian	(12, 15, 16)
Ammonoidea	Cephalopoda	Mollusca	Danian	(16, 17)
Ampelocrinida	Crinoidea	Echinodermata	Wuchiapingian	(12)
Anaspidea	Gastropoda	Mollusca	Rec.	(12)
Angulata	Crinoidea	Echinodermata	U. Ord.	(18)
Archaeogastropoda	Gastropoda	Mollusca	Rec.	(19)
Architaenioglossa	Gastropoda	Mollusca	Rec.	(20)
Architectibranchia	Gastropoda	Mollusca	Rec.	(21)
Arcida	Bivalvia	Mollusca	Rec.	(12)
Asaphida	Trilobita	Arthropoda	Hirnantian	(12)
Athyridida	Rhynchonellata	Brachiopoda	U. Jur.	(6)
Atrypida	Rhynchonellata	Brachiopoda	Frasnan	(6, 22)
Aulacopleurida	Trilobita	Arthropoda	Wuchiapingian	(12, 23, 24)
Auloporida	Anthozoa	Cnidaria	U. Perm.	(25)
Basommatophora	Gastropoda	Mollusca	Rec.	(12)
Bellerophontida	Gastropoda	Mollusca	Rhaetian	(12)
Billingsellida	Strophomenata	Brachiopoda	U. Ord.	(6)
Bourgueticrinida	Crinoidea	Echinodermata	Rec.	(12)
Calceocrinida	Crinoidea	Echinodermata	Kungurian	(12)
Cardiida	Bivalvia	Mollusca	Rec.	(12)
Carditida	Bivalvia	Mollusca	Rec.	(12)
Cephalaspida	Gastropoda	Mollusca	Rec.	(12)
Cephalaspidea	Gastropoda	Mollusca	Rec.	(12)
Ceratitida	Cephalopoda	Mollusca	Rhaetian	(12)
Cerithimorpha	Gastropoda	Mollusca	Changhsingian	(12)
Cheilostomata	Gymnolaemata	Bryozoa	Rec.	(12)
Cheilostomatida	Gymnolaemata	Bryozoa	Rec.	(12)
Chileida	Chileata	Brachiopoda	M. Cam.	(6)
Clymeniida	Cephalopoda	Mollusca	Famennian	(12)
Coenothecalia	Anthozoa	Cnidaria	Rec.	(26)
Colpomyida	Bivalvia	Mollusca	Darriwilian	(12)
Comatulida	Crinoidea	Echinodermata	Rec.	(27)
Corynexochida	Trilobita	Arthropoda	Frasnian	(12)
Craniida	Craniata	Brachiopoda	Rec.	(6)
Craniopsida	Craniata	Brachiopoda	L. Carb.	(6)
Cryptostomata	Stenolaemata	Bryozoa	Rhaetian	(12)
Cryptostomida	Stenolaemata	Bryozoa	Perm.	(28, 29)
Ctenostomata	Gymnolaemata	Bryozoa	Messinian	(12)
Cyathocrinida	Crinoidea	Echinodermata	U.Perm.	(12, 30)
Cyathocystida	Edrioasteroidea	Echinodermata	Hirnantian	(12)
Cycloneritimorpha	Gastropoda	Mollusca	Rec.	(12)
Cyclostomata	Stenolaemata	Bryozoa	Rec.	(12)
Cyclostomatida	Stenolaemata	Bryozoa	Rec.	(12)
Cyrtocrinida	Crinoidea	Echinodermata	Rec.	(27)
Cyrtodontida	Bivalvia	Mollusca	L. Perm.	(12, 31)
Cyrtoneritimorpha	Gastropoda	Mollusca	Perm.	(12, 32)
Cystiphyllida	Anthozoa	Cnidaria	Frasnian	(12)
Cystoporata	Stenolaemata	Bryozoa	Carnian	(12)
Cystoporida	Stenolaemata	Bryozoa	Rhaetian	(12, 33)
Dendrocrinida	Crinoidea	Echinodermata	Wuchiapingian	(12)

Dictyonellida	Chileata	Brachiopoda	L. Perm.	(6)
Diplobathrida	Crinoidea	Echinodermata	Visean	(12)
Edrioasterida	Edrioasteroidea	Echinodermata	Emsian	(12)
Edrioblastoida	Edrioasteroidea	Echinodermata	Darriwilian	(12)
Encrinida	Crinoidea	Echinodermata	U. Tri.	(27)
Entomotaeniata	Gastropoda	Mollusca	Rec.	(12)
Eodiscida	Trilobita	Arthropoda	Stage 10	(12)
Esthonioporata	Stenolaemata	Bryozoa	Kungurian	(12)
Euomphalina	Gastropoda	Mollusca	Rec.	(12)
Eustenocrinida	Crinoidea	Echinodermata	Homerian	(12)
Favositida	Anthozoa	Cnidaria	Changhsingian	(12)
Fenestrata	Stenolaemata	Bryozoa	Perm.	(12)
Fenestrida	Stenolaemata	Bryozoa	Olenekian	(12)
Fissiculata	NA	Echinodermata	Changhsingian	(12)
Fordillida	Bivalvia	Mollusca	Stage 10	(12)
Goniatitida	Cephalopoda	Mollusca	Changhsingian	(34)
Gorgonacea	Anthozoa	Cnidaria	Rec.	(12)
Granatocrinida	NA	Echinodermata	Visean	(12)
Harpida	Trilobita	Arthropoda	Frasnian	(12)
Heliolitida	Anthozoa	Cnidaria	Frasnian	(12, 35)
Helioporacea	Anthozoa	Cnidaria	Rec.	(12)
Heterocorallia	Anthozoa	Cnidaria	Serpukhovian	(12)
Heterostropha	Gastropoda	Mollusca	Rec.	(12)
Heterostrophia	Gastropoda	Mollusca	Rec.	(12)
Hiatellida	Bivalvia	Mollusca	Rec.	(12)
Hippuritida	Bivalvia	Mollusca	Maastrichtian	(12)
Holocrinida	Crinoidea	Echinodermata	U. Tri.	(27)
Homocrinida	Crinoidea	Echinodermata	Homerian	(12)
Hybocrinida	Crinoidea	Echinodermata	Telychian	(12)
Isocrinida	Crinoidea	Echinodermata	Rec.	(27)
Isorophida	Edrioasteroidea	Echinodermata	Gzhelian	(12)
Kilbuchophyllida	Anthozoa	Cnidaria	Katian	(12)
Kutorginida	Kutorginata	Brachiopoda	M. Cam.	(6)
Lichenariida	Anthozoa	Cnidaria	Telychian	(12)
Lichida	Trilobita	Arthropoda	Famennian	(12)
Lingulida	Lingulata	Brachiopoda	Rec.	(6)
Lucinida	Bivalvia	Mollusca	Rec.	(12)
Maennilicrinida	Crinoidea	Echinodermata	Ord.	(36)
Megalodontida	Bivalvia	Mollusca	Tithonian	(12)
Millericrinida	Crinoidea	Echinodermata	L. Cret.	(27)
Mitrosagophora	NA	Brachiopoda	L. Cam.	(37)
Modiomorphida	Bivalvia	Mollusca	L. Cret.	(38, 39)
Monobathrida	Crinoidea	Echinodermata	Wuchiapingian	(12, 40)
Murchisoniina	Gastropoda	Mollusca	Cenomanian	(12)
Myalinida	Bivalvia	Mollusca	Maastrichtian	(12)
Myelodactylida	Crinoidea	Echinodermata	Telychian	(12)
Myoida	Bivalvia	Mollusca	Rec.	(12)
Mytilida	Bivalvia	Mollusca	Rec.	(12)
Naraoiida	Trilobita	Arthropoda	Hirnantian	(12)
Naukatida	Obolellata	Brachiopoda	M. Cam.	(6)
Nautilida	Cephalopoda	Mollusca	Rec.	(12)
Neogastropoda	Gastropoda	Mollusca	Rec.	(12)
Neotaenioglossa	Gastropoda	Mollusca	Maastrichtian	(12)
Neritoina	Gastropoda	Mollusca	Rec.	(12)
Notaspidea	Gastropoda	Mollusca	Rec.	(12)
Nuculanida	Bivalvia	Mollusca	Rec.	(12)
Nuculida	Bivalvia	Mollusca	Rec.	(12)
Obolellida	Obolellata	Brachiopoda	M. Cam.	(6)
Odontopleurida	Trilobita	Arthropoda	Famennian	(12, 41, 42)
Olenida	Trilobita	Arthropoda	Hirnantian	(12)
Opisthobranchia	Gastropoda	Mollusca	Rec.	(12)

Orthida	Rhynchonellata	Brachiopoda	U. Perm.	(6)
Orthotetida	Strophomenata	Brachiopoda	U. Perm.	(6)
Ostreida	Bivalvia	Mollusca	Rec.	(12)
Pandorida	Bivalvia	Mollusca	Rec.	(12)
Patellogastropoda	Gastropoda	Mollusca	Rec.	(12)
Paterinida	Paterinata	Brachiopoda	U. Ord.	(6)
Pectinida	Bivalvia	Mollusca	Rec.	(12)
Pennatulacea	Anthozoa	Cnidaria	Rec.	(12)
Pentacystida	Edrioasteroidea	Echinodermata	Hirnantian	(12)
Pentamerida	Rhynchonellata	Brachiopoda	Frasnian	(6, 43)
Pentasmiliida	Anthozoa	Cnidaria	Tri.	(44)
Phacopida	Trilobita	Arthropoda	Famennian	(12, 41, 45)
Pholadida	Bivalvia	Mollusca	Rec.	(12)
Pholadomyida	Bivalvia	Mollusca	Rec.	(12)
Phylloceratida	Cephalopoda	Mollusca	Maastrichtian	(12)
Phylloceratitida	Cephalopoda	Mollusca	Maastrichtian	(12)
Pisocrinida	Crinoidea	Echinodermata	Eifelian	(12)
Porocrinida	Crinoidea	Echinodermata	Hirnantian	(12)
Poromyida	Bivalvia	Mollusca	Rec.	(12)
Poteriocrinina	Crinoidea	Echinodermata	Perm.	(46, 47)
Productida	Strophomenata	Brachiopoda	L. Tri.	(6, 48)
Proetida	Trilobita	Arthropoda	Changhsingian	(12, 24, 49)
Prolecanitida	Cephalopoda	Mollusca	Induan	(34, 50, 51)
Proparia	Trilobita	Arthropoda	Stage 10	(12)
Protobranchia	Bivalvia	Mollusca	Famennian	(12)
Protocrinoida	Crinoidea	Echinodermata	Tremadocian	(52)
Protorthida	Rhynchonellata	Brachiopoda	U. Dev.	(6, 53)
Pterioida	Bivalvia	Mollusca	Rec.	(12)
Ptychopariida	Trilobita	Arthropoda	Frasnian	(12)
Redlichiida	Trilobita	Arthropoda	Stage 10	(12)
Rhabdomesida	Stenolaemata	Bryozoa	Carnian	(12)
Rhynchonellida	Rhynchonellata	Brachiopoda	Rec.	(6)
Roveacrinida	Crinoidea	Echinodermata	Danian	(27)
Sagenocrinida	Crinoidea	Echinodermata	Oxfordian	(12)
Sarcinulida	Anthozoa	Cnidaria	Telychian	(12)
Scleractinia	Anthozoa	Cnidaria	Rec.	(12)
Siphonotretida	Lingulata	Brachiopoda	Ord.	(6)
Solemyida	Bivalvia	Mollusca	Rec.	(12)
Solemyoida	Bivalvia	Mollusca	Darriwilian	(12)
Solenida	Bivalvia	Mollusca	Rec.	(12)
Sorbeoconcha	Gastropoda	Mollusca	Rec.	(12)
Spiraculata	NA	Echinodermata	Capitanian	(12)
Spiriferida	Rhynchonellata	Brachiopoda	U. Tri.	(6)
Spiriferinida	Rhynchonellata	Brachiopoda	L. Jur.	(6)
Stauriida	Anthozoa	Cnidaria	Changhsingian	(12, 54)
Stolonifera	Anthozoa	Cnidaria	Rec.	(26)
Strophomenida	Strophomenata	Brachiopoda	Carb.	(55)
Tabulaconida	Anthozoa	Cnidaria	L. Cam.	(56)
Taxocrinida	Crinoidea	Echinodermata	Sakmarian	(12)
Tectibranchia	Gastropoda	Mollusca	Rec.	(12)
Terebratulida	Rhynchonellata	Brachiopoda	Rec.	(6)
Tetradiida	Anthozoa	Cnidaria	Hirnantian	(12)
Tetragonocrinida	Crinoidea	Echinodermata	Darriwilian	(12)
Thecideida	Rhynchonellata	Brachiopoda	Rec.	(6)
Thecosomata	Gastropoda	Mollusca	Rec.	(12)
Thraciida	Bivalvia	Mollusca	Rec.	(12)
Tommotiida	NA	Brachiopoda	M. Cam.	(57)
Trepostomata	Stenolaemata	Bryozoa	Rhaetian	(12)
Trepostomida	Stenolaemata	Bryozoa	Rhaetian	(12)
Trigoniida	Bivalvia	Mollusca	Rec.	(12)
Trimerellida	Craniata	Brachiopoda	Sil.	(6)

Tuarangiida	Bivalvia	Mollusca	Guzhangian	(12)
Umbraculomorpha	Gastropoda	Mollusca	Priabonian	(12)
Unionida	Bivalvia	Mollusca	Rec.	(58)
Veneroidei	Bivalvia	Mollusca	Rec.	(12)

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