

ADDITIONAL FILE 4 – ORIGINATION & EXTINCTION DATES

Provided below is information on all family-level taxa considered valid in this study. Dates are given for first fossil appearances, final fossil appearances (i.e. extinction dates) for extinct taxa (which are indicated by *), first absence dates (i.e. the stratum immediately after final fossil appearances), and phylogenetically-adjusted dates of origin based on both the MRC and MRP phylogeny. Those taxa in grey lack phylogenetic information though dates are given under the phylogenetically-adjusted date columns as they are included in lineage through time plots.

Family	Earliest Stratum	Minimum First Appearance Date	Latest Stratum	Minimum Final Appearance Date	Earliest Stratum Absent	Minimum First Absence Date	Minimum First Appearance Date (MRC)	Minimum First Appearance Date (MRP)
Aeschniidae*	Kimmeridgian (J)	150.8	Cenomanian (K)	93.6	Turonian (K)	88.6	161.2	161.2
Aeshnidae = Allopeltaliidae, Gomphaeschniidae	Tithonian (J)	145.5					145.5	145.5
Aktassiidae*	Oxfordian (J)	155.6	Barremian (K)	125.0	Aptian (K)	112.0	155.6	155.6
Amphipterygidae		0.0					48.6	48.6
Aranipechloromphidae*	Aptian (K)	112.0	Aptian (K)	112.0	Albian (K)	99.6	112.0	112.0
Aranipegompidae*	Aptian (K)	112.0	Aptian (K)	112.0	Albian (K)	99.6	145.5	145.5
Aranipellulidae*	Berriasian (K)	140.2	Aptian (K)	112.0	Albian (K)	99.6	140.2	140.2
Aranipephlebiidae*	Aptian (K)	112.0	Aptian (K)	112.0	Albian (K)	99.6	130.0	130.0
Archthemistidae*	Rhaetian (Tr)	199.6	Toarcian (J)	175.6	Aalenian (J)	171.6	199.6	199.6
Asiopteridae* = Oreopteridae	Toarcian (J)	175.6	Oxfordian (J)	155.6	Kimmeridgian (J)	150.8	216.5	216.5
Austroperlestidae*	Ypresian (Pg)	48.6	Ypresian (Pg)	48.6	Lutetian (Pg)	40.4	48.6	48.6
Austropeltidae		0.0					161.2	161.2
Batkeniidae*	Anisian (Tr)	237.0	Camian (Tr)	216.5	Norian (Tr)	203.6	237.0	237.0
Bechyidae*	Moscovian (C)	307.2	Moscovian (C)	307.2	Kasimovian (C)	303.4	307.2	307.2
Bolcacordulidae*	Ypresian (Pg)	48.6	Ypresian (Pg)	48.6	Lutetian (Pg)	40.4	48.6	48.6
Bolcathoridae*	Ypresian (Pg)	48.6	Ypresian (Pg)	48.6	Lutetian (Pg)	40.4	48.6	48.6
Callimokaltaniidae*	Roadian (P)	268.0	Roadian (P)	268.0	Wordian (P)	265.8	275.6	275.6
Calopterygidae = Agriidae	Priabonian (Pg)	33.9					33.9	33.9
Campterocheleidae* = Karatawidae	Sinemurian (J)	189.6	Berriasian (K)	140.2	Valanginian (K)	133.9	189.6	189.6
Camptotaxineuridae*	Artinskian (P)	275.6	Artinskian (P)	275.6	Kungurian (P)	270.6	275.6	275.6
Campylopteridae*	Kasimovian (C)	303.4	Kasimovian (C)	303.4	Gzhelian (C)	299.0	303.4	303.4
Chlorocyphidae = Dictyriastidae		0.0					48.6	48.6
Chlorogomphidae		0.0					112.0	112.0
Chlorolestidae = Syllestidae, Chorismagrionidae	Tithonian (J)	145.5					145.5	145.5
Coenagrionidae = Agrionidae, Coenagrionidae	Aptian (K)	112.0					112.0	112.0
Cordulegastridae	Rupelian (Pg)	28.4					28.4	145.5
Cordulephyidae	Thanetian (Pg)	55.8					55.8	55.8
Cordulidae = Idionychidae	Ypresian (Pg)	48.6					88.6	88.6
Cretacoenagrionidae*	Hauterivian (K)	130.0	Hauterivian (K)	130.0	Barremian (K)	125.0	145.5	145.5
Cretapelutidae*	Berriasian (K)	140.2	Aptian (K)	112.0	Albian (K)	99.6	155.6	155.6
Cyclothemistidae*	Camian (Tr)	216.5	Toarcian (J)	175.6	Aalenian (J)	171.6	216.5	216.5
Cymatophlebiidae*	Callovian (J)	161.2	Barremian (K)	125.0	Aptian (K)	112.0	161.2	161.2
Dictyriidae = Heliocharitidae		0.0					33.9	33.9
Ditaxineuridae*	Artinskian (P)	275.6	Kungurian (P)	270.6	Roadian (P)	268.0	275.6	275.6
Enigmaeschnidae*	Cenomanian (K)	93.6	Cenomanian (K)	93.6	Turonian (K)	88.6	93.6	93.6
Eocordulidae*	Berriasian (K)	140.2	Berriasian (K)	140.2	Valanginian (K)	133.9	140.2	140.2
Eosagrionidae*	Toarcian (J)	175.6	Toarcian (J)	175.6	Aalenian (J)	171.6	175.6	175.6
Epallagidae = Euphaeidae	Ypresian (Pg)	48.6					48.6	48.6
Epiophlebiidae		0.0					196.5	196.5
Erasipteridae*	Bashkirian (C)	311.7	Moscovian (C)	307.2	Kasimovian (C)	303.4	311.7	311.7
Erichschmidtidae*	Oxfordian (J)	155.6	Oxfordian (J)	155.6	Kimmeridgian (J)	150.8	196.5	196.5
Eumoraeschnidae*	Tithonian (J)	145.5	Tithonian (J)	145.5	Berriasian (K)	140.2	145.5	145.5
Europteridae*	Bashkirian (C)	311.7	Bashkirian (C)	311.7	Moscovian (C)	307.2	311.7	311.7
Euthemistidae*	Oxfordian (J)	155.6	Oxfordian (J)	155.6	Kimmeridgian (J)	150.8	155.6	155.6
Frenquellidae*	Ypresian (Pg)	48.6	Ypresian (Pg)	48.6	Lutetian (Pg)	40.4	48.6	48.6
Gomphidae		0.0					145.5	145.5
Gondwanogomphidae*	Aptian (K)	112.0	Aptian (K)	112.0	Albian (K)	99.6	155.6	155.6
Hemeroscopidae*	Aptian (K)	112.0	Albian (K)	99.6	Cenomanian (K)	93.6	145.5	145.5
Hemiphlebiidae	Tithonian (J)	145.5					145.5	145.5
Hemizygopteridae*	Kungurian (P)	270.6	Kungurian (P)	270.6	Roadian (P)	268.0	275.6	275.6
Henroyiidae*	Toarcian (J)	175.6	Toarcian (J)	175.6	Aalenian (J)	171.6	175.6	175.6
Heterophlebiidae*	Sinemurian (J)	189.6	Toarcian (J)	175.6	Aalenian (J)	171.6	189.6	189.6
Hypolestidae	Priabonian (Pg)	33.9					125.0	125.0
Isophlebiidae*	Aalenian (J)	171.6	Valanginian (K)	133.9	Hauterivian (K)	130.0	189.6	199.6
Isostictidae	Aptian (K)	112.0					112.0	112.0
Juracordulidae*	Tithonian (J)	145.5	Tithonian (J)	145.5	Berriasian (K)	140.2	145.5	145.5
Juragomphidae*	Oxfordian (J)	155.6	Oxfordian (J)	155.6	Kimmeridgian (J)	150.8	155.6	155.6
Juraheterophlebiidae*	Oxfordian (J)	155.6	Oxfordian (J)	155.6	Kimmeridgian (J)	150.8	189.6	189.6
Juralbellulidae*	Callovian (J)	161.2	Callovian (J)	161.2	Oxfordian (J)	155.6	161.2	161.2
Kaltanoneuridae*	Roadian (P)	268.0	Roadian (P)	268.0	Wordian (P)	265.8	268.0	268.0
Kargalotyidae*	Wordian (P)	265.8	Wordian (P)	265.8	Capitanian (P)	260.4	265.8	265.8
Kennectyidae*	Artinskian (P)	275.6	Camian (Tr)	216.5	Norian (Tr)	203.6	275.6	275.6
Kohlwaldiidae*	Moscovian (C)	307.2	Moscovian (C)	307.2	Kasimovian (C)	303.4	307.2	307.2

Lapeyriidae*	Kungurian (P)	270.6	Kungurian (P)	270.6	Roadian (P)	268.0	270.6	270.6
Latibasaliidae*	Thanetian (Pg)	55.8	Thanetian (Pg)	55.8	Ypresian (Pg)	48.6	55.8	55.8
Lestidae	Thanetian (Pg)	55.8					55.8	145.5
Lestoideidae = Diphlebiidae, Philogangidae		0.0					48.6	48.6
Liadotyptidae*	Kungurian (P)	270.6	Kungurian (P)	270.6	Roadian (P)	268.0	270.6	270.6
Liassogomphidae* = Gomphidae	Toarcian (J)	175.6	Toarcian (J)	175.6	Aalenian (J)	171.6	175.6	175.6
Liassophlebiidae*	Hettangian (J)	196.5	Toarcian (J)	175.6	Aalenian (J)	171.6	196.5	196.5
Liassostenophlebiidae*	Toarcian (J)	175.6	Toarcian (J)	175.6	Aalenian (J)	171.6	175.6	175.6
Libellulidae	Turonian (K)	88.6					88.6	88.6
Lindenidae	Aptian (K)	112.0					145.5	145.5
Liupanshanidae*	Barremian (K)	125.0	Turonian (K)	88.6	Coniacian (K)	85.8	155.6	155.6
Macromiidae	Burdigalian (Ng)	16.0					55.8	55.8
Meganeuridae* = Tupidae	Bashkirian (C)	311.7	Roadian (P)	268.0	Wordian (P)	265.8	311.7	311.7
Megapodaagrionidae = Dysagrionidae, Congqingidae, EuBarremian (K)		125.0					125.0	125.0
Mesochlorogomphidae*	Barremian (K)	125.0	Barremian (K)	125.0	Aptian (K)	112.0	125.0	125.0
Mesomantidiidae*	Carmanian (Tr)	216.5	Carmanian (Tr)	216.5	Norian (Tr)	203.6	216.5	216.5
Mesuropetalidae*	Oxfordian (J)	155.6	Valangianian (K)	133.9	Hauterivian (K)	130.0	155.6	155.6
Mitophlebiidae*	Carmanian (Tr)	216.5	Carmanian (Tr)	216.5	Norian (Tr)	203.6	216.5	216.5
Myopophlebiidae*	Toarcian (J)	175.6	Toarcian (J)	175.6	Aalenian (J)	171.6	196.5	196.5
Namurotyptidae*	Bashkirian (C)	311.7	Bashkirian (C)	311.7	Moscovian (C)	307.2	311.7	311.7
Nannogomphidae*	Tithonian (J)	145.5	Tithonian (J)	145.5	Berriasian (K)	140.2	145.5	145.5
Neopetalidae		0.0					28.4	145.5
Nodalulidae*	Aptian (K)	112.0	Aptian (K)	112.0	Albian (K)	99.6	112.0	112.0
Nothomacromiidae* = Pseudomacromiidae	Aptian (K)	112.0	Aptian (K)	112.0	Albian (K)	99.6	112.0	112.0
Oboraneuridae*	Sakmarian (P)	284.4	Sakmarian (P)	284.4	Artinskian (P)	275.6	284.4	284.4
Palaeomacromiidae* = Bolcaethemidae	Thanetian (Pg)	55.8	Ypresian (Pg)	48.6	Luletian (Pg)	40.4	55.8	55.8
Paracymatophlebiidae*	Oxfordian (J)	155.6	Oxfordian (J)	155.6	Kimmeridgian (J)	150.8	155.6	155.6
Paragomphlebiidae*	Oxfordian (J)	155.6	Tithonian (J)	145.5	Berriasian (K)	140.2	155.6	155.6
Parastenophlebiidae*	Tithonian (J)	145.5	Tithonian (J)	145.5	Berriasian (K)	140.2	145.5	145.5
Paralogidae*	Bashkirian (C)	311.7	Artinskian (P)	275.6	Kungurian (P)	270.6	311.7	311.7
Paurophlebiidae*	Carmanian (Tr)	216.5	Carmanian (Tr)	216.5	Norian (Tr)	203.6	216.5	216.5
Penlestidae		0.0					55.8	145.5
Permaeschnidae*	Artinskian (P)	275.6	Roadian (P)	268.0	Wordian (P)	265.8	275.6	275.6
Pernagrionidae* = Pernagriidae	Sakmarian (P)	284.4	Sakmarian (P)	284.4	Artinskian (P)	275.6	284.4	284.4
Pernepallagidae*	Roadian (P)	268.0	Roadian (P)	268.0	Wordian (P)	265.8	275.6	275.6
Permolestidae*	Kungurian (P)	270.6	Roadian (P)	268.0	Wordian (P)	265.8	284.4	284.4
Permophlebiidae*	Wuchiapingian (P)	253.8	Wuchiapingian (P)	253.8	Changhsingian (P)	251.0	253.8	253.8
Petaluridae	Aptian (K)	112.0					155.6	155.6
Pholidoptilidae	Roadian (P)	268.0	Roadian (P)	268.0	Wordian (P)	265.8	268.0	268.0
Piroutetiidae*	Rhaetian (Tr)	199.6	Rhaetian (Tr)	199.6	Hettangian (J)	196.5	237.0	237.0
Platycnemididae	Priabonian (Pg)	33.9					33.9	112.0
Platystictidae		0.0					125.0	125.0
Polyphoridae = Polythoridae		0.0					33.9	33.9
Polytaxineuridae*	Changhsingian (P)	251.0	Changhsingian (P)	251.0	Induan (Tr)	249.5	275.6	275.6
Priscalestidae*	Luletian (Pg)	40.4	Luletian (Pg)	40.4	Bartonian (Pg)	37.2	40.4	40.4
Progobieshidae*	Barremian (K)	125.0	Aptian (K)	112.0	Albian (K)	99.6	161.2	161.2
Prohemeroscopidae*	Tithonian (J)	145.5	Tithonian (J)	145.5	Berriasian (K)	140.2	145.5	145.5
Prostenophlebiidae*	Tithonian (J)	145.5	Tithonian (J)	145.5	Berriasian (K)	140.2	155.6	155.6
Proterogomphidae*	Tithonian (J)	145.5	Aptian (K)	112.0	Albian (K)	99.6	145.5	145.5
Protolindenidae*	Tithonian (J)	145.5	Tithonian (J)	145.5	Berriasian (K)	140.2	155.6	161.2
Protomyrmeleontidae* = Triassagrionidae	Carmanian (Tr)	216.5	Hauterivian (K)	130.0	Barremian (K)	125.0	237.0	237.0
Protoneuridae	Serravallian (Ng)	11.6					33.9	112.0
Pseudolestidae		0.0					33.9	33.9
Pseudostigmatidae		0.0					112.0	112.0
Rudialeschnidae*	Berriasian (K)	140.2	Aptian (K)	112.0	Albian (K)	99.6	161.2	161.2
Saxonagrionidae*	Kungurian (P)	270.6	Kungurian (P)	270.6	Roadian (P)	268.0	270.6	270.6
Sieblisidae*	Rupelian (Pg)	28.4	Tortonian (Ng)	7.2	Messinian (Ng)	5.3	48.6	48.6
Sonidae*	Hauterivian (K)	130.0	Hauterivian (K)	130.0	Barremian (K)	125.0	130.0	130.0
Sphenophlebiidae*	Toarcian (J)	175.6	Hauterivian (K)	130.0	Barremian (K)	125.0	216.5	216.5
Steleopteridae*	Oxfordian (J)	155.6	Tithonian (J)	145.5	Berriasian (K)	140.2	155.6	155.6
Stenophlebiidae*	Oxfordian (J)	155.6	Aptian (K)	112.0	Albian (K)	99.6	155.6	155.6
Synthemistidae = Synthemidae		0.0					88.6	88.6
Tarsophlebiidae*	Oxfordian (J)	155.6	Aptian (K)	112.0	Albian (K)	99.6	216.5	216.5
Triadophlebiidae*	Carmanian (Tr)	216.5	Carmanian (Tr)	216.5	Norian (Tr)	203.6	216.5	216.5
Triadotyptidae* = Reisidae	Anisian (Tr)	237.0	Carmanian (Tr)	216.5	Norian (Tr)	203.6	237.0	237.0
Triassolestidae* = Italophlebiidae, Mesophlebiidae, ProgCarmanian (Tr)		216.5	Toarcian (J)	175.6	Aalenian (J)	171.6	216.5	216.5
Turanthemistidae* = Selenothemistidae	Toarcian (J)	175.6	Oxfordian (J)	155.6	Kimmeridgian (J)	150.8	199.6	199.6
Valdicordulidae*	Hauterivian (K)	130.0	Hauterivian (K)	130.0	Barremian (K)	125.0	130.0	130.0
Xamenophlebiidae*	Carmanian (Tr)	216.5	Toarcian (J)	175.6	Aalenian (J)	171.6	216.5	216.5
Zacallitidae*	Ypresian (Pg)	48.6	Ypresian (Pg)	48.6	Luletian (Pg)	40.4	48.6	48.6
Zygophlebiidae*	Carmanian (Tr)	216.5	Carmanian (Tr)	216.5	Norian (Tr)	203.6	216.5	216.5