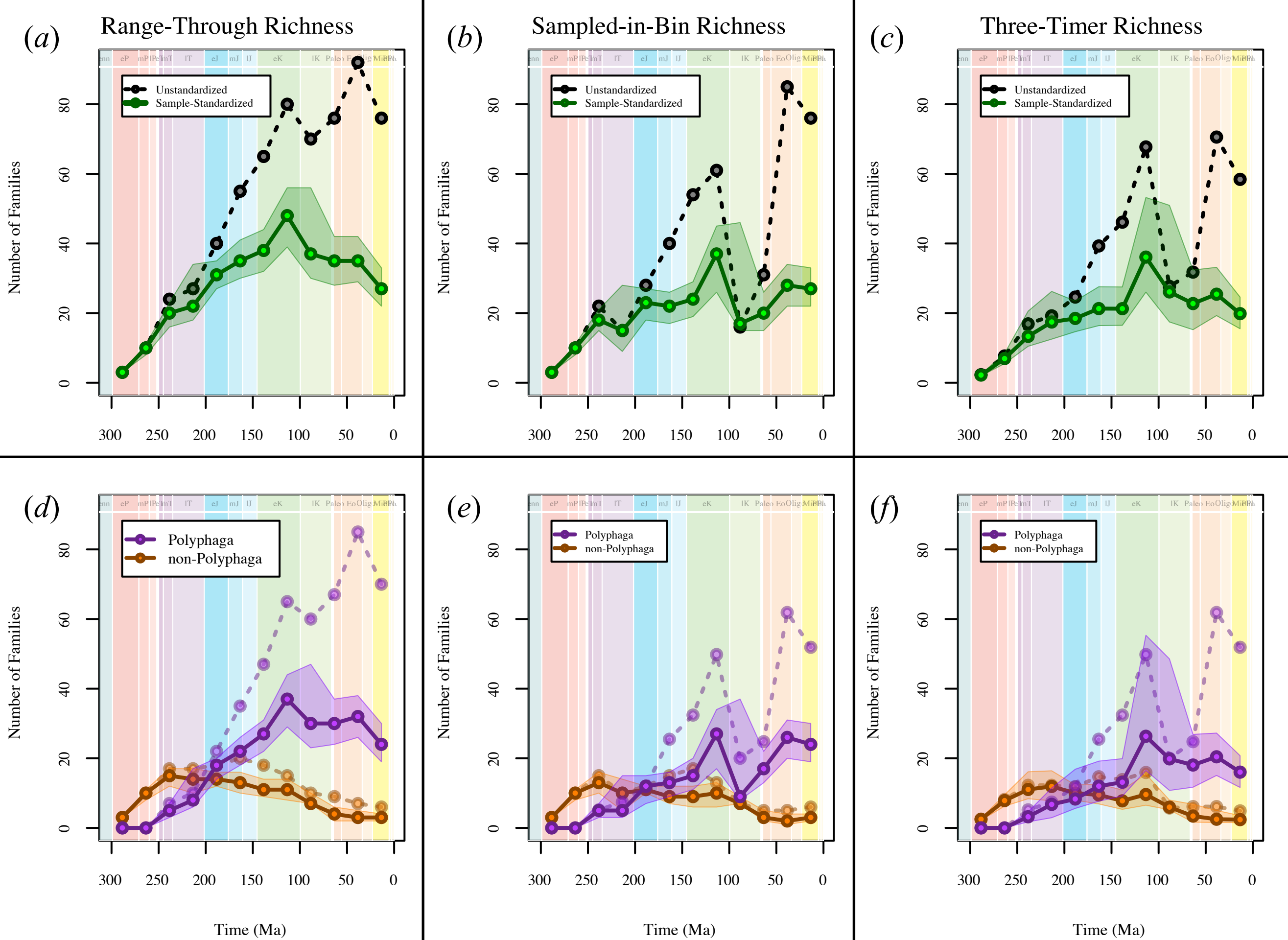
Supplementary Information

Alternative metrics of taxonomic richness: In analyses presented in the main text, we describe taxonomic richness using range-through (RT) richness, for which taxa are presumed to persist between their intervals of first and last occurrence. For completeness, we also estimated the pattern of taxonomic richness using two other common metrics of richness. The first is sampled-in-bin richness (SIB), which counts only taxa (i.e., families) actually preserved within an interval, regardless of whether they were preserved in earlier or later intervals. The second alternative richness metric we use is the three-timer (3T) correction (figures S1*c,e* and S2*c,e*). For 3T, SIB richness within an interval is adjusted by dividing by the sampling probability in that interval, which is calculated as the proportion of taxa preserved in the immediately earlier and immediately later interval that are preserved within the focal interval.

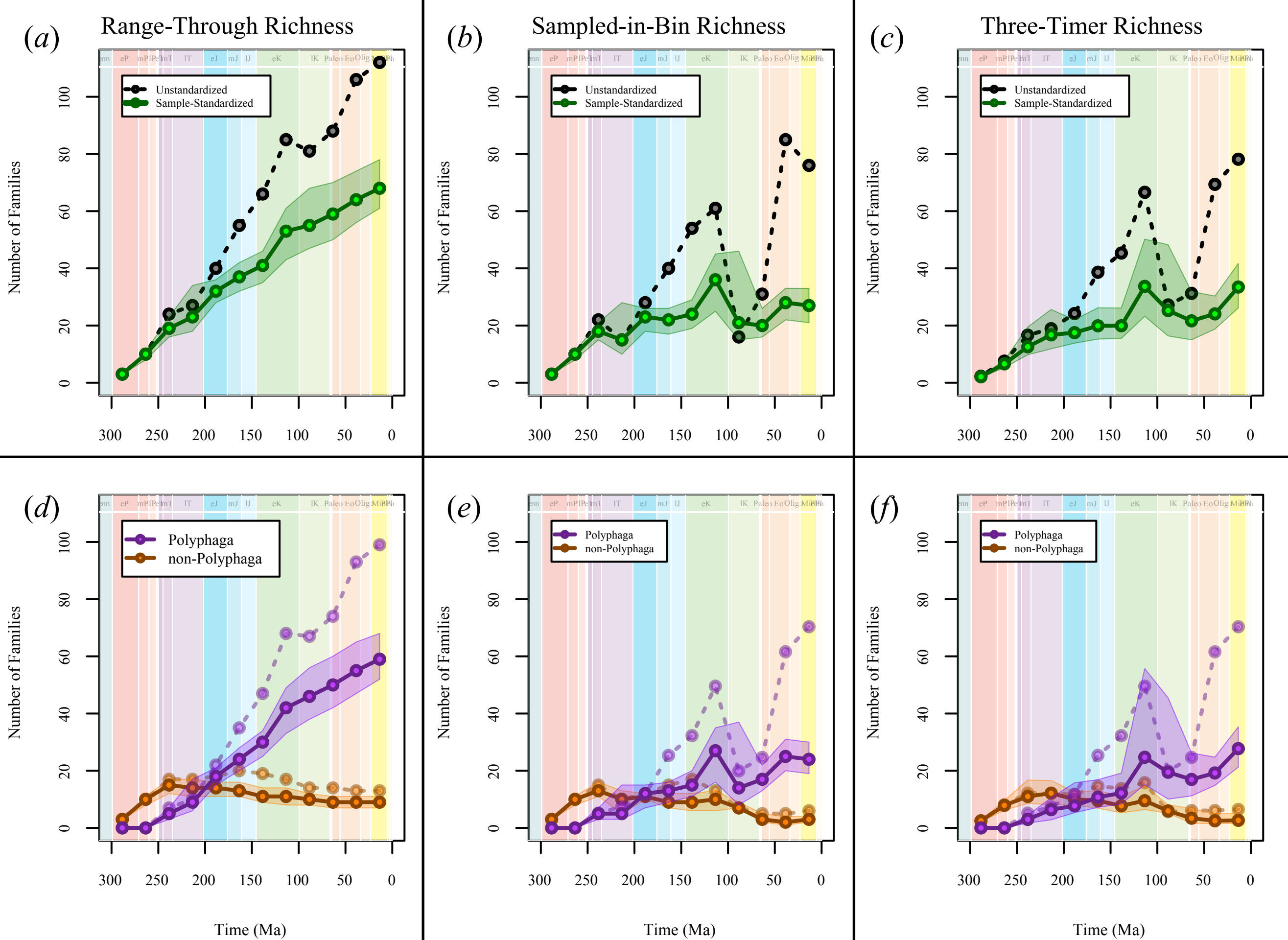
For these alternative metrics, the number of taxa sampled within in an interval either entirely (SIB) or predominantly (3T) determines the apparent pattern of taxonomic richness. Sampling of the coleopteran fossil record varies greatly among intervals (see text figures 1*a* and *c)*, and so has a variable impact on the inferred patterns of richness using these metrics. Our use of RT moderates the interval-to-interval variation to an extent, so we think it provides the most accurate representation of the pattern of coleopteran family richness.

Figure S1. Patterns of beetle family richness using alternative richness metrics not using extant occurrences. Family richness of all Coleoptera within 25My intervals using A) range-through, B) sampled-in-bin, and C) three-timer richness metrics. Unstandardized (black dashed line) and sample-standardized family richness curves (solid green line) are shown. Green-shaded envelope surrounding sample-standardized richness indicates 95% confidence intervals based on pseudoreplicate subsampling (see Methods). Unstandardized (dashed lines) and sample-standardized (solid lines) family richness within the suborder Polyphaga (purple) and non-polyphagan suborders (orange) within 25My intervals using D) range-through, E) sampled-in-bin, and F) three-timer richness metrics.



(a)
Range-Through Richness
(b)
Sampled-in-Bin Richness
(c)
Three-Timer Richness
Unstandardized
Sample-Standardized
(d)
(e)
(f)
Polyphaga
non-Polyphaga
Number of Families
Time (Ma)
0
20
40
60
80
300
250
200
150
100
50
0
eP
mP
lT
eJ
mJ
lJ
eK
lK
Paleo
Eo
Olig
Mi

Figure S2. Patterns of beetle family richness using alternative richness metrics. These analyses included extant occurrences, and used rarefaction in sample-standardization procedures. All metrics, symbols and colors as in figure S1.


(a)
Range-Through Richness
(b)
Sampled-in-Bin Richness
(c)
Three-Timer Richness
Unstandardized
Sample-Standardized
(d)
(e)
(f)
Polyphaga
non-Polyphaga
Number of Families
Time (Ma)

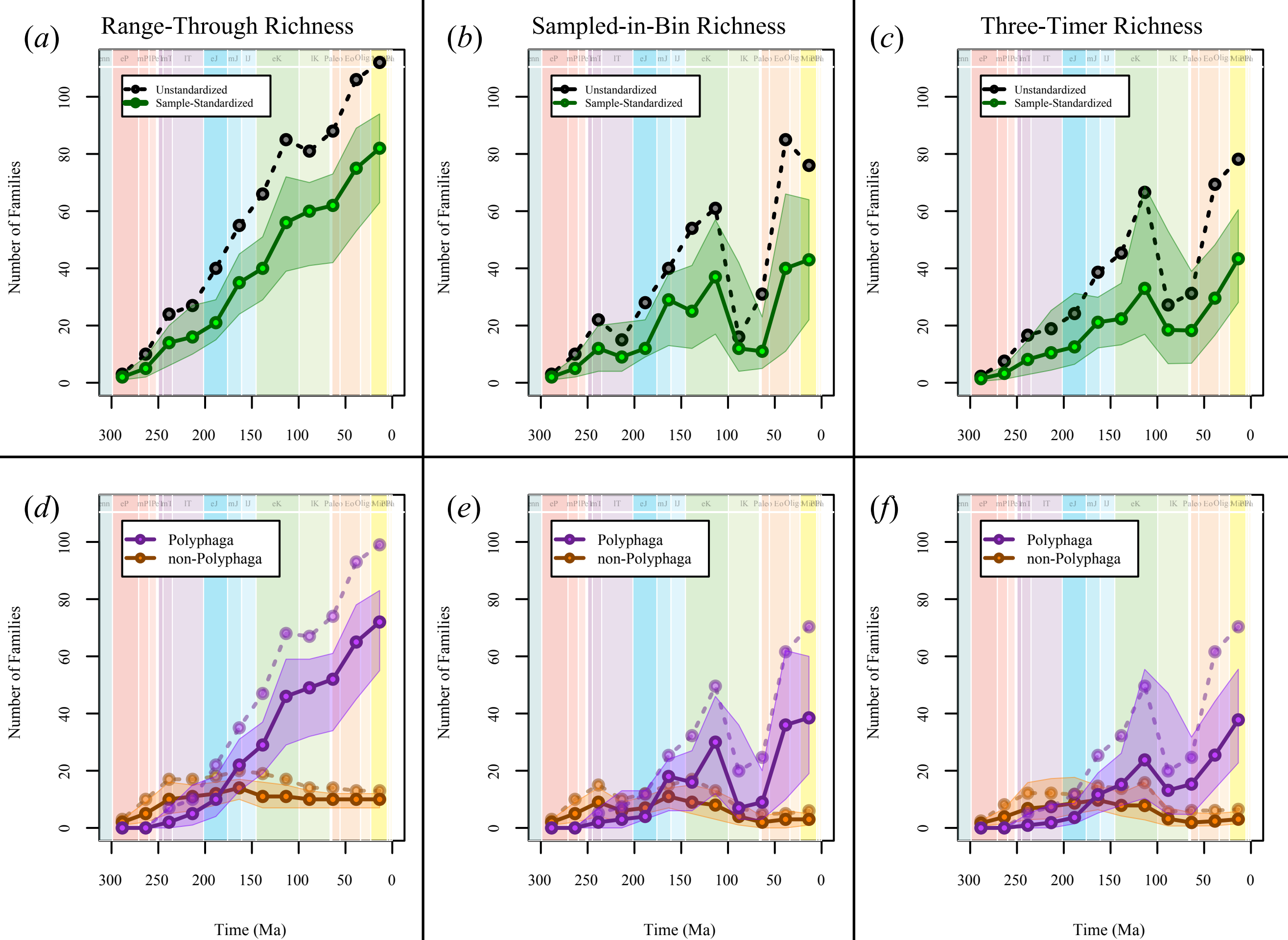
Pull of the Recent: In analyses presented in the main text, we treated extant taxa as having an "occurrence" in the Recent. This practice artificially extends the ranges of 36 extant families that are preserved in the fossil record, but did not have an occurrence in our final interval. Because we used first and last occurrences to generate stratigraphic ranges to estimate richness and taxonomic rates, this practice can influence the results of our analyses. To determine the effect of the Pull of the Recent on our results, we also estimated taxonomic richness using all three richness metrics (i.e., RT, SIB, 3T) without extending the ranges of these extant taxa (figure S1).

The early part of the RT richness curve for all coleopteran families (figure S1*a*) is identical, showing richness increasing at nearly constant rate. A more rapid increase in richness also is apparent in both curves during the latter part of the Early Cretaceous. The two curves predictably diverge after the Early Cretaceous, particularly in the final interval. Sampling in the final interval in our time-series is moderate in comparison with other intervals, but relatively poor in comparison with the preceding interval, which imparts an apparent decline in family richness in the final interval. It should be noted, however, that this apparent extinction is largely an artifactual "edge effect" (e.g., ref 4) due to our "window of observation" and incomplete sampling in our final fossil interval. Specifically, our study interval (i.e., the "window of observation") continues to the Recent, so there is no later interval in which taxa could be preserved as fossils, and accordingly had their ranges extended beyond our final fossil interval. Our use of extant "occurrences" ameliorates this bias due to edge effects.

Note that because SIB richness is not influenced by the Pull of the Recent, so figures S2*b* and S2*e* are identical to S2*b* and S2*e*, respectively. Similarly, the Pull of the Recent only influences the final interval for 3T richness, so figures S3*c* and S3*f* differ only slightly from Figures S1*b* and S1*f*, respectively.

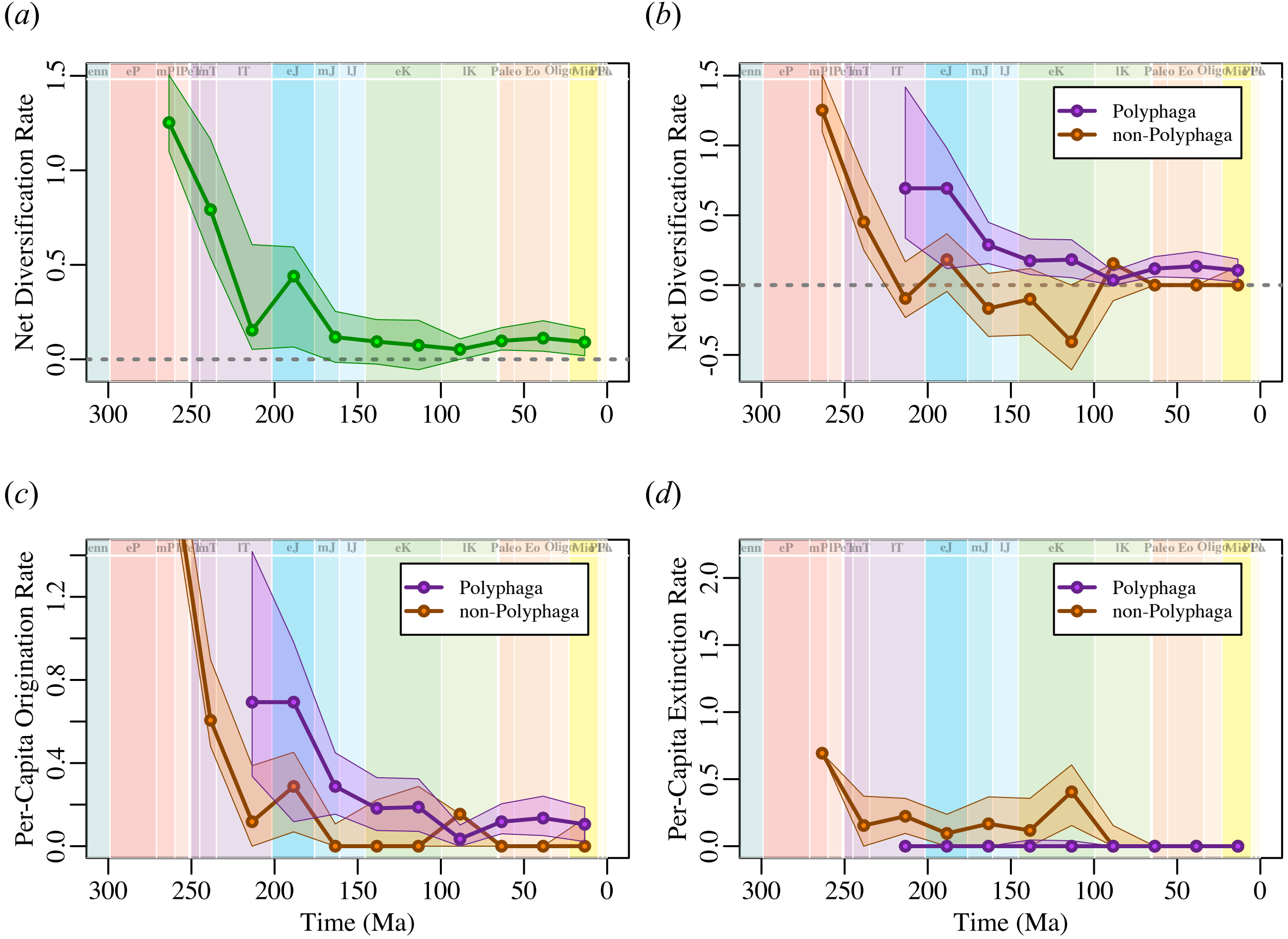
Alternative sample-standardization procedures: In analyses presented in the main text, we sought to minimize interval-to-interval variation in sampling using rarefaction of occurences. We also applied shareholder quorum subsampling (SQS; 3), which has some clear theoretical advantages over simple rarefaction. However, we are cautious about the application of SQS to our dataset for theoretical (with respect to our dataset) and empirical reasons. Specifically, in SQS, collections within intervals are drawn until a particular "coverage" level is reached. A taxon's contribution to the coverage quota is the proportion of occurrences in the interval that belong to it. Essentially, this proportion is a measure of the taxon's "commonness" among localities in the interval. However, the vast majority of published records of insect species are original descriptions, and subsequent finds of the same species rarely find their way into print. Therefore, a beetle species that is a relatively common fossil and one that is extraordinarily rare would both likely appear as single occurrences, thus diminishing the correspondence between the true "commonness" of species and their representation as published occurrences. The use of SQS under these conditions might serve to distort evolutionary patterns, rather than reveal them. In practice, the macroevolutionary patterns found using SQS do not differ qualitatively from those using rarefaction by occurrences (figure S3), although SQS generally results in larger confidence intervals for our data set.

Figure S3. Patterns of beetle family richness using shareholder quorum subsampling (SQS) and extant occurrences. All metrics, symbols and colors as in figure S1.



(a)
Range-Through Richness
(b)
Sampled-in-Bin Richness
(c)
Three-Timer Richness
Unstandardized
Sample-Standardized
(d)
(e)
(f)
Polyphaga
non-Polyphaga
Number of Families
Time (Ma)
300
250
200
150
100
50
0
0
20
40
60
80
100
eP
mP
lP
eT
mT
lT
eJ
mJ
lJ
eK
lK
Paleo
Eo
Olig
Mio
Plio
Pleis

Figure S4. Per-capita rates of beetle family diversification with all specimens preserved in amber removed from the analysis. This figure can be compared to figure 4 in the main document. A) Rate of net diversification for all beetle families within 25My intervals. Solid green line shows median rate from 1000 pseudoreplicate analyses, and surrounding green envelope indicates 95% confidence intervals. B) Rate of net diversification for Polyphaga (purple) and non-polyphagan suborders (orange) within 25My intervals. C) Per-capita rate of family origination for Polyphaga (purple) and non-polyphagan suborders (orange) within 25My intervals. Note that there is no longer a peak in origination rates in the early Cretaceous. D) Per-capita rate of family extinction for Polyphaga (purple) and non-polyphagan suborders (orange) within 25My intervals. Again, there are no known extinct families within Polyphaga, so their extinction rate is 0.0 throughout.



(a)
(b)
(c)
(d)
Net Diversification Rate
Per-Capita Origination Rate
Per-Capita Extinction Rate
Polyphaga
non-Polyphaga
Time (Ma)
300
250
200
150
100
50
0

Table S1. Maximum and minimum age estimates of first and last occurrences (dates in millions of years ago) for beetle families. Citations document first occurrences of taxa.

Suborder	Family	First Occurrence (max)	First Occurrence (min)	Last Occurrence (max)	Last Occurrence (min)	Citation(s)
Adephaga	Carabidae	201.5	196.5	0 (extant)	0 (extant)	(5)
Adephaga	Colymbotethidae	230	203.6	230	203.6	(6)
Adephaga	Coptoclavidae	236	201.5	125	112	(7, 8)
Adephaga	Dytiscidae	201.5	196.5	0 (extant)	0 (extant)	(9, 10)
Adephaga	DytiscoidFam1	252.3	247.2	252.3	247.2	(11)
Adephaga	Gyrinidae	203.6	176	0 (extant)	0 (extant)	(12)
Adephaga	Haliplidae	130	125	0 (extant)	0 (extant)	(13)
Adephaga	Hygrobiidae	28.4	23	0 (extant)	0 (extant)	(14)
Adephaga	Liadytidae	183	175.6	125	99.6	(15, 16)
Adephaga	Parahygrobiidae	161.2	155.7	161.2	155.7	(5)
Adephaga	Trachypachidae	259	252.3	0 (extant)	0 (extant)	(17)
Adephaga	Triaplidae	236	230	136.4	130	(5, 18)
Adephaga	Tritarsidae	55.8	48.6	55.8	48.6	(19)
Archostemata	Ademosynidae	272.5	268	130	125	(20, 21)
Archostemata	Catiniidae	236	230	125	112	(22, 23)
Archostemata	Cupedidae	272.5	268	0 (extant)	0 (extant)	(24)
Archostemata	Jurodidae	161.2	155.7	0 (extant)	0 (extant)	(15)
Archostemata	Magnocoleidae	236	201.5	236	201.5	(25)
Archostemata	Micromalthidae	125	112	0 (extant)	0 (extant)	(26)
Archostemata	Obrieniidae	236	230	161.2	155.7	(27)
Archostemata	Ommatidae	236	230	0 (extant)	0 (extant)	(23)
Archostemata	Schizophoridae	236	230	145.5	140.2	(23)
Myxophaga	Asiocoleidae	272.5	268	236	230	(23, 24)
Myxophaga	Hydroscaphidae	130	125	0 (extant)	0 (extant)	(28)
Myxophaga	Lepiceridae	106	100	0 (extant)	0 (extant)	(29, 30)
Myxophaga	Schizocoleidae	268	265	236	201.5	(24, 31)
Myxophaga	Sphaeriusidae	106	100	0 (extant)	0 (extant)	(32)
Myxophaga	Tricoleidae	236	230	236	230	(33)
Polyphaga	Acanthocnemidae	112	93.5	0 (extant)	0 (extant)	(5)
Polyphaga	Aderidae	106	100	0 (extant)	0 (extant)	(32)
Polyphaga	Agyrtidae	171.6	164.7	0 (extant)	0 (extant)	(34)
Polyphaga	Alloioscarabaeidae	164.7	155.7	164.7	155.7	(35)
Polyphaga	Anthicidae	125	112	0 (extant)	0 (extant)	(26)
Polyphaga	Anthribidae	161.2	155.7	0 (extant)	0 (extant)	(36)
Polyphaga	Artematopodidae	48.6	40.4	0 (extant)	0 (extant)	(37)
Polyphaga	Attelabidae	203.6	201.5	0 (extant)	0 (extant)	(10, 38)
Polyphaga	Belidae	125	112	0 (extant)	0 (extant)	(39)

Polyphaga	Berendtimiridae	48.6	40.4	48.6	40.4	(40)
Polyphaga	Biphyllidae	48.6	40.4	0 (extant)	0 (extant)	(41)
Polyphaga	Bostrichidae	34.01	33	0 (extant)	0 (extant)	(42)
Polyphaga	Bothrideridae	48.6	40.4	0 (extant)	0 (extant)	(43)
Polyphaga	Brachyceridae	70.6	65.5	0 (extant)	0 (extant)	(44)
Polyphaga	Brachypsectridae	16	16	0 (extant)	0 (extant)	(45)
Polyphaga	Brentidae	93.5	89.3	0 (extant)	0 (extant)	(46)
Polyphaga	Buprestidae	236	230	0 (extant)	0 (extant)	(47)
Polyphaga	Byrrhidae	201.5	196.5	0 (extant)	0 (extant)	(10, 48)
Polyphaga	Cantharidae	164.7	155.7	0 (extant)	0 (extant)	(49)
Polyphaga	Cerambycidae	150.8	145.5	0 (extant)	0 (extant)	(12)
Polyphaga	Cerophytidae	161.2	155.7	0 (extant)	0 (extant)	(50)
Polyphaga	Cerylonidae	145.5	140.2	0 (extant)	0 (extant)	(10)
Polyphaga	Chelonariidae	34.01	33	0 (extant)	0 (extant)	(42)
Polyphaga	Chrysomelidae	203.6	176	0 (extant)	0 (extant)	(51)
Polyphaga	Ciidae	106	100	0 (extant)	0 (extant)	(32)
Polyphaga	Clambidae	125	112	0 (extant)	0 (extant)	(26)
Polyphaga	Cleridae	130	125	0 (extant)	0 (extant)	(52)
Polyphaga	Coccinellidae	167.7	164.7	0 (extant)	0 (extant)	(10)
Polyphaga	Corylophidae	25.3	23.8	0 (extant)	0 (extant)	(53)
Polyphaga	Cryptophagidae	145.5	99.6	0 (extant)	0 (extant)	(54)
Polyphaga	Cucujidae	106	100	0 (extant)	0 (extant)	(32)
Polyphaga	Curculionidae	236	230	0 (extant)	0 (extant)	(10)
Polyphaga	Dascillidae	236	230	0 (extant)	0 (extant)	(33)
Polyphaga	Dermestidae	236	230	0 (extant)	0 (extant)	(33)
Polyphaga	Derodontidae	3.6	2.6	0 (extant)	0 (extant)	(55)
Polyphaga	Dryophthoridae	58.7	55.8	0 (extant)	0 (extant)	(56)
Polyphaga	Dryopidae	58.7	55.8	0 (extant)	0 (extant)	(57)
Polyphaga	Elateridae	236	201.5	0 (extant)	0 (extant)	(58)
Polyphaga	Elmidae	48.6	40.4	0 (extant)	0 (extant)	(59)
Polyphaga	Elodophthalmidae	125	112	125	112	(26)
Polyphaga	Endomychidae	130	125	0 (extant)	0 (extant)	(60)
Polyphaga	Erotylidae	58.7	55.8	0 (extant)	0 (extant)	(57)
Polyphaga	Eucinetidae	145.5	140.2	0 (extant)	0 (extant)	(61)
Polyphaga	Eucnemidae	106	100	0 (extant)	0 (extant)	(32)
Polyphaga	Geotrupidae	150.8	145.5	0 (extant)	0 (extant)	(62)
Polyphaga	Glaphyridae	130	125	0 (extant)	0 (extant)	(52)
Polyphaga	Glaresidae	201.5	196.5	0 (extant)	0 (extant)	(62)
Polyphaga	Helotidae	24.2	13.5	0 (extant)	0 (extant)	(63)
Polyphaga	Heteroceridae	145.5	140.2	0 (extant)	0 (extant)	(61)
Polyphaga	Histeridae	106	100	0 (extant)	0 (extant)	(64)
Polyphaga	Hybosoridae	161.2	155.7	0 (extant)	0 (extant)	(65)
Polyphaga	Hydraenidae	183	175.6	0 (extant)	0 (extant)	(15)

Polyphaga	Hydrophilidae	201.5	196.5	0 (extant)	0 (extant)	(9, 10)
Polyphaga	Kateretidae	125	112	0 (extant)	0 (extant)	(26)
Polyphaga	Laemophloeidae	48.6	40.4	0 (extant)	0 (extant)	(66)
Polyphaga	Lampyridae	48.6	40.4	0 (extant)	0 (extant)	(67)
Polyphaga	Latridiidae	201.5	196.5	0 (extant)	0 (extant)	(48)
Polyphaga	Leiodidae	236	230	0 (extant)	0 (extant)	(33)
Polyphaga	Limnichidae	48.6	40.4	0 (extant)	0 (extant)	(68)
Polyphaga	Lucanidae	161.2	155.7	0 (extant)	0 (extant)	(69)
Polyphaga	Lycidae	48.6	40.4	0 (extant)	0 (extant)	(70)
Polyphaga	Lymexylidae	125	112	0 (extant)	0 (extant)	(71)
Polyphaga	Megalopodidae	48.6	40.4	0 (extant)	0 (extant)	(72)
Polyphaga	Melandryidae	112	93.5	0 (extant)	0 (extant)	(73)
Polyphaga	Meloidae	58.7	55.8	0 (extant)	0 (extant)	(74)
Polyphaga	Melyridae	106	100	0 (extant)	0 (extant)	(32)
Polyphaga	Mesocinetidae	150.8	145.5	136.4	130	(75, 76)
Polyphaga	Mordellidae	161.2	155.7	0 (extant)	0 (extant)	(77)
Polyphaga	Mycetophagidae	201.5	196.5	0 (extant)	0 (extant)	(9)
Polyphaga	Mycteridae	48.6	40.4	0 (extant)	0 (extant)	(78)
Polyphaga	Nemonychidae	161.2	155.7	0 (extant)	0 (extant)	(5)
Polyphaga	Nitidulidae	201.5	196.5	0 (extant)	0 (extant)	(48)
Polyphaga	Nosodendridae	48.6	40.4	0 (extant)	0 (extant)	(66)
Polyphaga	Ochodaeidae	164.7	155.7	0 (extant)	0 (extant)	(79)
Polyphaga	Oedemeridae	106	100	0 (extant)	0 (extant)	(32)
Polyphaga	Omethidae	48.6	40.4	0 (extant)	0 (extant)	(67)
Polyphaga	Parandrexidae	161.2	155.7	130	125	(80, 81)
Polyphaga	Passalidae	125	112	0 (extant)	0 (extant)	(82)
Polyphaga	Phalacridae	33.9	28.4	0 (extant)	0 (extant)	(83)
Polyphaga	Pleocomidae	145.5	140.2	0 (extant)	0 (extant)	(5)
Polyphaga	Praelateriidae	201.5	196.5	201.5	196.5	(84)
Polyphaga	Prionoceridae	55.8	48.6	0 (extant)	0 (extant)	(85)
Polyphaga	Psephenidae	34.01	33	0 (extant)	0 (extant)	(86)
Polyphaga	Ptiliidae	106	100	0 (extant)	0 (extant)	(32)
Polyphaga	Ptilodactylidae	48.6	40.4	0 (extant)	0 (extant)	(87)
Polyphaga	Ptinidae	203.6	201.5	0 (extant)	0 (extant)	(88)
Polyphaga	Pyrochroidae	125	112	0 (extant)	0 (extant)	(89)
Polyphaga	Pythidae	34.01	33	0 (extant)	0 (extant)	(86)
Polyphaga	Ripiphoridae	112	99.6	0 (extant)	0 (extant)	(90)
Polyphaga	Salpingidae	106	100	0 (extant)	0 (extant)	(32)
Polyphaga	Scarabaeidae	183	175.6	0 (extant)	0 (extant)	(91)
Polyphaga	Schizopodidae	48.6	40.4	0 (extant)	0 (extant)	(92)
Polyphaga	Scirtidae	145.5	140.2	0 (extant)	0 (extant)	(12)
Polyphaga	Scraptiidae	145.5	140.2	0 (extant)	0 (extant)	(93)
Polyphaga	Septiventeridae	130	125	130	125	(94)

Polyphaga	Silphidae	230	203.6	0 (extant)	0 (extant)	(95)
Polyphaga	Silvanidae	106	100	0 (extant)	0 (extant)	(96)
Polyphaga	Sinisilvanidae	55.8	48.6	55.8	48.6	(19)
Polyphaga	Sphindidae	25.3	23.8	0 (extant)	0 (extant)	(53)
Polyphaga	Staphylinidae	171.6	167.7	0 (extant)	0 (extant)	(15)
Polyphaga	Synchroidae	34.01	33	0 (extant)	0 (extant)	(97)
Polyphaga	TenebFam1	164.7	155.7	164.7	155.7	(98)
Polyphaga	Tenebrionidae	236	230	0 (extant)	0 (extant)	(33)
Polyphaga	Tetratomidae	112	93.5	0 (extant)	0 (extant)	(73)
Polyphaga	Throscidae	201.5	196.5	0 (extant)	0 (extant)	(48)
Polyphaga	Trogidae	55.8	40.4	0 (extant)	0 (extant)	(62)
Polyphaga	Trogossitidae	183	175.6	0 (extant)	0 (extant)	(10)
Polyphaga	Ulyanidae	136.4	130	136.4	130	(99)
Polyphaga	Vesperidae	24.2	13.5	0 (extant)	0 (extant)	(63)
Polyphaga	Zopheridae	106	100	0 (extant)	0 (extant)	(32)
Stem	Labradorocoleidae	99.6	93.5	99.6	93.5	(23)
Stem	Oborocoleidae	290	284	290	284	(100)
Stem	Permocupedidae	284	279.5	265	260.5	(101, 102)
Stem	Permosynidae	255	252.3	145.5	140.2	(9, 103)
Stem	Rhombocoleidae	272.5	268	130	99.6	(13, 24, 104)
Stem	Sojanocoleidae	272.5	268	272.5	268	(20)
Stem	Taldycupedidae	268	265	175.6	161.2	(18, 23)
Stem	Triadocupedidae	236	230	230	203.6	(105)
Stem	Tshekardocoleidae	290	284	125	112	(100, 106)

REFERENCES

1. Alroy J (2008) Dynamics of origination and extinction in the marine fossil record. *Proceedings of the National Academy of Sciences of the Unites States of America* 105(Suppl. 1):11536-11542.
2. Alroy J*, et al.* (2008) Phanerozoic trends in the global diversity of marine invertebrates. *Science (Wash D C)* 321:97-100.
3. Alroy J (2010) Geographical, environmental and intrinsic biotic controls on Phanerozoic marine diversification. *Palaeontology (Oxford)* 53(6):1211-1235.
4. Foote M (2000) Origination and extinction components of taxonomic diversity: general problems. in *Paleobiology*, eds Erwin DH & Wing SL (The Paleontological Society, Lawrence, KS), pp 74-102.

5. Arnoldi LV, Zherikhin VV, Nikritin LM, & Ponomarenko AG (1992) *Mesozoic Coleoptera* (Smithsonian Institution Libraries and The National Science Foundation, Washington) p 285.

6. Ponomarenko AG (1993) Two new species of Mesozoic dytiscoid beetles from Asia. *Paleontological Journal* 27(1A):182-191.

7. Lin QB (1992) Late Triassic insect fauna from Toksun, Xinjiang. *Acta Palaeontologica Sinica* 31(3):334.

8. Ponomarenko AG & Kalugina HS (1980) General Characteristics of the Insects from the Manlay Locality. *Rannemelovoe ozero Manlai (Early Cretaceous Lake Manlay)*, ed Kalugina NS (Nauka, Moscow), pp 68-81.

9. Heer O (1852) Die Lias-Insel des Aargau's. *Zwei Geologische Vortrage Gehalten im Marz 1852* 1:1-15.

10. Handlirsch A (1906-1908) *Die fossilen Insekten und die Phylogenie der rezenten Formen. Erin Handbuch fur Palaontologen und Zoologen* (Wilhelm Engelmann, Leipzig) p 1430.

11. Ghosh SC, Pal TK, & Nandi A (2007) First record of an aquatic beetle larva (Insecta: Coleoptera) from the Parsora Formation (Permo-Triassic), India. *Palaeontology* 50:1335-1340.

12. Giebel CG (1856) Die insecten und spinnen der vorwelt mit steter Berucksichigung der lebenden insekten und spinnen. *Die Fauna der Vorwelt* 2:1-511.

13. Ren D, Zhu H, & Lu Y (1995) New Discovery of Early Cretaceous Fossil Insects from Chifeng City, Inner Mongolia. *Acta Geosicientia Sinica* 1995(4):432-438.

14. von Heyden C & von Heyden L (1866) Kafer und Polypen aus der Braunkohle des Siebengebriges. *Palaeontographica* 15:131-156.

15. Rasnitsyn AP ed (1985) *Jurassic Insects of Siberia and Mongolia.* (Turdy Paleontological Institute, Akad. Nau SSSR, Moscow), Vol 213, p 200.

16. Ponomarenko AG (1987) New Mesozoic Water Beetles (Insecta, Coleoptera) From Asia. . *Paleontological Journal* 21(2):79-92.

17. Ponomarenko AG & Volvok AN (2013) Ademosynoides asiaticus Martynov, 1936, the earliest known member of an extant beetle family (Insecta, Coleotpera, Trachypachidae). *Paleontological Journal* 47:610-606.

18. Hong YC (1983) *Middle Jurassic Fossil Insects in North China* (China Geological Press, Beijing).

19. Hong Y (2002) *Amber insects of China.* (Beijing Science and Technology Press, Beijing) p 653.

20. Martynov AV (1932) Permian fossil insects from the Arkhangelsk district. Part II. Neuroptera, Megaloptera and Colopetera, with the description of two new beetles from Tikhie Gory. *Trudy Paleontologicheskogo Instituta* 2:63-96.

21. Ren D (1995) Insecta. *Faunae and stratigraphy of Jurassic-Cretaceous in Beijing and the adjacent areas*:47-121.

22. Zhang HC (1997) Early Cretaceous insects from the Dalazi Formation of the Zhixin basin, Jilin Province, China. *Palaeoworld* 7:75-103.

23. Ponomarenko AG (1969) Historical development of Coleoptera Archostemata. *Transactions of the Paleontological Institute of the USSR Academy of Sciences* 125:1-239.

24. Rohdendorf BB (1961) *Superorder Coleopteroidea* (USSR Academy of Sciences).

25. Hong Y (1998) A new early Cretaceous beetle family - Magnocoleidae fam. n. (Insecta: Coleoptera) in Hebei Province. *Geoscience* 12(1):40-48.

26. Kirejtshuk AG & Azar D (2008) New taxa of beetles (Insecta, Coleoptera) form Lebanese amber with evolutionary and systematic comments. *Alavesia* 2:15-46.

27. Zherikhin VV & Gratshev GV (1993) Obrieniidae, fam. nov., the oldest Mesozoic weevils (Coleoptera, Curculionoidea). *Paleontological Journal* 27(1A):50-68.

28. Cai C, Andrew EZS, & Diying H (2012) The First Skiff Beetle (Coleoptera: Myxophaga: Hydroscaphidae) from Early Cretaceous Jehol Biota. *Journal of Paleontology* 86(1):116-119.

29. Kirejtshuk AG & Poinar G (2006) Haplochelidae, a new family of Cretaceous beetles (Coleoptera, Myxophaga) from Burmese amber. *Proceedings of the Entomological Society of Washington* 108(1):155-164.

30. Ge S-Q, Friedrich F, & Beutel RG (2010) On the systematic position and taxonomic rank of the extinct myxophagan Haplochelus (Coleoptera). *Insect Systematics & Evolution* 41(4):329-338.

31. Lin QB & Mou CJ (1989) On insects from Upper Triassic Xiaoping Formation, Guangzhou, China. *Acta Palaeontologica Sinica* 28:598-603.

32. Rasnitsyn AP & Ross AJ (2000) A preliminary list of arthropod families present in the Burmese amber collection at The Natural History Museum, London. In The history, geology, age and fauna (mainly insects) of Burmese amber, Myanmar. *Bulletin of the Natural History Museum, Geology Series* 56(1):53-58.

33. Dunstan B (1923) Mesozoic insects of Queensland Part 1 - Introduction and Coleoptera. *Queensland Geological Survey Publication* 273:1-89.

34. Lin QB (1985) Insect fossils from the Hanshan Formation at Hanshan County, Anhui Province. *Acta Palaeontologica Sinica* 24(3):300-315.

35. Bai M, Ahrens D, Yang X-K, & Ren D (2012) New fossil evidence of the early diversification of scarabs: Alloioscarabaeus cheni (Coleoptera: Scarabaeoidea) from the Middle Jurassic of Inner Mongolia, China. *Insect Science* 19(2):159-171.

36. Legalov AA (2011) The first record of anthribid beetle from the Jurassic of Kazakhstan (Coleoptera: Anthridibae). *Paleontological Journal* 45(6):629-633.

37. Hornschemeyer T (1998) New species of Electribius Crowson 1973 (Coleoptera: Artematopodidae) from Balitc amber. *Palaeontologische Zeitschrift* 72(3):299-305.

38. Heer O (1847) *Die Insektenfauna der Tertiargebilde von Oeningen und von Radoboj in Croatien.* (Erster theil: Kafer, Leipzig) pp 1-229.

39. Zherikhin VV & Gratshev GV (2004) Fossil Curculionoid Beetles (Coleotpera, Curculionoidea) from the Lower Cretaceous of Northwestern Brazil. *Paleontological Journal* 38(5):528-537.

40. Winkler JR (1987) Berendtimiridae fam. n, a new family of fossil beetles from Baltic Amber. *Mittellungen der Munchner Entomologischen Gesellscharft* 77:51-59.

41. Vitali F (2010) Diplocoelus probiphyllus n.sp., the first known fossil False Skin Beetle (Coleoptera: Biphyllidae). *Annales de la Societe Entomologique de France* 46(1-2):168-172.

42. Wickham HF (1914) New Miocene Coleoptera from Florissant. *Bulletin of the Museum of Comparative Zoology, Harvard College* 53:423-494.

43. Scudder SH (1891) Fossil insects of the world, including Myriapods and arachnids. *Bulletin, United States Geological Survey* 71:1-744.

44. Kuschel G (1959) Un Cuculionoido del Cretacao Superior, primer inseto fosil de Chile. *Investigaciones Zoologicas Chilenas* 5:49-54.

45. Costa C, Vanin SA, Lawrence JF, Ide S, & Branham MA (2006) Review of the family Brachypsectridae (Coleoptera: Elateroidea). *Annals of the Entomological Society of America* 99:409-432.

46. Kuschel G, Oberprieler RG, & Rayner RJ (1994) Cretaceous weevils from southern Africa, with description of a new genus and species and phylogenetic and zoogeographical comments (Coleoptera: Curculionoidea). *Entomologica Scandinavia* 25:137-149.

47. Etheridge R & Olliff AS (1890) The Mesozoic and Tertiary insects of New South Wales. *Memoirs of the Geological Survey of New South Wales, Palaeontology* 7:1-12.

48. Heer O (1865) *Die Urwelt der Schweiz* (F. Schulthess) p 713.

49. Kirejtshuk AG, Chang HL, Ren D, & Shih CK (2010) Family Lasiosynidae n fam, new palaeoendemic Mesozoic family from the infraorder Elateriformia (Coleoptera: Polyphaga). *Annales de la Societe Entomologique de France* 46:67-87.

50. Dolin VG (1980) Click beetles (Coleoptera, Elateridae) from the Upper Jurassic of Karatau. *Fossil insects of the Mesozoic*, eds Dolin VG, Panfilov DV, Ponomarenko AG, & Pritykina DN (Naukova Dumka, Kiev), pp 17-81.

51. Brodie PB (1845) *A history of the fossil insects in the secondary rocks of England. Accompanied by a particular account of the strata in which they occur, and of the circumstances connected with their preservation.* (London).

52. Kolibac J & Huang D-Y (2011) Mathesius liaoningensis gen. et sp. nov. of Jehol Biota, a presumptive relative of the clerid or thaneroclerid branches of Cleroidea (Coleoptera). *Zootaxa* 2872:1-17.

53. Schumann H & Wendt H (1989) Zur Kenntnis der tierischen Inclusen des Sachisischen Bernstein. *Dusch. entomol. Zeitschr* 36:33-44.

54. Cai C & Wang B (2013) The oldest silken fungus beetle from the Early Cretaceous of southern China (Coleoptera: Cryptophagidae: Atomariinae). *Alcheringa* 37:452-455.

55. Lin QB (1977) (Acad. Sinica, Nanking Institute Geol Paleontology, Science Press, Beijing) p 380.

56. Piton L (1935) Nore sur un Coleoptere fossile du Lac Chambon (Puy-de-Dome). *Annales de la Societe Linneenne de Lyon* 78:177-178.

57. Piton L (1939) Note complementaire sur les insectes fossiles des cinerites pliocenes du lac chambon (Puy de Dome). *Revue de Scieces Naturelles d'Auvergne* 5:102-108.

58. Tillyard RJ (1916) Descriptions of the fossil insects; Mesozoic and Tertiary Insects of Queensland and New South Wales. Descriptions of the fossil insects and stratigraphical features. *Queensland Geological Survey* 253:11-70.

59. Bollow H (1940) Die erste Helminide (Col. Dryop.) aus Bernstein. *Mitteilungen der Munchner Entomologischen Gesellschaft* 30:117-119.

60. Zhang JF (1992) Fossil Coleoptera from Laiyang, Shandong Province. *Acta Entomologica Sinica* 35:331-338.

61. Ponomarenko AG (1986) Beetles. Scarabaeida (=Coleoptera), in Nasekomye v rannemelovykh ekosistemakh zapadnoy Mongolii. *The Joint Soviet-Mongolian Palaeontological Expedition*, ed Rasnitsyn AP), Vol 28, pp 84-105.

62. Krell FT (2000) The fossil record of Mesozoic and Tertiary Scarabaeoidea (Coleoptera: Polyphaga). *Invertebrate Taxonomy* 14(6):871-905.

63. Zhang JF, Sun B, & Zhang X (1994) *Miocene insects and spiders from Shanwang, Shandong* (Beijing Science Press, Beijing) pp 1-298.

64. Poinar G & Brown AE (2009) Pantostictus burmanicus, A new genus and species of Cretaceous Beetle (Coleoptera: HydrophiloideaL Histeridae) in Burmese Amber. *Proceedings of the Entomological Society of Washington* 111(1):38-46.

65. Nikolajev GV (2010) On the Mesozoic taxa of scarabaeoid beetles of the family Hybosoridae (Coleoptera: Scarabaeoidea). *Paleontological Journal* 44(6):649-653.

66. Scudder SH (1890) The Tertiary insects of North America. *Report of the United States Geological Survey of the Territories* XIII:1-734.

67. Kazantsev SV (2012) New omethid and lampyrid taxa from the Baltic Amber (Insecta: Coleoptera). *Zootaxa* 3186:59-63.

68. Putz A, Hernando C, & Ribiera I (2004) A new genus of Limnichidae (Coleoptera) from Baltic amber. *Insect Systematics & Evolution* 35:329-334.

69. Nikolajev GV (1990) Lucanidae (Coleoptera) from the Palaeogene of Eurasia. *Paleontological Journal* 1990(4):119-122.

70. Kleine R (1940) Eine Lycidae aus dem Baltischen Bernstein. *Entomologische Blatter* 36(6):179-180.

71. Wolf-Schwenninger K (2011) The oldest fossil reocrd of Lymexylidae (Insecta: Coleoptera) from the Lower Cretaceou Crato Formation of Brazil. *Insect Systematics & Evolution* 42:205-212.

72. Hieke F & Pietrzeniuk E (1984) Die Bernstein-Kafer des Museums fur Naturkunde, Berling (Insecta, Coleoptera). *Mitteilungen aus dem Zoologischen Museum in Berlin* 60:297-326.

73. Nikitskiy NB (1977) Two new genera of the Melandryidae (Coleoptera) from the Upper Cretaceous. *Paleontological Journal* 11(2):267-270.

74. Piton L (1940) Paleontologie du Gisement Eocene de Menat (Puy-de-Dome). *Memoires d la Societe d'histoir naturelle de Auvergne* 1.

75. Ponomarenko AG (1990) Beetles, Scarabaeida, . in *Pozdne-Mezozoyskie Nasekomye Vostochnogo Zabaykal'ya* (Akademiya Nauk SSSR, Trudy Paleontologicheskogo Instituta Moscow), pp 39-82.

76. Kirejtshuk AG & Ponomarenko AG (2010) A new coleopterous family Mesocinetidae fam. nov. (Coleoptera:Scirtoidea) from Late Mesozoic and notes on fossil remains from Shar-Teg (Upper Jurassic, South-Western Mongolia). *Zoosystematica Rossica* 19:301-325.

77. Scegoleva-Barovkaja TI (1929) Earliest representative of the Family Mordellidae (Coleoptera) from Jurassic sediments of Turkestan. *Doklady Akademiya Nauk SSSR* 1929(A):27-29.

78. Abdullah M (1964) New Heteromerous Beetles (Coleoptera) from the Baltic Amber of Eastern Prussia and Gum Copal of Zanzibar. *Transactions of the Royal Entomological Society of London* 116(13):329-346.

79. Nikolajev GV & Ren D (2010) The oldest fossil Ochodaeidae (Coleoptera: Scarabaeoidea) from the Middle Jurassic of China. *Zootaxa* 2553:65-68.

80. Martynov AV (1926) To the knowledge of fossil insects from Jurassic beds in Turkestan 5. On some interesting Coleoptera. *Ezhegodnik Russkogo Paleontologicheskogo Obshestva* 5(1):1-39.

81. Soriano C, Kirejtshuk AG, & Declos X (2006) The Mesozoic Laurasian family Parandrexidae (Insecta: Coleoptera), new species from the lower Cretaceous of Spain. *Comptes Rendus Palevol* 5(6):779-784.

82. Bechly G (1998) Santana - Schatzkammer fossiler Insekten. *Fossilien* 2 and 3(55-99 and 148-156).

83. Forster B (1891) Die insekten der "Plattigen Steinmerfels" von Brunstatt. *Abhandlungen zur Geologischen Specialkarte von Elsass-Lothringen, Band 3* 1:335-593.

84. Dolin VG (1973) Fossil forms of click-beetles (Elateridae, Coleoptera) from the Lower Jurassic of cnetral Asia. *Fauna and biology of Moldavian insects.*, ed Yaroshenko Mea (Institut Zoologii, Akademiya Nauk Moldavskoy SSR, Kishinev), p 188.

85. Lawrence JF, Archibald SB, & Slipinski A (2008) A new species of Prionoceridae (Coleoptera: Cleroidea) from the Eocene of British Columbia, Canada. *Annales Zoologici* 58(4):689-693.

86. Wickham HF (1913) Fossil Coleoptera from the Wilson Ranch Near Florissant, Colorado. *Bulletin of the Laboratory of Natural History of the State University of Iowa* 6(4):329.

87. Motschulsky V (1856) Lettres de M. de Motschulsky a M. Menetries. *Etudes Entomologique* 5:3-38.

88. Linck O (1949) Fossile Bohrgange (Anobichnium simile n.g. n.sp.) an einem Keuperholz. *Neues Jahrbuch Mineralogie, Geologie und Palaeontologie, Monatshhefte* 1949B:180-185.

89. Vulcano MA & Pereira FS (1987) Entomofauna fossil da Chapada do Araripe, Ceara, Basil - Cretacimelittomoides cearensis gen. no., sp. nov. (Coleoptera: Pyrochroidae). *Resumos da Comunicaoes* 27.

90. Perrichot V, Nel A, & Neraudeau D (2004) Two new wedge-shaped beetles in Albo-Cenomanian ambers of France (Coleoptera: Ripiphoridae: Ripiphorinae). *European Journal of Entomology* 101:577-581.

91. Bode A (1953) Die Insektenfauna des ostniedersachsischen oberen Lias. *Palaeontographica, Abteilung A* 103(1-4):1-375.

92. Iablokov-Khnzorian SM (1962) Representatives of Sternoxia (Coleoptera) in Baltic amber. *Paleontologicheskii Zhurnal* 3:81-89.

93. Medvedev LN (1969) New Mesozoic Coleoptera (Cucjoidea) of Asia. *Paleontological Journal* 3(1):108-113.

94. Bai M, Beutel RG, Shih CK, Ren D, & Yang X-K (2013) Septiventeridae, a new and ancestral fossil family of Scarabaeoidea (Insecta: Coleoptera) from the Late Jurassic to Early Cretaceous Yixian Formation. *Journal of Systematic Palaeontology* 11:359-374.

95. Zeuner FE (1960) A Triassic insect fauna from the Molteno beds of South Africa. *XI Internationaler Kongress fur Entomologie, Verhandlungen* 1:304-306.

96. Poinar G, Kirejtshuk AG, & Buckley R (2008) Pleuroceratos burmiticus, n. gen., n. sp. (Coleoptera: Silvanidae) from Early Cretaceous Burmese Amber. *Proceedings of the Entomological Society of Washington* 110(1):250-257.

97. Wickham HF (1911) Fossil Coleoptera from Florissant, with descriptions of several new species. *Bulletin of the American Museum of Natural History* 30:53-69.

98. Wang B & Zhang HC (2011) The oldest Tenebrionoidea (Coleoptera) from the middle Jurassic of China. *Journal of Paleontology* 85(2):260-270.

99. Gratshev GV (1999) Ulyanidae, an extinct family of weevils (Coleoptera, Curculionidae)>. *Proceedings of the First International Palaeoentomological Conference*:41-47.

100. Kukalova J (1969) On the systematic position of the supposed Permian beetles Tshekardocoleidae with a desripction of a new collections from Moravia. *Sborn. Geolog. Ved (P)* 11:139-162.

101. Ponomarenko AG (2004) Beetles (Insecta, Coleoptera) of the Late Permian and Early Triassic. *Paleontological Journal* 38(Suppl 2):S185-S196.

102. Pinto ID (1987) Permian insects from Parana Basin, South Brazil IV Coleoptera. *Pesquisas* 19:5-12.

103. Ponomarenko AG (2011) Systematic Palaeontology, in First beetle elytra, abdomen (Coleoptera) and a mine trace from LUNZ (Carnian, Late Triassic, Lunz-am-See, Austria) and their taphonomic and evolutionary aspects. *Palaeontology* 54(1):97-110.

104. Hong YC (1988) New fossil insects of Lenshuiwu Formation, northeastern Jiangxi. *Professional Papers of Stratigraphy and Palaeontology* 21:172-179.

105. Ponomarenko AG (1966) New beetles of the family Cupedidae of the Upper Triassic. *Paleontological Journal* 1966(4):47-68.

106. Hong YC (1982) *Mesozoic Fossil Insects of Jiuquan Basin in Gansu Province* (China Geological Press, Beijing) pp 1-187.