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The influence of juvenile dinosaurs on community structure and diversity

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Abstract

Despite dominating biodiversity in the Mesozoic, dinosaurs were not speciose. Oviparity constrained even gigantic dinosaurs to less than 15 kg at birth; growth through multiple morphologies led to the consumption of different resources at each stage. Such disparity between neonates and adults could have influenced the structure and diversity of dinosaur communities. Here, we quantified this effect for 43 communities across 136 million years and seven continents. We found that megatheropods (more than 1000 kg) such as tyrannosaurs had specific effects on dinosaur community structure. Although herbivores spanned the body size range, communities with megatheropods lacked carnivores weighing 100 to 1000 kg. We demonstrate that juvenile megatheropods likely filled the mesocarnivore niche, resulting in reduced overall taxonomic diversity. The consistency of this pattern suggests that ontogenetic niche shift was an important factor in generating dinosaur community structure and diversity.

Dinosaurs were the dominant terrestrial vertebrates for >150 million years, yet their species diversity, particularly at sizes <60 kg, remained well below that of other fossil groups (1). Moreover, their overall body

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size distribution differed from other vertebrates. Because small-bodied vertebrates can finely partition resources and have high turnover between environments (2, 3), they typically have the highest diversity across regions. Yet curiously, large-bodied dinosaurs were the most diverse. This was particularly true for herbivorous sauropods and ornithischians, whereas the predominantly carnivorous theropods exhibited a more uniform range of sizes globally (4). Although the preponderance of large-bodied forms may be partially due to taphonomy (5), some 90% of dinosaur species <60 kg would have to be missing from the fossil record for the body mass distribution of dinosaurs to resemble that of extinct mammals, which display a pattern less skewed by size (4). Rather, dinosaurs' global body mass distribution patterns may have been linked to their physiology; as oviparous organisms, the largest dinosaurs grew from disproportionately small infants (6). Many dinosaurs exhibited marked morphological differences between juveniles and adults (7, 8), resulting in the utilization of different resources through growth and development (9–12), a relatively rare terrestrial life history strategy observed mostly in large egg-laying reptiles (13). Moreover, rapid growth combined with low adult survivorship (14–16) resulted in large populations of juvenile dinosaurs (17) that may have competed with dinosaurs that were small and medium-sized as adults.

Here, we tested whether low dinosaur species diversity and their unusual body size distribution was, at least partially, due to the large disparity between neonate and adult body size, with juveniles of larger-bodied species filling ecological niches that might have otherwise been available to other taxa. This concept of “ontogenetic niche shift” (ONS) in dinosaurs is widely assumed based on modern correlates (10, 13, 14, 18, 19). For example, based on modeling of hypothetical dinosaur communities, Codron et al. (9, 11) predicted that ONS led to reduced diversity of dinosaurs weighing between 1 and 1000 kg. Despite these predictions, little work has empirically explored juveniles' influence on community structure and overall dinosaur diversity (11, 19). Thus, we examined small-scale body size patterns for evidence of competitive interactions using fossil evidence from dozens of communities representing a wide variety of environments spanning most of dinosaur evolution and evaluated the potential effects of spatial scale and trophic affiliation using well-constrained groups of biologically interacting species.

Our analyses are based on 43 dinosaur communities constructed from data extracted from the Paleobiology Database (20, 21) (Table S1). From this baseline, each species' occurrence and taxonomic validity were checked individually against the literature, with taxa deemed synonymous by most experts removed and new taxa absent from the Paleobiology Database added. Masses were derived using averages from the primary literature (Table S1). Wherever possible, formations were limited to smaller subsets of co-occurring species. Our dataset represents seven continents spanning 136 million years and includes >550 species. We predicted that dinosaur communities with strong local drivers would diverge from the global distribution (2, 22, 23). Because ecological interactions such as competition might not have influenced carnivorous and herbivorous dinosaurs equally (24), the shape of each carnivore and herbivore dinosaur guild within each community was compared against the global distribution (4).

We found that the overall body size distributions within communities were consistently bimodal regardless of continent, taxa, and time, resulting in less-extreme skew toward large size than evidenced in the global distribution (global skew = -0.577 , community average skew = -0.365 ; Table S2). The disparity between the local and global distributions was driven primarily by small (10 to 100 kg) carnivorous dinosaurs (Table S4 and Fig. 1); when examined separately, local herbivore body mass distributions closely reflect their global distribution, suggesting that ecological interactions have little effect on their distribution [$P < 0.05$ in 40% of communities, Kolmogorov–Smirnov (K-S) test; Table S3].

By contrast, most carnivorous guilds within communities differed from the global carnivore pattern ($P < 0.05$ for 64% of communities, K-S test; Table S4), as predicted for strong local interactions. Pairwise comparisons between carnivore guild distributions were nonsignificant in 92% of tests ($\alpha = 0.05$, two-tailed t test with Bonferroni correction for multiple comparisons: $\alpha = 0.000058$ nonsignificant in 99.7%, Table S7) despite differing variances, means, and sample sizes, suggesting similar underlying drivers across communities. The only exceptions are formations lacking megatheropods (carnivores >1000 kg) (e.g., Tremp and Bissekty), those dominated by very small taxa (e.g., Yixian), or those containing multiple sauropods (e.g., Morrison and Lameta), where the availability of multiple enormous prey species may have reduced interspecific competition and allowed the coexistence of an unusually diverse assortment of carnivores.

Fig. 1. Community divergence from global distributions. Distributions comparing 1303 global taxa with local community taxa (median). Overall, global taxa are more left skewed and communities are more bimodal. “A” indicates the largest deviation from the global distribution; the same deviation is clearly shown in the carnivore distribution.

Community distributions exhibited a persistent lack of carnivorous dinosaurs weighing between 100 and 1000 kg (Fig. 2). The least likely body size of carnivorous taxa was consistently in the 100- to 300-kg range (Fig. S1). For perspective, if the modern mammal carnivore assemblage of Kruger National Park were similarly structured, there would be no carnivores between the size of an African lion (190 kg) and a bat-eared fox (4 kg) (Fig. 3). The carnivore “gap” was above the expected limit of taphonomic size bias against small dinosaurs (5), and the drivers of such bias were unlikely to have selectively affected carnivores but not herbivores, suggesting that the gap represents a true biological signal. Moreover, it is unlikely that other clades such as mammals or crocodylomorphs occupied this body size niche because no known Mesozoic mammals exceeded 15 kg (22), and crocodylomorphs were predominantly

Fig. 2. Community mass-species distributions of nine formations. The formations shown are as follows: (A) Judith River, (B) Dinosaur Park, (C) Two Medicine, (D) Bayan Shireh, (E) Barun Goyot, (F) Horseshoe Canyon, (G) Cedar Mountain, (H) Cloverly, (I) Hell Creek. Brackets illustrate the gaps in carnivore distributions.

Fig. 3. The dinosaur gap versus modern carnivorous mammals. (A) Carnivorous mammals of Kruger National Park organized to scale by mass. (B) Carnivorous dinosaurs of Dinosaur Park Formation if the largest carnivore were scaled equally to the largest mammalian carnivore in Kruger. Infants (gray) of the largest species shown below adult to show relative growth requirement.

semiaquatic after the Triassic (25). Furthermore, the width of the carnivore body size gap is correlated with the size of the largest carnivore (Kendall rank $t = 0.437$, $P = 0.000652$). The presence of megatheropods in the community decreased the likelihood of co-occurring species between 100 and 1000 kg even further (Table S5). Formations without megatheropods, such as Yixian Lujiantun, did not exhibit body size discontinuities in their carnivorous dinosaur assemblages.

Although the overall distribution of carnivore body size was consistent, the gap itself was dynamic. From the Jurassic to the Cretaceous, the size gap in carnivore species shifted toward larger sizes, mirroring the evolutionary increase in overall dinosaur size (26), and widened from an average of 436 kg to >2060 kg. We suspect that the shift and expansion of the body size gap was caused by a number of changes from the Jurassic to the Cretaceous resulting in increased competition, including (i) decrease by half of average prey body mass, limiting the potential for size partitioning (26); (ii) the diversification of small, potentially endothermic carnivorous dinosaurs (27); and (iii) heightened ONS in Cretaceous megatheropods.

A smaller size gap was found in Jurassic communities, which were characterized by multiple large allosauroids and medium-sized ceratosaurs. Allosauroides was a morphologically diverse clade (28), which likely facilitated the co-occurrence of multiple carnivores within communities. Juvenile allosaurs were more similar to adults than Cretaceous megatheropods (29), resulting in fewer feeding niche shifts through ontogeny. Predation on sauropods (30) may have reduced allosaurs' competition with ceratosaurs, which have been associated with piscivory or omnivory, respectively (31). This relatively high morphological differentiation and associated dietary niche partitioning combined with limited ONS in megatheropods may have allowed for the coexistence of large- and medium-sized Jurassic carnivores.

The end of the Jurassic saw a drastic reduction in the diversity of both sauropods and stegosaurs and may have led to the disappearance of many allosauroid taxa (32). Replacing the diverse megatheropod guilds of the Jurassic were Cretaceous communities dominated by a single clade: tyrannosaurs in the north and abelisaurs in the south. Both tyrannosaurs and abelisaurs have been associated with extensive morphological changes through ontogeny (7, 33). Concurrent diversification of dromaeosaurs added competitive pressure on the truncated prey base

(34). The ornithischian prey that replaced sauropods likely traveled in multigenerational herds (35), limiting the possibility of predation of isolated juveniles. We suggest that competition for a limited prey source by both large and small carnivores, and the broadening of megatheropod niches, resulted in a widening of the carnivore gap.

For juvenile megatheropods to exclude smaller species from the community, they must represent a non-negligible proportion (>50%) of the biomass. Moreover, juvenile peak biomass must fall predominantly within the carnivore gap. To evaluate the effect of juveniles [<16 years of age (12, 33)] on community composition, we calculated the proportion of juvenile biomass using published growth rates derived from lines of arrested growth and survivorship curves based on relative age abundance from mass-death assemblages recorded in the fossil record (17, 36–38).

We calculated biomass through ontogeny for 1000 individual cohorts of six tyrannosaurs and four allosaurs by multiplying the mass (M_a) and survivorship (S_a) at age in years (a) such that the proportion of any species' biomass represented by juveniles (BM_j) is as follows:

$$BM_j = \sum \left(\frac{M_1 * S_1}{\sum(M_1 * S_1, M_2 * S_2, \dots M_{\max} * S_{\max})} \right),$$

$$\left(\frac{M_2 * S_2}{\sum(M_1 * S_1, \dots M_{\max} * S_{\max})} \right) \dots$$

$$\left(\frac{M_{16} * S_{16}}{\sum(M_1 * S_1, \dots M_{\max} * S_{\max})} \right) \quad (1)$$

We then related BM_j to the proportion of mass contained in adults, set to 1, so that relative juvenile species proportion (RSP_j) is equal to the following:

$$RSP_j = BM_j / (1 - BM_j) \quad (2)$$

For example, if juveniles represented 60% of the biomass of *Tyrannosaurus rex*, then the juvenile “morphospecies” would be equivalent to 1.5× the taxonomic species. Tyrannosaurs and other megatheropods did not live long past somatic maturity (16), and their juvenile growth rate

Fig. 4. Community mass-species distributions with juvenile megatheropods as morphospecies stacked with adult conspecifics. The formations shown are as follows: (A) Judith River, (B) Dinosaur Park, (C) Two Medicine, (D) Bayan Shireh, (E) Barun Goyot, (F) Horseshoe Canyon, (G) Cedar Mountain, (H) Cloverly, (I) Hell Creek. The influence of juveniles was highest within the carnivore gap and was proportional to at least 60% of adults in all measured communities. Megatheropods <3000 kg exerted the most influence, matching or outweighing their adult conspecifics in more than half of the measured formations.

approached that of mammals and birds (12). This supports our finding that megatheropod biomass peaked at sexual maturity (16 to 19 years of age) and followed a log-normal distribution (Fig. S2). For all 10 species examined, juvenile biomass was proportional to at least 60% of adult conspecifics (Table S6) and exceeded adult biomass in five tyrannosaur species. Substantial proportions of juvenile biomass, including peak biomass, fell within the range of the size gap in all communities (Fig. 4). Thus, juvenile megatheropods represented taxonomically identical but ecologically disparate morphospecies within their communities, with the greatest potential influence in the mass range of 300 to 1000 kg. Our results support the hypothesis that juvenile megatheropods effectively filled the niche of medium-sized carnivores, or mesocarnivores

and therefore likely limited diversification of theropods with adult body sizes that fell within this range.

That large carnivorous dinosaurs may have filled multiple niches through ontogeny is not a new assertion (7, 9, 11, 12, 32), yet despite their morphological disparity, adults and juveniles continue to be grouped together in diversity indices, which is accurate taxonomically but not ecologically. Our analysis demonstrates the influence that juvenile megatheropods would have had as morphospecies on their community. We found a gap in the community body size distribution of carnivorous dinosaurs regardless of continent, biome, formation size, or species examined. Our analysis demonstrates that this gap was likely filled by juvenile megatheropods and suggests that low taxonomic diversity in carnivorous dinosaurs was not caused solely by taphonomy or collection bias but rather by competition for resources within and among body size niches filled by juveniles. Dinosaurs existed in a specialized terrestrial community structure, largely organized as a result of their extreme size, ovipary, and resulting ontogenetic niche shift. The “grow fast, die young” approach of megatheropods resulted in a predominance of juveniles in communities, filling the morphological and functional role of mesocarnivores, which as a result are absent from the fossil record as individual species, artificially deflating diversity indices of dinosaurs as a whole.

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Supplementary materials attached to this archive record:

Materials and Methods

Figs. S1 and S2

Tables S1 to S7

References (39–378)

MDAR Reproducibility Checklist

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Supplementary Materials for
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This PDF file includes:

Materials and Methods
Supplementary Text
Figs. S1 and S2
Tables S1 to S7
References

Other Supplementary Material for this manuscript includes the following:
(available at science.sciencemag.org/content/371/6532/941/suppl/DC1)

MDAR Reproducibility Checklist (PDF)

Materials and Methods

Data

Dinosaur assemblages were identified by downloading all vertebrate occurrences known to species or genus level between 200Ma and 65MA from the Paleobiology Database (PaleoDB <https://paleobiodb.org/#/> download 6 August, 2018). Using associated depositional environment and taxonomic information, the vertebrate database was limited to only terrestrial organisms, excluding amphibians, pseudosuchians, champsosaurs and ichnotaxa. Taxa present in formations were confirmed against the most recent available literature, as of November, 2020. Synonymous taxa or otherwise duplicated taxa were removed. Taxa that could not be identified to genus level were included as “Taxon X”. GPS locality data for all formations between 200MA and 65MA was downloaded from PaleoDB to create a minimally convex polygon for each possible formation.

Any attempt to recreate local assemblages must include all potentially interacting species, while excluding those that would have been separated by either space or time. We argue it is acceptable to substitute formation for home range in the case of non-avian dinosaurs, as range increases with body size. Reaching masses of 80,000kg, it is not unrealistic for gigantic non-avian dinosaurs to have home ranges that spanned the entirety of a geologic formation, particularly as none of the included formations exceed the modern range of some mammalian megafauna (39). Further, our research is focused on the overall shape of body size diversity distributions, so while there is time-averaging in our dataset, this is also acceptable, as we are examining the presence/absence of body sizes, rather than the exact species identified within the assemblage. Wherever possible, formations were reduced to biostratigraphic groups recognized in the literature to remedy this potential issue, resulting in an average time span of 4.8 million years for our formations. Only formations with at least 5 species were included in the overall dataset, and only formations containing at least 3 carnivores were included in the carnivore test set.

Mass estimates from the literature were added to the final dataset of terrestrial vertebrates. When a range of masses were available for one species, the average was used to normalize for variability within mass estimate techniques, which included, (but were not limited to) volumetric, limb bone circumference, limb bone length, and polynomial regression. Where no mass estimate was available, estimates from similarly sized species within the same genus, family or order were substituted. Species were assigned to a 0.5 log(10) bin based on mass. While it is noted that a wide variety of mass estimate techniques are included within this dataset, as all analyses were performed on log10 scale, variability between estimates did not have an appreciable effect on our results.

All species were assigned a basic trophic level designator based on species morphological and ecological descriptions in the literature. Species were categorized individually, regardless of taxonomic affinity in order to most accurately capture the intricacies of dinosaur community structuring. “Carnivores” and “Herbivores” were identified as any organism never having been contested in the literature as a non-carnivore or non-herbivore, respectively. As only a small percentage of the species included in our analyses fell outside of these two main categories, we subdivided the “omnivore” group in two, which were then added to either the “carnivore” or “herbivore” group as appropriate. “Meat-dominant omnivore” was assigned to any species that had been suggested as an omnivore after an initial designation of carnivore, or which was identified as an omnivore with identifiable faunivore morphology, and were grouped with carnivores for analysis. A similar method was used to designate “plant-dominant omnivore”,

which were grouped with herbivores. Recent accounts of dietary remnants, such as stomach contents and coprolites, were also considered when grouping species into trophic categories. While we endeavored to be as accurate as possible with these descriptions, some species, particularly enigmatic species within caenagnathidae and oviraptoridae, have yet to be definitively described within a single dietary category. Our inclusion of these species within the “meat-dominant omnivore” group may prove to be inaccurate as more evidence is presented in the literature. However, these enigmatic species represent an exceedingly small portion of the overall sample tested (1.6%) and therefore are unlikely to significantly change our results when grouped as herbivores rather than carnivores.

Statistical Analysis

To determine the shape of the M-S distribution, each dinosaur assemblage, as well as each carnivore and herbivore assemblage was tested for fit with K-S Goodness of Fit ($\alpha=0.05$) against the global dataset, bootstrapped 1,000 times. Bimodality was assessed with Sarle’s Bimodality Coefficient, summary statistics, and fit to quadratic and 4th degree polynomial regressions. Bimodality was further tested through likelihood of bin occupancy for the entire dataset, as well as on carnivores and herbivores separately. To determine the effect of the presence of megatheropods in an assemblage, a Kendal Rank test was performed on 39 carnivore guild distributions. Likelihood of bin occupancy was further tested in relation to occupancy of surrounding mass bins to determine the influence of any larger species on occupancy.

Ontogenetic Biomass Calculations

In order to identify potential competitive exclusion in dinosaur assemblages, biomass was calculated for megatheropods from nine formations from the total dataset. These formations were selected because they represent multiple geographic locations and geologic periods, and contain theropods for which growth and survivorship curves have been calculated. Growth rates from Erickson and Bybee were multiplied by survivorship of the same species from Erickson, using a 1,000-individual cohort. As it has been hypothesized that giant theropods would all employ a similar rapid growth curve, and as neither growth curves nor survivorship curves for *Acrocanthosaurus atokensis* and *Siats meekerorum* were available in the primary literature, growth curves for these species were created by averaging growth rates from *Tyrannosaurus rex* for its increased size, and *Allosaurus fragilis* for its taxonomic similarity to *A.atokensis* and *S. meekerorum*. Survivorship curves from *Daspletosaurus torosus* were substituted directly, as the mass of all three species is similar. The same method was utilized for *Tarbosaurus bataar*, averaging curves from *T. rex* and *D. torosus*. Biomass estimates for *Achillobator giganticus* were not included as there are no existing comparable growth curves or survivorship estimates available.

The relative biomass for juveniles and adults of each species was multiplied by the proportional biomass for each mass bin, normalized so the adult proportion = 1. Juveniles were defined as individuals in the cohort that had not reached somatic maturity based on asymptotic growth (approximately age 16).

Supplementary Text

Inclusion and exclusion of taxa

Our database of 557 non-avian dinosaur taxa are based on downloads from the Paleobiology Database, an extensive recording of all published taxa, updated and maintained by a group of paleontologists from around the globe. Downloads from the PBDB provided a baseline of all potential taxa to be found in a community, which was then independently verified against the literature, as of November, 2020. Sources for every occurrence of every species were identified independent from the PBDB to confirm their accuracy temporally and spatially, and are listed in Table S1. All obsolete taxa (e.g. *Deinodon*) were excluded. Morphological and phylogenetic reassessments were followed as much as possible, and taxonomy was updated accordingly, specifically pertaining to the following species:

Amtosaurus archibaldi- fragmentary remains that have been described with ankylosaur or hadrosaur affinities have since been renamed as *Bissektipelta* (40)

Anatotitan copei- hadrosaur material from western North America which most recently has been demonstrated to be the remains of *Edmontosaurus* (41).

Chialingosaurus kuani- based solely on juvenile remains from the Shaximiao formation that cannot be distinguished as a unique taxon, and is therefore a nomen dubium (42)

Chungkingosaurus jiangbeiensis- has been identified as a possible juvenile of *Tuojiangosaurus* (43)

Compsosuchus solus- based on fragmentary remains from the Lameta formation, has since been determined to be a nomen dubium and is therefore listed as “Noosaurid C” in this paper (44)

Drinker nisti- neornithischian remains from this species were reclassified together with at least one other taxon as a single taxon *Nanosaurus agilis* (45)

Iguanodon dawsoni- limited post-cranial material from the Wadhurst Clay formation that has since been reclassified as *Barilium dawsoni* (46)

Iguanodon orientalis- poorly described skull material from Khuren Dukh that has since been reclassified as *Altirhinus kurzanovi* (47)

Jubbulpuria tenuis- based on fragmentary remains from the Lameta formation, has been determined to be a nomen dubium and is therefore listed as “Theropod B” in this paper (44)

Koutalisaurus kohlerorum- synonymous with *Pararhabdodon* (48)

Leptorhynchus elegans- caenagnathid redescribed as *Citipes elegans* (49)

Majungatholus atopus- originally described as a new pachycephalosaur, material has been re-assigned to *Majungasaurus* (50)

Maleevus disparoserratus- originally described as a new ankylosaur from the Bayan Shireh formation, has since been determined to be a junior synonym of *Pinacosaurus* (51)

Nanotyrannus- based on a skull originally described as *Gorgosaurus lancensis* from the Hell Creek formation, *Nanotyrannus* was erected as a new genus of pygmy tyrannosaur (52). Following the discovery of a second, more complete skeleton, numerous morphological analyses have overwhelmingly shown the two specimens attributed to *N. lancensis* to be juvenile specimens of *Tyrannosaurus rex* (8, 12, 53–56)

Ornithomimus minutus- based on isolated toe bones from the Laramie formation with likely Alvarezsaurid affinity (57), is listed as “Alvarezsauridae” in this paper

Richardoestesia asiatica- although likely a valid species, this tooth taxon cannot be distinguished from *R. isosceles* and has been included within this taxon in this paper (58)

Styracosaurus ovatus- ceratopsian remains from the Two Medicine formation that have since been reclassified as *Rubeosaurus* (59)

Titanosaurus madagascariensis- based on fragmentary remains from the Maevarano formation, has been identified as synonymous with *Laplatasaurus* (60)

Triceratops / *Torosaurus*- although the validity of the genus *Torosaurus* has been called into question (61-62) as a possible ontogenetic stage of the earlier named *Triceratops*, we feel this assertion has yet to be definitively proven, particularly in light of more recent morphometric analyses (63-64). As such, we include both genera in our paper.

Ugrunaaluk kuukpikensis- hadrosaurid remains from the Prince Creek formation that have since been reclassified as remains of juvenile *Edmontosaurus* (65)

Wuerhosaurus mongoliensis- informally named stegosaur material from the Dzunbain formation which has since been formally described as *Mongolostegus exspectabilis* (66)

Willinakaqe salitralensis- originally described as a new saurolophine hadrosaur from the Allen formation(67), *W. salitralensis* has since been determined to refer to multiple species and is therefore a nomen dubium (68).

Yunnanosaurus robustus- material from the Lufeng formation represents an ontogenetic series, synonymous with *Y. huangi* (69)

In the interest of capturing as much biodiversity as possible, we removed as few “problematic” taxa as possible. Only those that we found to be definitively synonymous, or those that showed a preponderance of evidence towards synonymizing were excluded.

Fig. S1.

Number of species in each mass bin, by guild, in formations from the Jurassic and Cretaceous eras (bars) appears more normal than global distribution. Herbivores (light grey) mirror their left-skewed global distribution, while carnivores exhibit a unique bimodal trend. Likelihood of at least one species existing in mass bin in any formation (lines) shows the distinctly more platykurtic distribution at local scales, as well as the severe drop in likelihood in medium size carnivore bins.

Fig. S2.

215 Growth vs survivorship of three megatheropods shows biomass is highest at sexual maturity, which occurs shortly before somatic maturity in dinosaurs.

Table S1.

Assemblage	Herbivores / Plant Dominant	Locality		Carnivores / Meat Dominant	Locality	
	Omnivores	Ref	Mass (kg) Mass Ref		Ref	Mass (kg) Mass Ref
Allen Argentina 79-69MYA	<i>Bonatitan reigi</i>	(70)	808.0086 (26, 71)	<i>Dromaeosaurid A</i>	(76)	15.142 (43)
	<i>Nodosaurid A</i>	(72)	1788.277 (4, 9, 26, 43, 73)	<i>Bonapartenykus ultimus</i>	(83)	20.5 (57)
	<i>Bonapartesaurus rionegrensis</i>	(74)	2071.494 (43, 57, 73)	<i>Austroraptor cabazai</i>	(84)	373.849 (4, 26-27, 43)
	<i>Hadrosaurid A</i>	(67)	2071.494 (43, 57, 73)	<i>Quilmesaurus curriei</i>	(85)	460 (43, 57, 86)
	<i>Lapampasaurus cholinoi</i>	(75)	2071.494 (43, 57, 73)	<i>Carcharodontosaurid A</i>	(70)	491.667 (86)
	<i>Saltasaurid A</i>	(76)	3741.3 (4, 43, 57, 71, 73)			
	<i>Saltasaurine A</i>	(76)	3741.3 (4, 43, 57, 71, 73)			
	<i>Hadrosaurid B</i>	(70)	4000 (43)			
	<i>Aeolosaurus</i>	(77)	6000 (43)			
	<i>Laplatasaurus araukanicus</i>	(72)	8395.233 (4, 43, 71)			
	<i>Panamericansaurus schroederi</i>	(78)	11629.23 (26, 71)			
Anacleto Argentina 84-79MYA	<i>Antarctosaurus wichmannianus</i>	(79)	20817.15 (4, 26, 43, 71, 80)			
	<i>Titanosaurian A</i>	(81)	22385.94 (43, 82)			
	<i>Gasparinisaura cincosaltensis</i>	(87)	8.96212 (4, 26, 43)	<i>Aerosteon riocoloradensis</i>	(93)	672.43 (26, 43, 86)
	<i>Saltasaurine B</i>	(87)	3741.3 (4, 43, 57, 71, 73)	<i>Aucasaurus garridoi</i>	(87)	734.233 (4, 26, 43, 86)
	<i>Neuquensaurus australis</i>	(87)	3802.349 (4, 26-27, 43, 71)	<i>Abelisaurus comahuensis</i>	(87)	2325 (43, 86)
	<i>Overosaurus paradasorum</i>	(88)	5250 (43, 71)			
	<i>Pitekunsaurus macayai</i>	(89)	5500 (43, 57)			
	<i>Laplatasaurus araukanicus</i>	(87)	8395.233 (4, 43, 71)			
	<i>Narambuenatitan palomoi</i>	(90)	8919.105 (27, 43, 57, 73, 86)			
	<i>Barrosasaurus casamiquelai</i>	(91)	13500 (71)			
	<i>Nemegtosaurid A</i>	(92)	14139.36 (43, 71)			
Bajo de la Carpa Argentina 85-84MYA	<i>Antarctosaurus wichmannianus</i>	(87)	20817.15 (4, 26, 43, 71, 80)			
	<i>Pellegrinisaurus powelli</i>	(87)	29050 (43, 71)			
	<i>Ornithopod D</i>	(94)	8.96212 (4, 26, 43)	<i>Neuquenornis volans</i>	(95)	0.3795 (73)
	<i>Elasmarian Ornithopod</i>	(94)	300 (43)	<i>Alvarezsaurus calvoi</i>	(95)	2.79242 (26-27, 43, 86)
	<i>Rinconsaurus caudamirus</i>	(95)	3426.56 (26, 43, 71)	<i>Velocisaurus unicus</i>	(95)	3.94576 (26, 86)
	<i>Bonitasaura salgadoi</i>	(95)	5250 (43, 71)	<i>Achillesaurus manazzoni</i>	(96)	16.5 (43, 86)
	<i>Lithostrotian Sauropod A</i>	(95)	5250 (43, 71)	<i>Viavenator exxoni</i>	(95)	700 (43)
	<i>Lithostrotian Sauropod B</i>	(95)	5250 (43, 71)	<i>Tratayenia rosalesi</i>	(97)	1150 (43, 86)
	<i>Overosaurus paradasorum</i>	(95)	5250 (43, 71)	<i>Carnotaurine A</i>	(98)	1925 (43, 86)
	<i>Laplatasaurus</i>	(87)	6488.299 (4, 43, 71, 73)			
	<i>Traukutitan eocaudata</i>	(95)	32064.56 (26, 71)			
Baruungoyot Mongolia 79-70MYA	<i>Bagaceratops rozhdestvenskyi</i>	(99)	4.271304 (4, 26, 43)	<i>Parvicursor remotus</i>	(99)	0.16883 (26-27, 43, 86)
	<i>Magnirostris dodsoni</i>	(99)	4.271304 (4, 26, 43)	<i>Ceratomykus oculatus</i>	(103)	0.57999 (26-27, 43, 86)
	<i>Tylocephale gilmorei</i>	(100)	40 (43)	<i>Hulsanpes perlei</i>	(104)	1.36383 (105)
	<i>Protoceratops hellenikorhinus</i>	(100)	180 (43)	<i>Shuvuuia deserti</i>	(103)	2.9821 (26-27, 43, 86)
	<i>Ornithomimid B</i>	(100)	315.6433 (4, 26-27, 43, 73)	<i>Mononykus olecranus</i>	(99)	3.95592 (4, 26, 43, 86)
	<i>Pinacosaurus mephistocephalus</i>	(99)	1100.806 (4, 43)	<i>Machairasaurus</i>	(99)	10 (86)
	<i>Saichania chulsanensis</i>	(99)	1305.986 (26, 43)	<i>Avimimus</i>	(99)	13.2792 (4, 26, 43, 86)
	<i>Tarchia gigantea</i>	(99)	2000 (43)	<i>Velociraptor osmolskae</i>	(100)	18.734 (4, 26-27, 43, 73)
	<i>Zaraapelta nomadis</i>	(101)	2500 (101)	<i>Conchoraptor gracilis</i>	(99)	24.5 (43, 86)
	<i>Hadrosaurid C</i>	(100)	3062.165 (4, 26, 43, 57, 73)	<i>Oviraptor philoceratops</i>	(100)	33.0698 (4, 43, 86)
	<i>Quaesitossaurus</i>	(100)	12172.7 (43, 71, 102)	<i>Ingenia</i>	(99)	43.4805 (26)
Bayan Shireh / Iren Dabasu Mongolia 101-90MYA	<i>Tarbosaurus bataar</i>	(106)	3103.15 (26, 43, 73, 86)			
	<i>Yamaceratops dornogobiensis</i>	(107)	2 (43)	<i>Avimimus</i>	(112)	13.2792 (4, 26, 43, 86)
	<i>Graciliceratops mongoliensis</i>	(108)	4.335756 (4, 26)	<i>Velociraptor</i>	(112)	18.734 (4, 26-27, 43, 73)
	<i>Amtocephale gobiensis</i>	(109)	50 (109)	<i>Sauornithoides mongoliensis</i>	(112)	21.7546 (26, 43, 86)
	<i>Garudimimus brevipes</i>	(100)	99.61264 (26-27, 43, 73, 86)	<i>Deinonychosaurian A</i>	(116)	90 (4, 26, 43, 86)
	<i>Archaeornithomimus</i>	(110)	146.8911 (26, 86)	<i>Achillobator giganticus</i>	(117)	373.849 (4, 26-27, 43)
	<i>Amtoosaurus magnus</i>	(100)	300 (40)	<i>Alectrosaurus olseni</i>	(100)	601.026 (26, 86)
	<i>Erlikosaurus andrewsi</i>	(100)	430 (43, 86)	<i>Theropod A</i>	(116)	1742.73 (4, 26, 43, 73, 86)
	<i>Tsagantegia longicranialis</i>	(107)	500 (43)			
	<i>Enigmosaurus mongoliensis</i>	(100)	960.1667 (43, 57, 86)			
	<i>Talarurus plicatospineus</i>	(100)	1020.246 (4, 26, 43)			
Bayan Shireh / Iren Dabasu Mongolia 101-90MYA	<i>Pinacosaurus disparoserratus</i>	(100)	1100.806 (4, 43)			
	<i>Gilmoreosaurus mongoliensis</i>	(111)	1136.287 (4, 26, 43)			
	<i>Bactrosaurus</i>	(112)	1472.773 (4, 26, 43)			
	<i>Gobihadros mongoliensis</i>	(113)	1712.598 (43, 73)			
	<i>Gigantoraptor erlianensis</i>	(114)	2216.107 (4, 26, 43, 86, 115)			
	<i>Segnosaurus galbinensis</i>	(100)	2633.2 (26, 43, 86)			
	<i>Erketu ellisoni</i>	(116)	11225.59 (43, 71, 116)			
	<i>Quaesitossaurus orientalis</i>	(107)	25418.09 (102)			

Assemblage	Herbivores / Plant Dominant	Locality		Carnivores / Meat Dominant	Locality			
	Omnivores	Ref	Mass (kg)	Mass Ref	Omnivores	Ref	Mass (kg)	Mass Ref
Bissekty Uzbekistan 92-90MYA	<i>Levnesovia transoxiana</i>	(118)	175	(43)	<i>Caenagnathasia martinsoni</i>	(122)	1.4	(43)
	<i>Bissektipelta archibaldi</i>	(110)	300	(40)	<i>Richardoestesia isosceles</i>	(123)	10.1954	(9, 86)
	<i>Ornithomimid C</i>	(119)	315.6433	(4, 26-27, 43, 73)	<i>Urbacodon itemirensis</i>	(123)	10.8333	(57, 86)
	<i>Turanoceratops tardabilis</i>	(120)	483.7592	(26, 43)	<i>Itemirus medullaris</i>	(124)	12.422	(26)
	<i>Bactrosaurus</i>	(104)	1472.773	(4, 26, 43)	<i>Paronychodon asiaticus</i>	(123)	12.9875	(86)
	<i>Therizinosauroida</i>	(120)	4750	(43, 86)	<i>Timurlengia euotica</i>	(125)	220	(125)
	<i>Non-lithostrotian Titanosaur A</i>	(121)	7000	(43)				
Callovian Oxford Clay United Kingdom 166-163.5MYA	<i>Callovosaurus leedsi</i>	(126)	108.3666	(4, 27)	<i>Eustreptospondylus oxoniensis</i>	(131)	348.725	(4, 26, 43, 86)
	<i>Sarcolestes leedsi</i>	(127)	187.5	(57)	<i>Metriacanthosaurus parkeri</i>	(132)	1184.89	(26, 86)
	<i>Lexovisaurus durobrivensis</i>	(126)	2155.233	(4, 43)				
	<i>Omosaurus durobrivensis</i>	(128)	2155.233	(4, 43)				
	<i>Loricatosaurus priscus</i>	(104)	2257.871	(4, 26, 57, 73)				
	<i>Cetiosauriscus stewarti</i>	(129)	12160.95	(4, 26, 43, 71)				
<i>Cetiosaurus</i>	(130)	12232.49	(4, 26, 43, 71)					
Cedar Mountain Mussentuchit United States 102-95.64MYA	<i>Neoceratopsian A</i>	(133)	1.5	(134)	<i>Velociraptorine A</i>	(142)	5.82906	(4, 43, 86)
	<i>Zephyrosaurus</i>	(135)	20	(43)	<i>Richardoestesia</i>	(142)	10.2398	(9, 43, 86)
	<i>Pachycephalosaurid A</i>	(136)	27.6576	(4, 26, 43)	<i>Paronychodon</i>	(142)	12.9875	(9, 26, 43, 86)
	<i>Animantax ramaljonesi</i>	(137)	411.8695	(4, 26, 43)	<i>Caenagnathoid A</i>	(136)	13.2792	(4, 26, 43, 86)
	<i>Ornithopod E</i>	(136)	500	(43)	<i>Troodontid C</i>	(142)	21.7546	(26, 43, 86)
	<i>Tenontosaurus</i>	(138)	818.362	(4, 26-27, 43)	<i>Dromaeosaurine A</i>	(142)	83.1907	(4, 26, 43, 86)
	<i>Eolambia caroljonesa</i>	(139)	1000	(43)	<i>Alectrosaurus</i>	(135)	601.026	(26, 86)
	<i>Peloroplites cedrimontanus</i>	(140)	2000	(43)	<i>Siats meekerorum</i>	(143)	3950	(86, 143)
	<i>Cedarapelta bilbeyhallorum</i>	(140)	5000	(43)				
<i>Astrodon</i>	(135)	10800	(71, 141)					
Cloverly United States 113-100.5MYA	<i>Aquilops americanus</i>	(134)	1.5	(134)	<i>Microvenator celer</i>	(144)	3.62685	(4, 26)
	<i>Zephyrosaurus schaffi</i>	(144)	20	(43)	<i>Deinonychus antirrhopus</i>	(144)	83.1907	(4, 26, 43, 86)
	<i>Ornithomimus velox</i>	(104)	175.6667	(9, 43, 86)	<i>Acrocanthosaurus atokensis</i>	(144)	4558.8	(4, 26, 43, 86)
	<i>Tenontosaurus tilletti</i>	(144)	818.362	(4, 26-27, 43)				
	<i>Sauropelta edwardsorum</i>	(144)	2000	(43)				
	<i>Tatankacephalus cooneyorum</i>	(144)	2505.082	(43, 145)				
	<i>Rugocaudia coonevi</i>	(146)	6300	(71)				
<i>Sauroposeidon proteles</i>	(144)	34146.02	(26, 43, 147)					
Dinosaur Park MAZ-1b Canada 76-75.5MYA	<i>Stegoceras validum</i>	(148)	27.6576	(4, 26, 43)	<i>Hesperonychus elizabethae</i>	(152)	2.55	(43, 86)
	<i>Hanssuesia sternbergi</i>	(148)	28.07162	(43)	<i>Bambiraptor feinbergi</i>	(153)	5.82906	(4, 43, 86)
	<i>Prencephale</i>	(148)	38.50373	(26, 43)	<i>Richardoestesia isosceles</i>	(153)	10.1954	(9, 86)
	<i>Struthiomimus altus</i>	(149)	215.0365	(4, 26-27, 43, 73)	<i>Richardoestesia gilmorei</i>	(153)	10.3284	(9, 43, 86)
	<i>Panoplosaurus mirus</i>	(150)	1436.424	(26, 43)	<i>Zapsalis abradens</i>	(153)	12.3333	(86, 104)
	<i>Euoplocephalus tutus</i>	(150)	1617.899	(4, 26, 43)	<i>Dromaeosaurus albertensis</i>	(153)	14.7467	(9, 43, 86)
	<i>Centrosaurus apertus</i>	(150)	2214.703	(4, 26, 43)	<i>Saurornitholestes langstoni</i>	(153)	23.4053	(4, 9, 26, 43, 57)
	<i>Chasmosaurus belli</i>	(150)	2244.365	(4, 26, 43)	<i>Pectinodon</i>	(153)	47.3759	(26)
	<i>Chasmosaurus russelli</i>	(151)	2258.128	(4, 26-27, 43)	<i>Caenagnathus collinsi</i>	(154)	61.5	(43, 155)
	<i>Edmontonia rugosidens</i>	(150)	2265.253	(26, 43)	<i>Troodon formosus</i>	(153)	68.1649	(4, 26, 43, 86)
	<i>Corythosaurus intermedius</i>	(104)	2977.832	(26, 43)	<i>Chirostenotes pergracilis</i>	(154)	74.7759	(9, 43, 73, 86)
	<i>Lambeosaurus lambei</i>	(150)	3248.555	(4, 26, 43)	<i>Gorgosaurus libratus</i>	(156)	2554.78	(4, 26, 43, 86)
	<i>Lambeosaurus clavinitialis</i>	(150)	3300	(43)	<i>Daspletosaurus</i>	(156)	2565.55	(4, 43, 73, 86)
	<i>Parasaurolophus walkeri</i>	(150)	3549.646	(4, 26, 43)				
Djadokhta Mongolia 75-71MYA	<i>Bagaceratops</i>	(157)	4.271304	(4, 26, 43)	<i>Parvicursor remotus</i>	(159)	0.16883	(26-27, 43, 86)
	<i>Goyocephale lattermorei</i>	(100)	27.6576	(4, 26, 43)	<i>Mahakala omnogovae</i>	(160)	0.53745	(26, 43, 86)
	<i>Oviraptor philoceratops</i>	(100)	33.06984	(4, 43, 86)	<i>Halszkaraptor escuilliei</i>	(161)	0.76234	(26, 161)
	<i>Protoceratops andrewsi</i>	(100)	99.57581	(4, 26, 43)	<i>Shuvuuia deserti</i>	(162)	2.9821	(26-27, 43, 86)
	<i>Aepyornithomimus tugrikinesis</i>	(158)	105.9753	(158)	<i>Gobivenator mongoliensis</i>	(113)	12.7809	(26, 43, 86)
	<i>Udanoceratops tschizhovi</i>	(110)	736.087	(26, 43)	<i>Avimimus portentosus</i>	(100)	13.2792	(4, 26, 43, 86)
	<i>Pinacosaurus grangeri</i>	(100)	1100.806	(4, 43)	<i>Byronosaurus</i>	(163)	13.6	(43, 86)
	<i>Nemegtosaurus</i>	(100)	14139.36	(43, 71)	<i>Velociraptor mongoliensis</i>	(100)	18.734	(4, 26-27, 43, 73)
					<i>Kol ghuva</i>	(164)	20	(43)
					<i>Tsaagan mangas</i>	(165)	20.5	(43, 86)
					<i>Saurornithoides mongoliensis</i>	(100)	21.7546	(26, 43, 86)
					<i>Khaan mckennai</i>	(166)	23.9839	(26-27)
					<i>Citipati osmolskae</i>	(116)	93.9976	(26, 43, 86)
					<i>Tyrannosauroid</i>	(99)	3103.15	(26, 43, 73, 86)

Assemblage	Herbivores / Plant Dominant Omnivores	Locality Ref	Mass (kg)	Mass Ref	Carnivores / Meat Dominant Omnivores	Locality Ref	Mass (kg)	Mass Ref
Griman Creek Australia 99.6-93.5MYA	<i>Iguanodontian A</i>	(167-168)	6	(43)	<i>Noasaurid A</i>	(174)	13.7896	(4, 26, 43)
	<i>Ornithopod A</i>	(169)	8.9165	(43, 57)	<i>Noasaurid B</i>	(174)	26.5	(43, 86)
	<i>Ornithopod B</i>	(169-170)	20	(43)	<i>Raptor ornitholestoides</i>	(167)	156.745	(4, 26, 43, 57, 73)
	<i>Weewarrasaurus poheni</i>	(168-169)	50	(169)	<i>Megaraptorid A</i>	(175)	201.729	(26, 43, 86)
	<i>Ornithopod C</i>	(169, 171)	90	(43)	<i>Avetheropoda A</i>	(175)	672.43	(26, 43, 86)
	<i>Ankylosaurian A</i>	(168)	300	(43)				
	<i>Fostoria dhimbangunmal</i>	(168, 172)	355.8834	(27, 43)				
	<i>Ankylopollexian A</i>	(168-169)	910.3948	(4, 26-27, 43)				
	<i>Iguanodontian B</i>	(169)	4225.792	(4, 9, 27, 73)				
	<i>Titanosaurian B</i>	(168, 173)	6000	(43)				
Hanson Antarctica 194-188MYA	<i>Prosauropod A</i>	(104)	554.9922	(4, 9, 71, 73, 176)	<i>Coelophysoid A</i>	(178-179)	6	(43, 178, 180)
	<i>Glacialisaurus hammeri</i>	(177)	745	(71, 177)	<i>Coelophysoid B</i>	(179)	25.0459	(26, 43, 86)
					<i>Cryolophosaurus ellioti</i>	(181)	349.387	(26, 43)
Hell Creek United States 66.8-66MYA	<i>Orodromeus makelai</i>	(182)	15.1695	(4, 26)	<i>Richardoestesia isosceles</i>	(196)	10.1954	(9, 86)
	<i>Stegoceras</i>	(183)	27.6576	(4, 26, 43)	<i>Richardoestesia gilmorei</i>	(197)	10.3284	(9, 43, 86)
	<i>Citipes elegans</i>	(184)	56.36128	(9, 43, 185)	<i>Acheroraptor temertyorum</i>	(198)	18.5	(86, 199)
	<i>Sphaerotherolus buchholtzae</i>	(186)	68.33955	(43, 57, 73)	<i>Sauornitholestes</i>	(197)	23.7026	(4, 9, 26, 43, 57)
	<i>Thescelosaurus</i>	(187)	170.3897	(4, 26, 43)	<i>Pectinodon bakkeri</i>	(200)	47.3759	(26)
	<i>Leptoceratops gracilis</i>	(188)	212.9821	(4, 26, 43)	<i>Anzu wyliei</i>	(201)	246.013	(43, 86, 201)
	<i>Ornithomimus</i>	(189)	221.4634	(4, 9, 26-27, 43)	<i>Dakotaraptor steini</i>	(202)	285	(43, 86)
	<i>Pachycephalosaurus wyomingensis</i>	(190)	342.0206	(4, 26, 43)	<i>Tyrannosaurus rex</i>	(55)	6428.6	(4, 26, 43, 73, 86)
	<i>Ankylosaurus magniventris</i>	(191)	3872.272	(4, 26, 43)				
	<i>Edmontosaurus annectens</i>	(192)	4595.999	(4, 26, 43)				
	<i>Torosaurus</i>	(63, 193)	7598.517	(4, 26-27, 43, 73)				
	<i>Triceratops horridus</i>	(194)	8318.221	(4, 26-27, 43, 73)				
Horseshoe Canyon Drumheller- Horsethief Canada 73.1-71.5MYA	<i>Ornithomimus edmontonicus</i>	(149)	138.7235	(4, 26-27, 73)	<i>Richardoestesia gilmorei</i>	(203)	10.3284	(9, 43, 86)
	<i>Struthiomimus</i>	(149)	215.0365	(4, 26-27, 43, 73)	<i>Paronychodon</i>	(149)	12.9875	(9, 26, 43, 86)
	<i>Arrhinoceratops brachyops</i>	(149)	1300	(43)	<i>Dromaeosaurus</i>	(149)	13.56	(9, 43, 86)
	<i>Edmontonia longiceps</i>	(149)	1985.43	(4, 26, 43)	<i>Atrociraptor marshalli</i>	(203)	15.25	(43, 86)
	<i>Anodontosaurus lambei</i>	(203)	2164.816	(43, 204)	<i>Troodontid D</i>	(203)	22.496	(86)
	<i>Anchiceratops ornatus</i>	(149)	2229.013	(26, 43)	<i>Albertavenator</i>	(203)	50	(205)
	<i>Pachyrhinosaurus canadensis</i>	(149)	3139.13	(4, 26, 43)	<i>Epichirostenotes</i>	(149)	98.0518	(86)
	<i>Edmontosaurus regalis</i>	(149)	5260.076	(4, 26, 43)	<i>Apatoraptor</i>	(203)	115.552	(206)
					<i>Albertosaurus sarcophagus</i>	(149)	2345.18	(4, 26, 43, 86)
Judith River Coal Ridge Canada 76.2-75.2MYA	<i>Pachycephalosaurid B</i>	(207)	27.6576	(4, 26, 43)	<i>Richardoestesia gilmorei</i>	(208)	10.3284	(9, 43, 86)
	<i>Hypsilophodontid A</i>	(207-208)	170.3897	(4, 26, 43)	<i>Zapsalis abradens</i>	(208)	12.3333	(86, 104)
	<i>Avaceratops lammersi</i>	(208)	579.6361	(4, 43)	<i>Paronychodon</i>	(207)	12.9875	(9, 26, 43, 86)
	<i>Nodosaurid B</i>	(208)	1436.424	(26, 43)	<i>Dromaeosaurus albertensis</i>	(208)	14.7467	(9, 43, 86)
	<i>Mercuriceratops gemini</i>	(208)	2070.972	(43, 209)	<i>Troodon formosus</i>	(208)	68.1649	(4, 26, 43, 86)
	<i>Monoclonius crassus</i>	(207)	2396.318	(43, 210)	<i>Gorgosaurus libratus</i>	(104)	2554.78	(4, 26, 43, 86)
	<i>Zuul crurivastator</i>	(211)	2500	(211)				
	<i>Lambeosaurus</i>	(207)	3117.374	(4, 26, 43)				
	<i>Gryposaurus</i>	(208)	3428.063	(4, 26, 43)				
	<i>Spiclypeus shipporum</i>	(208)	3500	(208)				
	<i>Hadrosaurid D</i>	(207-208)	4000	(43)				
Kaiparowits United States 76.1-74MYA	<i>Stegoceras validum</i>	(104)	27.6576	(4, 26, 43)	<i>Richardoestesia</i>	(213)	10.2398	(9, 43, 86)
	<i>Hypsilophodontid B</i>	(212)	40.23712	(26, 43)	<i>Paronychodon</i>	(213)	12.9875	(9, 26, 43, 86)
	<i>Ornithomimus velox</i>	(213)	175.6667	(9, 43, 86)	<i>Dromaeosaurid B</i>	(213)	13.56	(9, 43, 86)
	<i>Akainacephalus johnsoni</i>	(214)	1500	(43)	<i>Velociraptorine B</i>	(213)	23.7026	(4, 9, 26, 43, 57)
	<i>Nasutoceratops titusi</i>	(215)	1500	(43)	<i>Talos sampsoni</i>	(219)	29	(43, 219)
	<i>Kosmoceratops richardsoni</i>	(216)	1850	(43, 216)	<i>Hagryphus giganteus</i>	(220)	80	(43, 86)
	<i>Utahceratops gettyi</i>	(216)	2750	(43, 216)	<i>Teratophoneus curriei</i>	(221)	1532.18	(26, 43, 86)
	<i>Gryposaurus monumentensis</i>	(217)	3000	(43)				
	<i>Parasaurolophus cyrtocristatus</i>	(218)	3292.803	(4, 43)				
Kayenta/Navajo Sandstone United States 199-182MYA	<i>Segisaurus</i>	(222)	6	(43, 178, 180)	<i>Kayentavenator elysiae</i>	(227)	17.75	(43, 57)
	<i>Scutelosaurus lawleri</i>	(223)	14.8132	(26, 43)	<i>Coelophysis kayentakatae</i>	(228)	30.1113	(26, 43)
	<i>Seitaad ruessi</i>	(224)	85	(43, 71)	<i>Dilophosaurus wetherilli</i>	(229)	340.609	(4, 26-27, 43, 86)
	<i>Sarahsaurus aurifontanalisis</i>	(225)	163.7259	(26-27, 43, 71)				
	<i>Ammosaurus</i>	(222)	355.1782	(4, 26, 43, 71)				
	<i>Scelidosaurus</i>	(226)	500	(86)				

Assemblage	Herbivores / Plant Dominant Omnivores	Locality			Carnivores / Meat Dominant Omnivores	Locality		
		Ref	Mass (kg)	Mass Ref		Ref	Mass (kg)	Mass Ref
Khuren Dukh Mongolia 107-100MYA	<i>Psittacosaurus mongoliensis</i>	(230)	14.01595	(4, 26, 43)	<i>Troodontid A</i>	(230)	2.5	(43)
	<i>Harpymimus okladnikovi</i>	(230)	99.94297	(4, 43, 86)	<i>Troodontid B</i>	(232)	10.8333	(86)
	<i>Ornithomimid A</i>	(230)	146.8911	(26, 86)	<i>Carnosaurian A</i>	(116)	1742.73	(4, 26, 43, 73, 86)
	<i>Mongolostegus exspectabilis</i>	(66)	950	(43, 57)				
	<i>Choyrodon barsboldi</i>	(231)	1000	(43, 231)				
	<i>Altirhinus kurzanovi</i>	(104)	1100	(43)				
	<i>Shamosaurus scutatus</i>	(230)	2000	(43)				
	<i>Sauropod A</i>	(116)	11225.59	(43, 71)				
Kirtland Hunter-Willow Washes United States 75-73MYA	<i>Stegoceras validum</i>	(233)	27.6576	(4, 26, 43)	<i>Richardoestesia</i>	(238)	10.2398	(9, 43, 86)
	<i>Sphaerolitholus goodwini</i>	(233)	64.06949	(43, 57, 73)	<i>Dromaeosaurid C</i>	(239)	13.56	(9, 43, 86)
	<i>Ornithomimus edmontonicus</i>	(234)	138.7235	(4, 26-27, 73)	<i>Troodontid E</i>	(240)	17	(86)
	<i>Ornithomimus antiquus</i>	(233)	221.4634	(4, 9, 26-27, 43)	<i>Saurornitholestes langstoni</i>	(233)	23.4053	(4, 9, 26, 43, 57)
	<i>Nodocephalosaurus kirtlandensis</i>	(233)	1500	(43)	<i>Troodon</i>	(239)	68.1649	(4, 26, 43, 86)
	<i>Ziapelta sanjuanensis</i>	(235)	2164.816	(43, 204)	<i>Bistahieversor sealeyi</i>	(241)	2900	(43, 86)
	<i>Anasazisaurus horneri</i>	(233)	2500	(43)				
	<i>Parasaurolophus tubicen</i>	(233)	3183.813	(4, 26, 43)				
	<i>Kritosaurus navajovius</i>	(233)	4000	(43)				
	<i>Naashoibitosaurus ostromi</i>	(233)	4000	(43)				
	<i>Pentaceratops sternbergii</i>	(233)	5471.06	(4, 26, 43)				
	<i>Titanoceratops ouranos</i>	(236)	5500	(43, 236)				
	<i>Alamosaurus sanjuanensis</i>	(233)	37468.47	(4, 26, 43, 71, 237)				
Kota India 152-139MYA	<i>Ankylosaurian B</i>	(242)	500	(86)	<i>Dandakosaurus indicus</i>	(86)	2300	(86)
	<i>Thyreophoran A</i>	(243)	3374.023	(4, 26, 43, 73)				
	<i>Kotasaurus yamanpalliensis</i>	(244)	5366.125	(4, 26-27, 43)				
	<i>Barapasaurus tagorei</i>	(245)	9286.718	(4, 43, 71)				
Lameta India 72-66MYA	<i>Titanosaurus blanfordi</i>	(60)	8650	(57, 71)	<i>Theropod B</i>	(248)	9.12639	(4, 9, 43, 57, 73)
	<i>Titanosaurus indicus</i>	(246)	10362.15	(4, 43, 71)	<i>Noosaurid C</i>	(249)	12	(86)
	<i>Isisaurus colberti</i>	(246)	15000	(43)	<i>Laevisuchus indicus</i>	(246)	34.5	(86, 250)
	<i>Jainosaurus septentrionalis</i>	(247)	15555.35	(26-27, 43)	<i>Indosaurus matleyi</i>	(246)	491.25	(86)
					<i>Indosuchus raptorius</i>	(246)	1500	(43, 57, 86, 251)
					<i>Rahiolisaurus gujaratensis</i>	(252)	2519.65	(43, 86, 252)
					<i>Rajasaurus narmadensis</i>	(246)	3500	(43, 86)
Lance United States 66.8-66MYA	<i>Leptoceratops gracilis</i>	(253)	212.9821	(4, 26, 43)	<i>Richardoestesia</i>	(196)	10.2398	(9, 43, 86)
	<i>Thescelosaurus neglectus</i>	(104)	214.9144	(4, 26, 43)	<i>Paronychodon</i>	(196)	12.9875	(9, 26, 43, 86)
	<i>Pachycephalosaurus wyomingensis</i>	(254)	342.0206	(4, 26, 43)	<i>Dromaeosaurus</i>	(256)	13.56	(9, 43, 86)
	<i>Ornithomimus sedens</i>	(255)	350	(43)	<i>Saurornitholestes langstoni</i>	(153)	23.4053	(4, 9, 26, 43, 57)
	<i>Edmontonia longiceps</i>	(104)	1985.43	(4, 26, 43)	<i>Pectinodon bakkeri</i>	(153)	47.3759	(26)
	<i>Ankylosaurus magniventris</i>	(191)	3872.272	(4, 26, 43)	<i>Chirostenotes</i>	(104)	65.5686	(43, 86)
	<i>Edmontosaurus annectens</i>	(256)	4595.999	(4, 26, 43)	<i>Troodon</i>	(104)	68.1649	(4, 26, 43, 86)
	<i>Dyslocosaurus polyonychius</i>	(257)	5000	(43)	<i>Anzu</i>	(258)	246.013	(43, 86, 201)
	<i>Torosaurus</i>	(63)	7598.517	(4, 26-27, 43, 73)	<i>Tyrannosaurus rex</i>	(259)	6428.6	(4, 26, 43, 73, 86)
	<i>Triceratops horridus</i>	(63)	8318.221	(4, 26-27, 43, 73)				
	<i>Triceratops prorsus</i>	(63)	8902.168	(4, 26-27, 43)				
Laramie United States 69-68MYA	<i>Thescelosaurus</i>	(260)	170.3897	(4, 26, 43)	<i>Alvarezsauridae</i>	(104)	8.93	(43)
	<i>Edmontonia</i>	(260)	2125.341	(4, 26, 43)	<i>Paronychodon</i>	(104)	12.9875	(9, 26, 43, 86)
	<i>Edmontosaurus annectens</i>	(261)	4595.999	(4, 26, 43)	<i>Dromaeosaurus</i>	(260)	13.56	(9, 43, 86)
	<i>Torosaurus</i>	(260)	7598.517	(4, 26-27, 43, 73)	<i>Tyrannosaurus rex</i>	(260)	6428.6	(4, 26, 43, 73, 86)
	<i>Triceratops horridus</i>	(260)	8318.221	(4, 26-27, 43, 73)				
	<i>Triceratops prorsus</i>	(261)	8902.168	(4, 26-27, 43)				
Lourinhã Spain 152-146MYA	<i>Draconyx loureiroi</i>	(262)	322.0178	(27, 43)	<i>Coelurosaurian A</i>	(264)	10.2398	(9, 43, 86)
	<i>Miragaia longicollum</i>	(263)	4729.744	(26, 43)	<i>Lourinhanosaurus antunesi</i>	(262)	249.344	(26, 43, 86)
	<i>Dinheirosaurus lourinhanensis</i>	(262)	5000	(43)	<i>Ceratosaurus nasicornis</i>	(262)	580.377	(4, 26-27, 43, 73)
	<i>Dacentrurus armatus</i>	(262)	6121.788	(4, 26-27, 43)	<i>Allosaurus</i>	(262)	1742.73	(4, 26, 43, 73, 86)
	<i>Lourinhasaurus alenquerensis</i>	(262)	18201.68	(26, 43, 71)	<i>Torvosaurus</i>	(262)	3483.33	(26, 43, 86)
	<i>Lusotitan atalaiensis</i>	(262)	32249.65	(26, 43, 71)				
Lufeng BII "Zhangjia'ao" China 199-190.8MYA	<i>Eshanosaurus deguchiiianus</i>	(265)	26	(86, 265)	<i>Panguraptor lufengensis</i>	(265)	9.7	(86, 266)
	<i>Yunnanosaurus huangi</i>	(265)	591.7413	(26-27, 43, 57, 71)	<i>Coelophys</i>	(265)	25.0459	(26, 43, 86)
	<i>Chuxiongosaurus lufengensis</i>	(265)	650	(43, 71)	<i>Sinosaurus triassicus</i>	(265)	324.792	(4, 43)
	<i>Lufengosaurus huenei</i>	(265)	1884.985	(4, 26, 43, 71)				
	<i>Jingshanosaurus xinwaensis</i>	(265)	3158.544	(4, 26-27, 43)				
Maevarano Madagascar 70-66MYA	<i>Rapetosaurus krausei</i>	(267)	4581.365	(4, 26, 71)	<i>Rahonavis ostromi</i>	(269)	0.84205	(26, 43, 86)
	<i>Vahiny depereti</i>	(268)	8672.855	(26, 71)	<i>Masiakasaurus knopfleri</i>	(104)	13.7896	(4, 26, 43)
					<i>Majungasaurus crenatissimus</i>	(104)	1195.68	(26, 43, 57, 73, 86)

Assemblage	Herbivores / Plant Dominant Omnivores	Locality		Carnivores / Meat Dominant Omnivores	Locality	
		Ref	Mass (kg) Mass Ref		Ref	Mass (kg) Mass Ref
Milk River Canada 84.5-83.5MYA	<i>Acrotholus audeti</i>	(270)	40 (270)	<i>Richardoestesia isosceles</i>	(272)	10.1954 (9, 86)
	<i>Gryphoceratops morrisoni</i>	(271)	50 (271)	<i>Richardoestesia gilmorei</i>	(272)	10.3284 (9, 43, 86)
	<i>Brachyceratops</i>	(104)	1300 (43)	<i>Zapsalis</i>	(272)	12.3333 (86, 104)
	<i>Paleoscincus</i>	(104)	1617.899 (4, 26, 43)	<i>Atrociraptor</i>	(272)	15.25 (43, 86)
	<i>Nodosaurid C</i>	(272)	2125.341 (4, 26, 43)	<i>Saurornitholestes langstoni</i>	(104)	23.4053 (4, 9, 26, 43, 57)
	<i>Ankylosaurid A</i>	(272)	2297.224 (43)	<i>Saurornitholestes</i>	(272)	23.7026 (4, 9, 26, 43, 57)
	<i>Hadrosaurid E</i>	(272)	3428.063 (4, 26, 43)	<i>Tyrannosaurid A</i>	(272)	2554.78 (4, 26, 43, 86)
Morrison Brushy Basin Zone 3 United States 150-149.2MYA	<i>Nanosaurus agilis</i>	(273)	24.29303 (4, 43, 57, 73)	<i>Coelurus fragilis</i>	(273)	20.3806 (26, 43, 86)
	<i>Mymoorapelta maysi</i>	(273)	300 (43)	<i>Stokesosaurus clevelandi</i>	(273)	92.5 (43, 86)
	<i>Camptosaurus</i>	(273)	910.3948 (4, 26-27, 43)	<i>Marshosaurus bicentesimus</i>	(273)	212.5 (43, 86)
	<i>Stegosaurus stenops</i>	(273)	3353.66 (4, 26, 43)	<i>Ceratosaurus nasicornis</i>	(273)	580.377 (4, 26-27, 43, 73)
	<i>Ankylosaurus</i>	(273)	3872.272 (4, 26, 43)	<i>Allosaurus fragilis</i>	(273)	1913.75 (4, 26, 43, 73, 86)
	<i>Stegosaurus ungulatus</i>	(273)	5376.958 (26, 43)	<i>Allosaurus jimmadseni</i>	(273, 278)	1913.75 (4, 26, 43, 73, 86)
	<i>Diplodocus carnegii</i>	(273)	10877.24 (9, 43, 71, 274)	<i>Torvosaurus</i>	(273)	3483.33 (26, 43, 86)
	<i>Camarasaurus lewisi</i>	(273)	12499.94 (4, 26, 43)	<i>Saurophaganax maximus</i>	(273)	3758.72 (26, 43, 86)
	<i>Camarasaurus lentus</i>	(273)	13254.41 (4, 26, 43, 71, 275)			
	<i>Haplocanthosaurus</i>	(273)	14217.57 (4, 26, 43, 71)			
	<i>Camarasaurus grandis</i>	(273)	14224.85 (26, 43, 71)			
	<i>Diplodocus longus</i>	(273)	17338.44 (4, 26, 43, 71)			
	<i>Barosaurus</i>	(273)	21136.82 (4, 26, 43, 71)			
	<i>Barosaurus lentus</i>	(273)	21136.82 (4, 26, 43, 71)			
	<i>Camarasaurus supremus</i>	(273)	22974.7 (4, 43, 71)			
	<i>Apatosaurus louisae</i>	(273)	25385.81 (4, 26, 43, 71)			
	<i>Diplodocus hallorum</i>	(273, 276)	26689.4 (26, 43)			
	<i>Apatosaurus ajax</i>	(273)	29708.57 (4, 26-27, 43, 71)			
Oldman Canada 77.5-76.5MYA	<i>Prenocephale brevis</i>	(148)	10 (43)	<i>Saurornitholestes langstoni</i>	(286)	23.4053 (4, 9, 26, 43, 57)
	<i>Hanssuesia sternbergi</i>	(148)	28.07162 (43)	<i>Daspletosaurus torosus</i>	(53)	2631.11 (4, 43, 73, 86)
	<i>Struthiomimus altus</i>	(279)	215.0365 (4, 26-27, 43, 73)			
	<i>Wendiceratops pinhornensis</i>	(280)	1250 (43, 281)			
	<i>Ankylosaurid B</i>	(282)	1617.899 (4, 26, 43)			
	<i>Spinops sternbergorum</i>	(283)	1896.318 (43, 283)			
	<i>Coronosaurus brinkmani</i>	(150)	2000 (43)			
	<i>Nodosaurid D</i>	(150)	2125.341 (4, 26, 43)			
	<i>Centrosaurus apertus</i>	(284)	2214.703 (4, 26, 43)			
	<i>Chasmosaurine A</i>	(150)	2244.365 (4, 26, 43)			
	<i>Hypacrosaurus stebingeri</i>	(150)	3293.245 (4, 43)			
Prince Creek Alaska 70.6-69.1MYA	<i>Albertaceratops nesmoi</i>	(285)	3500 (43)			
	<i>Brachylophosaurus canadensis</i>	(150)	5729.18 (26, 43)			
	<i>Hypsilophodontid C</i>	(287)	82.79609 (4, 26-27, 43, 288)	<i>Dromaeosaurus albertensis</i>	(34)	14.7467 (9, 43, 86)
	<i>Alaskacephale gangloffii</i>	(287)	130 (289)	<i>Saurornitholestes langstoni</i>	(34)	23.4053 (4, 9, 26, 43, 57)
	<i>Ornithomimid D</i>	(287)	221.4634 (4, 9, 26-27, 43)	<i>Troodon formosus</i>	(34)	68.1649 (4, 26, 43, 86)
	<i>Ceratopsid A</i>	(290)	1300 (43)	<i>Nanuqsaurus hoglundi</i>	(294)	750 (43, 294)
	<i>Pachyrhinosaurus perotorum</i>	(291)	2260.778 (4, 26, 43)			
Scollard Canada 66.8-66MYA	<i>Pachyrhinosaurus canadensis</i>	(287)	3139.13 (4, 26, 43)			
	<i>Lambeosaurine A</i>	(292)	3594.614 (4, 26, 43)			
	<i>Edmontosaurus annectens</i>	(293)	4595.999 (4, 26, 43)			
	<i>Leptoceratops gracilis</i>	(203)	212.9821 (4, 26, 43)	<i>Richardoestesia</i>	(203)	10.2398 (9, 43, 86)
	<i>Thescelosaurus neglectus</i>	(203)	214.9144 (4, 26, 43)	<i>Paronychodon</i>	(203)	12.9875 (9, 26, 43, 86)
Shangshaximiao China 170.3-166.1MYA	<i>Pachycephalosaurus</i>	(104)	342.0206 (4, 26, 43)	<i>Dromaeosaurus albertensis</i>	(203)	14.7467 (9, 43, 86)
	<i>Ankylosaurus magniventris</i>	(203)	3872.272 (4, 26, 43)	<i>Troodon</i>	(203)	68.1649 (4, 26, 43, 86)
	<i>Triceratops horridus</i>	(203)	8318.221 (4, 26-27, 43, 73)	<i>Tyrannosaurus rex</i>	(203)	6428.6 (4, 26, 43, 73, 86)
	<i>Gongbusaurus shiyii</i>	(295)	20.05596 (4, 26, 43, 73, 296)	<i>Sinocoelurus fragilis</i>	(295)	25.0459 (26, 43, 86, 298)
	<i>Yandusaurus hongheensis</i>	(295)	140 (43)	<i>Chienkosaurus ceratosauroides</i>	(295)	420 (86)
	<i>Yingshanosaurus jichuanensis</i>	(295)	1277.148 (4, 43, 73)	<i>Szechuanosaurus campi</i>	(295)	1001.33 (57, 86, 299)
	<i>Gigantipinosaurus sichuanensis</i>	(295)	1460.431 (26, 43)	<i>Yangchuanosaurus shangyouensis</i>	(295)	2950 (43, 86)
	<i>Daanosaurus zhangii</i>	(295)	3517.054 (4, 43, 71, 73)	<i>Yangchuanosaurus hepingensis</i>	(295)	3000 (43)
	<i>Tuojiangosaurus multispinus</i>	(295)	3532.595 (4, 26-27, 43)			
	<i>Omeisaurus maoi</i>	(295)	6232.125 (43, 71, 73)			
	<i>Mamenchisaurus youngi</i>	(295)	6746.814 (26, 43, 71)			
	<i>Omeisaurus changshouensis</i>	(295)	6900 (71-71)			
	<i>Mamenchisaurus fuxiensis</i>	(295)	6967.05 (43, 57, 73, 297)			
	<i>Omeisaurus fuxiensis</i>	(295)	7400 (71)			
	<i>Mamenchisaurus constructus</i>	(295)	11334.89 (4, 26, 43, 71)			
	<i>Mamenchisaurus hochuanensis</i>	(295)	14411.76 (4, 43, 71, 73, 80)			
	<i>Mamenchisaurus anyueensis</i>	(295)	25000 (43)			
	<i>Mamenchisaurus jingyanensis</i>	(295)	28500 (43, 71)			

Assemblage	Herbivores / Plant Dominant Omnivores	Locality		Carnivores / Meat Dominant Omnivores	Locality	
	Ref	Mass (kg)	Mass Ref	Ref	Mass (kg)	Mass Ref
Tendaguru Middle Saurian Tanzania 157-152MYA	<i>Dryosaurus lettowvorbecki</i>	(300)	80 (43)	<i>Abelisauroid A</i>	(303)	10.742 (86)
	<i>Dicraeosaurus hansemanni</i>	(301)	7268.766 (4, 9, 43, 71, 274)	<i>Non-coelurosaurian Tetanuran A</i>	(303)	15.1685 (4, 26, 43)
	<i>Giraffatitan brancai</i>	(302)	36554.87 (4, 26-27, 43, 71)	<i>Elaphrosaurus bambergi</i>	(303)	248.155 (4, 26, 43)
				<i>Ceratosaurid B</i>	(303)	481.333 (86)
				<i>Ceratosaurid C</i>	(300)	712.644 (86)
				<i>Abelisaurid A</i>	(303)	1002.5 (86)
Tendaguru Upper Saurian Tanzania 152-145MYA				<i>Veterupristisaurus milneri</i>	(303)	1175 (57, 86)
				<i>Allosaurus tendagurensis</i>	(300)	2143.4 (4, 26, 43, 73, 86)
				<i>Carcharodontosaurid B</i>	(303)	2981.55 (86)
	<i>Kentrosaurus aethiopicus</i>	(305)	1149.464 (4, 26, 43)	<i>Abelisauroid A</i>	(303)	10.742 (86)
	<i>Australodocus bohetti</i>	(305)	4000 (43)	<i>Ceratosaurid A</i>	(300)	481.333 (86)
	<i>Dicraeosaurus sattleri</i>	(301)	7154.417 (26, 43, 71)	<i>Abelisaurid A</i>	(303)	1002.5 (86)
Trempe Spain 67.6-66MYA	<i>Tendaguria tanzaniensis</i>	(305)	10000 (57, 71)	<i>Ostafrikasaurus crassisserratus</i>	(307)	1150 (86)
	<i>Tornieria africana</i>	(305)	12025.71 (26-27, 43, 71)	<i>Megalosauroid A</i>	(303)	1966.67 (86)
	<i>Janenschia robusta</i>	(305)	12332.74 (4, 27, 43, 71)	<i>Megalosaurus ingens</i>	(303)	5700 (86, 251)
	<i>Wamweracaudia keranji</i>	(306)	12332.74 (4, 27, 43, 71)			
	<i>Giraffatitan brancai</i>	(302)	36554.87 (4, 26-27, 43, 71)			
Two Medicine United States 82.6-74MYA	<i>Euhadrosaurian A</i>	(308)	600 (43)	<i>Richardoestesia</i>	(311)	10.2398 (9, 43, 86)
	<i>Pararhabdodon isonensis</i>	(309)	1250 (43, 57)	<i>Euronychodon</i>	(311)	12.9875 (86)
	<i>Nodosaurid E</i>	(104)	1817.855 (4, 9, 43, 73)	<i>Paronychodon</i>	(311)	12.9875 (9, 26, 43, 86)
	<i>Hadrosaurid F</i>	(309)	3274.599 (4, 26, 43, 57, 73)	<i>Dromaeosaurus</i>	(311)	13.56 (9, 43, 86)
	<i>Lambeosaurine B</i>	(309)	3363.898 (4, 26, 43)	<i>Pyroraptor olympius</i>	(311)	14.7361 (86, 312)
	<i>Hypselosaurus</i>	(310)	6300 (57, 71)	<i>Theropod C</i>	(311)	757 (313)
Upper Elliot Lesotho 201-199.3MYA	<i>Titanosaurus indicus</i>	(309)	10362.15 (4, 43, 71)			
	<i>Orodromeus makelai</i>	(314)	15.1695 (4, 26)	<i>Bambiraptor feinbergi</i>	(324)	5.82906 (4, 43, 86)
	<i>Prenoceratops pieganensis</i>	(315)	20 (43)	<i>Richardoestesia isosceles</i>	(323)	10.1954 (9, 86)
	<i>Stegoceras validum</i>	(314)	27.6576 (4, 26, 43)	<i>Dromaeosaurus</i>	(314)	13.56 (9, 43, 86)
	<i>Hanssuesia sternbergi</i>	(314)	28.07162 (43)	<i>Saurornitholestes</i>	(323)	23.7026 (4, 9, 26, 43, 57)
	<i>Montanaceratops</i>	(316)	134.4206 (4, 43)	<i>Troodon formosus</i>	(323)	68.1649 (4, 26, 43, 86)
Upper Elliot Lesotho 201-199.3MYA	<i>Cerasinops hodgskissi</i>	(317)	151.9703 (4, 26-27, 43)	<i>Caenagnathus sternbergi</i>	(314)	74.7759 (9, 43, 73, 86, 325)
	<i>Einiosaurus procurvicornis</i>	(318)	974.7027 (4, 43)	<i>Daspletosaurus horneri</i>	(326)	2500 (43)
	<i>Brachyceratops montanensis</i>	(318)	1300 (43)	<i>Gorgosaurus</i>	(314)	2554.78 (4, 26, 43, 86)
	<i>Stellasaurus ancillae</i>	(319)	1521.933 (319)			
	<i>Prosaurolophus blackfeetensis</i>	(314)	1532.758 (4)			
	<i>Euoplocephalus tutus</i>	(314)	1617.899 (4, 26, 43)			
Upper Elliot Lesotho 201-199.3MYA	<i>Achelousaurus horneri</i>	(318)	1709.393 (4, 26, 43)			
	<i>Oohkotokia horneri</i>	(320)	1750 (43, 320)			
	<i>Chasmosaurus</i>	(314)	2251.247 (4, 26-27, 43)			
	<i>Edmontonia rugosidens</i>	(314)	2265.253 (26, 43)			
	<i>Rubeosaurus ovatus</i>	(314)	2289.302 (43, 57, 321)			
	<i>Maiaasaura peeblesorum</i>	(314)	2873.436 (4, 26, 43)			
Upper Elliot Lesotho 201-199.3MYA	<i>Acristavus gagslarsoni</i>	(322)	3000 (43)			
	<i>Hypacrosaurus stebingeri</i>	(323)	3293.245 (4, 43)			
	<i>Gryposaurus latidens</i>	(323)	3365.19 (26, 43)			
	<i>Abrictosaurus consors</i>	(327)	1.797141 (4, 26-27, 43)	<i>Coelophysis rhodesiensis</i>	(336)	13.0264 (26, 43)
	<i>Lycorhinus angustidens</i>	(327)	3.763795 (43, 328)	<i>Dracovenator regenti</i>	(337)	217.5 (43, 86)
	<i>Pegomastax africanus</i>	(329)	4 (329)			
Upper Elliot Lesotho 201-199.3MYA	<i>Heterodontosaurus tucki</i>	(327)	4.02759 (4, 26, 43)			
	<i>Lesothosaurus diagnosticus</i>	(327)	4.959149 (4, 26, 43)			
	<i>Stormbergia dangershoekei</i>	(327)	35.54129 (4, 26-27)			
	<i>Arcusaurus pereirabdalorum</i>	(330)	51.32899 (331)			
	<i>Massospondylus kaalae</i>	(332)	280 (43, 71)			
	<i>Massospondylus carinatus</i>	(330)	430.3565 (4, 26, 43, 71)			
Upper Elliot Lesotho 201-199.3MYA	<i>Melanorosaurus</i>	(333)	1300 (43)			
	<i>Aardonyx celestae</i>	(330)	2604.76 (4, 71, 334)			
	<i>Pulanesaura eocollum</i>	(330)	3200 (43, 71, 335)			

Assemblage	Herbivores / Plant Dominant Omnivores			Carnivores / Meat Dominant Omnivores		
	Ref	Mass (kg)	Mass Ref	Ref	Mass (kg)	Mass Ref
Wadhurst Clay United Kingdom 141-137MYA	<i>Valdosaurus canaliculatus</i>	(338)	29.05354 (27, 43)	<i>Maniraptoran A</i>	(351)	0.1 (43)
	<i>Valdoraptor oweni</i>	(339)	435 (86)	<i>Ornithodesmus</i>	(352)	13.56 (9, 43, 57, 86)
	<i>Polacanthus foxii</i>	(340)	1148.738 (4, 26, 43)	<i>Altispinax dunkeri</i>	(353)	1070.9 (43, 73, 353)
	<i>Stegosaurian A</i>	(340)	1149.464 (4, 26, 43)	<i>Baryonyx walkeri</i>	(352)	1600 (43, 86)
	<i>Pleurocoelus valdensis</i>	(341)	1194.873 (26, 71, 73)			
	<i>Hylaeosaurus armatus</i>	(340)	1676.957 (26, 43)			
	<i>Hypselospinus fittoni</i>	(342)	2773.986 (27, 43)			
	<i>Barillium dawsoni</i>	(343)	3589.012 (27, 43, 344)			
	<i>Haestasaurus becklesii</i>	(345)	4047.026 (71, 345)			
	<i>Xenoposeidon proneneukos</i>	(346)	7300 (71, 347)			
Wahweap United States 80.6-76.1MYA	<i>Cetiosaurus brevis</i>	(348)	9000 (71)			
	<i>Ornithopsis hulkei</i>	(349)	15854.83 (71, 350)			
	<i>Thescelosaurus</i>	(104)	170.3897 (4, 26, 43)	<i>Richardoestesia</i>	(104)	10.2398 (9, 43, 86)
	<i>Diabloceratops eatoni</i>	(354)	1300 (43)	<i>Paronychodon</i>	(104)	12.9875 (9, 26, 43, 86)
	<i>Nodosaurid F</i>	(355)	1436.424 (26, 43)	<i>Dromaeosaurid D</i>	(355)	13.56 (9, 43, 86)
	<i>Ankylosaurid C</i>	(356)	1500 (43)	<i>Velociraptorine C</i>	(213)	18.734 (4, 26-27, 43, 73)
	<i>Hadrosaurine A</i>	(357)	2873.436 (4, 26, 43)	<i>Troodon</i>	(213)	68.1649 (4, 26, 43, 86)
	<i>Acristavus gagslarsoni</i>	(322)	3000 (43)	<i>Lythronax argestes</i>	(360)	1466.67 (43, 86, 360)
	<i>Gryposaurus monumentensis</i>	(357)	3000 (43)	<i>Tyrannosaurid B</i>	(213)	1532.18 (26, 43, 86)
	<i>Adelolophus hutchisoni</i>	(357)	3342.087 (4, 26, 43)			
Xiashaximiao China 172-170MYA	<i>Machairoceratops cronusi</i>	(358)	3500 (359)			
	<i>Brachylophosaurus</i>	(358)	5729.18 (26, 43)			
	<i>Xiaosaurus dashanpensis</i>	(295)	5.24155 (26-27)	<i>Chuangdongocoelurus primitivus</i>	(295)	86.5221 (26, 86)
	<i>Agilisaurus louderbacki</i>	(295)	85.7595 (26, 43)	<i>Gasosaurus constructus</i>	(295)	201.054 (4, 26, 86)
	<i>Yandusaurus hongheensis</i>	(295)	140 (43)	<i>Gasosaurus lini</i>	(295)	201.054 (4, 26, 86)
	<i>Huayangosaurus taibaii</i>	(295)	440.5137 (4, 43)	<i>Xuanhanosaurus qilixiaensis</i>	(295)	250 (43)
	<i>Abrosaurus dongpoi</i>	(361)	4550 (43, 71)	<i>Yangchuanosaurus zigongensis</i>	(364)	1745 (43, 86)
	<i>Omeisaurus junghsiensis</i>	(295)	5100.288 (26, 43, 71)	<i>Yangchuanosaurus shangyouensis</i>	(365)	2950 (43)
	<i>Shunosaurus lii</i>	(295)	5776.958 (4, 26-27, 43)			
	<i>Protognathosaurus oxyodon</i>	(295)	6300 (71)			
Yixian Jianshangou China 125-122.5MYA	<i>Datousaurus bashanensis</i>	(295)	7196.814 (4, 43, 71)			
	<i>Dashanpusaurus dongi</i>	(362)	7511.192 (26, 71)			
	<i>Omeisaurus luquanensis</i>	(295)	8000 (71)			
	<i>Omeisaurus puxiani</i>	(363)	8000 (57)			
	<i>Omeisaurus jiao</i>	(363)	10090.81 (26, 71)			
	<i>Omeisaurus tianfuensis</i>	(295)	11952.59 (4, 9, 26-27, 43)			
	<i>Ningyuansaurus wangi</i>	(366)	2.3 (86-86)	<i>Sinosauroptryx prima</i>	(367)	1.12591 (4, 26-27, 43, 86)
	<i>Beipiaosaurus inexpectus</i>	(367)	69.72641 (26, 43, 86)	<i>Caudipteryx zoui</i>	(367)	2.2 (43)
	<i>Dongbeititan dongi</i>	(368)	6450 (43, 71)	<i>Changyuraptor yangi</i>	(369)	3.06667 (43, 86, 369)
				<i>Sinornithosaurus millenii</i>	(367)	3.47873 (4, 43, 86)
Yixian Lujiantun China 130-128.2MYA				<i>Protarchaeopteryx robusta</i>	(367)	4.70168 (4, 26, 43, 86)
				<i>Caudipteryx dongi</i>	(367)	6.14309 (4, 43)
				<i>Zhenyuanlong suni</i>	(370)	7.2 (43, 86)
				<i>Dilong paradoxus</i>	(367)	11.7091 (4, 26-27, 43, 86)
				<i>Huaxiagnathus orientalis</i>	(367)	17.3632 (26-27, 43, 86)
				<i>Jianchangosaurus yixianensis</i>	(371)	20 (43)
				<i>Sinocalliopteryx gigas</i>	(372)	35.4102 (26-27, 43, 86)
				<i>Yutyranus huali</i>	(373)	1300 (43, 86)
	<i>Liaoceratops yanzigouensis</i>	(367)	2 (43)	<i>Mei long</i>	(367)	0.55869 (26, 43, 86)
	<i>Hexing qingyi</i>	(374)	4.33697 (26, 86)	<i>Liaoningvenator curriei</i>	(376)	0.78033 (4, 43, 73, 376)
	<i>Incisivosaurus gauthieri</i>	(367)	4.701678 (4, 26, 43, 86)	<i>Sinovenator changii</i>	(367)	1.90301 (26, 43, 86)
	<i>Psittacosaurus lujiatunensis</i>	(375)	5 (43)	<i>Daliansaurus liaoningensis</i>	(377)	1.90903 (378)
	<i>Jeholosaurus shangyuanensis</i>	(367)	5.667104 (4, 26)	<i>Changyuraptor yangi</i>	(369)	3.06667 (43, 86, 369)
	<i>Shenzhousaurus orientalis</i>	(367)	13.08922 (26, 43, 86)	<i>Sinusonasus magodens</i>	(367)	3.19335 (26, 43, 86)
	<i>Hongshanosaurus houi</i>	(367)	15 (43)	<i>Graciliraptor lujiatunensis</i>	(367)	3.47873 (4, 43, 86)
	<i>Psittacosaurus major</i>	(375)	18 (43)	<i>Dilong paradoxus</i>	(367)	11.7091 (4, 26-27, 43, 86)
				<i>Jianchangosaurus yixianensis</i>	(371)	20 (43)

Taxon list for each community with mass in kg and references

Table S2.

Formation		Raw Data = Log2(mass(kg))								M-S Distribution			KS Goodness of Fit (vs Global)		Quadratic Regression (bins)			4th degree polynomial regression			Bimodality Coefficient				
		N	Min	Max	IQR	Q1	Q3	Median	Mean	P _{Mean}	Skew	P _{Skew}	kurtosis	P _{kurt}	D	P	F	P	R ²	F	P	R ²	b1	b2	b (Sarle)
Jurassic																									
Upper Elliot	14	1.8	3200.0	643.7	4.0	647.8	43.4	582.2	0.032	0.3142	0.157	-1.201	0.555	0.4535	0.0090	3.0044	0.1064	0.4289	1.8307	0.2420	0.5496	0.1159	1.7870	0.1983	
Lufeng Bil "Zhangjia'ao"	8	9.7	3158.5	1551.0	25.3	1576.2	458.3	833.9	0.254	-0.5714	0.994	-1.729	0.335	0.5249	0.0020	1.3960	0.3020	0.2587	0.5478	0.7084	0.2675	0.4444	1.5102	0.2253	
Kayenta/Navajo Sandstone	9	6.0	500.0	331.6	16.3	347.9	85.0	168.1	0.040	0.0363	0.320	-1.818	0.316	0.6402	0.0000	2.5982	0.1351	0.3938	1.5300	0.3051	0.5050	0.0017	1.4454	0.1665	
Hanson	5	6.0	745.0	634.5	15.5	650.0	349.4	336.1	0.132	-0.7560	0.794	-2.479	0.171	0.6402	0.0000	0.7537	0.5013	0.1585	0.3046	0.8651	0.1688	1.0160	1.3802	0.2149	
Xiaoshaximiao	21	5.2	11952.6	7183.5	170.5	7354.0	2950.0	3844.0	0.608	-0.6533	0.919	-0.453	0.926	0.2532	0.2620	1.5944	0.2613	0.2850	1.3187	0.3622	0.4678	0.4728	2.3752	0.2503	
Shangshaximiao	21	20.1	28500.0	6044.3	1139.2	7183.5	3532.6	6398.5	0.188	-1.4961	0.146	1.883	0.129	0.1693	0.7670	1.8521	0.2183	0.3165	6.5876	0.0220	0.8145	2.4802	4.1911	0.4520	
Callovian Oxford Clay	10	108.4	12232.5	4565.9	167.7	4733.6	1670.1	3290.0	0.472	0.3895	0.134	-0.782	0.827	0.3249	0.1280	1.4842	0.2830	0.2706	1.1403	0.4209	0.4319	0.1920	2.0123	0.1877	
Tendaguru Middle Saurian	12	10.7	36554.9	2650.0	122.0	2772.0	741.9	4370.2	0.967	0.0157	0.335	-0.113	0.698	0.3582	0.1280	2.4018	0.1524	0.3752	1.2333	0.3890	0.4512	0.0003	2.4675	0.1539	
Tendaguru Upper Saurian	14	10.7	36554.9	10989.7	1112.7	12102.5	4850.0	7561.5	0.087	-1.4106	0.186	3.114	0.053	0.2170	0.4850	3.6299	0.0755	0.4757	7.9123	0.0143	0.8406	2.3352	4.7080	0.3901	
Kota	5	500.0	9286.7	5926.4	1400.0	7326.4	3374.0	4165.4	0.152	-1.2578	0.277	0.313	0.449	0.3485	0.1280	0.9583	0.4236	0.1933	1.9624	0.2196	0.5668	2.8125	2.0781	0.3783	
Morrison Brushy Basin Zone 3	27	20.4	29708.6	16428.0	910.4	17338.4	3872.3	9554.0	0.132	-1.1571	0.346	0.228	0.495	0.1476	0.7670	1.8688	0.2158	0.3184	2.2611	0.1778	0.6012	1.4481	2.9734	0.3853	
Lourinhã	11	10.2	32249.7	5799.8	322.0	6121.8	3483.3	6608.3	0.254	-0.7265	0.824	0.552	0.360	0.1667	0.7670	2.5311	0.1407	0.3875	1.9438	0.2226	0.5644	0.6516	2.8312	0.2360	
Cretaceous																									
Wadhurst Clay	17	0.1	15854.8	3065.1	753.0	3818.0	1600.0	3204.3	0.657	-2.0267	0.040	4.173	0.023	0.2896	0.2620	1.1494	0.3641	0.2232	2.0168	0.2111	0.5735	4.6736	5.7093	0.6057	
Yixian Lujiantun	17	0.6	20.0	10.4	2.0	12.4	4.3	6.7	0.000	0.1170	0.264	-1.516	0.407	0.8865	0.0000	2.1308	0.1812	0.3476	14.2267	0.0032	0.9046	0.0156	1.5610	0.1946	
Yixian Jianshangou	15	1.1	6450.0	32.3	3.1	35.4	7.2	529.0	0.000	1.4492	0.002	1.636	0.145	0.6675	0.0000	2.1760	0.1760	0.3523	16.7500	0.0021	0.9178	2.4359	3.7646	0.4561	
Cloverly	11	1.5	34146.0	4538.8	20.0	4558.8	818.4	4601.1	0.608	-0.1915	0.535	-0.889	0.761	0.2576	0.2620	1.7993	0.2263	0.3103	0.8358	0.5491	0.3578	0.0453	1.9665	0.1704	
Khuren Dukh	12	2.5	11225.6	1546.5	35.5	1582.0	975.0	1616.0	0.562	-0.5796	0.997	-0.370	0.874	0.4416	0.0090	1.0199	0.4032	0.2032	0.5282	0.7206	0.2604	0.4065	2.3054	0.2219	
Cedar Mountain Mussentuchit	18	1.5	10800.0	1236.8	13.2	1250.0	247.5	1404.3	0.204	0.1482	0.239	-1.251	0.530	0.3624	0.1280	1.2570	0.3352	0.2391	0.5752	0.6917	0.2772	0.0248	1.7546	0.1909	
Bayan Shireh / Iren Dabusu	25	2.0	25418.1	1522.7	70.0	1592.7	500.0	2131.6	0.562	-0.4327	0.828	-0.348	0.854	0.4449	0.0090	2.7860	0.1207	0.4106	1.3721	0.3466	0.4777	0.2039	2.4874	0.2040	
Griman Creek	15	6.0	6000.0	652.4	20.0	672.4	156.7	869.2	0.152	0.3391	0.146	-0.654	0.914	0.5068	0.0020	6.0900	0.0247	0.6036	2.9697	0.1131	0.6644	0.1334	2.1694	0.1908	
Bissekty	14	1.4	7000.0	719.0	12.0	731.0	197.5	1055.6	0.132	0.2035	0.210	-0.676	0.899	0.4357	0.0410	1.4119	0.2984	0.2609	0.5693	0.6953	0.2751	0.0486	2.1422	0.1753	
Bajo de la Carpa	15	2.8	32064.6	5233.5	16.5	5250.0	1925.0	4472.4	0.967	-0.7169	0.834	-0.828	0.799	0.2818	0.2620	0.4695	0.6415	0.1050	0.9024	0.5177	0.3756	0.5960	2.0483	0.2743	
Milk River	17	10.2	4000.0	2406.7	19.3	2426.0	50.0	1237.2	0.345	0.1520	0.237	-2.035	0.256	0.3485	0.1280	0.8039	0.4807	0.1673	0.3644	0.8261	0.1955	0.0263	1.1828	0.2120	
Anacleto	14	9.0	29050.0	11732.5	1927.3	13659.8	5375.0	8346.8	0.119	-2.1792	0.022	5.608	0.005	0.2072	0.4850	1.5445	0.2709	0.2786	5.3188	0.0356	0.7800	5.5734	6.3964	0.6421	
Two Medicine	28	5.8	3365.2	2255.5	27.8	2283.3	1411.0	1263.3	0.562	-0.4497	0.854	-1.528	0.402	0.4535	0.0090	1.1325	0.3689	0.2207	0.5157	0.7284	0.2558	0.2181	1.5248	0.2491	
Wahweap	18	10.2	5729.2	3029.7	55.8	3085.5	1483.3	1928.0	0.967	-0.7784	0.756	-1.135	0.599	0.3485	0.1280	1.0083	0.4069	0.2013	0.7372	0.5994	0.3295	0.6840	1.8407	0.3088	
Allen	18	15.1	22385.9	6115.1	483.8	6598.8	2071.5	5049.0	0.307	-1.1339	0.370	1.116	0.224	0.1818	0.7670	2.3972	0.1529	0.3747	6.1289	0.0259	0.8034	1.4514	3.5131	0.3440	
Oldman	15	10.0	5729.2	2416.1	215.0	2631.1	2000.0	1918.6	0.812	-1.1793	0.327	-0.116	0.699	0.3485	0.1280	0.8121	0.4774	0.1688	0.7073	0.6155	0.3204	1.6130	2.5440	0.4139	
Judith River Coal Ridge	17	10.3	4000.0	2814.9	21.2	2836.1	1436.4	1523.5	0.657	-0.3687	0.745	-1.696	0.343	0.3485	0.1280	1.3925	0.3028	0.2582	0.6884	0.6259	0.3146	0.1547	1.4299	0.2270	
Kaiparowits	16	10.2	3292.8	1745.9	24.7	1770.5	127.8	989.9	0.276	0.1364	0.248	-1.965	0.278	0.4624	0.0090	1.1112	0.3751	0.2174	0.4196	0.7900	0.2186	0.0214	1.2443	0.2062	
Dinosaur Park MAZ-1b	27	2.6	3549.6	2241.8	23.4	2265.3	74.8	1143.5	0.276	-0.0515	0.390	-1.495	0.419	0.4138	0.0410	1.3834	0.3048	0.2570	0.5585	0.7019	0.2713	0.0029	1.5534	0.2033	
Djadokhta	21	0.2	14139.4	88.3	8.5	96.8	20.5	785.2	0.001	1.0087	0.023	1.686	0.138	0.6104	0.0000	1.2975	0.3250	0.2449	1.0873	0.4405	0.4202	1.1274	0.4077	0.2819	
Kirtland Hunter-Willow Washes	19	10.2	37468.5	3972.7	27.7	4000.0	1500.0	3645.9	0.812	-0.0008	0.351	-1.421	0.441	0.2958	0.2620	1.2698	0.3319	0.2410	0.5260	0.7220	0.2596	0.0000	1.6262	0.1923	
Horseshoe Canyon Drumheller-H	17	10.3	5260.1	2178.0	18.9	2196.9	138.7	1124.4	0.345	0.0459	0.313	-1.725	0.336	0.4661	0.0090	1.8652	0.2163	0.3180	0.7229	0.6070	0.3252	0.0024	1.4091	0.1979	
Baruungoyot	23	0.2	12172.7	1301.7	4.3	1306.0	33.1	1127.9	0.024	0.2470	0.190	-1.047	0.656	0.4814	0.0090	1.4630	0.2874	0.2678	0.7251	0.6058	0.3259	0.0670	1.9175	0.1985	
Lameta	11	9.1	15555.3	10327.7	34.5	10362.2	2519.6	5239.5	0.562	-0.8124	0.718	-0.696	0.885	0.1476	0.7670	1.8320	0.2213	0.3141	4.3288	0.0550	0.7427	0.8149	2.0825	0.2904	
Prince Creek	12	14.7	4596.0	2847.7	71.8	2919.5	485.7	1348.4	0.608	-0.1062	0.456	-1.484	0.422	0.3582	0.1280	5.9497	0.0261	0.5980	2.9375	0.1153	0.6620	0.0137	1.6044	0.1798	
Maevavano	6	0.8	8672.9	5593.7	10.6	5604.2	2888.5	3174.3	0.812	-1.0837	0.418	-0.839	0.793	0.3485	0.1280	0.1531	0.8605	0.0369	1.0161	0.4686	0.4038	1.8351	1.8551	0.3498	
Laramie	10	8.9	8902.2	7765.0	13.4	7778.4	3360.7	3817.5	0.967	-0.6980	0.863	-1.521	0.404	0.3485	0.1280	0.4370	0.6605	0.0985	0.6667	0.6381	0.3077	0.6166	1.5944	0.2724	
Hell Creek	22	10.2	8902.2	4026.5	26.7	4053.2	217.2	1975.3	0.390	0.3287	0.153	-1.481	0.423	0.3578	0.1280	1.9890	0.1990	0.3321	0.7490	0.5931	0.3330	0.1191	1.5737	0.2214	
Tremp	13	10.2	10362.2	3306.0	13.3	3319.2	757.0	2137.7	0.702	-0.1500	0.494	-1.819	0.315	0.2715	0.2620	0.7828	0.4892	0.1637	0.4703	0.7572	0.2387	0.0268	1.3803	0.1935	
Lance	23	10.2	8902.2	4572.6	23.4	4596.0	246.0	2301.2	0.608	0.0280	0.327	-1.748	0.328	0.3485	0.1280	1.4320	0.2940	0.2636	0.5949	0.6798	0.2840	0.0009	1.3593	0.2078	
Scollard	10																								

Summary Statistics, KS Test and polynomial tests for full communities. $\alpha = 0.05$, Sarle's $b = .555$

Table S3.

Formation		Raw Data = Log2(mass(kg))								M-S Distribution				KS Goodness of Fit (vs Global)		Quadratic Regression (bins)		4th degree polynomial		Bimodality Coefficient				
		N	Min	Max	IQR	Q1	Q3	Median	Mean	P _{Mean}	Skew	P _{skew}	kurtosis	P _{kurt}	D	P	F	P	R ²	F	P	R ²	b1	b2
Upper Elliot	12	1.8	3200.0	1078.6	4.0	1082.6	43.4	660.0	0.006	0.2829	0.110	-1.4683	0.391	0.7917	0.0000	1.2707	0.3317	0.2411	0.8434	0.5454	0.3599	0.0968	1.6143	0.1942
Lufeng BII "Zhangjia'ao"	5	26.0	3158.5	2212.9	308.9	2521.8	650.0	1262.3	0.262	-1.7356	0.246	3.2510	0.176	0.6667	0.0000	1.3061	0.3229	0.2462	0.8051	0.5643	0.3493	5.3551	2.8128	0.5877
Kayenta/Navajo Sandstone	6	6.0	500.0	378.8	12.6	391.4	124.4	187.5	0.007	-0.3827	0.441	-1.4813	0.387	0.7273	0.0000	4.1315	0.0586	0.5081	2.7250	0.1313	0.6450	0.2289	1.6350	0.1559
Xiashaximiao	15	5.2	11952.6	7860.0	140.0	8000.0	5777.0	5019.3	0.957	-1.2712	0.616	0.8317	0.695	0.2051	0.8430	0.7981	0.4830	0.1663	1.0851	0.4414	0.4197	1.8740	3.2042	0.4121
Shangshaximiao	16	20.1	28500.0	8376.6	1974.6	10351.2	6489.5	7935.8	0.452	-2.0360	0.132	4.4682	0.082	0.5000	0.0510	1.3932	0.3026	0.2583	3.6460	0.0774	0.7085	4.7586	5.8361	0.6033
Callovian Oxford Clay	8	108.4	12232.5	9557.0	128.1	9685.2	2155.2	3920.8	0.859	0.2765	0.112	-1.3917	0.418	0.5278	0.0510	1.0217	0.4026	0.2035	0.6426	0.6519	0.2999	0.1041	1.6706	0.1680
Tendaguru Middle Saurian	3	80.0	36554.9	36474.9	80.0	36554.9	7268.8	14634.5	0.684	-0.9352	0.967			0.3333	0.1700	1.1120	0.3749	0.2175	0.6273	0.6607	0.2949	3.4985		
Tendaguru Upper Saurian	8	1149.5	36554.9	7544.1	4788.6	12332.7	11012.9	11943.7	0.076	-0.4877	0.539	0.4208	0.882	0.3750	0.1700	4.7277	0.0441	0.5417	6.1118	0.0261	0.8029	0.3238	2.5337	0.1781
Kota	4	500.0	9286.7	7088.1	1218.5	8306.6	4370.1	4631.7	0.528	-2.0000	0.145	4.0000	0.111	0.6389	0.0090	0.5768	0.5834	0.1260	0.9225	0.5086	0.3808	9.0000	2.3333	0.6316
Morrison Brushy Basin Zone 3	19	24.3	29708.6	17783.2	3353.7	21136.8	13254.4	12946.5	0.213	-2.0478	0.131	3.8594	0.118	0.6316	0.0090	1.4041	0.3002	0.2598	1.4557	0.3238	0.4925	4.7014	5.6160	0.6204
Lourinhã	6	322.0	32249.7	18085.9	3627.8	21713.7	5560.9	11104.1	0.171	-0.4401	0.492	1.3350	0.530	0.3333	0.1700	2.5238	0.1413	0.3869	1.8270	0.2426	0.5491	0.3026	2.6006	0.1472
Cretaceous																								
Wadhurst Clay	13	29.1	15854.8	4524.4	1149.1	5673.5	2774.0	3983.7	0.776	-2.0090	0.144	5.5074	0.040	0.1099	1.0000	1.3285	0.3175	0.2493	3.3187	0.0925	0.6887	4.8031	6.1775	0.5743
Yixian Lujiantun	8	2.0	18.0	10.1	4.4	14.5	5.3	8.5	0.000	-0.4041	0.456	-0.2286	0.826	0.9333	0.0000	1.2138	0.3464	0.2328	4.0217	0.0639	0.7283	0.2222	2.2245	0.1716
Yixian Jianshangou	3	2.3	6450.0	6447.7	2.3	6450.0	69.7	2174.0	0.007	0.4233	0.078			0.6667	0.0000	0.1035	0.9029	0.0252	0.2206	0.9174	0.1282	0.7166		
Cloverly	8	1.5	34146.0	5292.4	58.9	5351.3	1409.2	5745.8	0.262	-0.4742	0.526	0.0175	0.931	0.1389	0.8430	0.9205	0.4367	0.1871	0.4167	0.7919	0.2174	0.3061	2.3417	0.1804
Khuren Dukh	9	14.0	11225.6	1426.6	123.4	1550.0	1000.0	1959.6	0.377	-0.3645	0.427	-0.1324	0.867	0.1111	0.8430	1.6962	0.2432	0.2978	0.9844	0.4817	0.3962	0.1735	2.3305	0.1700
Cedar Mountain Mussentuchit	10	1.5	10800.0	2724.3	25.7	2750.0	659.2	2057.9	0.171	-0.6523	0.716	-0.3727	0.763	0.1545	0.8430	1.0059	0.4077	0.2009	0.7075	0.6154	0.3205	0.5386	2.2437	0.2337
Bayan Shireh / Iren Dabasu	18	2.0	25418.1	1703.4	135.1	1838.5	990.2	2801.6	0.262	-0.8488	0.908	0.7106	0.756	4.0000	0.0000	1.5294	0.2739	0.2766	1.0649	0.4491	0.4152	0.8134	3.2122	0.2657
Griman Creek	10	6.0	6000.0	1722.0	17.2	1739.2	195.0	1196.7	0.033	0.2376	0.128	-1.1019	0.505	0.5000	0.0510	2.8299	0.1176	0.4143	1.1395	0.4212	0.4317	0.0714	1.8312	0.1736
Blissekty	7	175.0	7000.0	4450.0	300.0	4750.0	483.8	2071.0	0.528	0.3587	0.100	-2.0895	0.273	0.6234	0.0090	1.8306	0.2215	0.3140	1.4175	0.3340	0.4859	0.1852	1.3794	0.1748
Bajo de la Carpa	9	9.0	32064.6	4005.9	1863.3	5869.1	5250.0	7032.0	0.776	-1.6337	0.309	2.9275	0.200	0.2222	0.4490	0.5202	0.6132	0.1151	0.5317	0.7184	0.2617	3.4860	3.9370	0.5272
Milk River	9	40.0	4000.0	2789.0	675.0	3464.0	2125.3	2039.8	0.776	-1.2468	0.649	0.1714	0.993	0.3778	0.1700	1.0227	0.4022	0.2036	1.0745	0.4454	0.4174	2.0305	2.4900	0.4292
Anacleto	11	9.0	29050.0	10337.0	3802.3	14139.4	8395.2	10284.0	0.313	-2.9477	0.006	9.2967	0.003	0.8091	0.0000	1.1022	0.3777	0.2160	3.1630	0.1010	0.6783	10.7269	8.0780	0.9577
Two Medicine	20	15.2	3365.2	2144.5	138.8	2283.3	1575.3	1506.1	0.377	-1.0316	0.850	-0.4318	0.744	0.2000	0.8430	0.9518	0.4258	0.1922	0.6369	0.6552	0.2980	1.1858	2.3831	0.3691
Wahweap	11	170.4	5729.2	2063.6	1436.4	3500.0	3000.0	2871.0	0.776	-1.5076	0.393	3.5232	0.141	0.6591	0.0090	0.9631	0.4219	0.1941	1.6611	0.2753	0.5255	2.8061	4.6139	0.4335
Allen	13	808.0	22385.9	7940.7	2071.5	10012.2	3741.3	6886.2	0.377	-0.2108	0.322	-0.5456	0.684	0.3846	0.1700	2.0947	0.1855	0.3437	19.3094	0.0014	0.9279	0.0529	2.2142	0.1714
Oldman	13	10.0	5729.2	2036.3	732.5	2768.8	2000.0	2009.6	0.684	-1.4499	0.437	1.0172	0.620	0.3077	0.4490	0.8705	0.4549	0.1787	0.8863	0.5251	0.3714	2.5018	3.2375	0.4888
Judith River Coal Ridge	11	27.7	4000.0	2848.4	579.6	3428.1	2396.3	2111.5	0.776	-1.6202	0.318	2.7817	0.220	0.5273	0.0510	1.4354	0.2933	0.2641	1.8759	0.2340	0.5557	3.2409	4.1690	0.5088
Kaiparowits	9	27.7	3292.8	2767.0	108.0	2875.0	1500.0	1570.7	0.377	-1.0176	0.863	-0.2875	0.804	0.6667	0.0000	1.0694	0.3876	0.2109	0.7037	0.6175	0.3193	1.3525	2.2491	0.3449
Dinosaur Park MAZ-1b	14	27.7	3549.6	2874.6	170.9	3045.5	2229.5	1815.9	0.528	-1.0848	0.788	-0.2373	0.822	0.3143	0.4490	1.0604	0.3904	0.2095	0.8893	0.5237	0.3722	1.3810	2.4394	0.3791
Djadokhta	8	4.3	14139.4	980.6	29.0	1009.6	102.8	2030.9	0.042	0.5879	0.044	-0.0778	0.893	0.5000	0.0510	4.6877	0.0449	0.5396	2.2795	0.1756	0.6031	0.4705	2.2963	0.2043
Kirtland Hunter-Willow Washe	13	27.7	37468.5	4555.4	180.1	4735.5	2500.0	5095.4	0.859	-0.5558	0.616	-0.2175	0.830	0.6923	0.0000	1.4919	0.2814	0.2716	1.0225	0.4660	0.4053	0.3676	2.4290	0.2152
Horseshoe Canyon Drumheller	8	138.7	5260.1	2425.3	486.3	2911.6	2075.1	2054.0	0.776	-0.9129	0.996	-0.1270	0.870	0.2143	0.8430	0.9315	0.4328	0.1889	0.8808	0.5277	0.3700	1.1343	2.2729	0.2975
Baruungoyot	11	4.3	12172.7	2460.0	40.0	2500.0	1100.8	2062.3	0.171	-0.5413	0.597	-0.5608	0.675	0.5894	0.0090	0.7931	0.4850	0.1655	0.4015	0.8018	0.2111	0.3618	2.1635	0.2151
Lameta	4	8650.0	15555.3	6338.5	9078.0	15416.5	12681.1	12391.9	0.058	-2.0000	0.145	4.0000	0.111	0.6731	0.0000	1.5461	0.2706	0.2788	1.8944	0.2308	0.5581	9.0000	2.3333	0.6316
Prince Creek	8	82.8	4596.0	3327.9	152.9	3480.7	1780.4	1915.6	0.607	-0.5176	0.572	-1.3423	0.435	0.1528	0.8430	1.8825	0.2138	0.3200	1.5478	0.3008	0.5078	0.3647	1.6942	0.2070
Maevarano	3	4581.4	8672.9	4091.5	4581.4	8672.9	4581.4	5945.2	0.262					0.3333	0.1700	0.4018	0.6819	0.0913	0.8214	0.5562	0.3538			
Laramie	6	170.4	8902.2	6827.6	1636.6	8464.2	6097.3	5285.1	0.684	-1.9517	0.159	3.6570	0.130	0.7500	0.0000	0.7206	0.5155	0.1526	1.1472	0.4185	0.4334	5.9518	3.3967	0.7206
Hell Creek	13	15.2	8902.2	5977.9	119.4	6097.3	342.0	2794.7	0.313	-0.3149	0.386	-1.4689	0.391	0.1346	0.8430	1.6267	0.2554	0.2891	0.8608	0.5371	0.3646	0.1180	1.6096	0.2019
Trempe	7	600.0	10362.2	5050.0	1250.0	6300.0	3274.6	3852.6	0.452	-0.2767	0.370	0.0420	0.938	0.3333	0.1700	1.8404	0.2200	0.3151	9.2714	0.0097	0.8607	0.1102	2.2675	0.1448
Lance	12	213.0	8902.2	6604.9	344.0	6948.9	4234.1	3832.4	0.859	-0.8715	0.940	-1.0103	0.531	0.1667	0.8430	0.9629	0.4220	0.1940	1.2439	0.3855	0.4533	0.9191	1.9026	0.3233
Scollard	5	213.0	8318.2	5881.3	213.9	6095.2	342.0	2592.1	0.607	0.3154	0.104	-3.0813	0.151	0.6316	0.0090	1.2132	0.3466	0.2327	0.8350	0.5495	0.3576	0.1768	1.2297	0.1275

Summary Statistics, KS Test and polynomial tests for herbivore guilds. $\alpha = 0.05$, Sarle's $b = .555$

Table S4.

Formation		Raw Data = Log2(mass(kg))								M-S Distribution				KS Goodness of Fit (vs Global)		Quadratic Regression (bins)				4th degree polynomial regression			Bimodality Coefficient		
		N	Min	Max	IQR	Q1	Q3	Median	Mean	P _{mean}	Skew	P _{skew}	kurtosis	P _{kurt}	D	P	F	P	R ²	F	P	R ²	b1	b2	b (Sarle)
Jurassic																									
Lufeng BII "Zhangjia'ao"	3	9.7	324.8	315.1	9.7	324.8	25.0	119.8	0.391	1.2933	0.016				0.4424	0.0170	1.0215	0.4026	0.2034	0.7075	0.6154	0.3205			
Kayenta/Navajo Sandstone	3	17.8	340.6	322.9	17.8	340.6	30.1	129.5	0.669	1.7321	0.004				0.4424	0.0170	0.6646	0.5407	0.1425	0.3818	0.8147	0.2029			
Hanson	3	6.0	349.4	343.4	6.0	349.4	25.0	126.8	0.391	1.2933	0.016				0.4424	0.0170	1.0215	0.4026	0.2034	0.7075	0.6154	0.3205			
Xiaoshaximiao	6	86.5	2950.0	1873.8	172.4	2046.3	225.5	905.6	0.170	0.4899	0.266	-1.4667	0.442		0.2242	0.4720	1.6356	0.2538	0.2902	1.1923	0.4027	0.4429	0.3750	1.6400	0.1743
Shangshaximiao	5	25.0	3000.0	2752.5	222.5	2975.0	1001.3	1479.3	0.034	-1.9245	0.006	3.6667	0.006		0.3309	0.1270	0.8279	0.4712	0.1715	0.5481	0.7082	0.2676	6.5844	2.9167	0.6948
Tendaguru Middle Saurian	9	10.7	2981.6	1527.5	131.7	1659.2	481.3	948.8	0.128	-1.0103	0.190	-0.5336	0.783		0.2216	0.4720	1.6278	0.2552	0.2892	0.8973	0.5200	0.3743	1.3331	2.1198	0.3487
Tendaguru Upper Saurian	6	10.7	5700.0	2536.3	363.7	2900.0	1076.3	1718.5	0.012	-1.7628	0.013	3.5586	0.006		0.3643	0.1270	1.1351	0.3682	0.2210	1.0644	0.4493	0.4151	4.8553	3.3629	0.6091
Morrison Brushy Basin Zone 3	8	20.4	3758.7	2968.4	122.5	3090.9	1247.1	1496.9	0.034	-0.5401	0.577	-1.0500	0.783		0.1559	0.7580	4.4837	0.0494	0.5285	3.4725	0.0850	0.6983	0.3970	1.8333	0.2075
Lourinhã	5	10.2	3483.3	2483.2	129.8	2613.0	580.4	1213.2	0.090	-0.5901	0.513	-0.0219	0.374		0.1840	0.7580	3.8576	0.0672	0.4909	2.3152	0.1714	0.6068	0.6191	1.9945	0.1620
Cretaceous																									
Wadhurst Clay	4	0.1	1600.0	1464.3	3.5	1467.7	542.2	671.1	0.669	-0.8546	0.301	-1.2893	0.574		0.2758	0.2480	0.4395	0.6590	0.0990	0.2361	0.9081	0.1360	1.6431	1.6281	0.1747
Yixian Lujiantun	9	0.6	20.0	6.3	1.3	7.6	3.1	5.2	0.000	0.8248	0.107	-1.0794	0.760		0.7758	0.0000	1.9772	0.2006	0.3308	3.9698	0.0655	0.7258	0.8885	1.8333	0.2949
Yixian Jianshangou	12	1.1	1300.0	16.2	3.2	19.3	6.7	117.7	0.024	1.7714	0.004	4.0246	0.004		0.6091	0.0030	2.1738	0.1762	0.3521	13.7609	0.0035	0.9017	3.7970	5.0714	0.5269
Cloverly	3	3.6	4558.8	4555.2	3.6	4558.8	83.2	1548.5	0.724	0.9352	0.068				0.2826	0.2480	0.2955	0.7519	0.0688	0.3571	0.8309	0.1923			
Khuren Dukh	3	2.5	1742.7	1740.2	2.5	1742.7	10.8	585.4	0.391	0.9352	0.068				0.4424	0.0170	0.3759	0.6982	0.0859	0.3571	0.8309	0.1923			
Cedar Mountain Mussentuchit	8	5.8	3950.0	460.6	10.9	471.6	17.5	587.3	0.669	1.4286	0.010	1.3571	0.055		0.4008	0.0500	1.0008	0.4093	0.2001	0.8257	0.5541	0.3550	2.7778	2.9796	0.4794
Bayan Shireh / Iren Dabasu	7	13.3	1742.7	582.3	18.7	601.0	90.0	408.8	0.796	0.3830	0.345	-2.1066	0.171		0.2437	0.4720	1.6756	0.2467	0.2952	0.7696	0.5824	0.3391	0.2112	1.3723	0.1788
Griman Creek	5	13.8	672.4	416.9	20.1	437.1	156.7	214.2	0.976	-0.1656	0.948	-2.4074	0.106		0.3866	0.0500	1.7421	0.2355	0.3034	1.1822	0.4062	0.4407	0.0488	1.3981	0.1116
Bissekty	7	1.4	220.0	2.8	10.2	13.0	12.4	40.1	0.105	0.0000	0.717	3.0000	0.008		0.6329	0.0000	0.6446	0.5501	0.1388	0.6248	0.6622	0.2940	0.0000	3.5000	0.1124
Bajo de la Carpa	6	2.8	1925.0	1340.1	3.7	1343.8	358.3	633.0	0.976	-0.1526	0.923	-2.5338	0.083		0.2758	0.2480	0.7064	0.5218	0.1501	0.4831	0.7491	0.2436	0.0364	1.2741	0.1377
Milk River	8	10.2	2554.8	12.9	10.8	23.7	19.3	334.2	0.308	2.8284	0.000	8.0000	0.000		0.6508	0.0000	0.3976	0.6845	0.0904	0.3656	0.8254	0.1959	10.8889	6.1429	1.0766
Anacleto	3	672.4	2325.0	1652.6	672.4	2325.0	734.2	1243.9	0.012	1.7321	0.004				0.5309	0.0070	0.9709	0.4193	0.1953	0.9243	0.5078	0.3813			
Two Medicine	8	5.8	2554.8	1882.7	11.0	1893.7	45.9	656.4	0.796	0.9570	0.064	-0.5060	0.762		0.3660	0.1270	1.4517	0.2898	0.2663	0.8841	0.5261	0.3708	1.2466	2.0924	0.3213
Wahweap	7	10.2	1532.2	1453.7	13.0	1466.7	18.7	446.1	0.920	1.0879	0.040	-1.0282	0.796		0.3472	0.1270	0.7415	0.5065	0.1564	0.3938	0.8069	0.2079	1.7044	1.8216	0.3745
Allen	5	15.1	491.7	458.0	17.8	475.8	373.8	272.2	0.622	-0.6086	0.497	-3.3333	0.041		0.3866	0.0500	0.7967	0.4836	0.1661	0.3728	0.8207	0.1990	0.6584	1.1667	0.1809
Judith River Coal Ridge	6	10.3	2554.8	678.0	11.8	689.8	13.9	445.6	0.519	2.1482	0.001	4.6399	0.004		0.4493	0.0170	0.7093	0.5205	0.1506	0.5267	0.7215	0.2599	7.2104	3.7337	0.8224
Kaiparowits	7	10.2	1532.2	67.0	13.0	80.0	23.7	243.1	0.427	2.3466	0.000	5.5804	0.003		0.4901	0.0170	0.6368	0.5538	0.1373	0.5111	0.7313	0.2541	7.9297	4.5751	0.8952
Dinosaur Park MAZ-1b	13	2.6	2565.6	61.2	10.3	71.5	23.4	419.3	0.427	0.9280	0.069	1.0217	0.077		0.4621	0.0170	1.5507	0.2697	0.2794	1.2414	0.3863	0.4528	1.0249	3.2404	0.2825
Djadokhta	14	0.2	3103.1	19.9	2.4	22.3	16.2	239.0	0.012	0.8632	0.097	2.5585	0.022		0.6989	0.0000	0.9229	0.4359	0.1875	0.7649	0.5848	0.3377	0.8745	4.3319	0.2294
Kirtland Hunter-Willow Washe	6	10.2	2900.0	763.4	12.7	776.1	20.2	505.4	0.519	2.1482	0.001	4.6399	0.004		0.4493	0.0170	0.7093	0.5205	0.1506	0.5267	0.7215	0.2599	7.2104	3.7337	0.8224
Horseshoe Canyon Drumheller	9	10.3	2345.2	93.5	13.3	106.8	22.5	298.2	0.572	1.7708	0.004	3.0326	0.008		0.3938	0.0500	1.2662	0.3329	0.2404	0.9668	0.4892	0.3919	4.0957	3.9921	0.5950
Barungoyot	12	0.2	3103.1	29.2	1.8	30.9	11.6	271.3	0.028	0.8791	0.085	1.4872	0.049		0.5326	0.0070	2.5866	0.1360	0.3927	2.0331	0.2086	0.5754	0.9352	3.4744	0.2578
Lameta	7	9.1	3500.0	2507.6	12.0	2519.6	491.3	1152.4	0.278	-0.3718	0.770	-1.6856	0.325		0.1024	0.9670	2.4335	0.1494	0.3783	1.1934	0.4023	0.4431	0.1990	1.5477	0.1726
Prince Creek	4	14.7	750.0	562.6	16.9	579.5	45.8	214.1	0.669	1.4142	0.011	1.5000	0.049		0.3866	0.0500	1.4257	0.2954	0.2628	0.9957	0.4770	0.3990	4.5000	2.0000	0.3548
Maevarano	3	0.8	1195.7	1194.8	0.8	1195.7	13.8	403.4	0.391	0.9352	0.068				0.4424	0.0170	0.3759	0.6982	0.0859	0.3571	0.8309	0.1923			
Laramie	4	8.9	6428.6	4814.9	9.9	4824.8	13.3	1616.0	0.669	1.8128	0.004	3.4835	0.008		0.5258	0.0070	0.3585	0.7094	0.0823	0.7780	0.5780	0.3415	7.3941	2.2645	0.5325
Hell Creek	9	10.2	6428.6	251.1	14.4	265.5	47.4	791.8	0.865	1.7271	0.004	3.2998	0.008		0.3580	0.1270	1.6144	0.2576	0.2875	1.1516	0.4169	0.4343	3.8962	4.1324	0.5625
Tremp	6	10.2	757.0	188.0	12.3	200.3	13.3	136.9	0.308	2.4495	0.000	6.0000	0.003		0.6091	0.0030	0.4964	0.6263	0.1104	0.4113	0.7955	0.2152	9.3750	4.2000	0.9928
Lance	11	10.2	6428.6	55.2	13.0	68.2	23.4	630.8	0.572	2.3002	0.000	5.8097	0.003		0.4342	0.0500	1.0868	0.3824	0.2136	0.9146	0.5121	0.3788	6.5318	5.9858	0.7419
Scollard	5	10.2	6428.6	3236.8	11.6	3248.4	14.7	1306.9	0.865	2.0315	0.003	4.1512	0.004		0.4160	0.0500	0.5525	0.5960	0.1214	0.4500	0.7703	0.2308	7.3371	3.0378	0.7553

Summary Statistics, KS Test and polynomial tests for carnivore guilds. $\alpha = 0.05$, Sarle's $b = .555$

Table S5.

		Percentage of Communities Containing at least one Species											
	Log(kg)	-1	-0.5	0	0.5	1	1.5	2	2.5	3	3.5	4	4.5
All	Carnivores	2	5	21	28	88	47	23	42	63	23	0	0
	Herbivores	0	0	14	23	42	37	63	53	67	79	37	14
	Carnivores with larger Carnivore	2	5	21	28	86	47	19	26	9	0	0	0
	Herbivores with larger Herbivore	0	0	14	23	40	37	63	49	65	35	5	0
Cretaceous	Carnivores	2	5	21	23	67	42	12	21	44	16	0	0
	Herbivores	0	0	12	16	33	28	49	35	53	60	23	7
	Carnivores with larger Carnivore	2	5	21	23	65	42	9	12	2	0	0	0
	Herbivores with larger Herbivore	0	0	12	16	30	28	49	35	53	21	0	0
Jurassic	Carnivores	0	0	0	5	21	5	12	21	19	7	0	0
	Herbivores	0	0	2	7	9	9	14	19	14	19	14	7
	Carnivores with larger Carnivore	0	0	0	5	21	5	9	14	7	0	0	0
	Herbivores with larger Herbivore	0	0	2	7	9	9	14	14	12	14	5	0

The likelihood of bin occupation by guild with and without larger species present.

Species	Biomass Proportion		
	Adult	Juvenile	RSP _j
<i>Acrocanthosaurus atokensis</i>	0.32	0.68	211%
<i>Albertosaurus sarcophagus</i>	0.31	0.69	219%
<i>Alectrosaurus olseni</i>	0.31	0.69	219%
<i>Alioramus altai</i>	0.31	0.69	217%
<i>Allosaurus fragilis</i>	0.55	0.45	82%
<i>Daspletosaurus torosus</i>	0.63	0.37	60%
<i>Gorgosaurus libratus</i>	0.40	0.60	148%
<i>Siats meekerorum</i>	0.32	0.68	211%
<i>Tarbosaurus bataar</i>	0.36	0.64	179%
<i>Tyrannosaurus rex</i>	0.40	0.60	148%

Proportional biomass for 10 species of large theropods

Table S7.

Pairwise t-test
 $\alpha = 0.05$ (bold)
 Bonferroni Correction
 $\alpha = 0.00058$ (bold & outlined)

	Bayan Shireh / Iren Dabasu	Cedar Mountain Mussentuchit	Cloverly	Dinosaur Park MAZ-1b	Hell Creek	Horseshoe Canyon D-H	Oldman	Two Medicine	Allen	Anacleto	Bajo de la Carpa	Bluekey	Callovian Oxford Clay	Djadokhta	Griman Creek	Hanson	Judith River Coal Ridge	Kaiparowits	Kayenta / Navajo Sandstone	Khuren Dukh	Kirtland Hunter- Willow Washes
Baruungoyot	0.729265	0.569573	0.352394	0.673321	0.480607	0.943344	0.356891	0.439320	0.998085	0.165487	0.439290	0.485196	0.475251	0.297476	0.887606	0.777779	0.741626	0.941639	0.781428	0.653161	0.681036
Bayan Shireh / Iren Dabasu		0.726212	0.397203	0.972291	0.589137	0.726543	0.393318	0.578107	0.633004	0.170936	0.565271	0.122716	0.503026	0.026798	0.505895	0.441953	0.936694	0.587117	0.444621	0.768572	0.849629
Cedar Mountain Mussentuchit			0.519951	0.705182	0.799543	0.565334	0.583282	0.909003	0.599842	0.466442	0.940619	0.281075	0.855663	0.127217	0.536510	0.553150	0.831276	0.523471	0.555124	0.998293	0.906541
Cloverly				0.100648	0.454536	0.126263	0.908169	0.318064	0.230588	0.827003	0.351604	0.097866	0.645463	0.021352	0.213137	0.312906	0.283974	0.153918	0.313586	0.505034	0.319193
Dinosaur Park MAZ-1b					0.616205	0.758362	0.434402	0.640992	0.730186	0.250455	0.658381	0.287860	0.632805	0.126872	0.633755	0.593130	0.961576	0.663504	0.595950	0.818006	0.882727
Hell Creek						0.495448	0.757959	0.868222	0.573300	0.721669	0.857393	0.356152	0.986554	0.177765	0.532584	0.577715	0.707012	0.493313	0.579107	0.871626	0.761648
Horseshoe Canyon D-H							0.354737	0.448250	0.940051	0.151086	0.436545	0.364511	0.448626	0.179901	0.810012	0.697440	0.766319	0.873151	0.701261	0.658786	0.701022
Oldman								0.294997	0.134147	0.292922	0.297150	0.035031	0.621191	0.003123	0.119310	0.211543	0.228171	0.080737	0.212062	0.465116	0.277879
Two Medicine									0.451769	0.461801	0.965617	0.156130	0.896107	0.046720	0.390928	0.422691	0.725118	0.379598	0.424484	0.929678	0.812055
Allen										0.071889	0.269307	0.020650	0.195622	0.000550	0.695930	0.376163	0.670934	0.894651	0.376219	0.544816	0.613504
Anacleto											0.197453	0.003232	0.495325	0.000048	0.028365	0.068389	0.151430	0.021442	0.068450	0.366141	0.211698
Bajo de la Carpa												0.053121	0.827871	0.006891	0.248778	0.273210	0.706965	0.272156	0.274520	0.941734	0.813503
Bluekey													0.046028	0.329954	0.152406	0.412991	0.325345	0.379684	0.283627	0.311185	
Callovian Oxford Clay														0.000022	0.085996	0.050514	0.089188	0.474550	0.078317	0.597731	
Djadokhta															0.088996	0.259365	0.283347	0.274944	0.224997	0.250510	0.821290
Griman Creek																0.617165	0.574878	0.897706	0.622519	0.479606	0.532115
Hanson																	0.441261	0.591082	0.983972	0.394576	0.420031
Judith River Coal Ridge																		0.629844	0.584513	0.851787	0.920242
Kaiparowits																			0.728603	0.559353	0.601097
Kayenta/Navajo Sandstone																				0.396308	0.422697
Khuren Dukh																					0.888570
Lameta	0.151888	0.561939	0.370516	0.191532	0.766834	0.826132	0.883459	0.050491	0.901597	0.404466	0.096290	0.130141	0.105236	0.718764	0.801885	0.478391	0.674811	0.275308	0.571215	0.361625	
Lance	0.191977	0.707040	0.417112	0.230195	0.428881	0.991169	0.839699	0.065727	0.569816	0.462116	0.115424	0.171109	0.131303	0.324349	0.505634	0.575554	0.913084	0.342136	0.158295	0.056649	
Laramie	0.427843	0.949345	0.516761	0.456840	0.546842	0.825387	0.648141	0.199946	0.584780	0.585633	0.291448	0.509255	0.247000	0.417812	0.618606	0.910747	0.800398	0.650418	0.238317	0.194272	
Laurinãhã	0.685267	0.300063	0.970736	0.773010	0.310670	0.418533	0.167609	0.955709	0.269784	0.876460	0.952114	0.458838	0.887555	0.151292	0.411741	0.468468	0.227351	0.530402	0.038924	0.054711	
Lufeng Bi Zhangjiao	0.237495	0.735396	0.425992	0.275904	0.583632	0.979839	0.848119	0.086392	0.676367	0.475950	0.147304	0.244592	0.146167	0.478369	0.647525	0.666246	0.950821	0.410992	0.297523	0.188766	
Maewarano	0.694646	0.846078	0.639324	0.698074	0.573622	0.752206	0.558842	0.427804	0.578702	0.728879	0.527076	0.834224	0.422541	0.440179	0.643458	0.911072	0.670355	0.904051	0.263603	0.234232	
Milk River	0.150733	0.582807	0.378361	0.189815	0.684860	0.846191	0.927940	0.050044	0.834971	0.413276	0.094301	0.124146	0.107810	0.619278	0.735914	0.471469	0.697037	0.272768	0.448467	0.242804	
Morrison Brushy Basin Zone 3	0.808651	0.336816	0.859907	0.894498	0.209171	0.341552	0.107658	0.809446	0.173011	0.988004	0.858670	0.500880	0.689811	0.071339	0.320285	0.423997	0.155405	0.563981	0.009195	0.013975	
Prince Creek	0.451106	0.968723	0.534209	0.473170	0.416127	0.727199	0.516255	0.203366	0.449606	0.611102	0.291328	0.552962	0.253279	0.276309	0.500800	0.927079	0.668423	0.696266	0.118390	0.900718	
Scollard	0.107061	0.529964	0.366936	0.143873	0.342781	0.717347	0.843183	0.034086	0.765611	0.394201	0.067639	0.061222	0.093840	0.366578	0.387697	0.305545	0.525598	0.191631	0.216083	0.002575	
Shangshaximiao	0.876298	0.326507	0.806504	0.964821	0.066710	0.199485	0.049703	0.667131	0.054793	0.959637	0.733283	0.487265	0.584605	0.012544	0.130446	0.316707	0.107107	0.550714	0.000478	0.000663	
Tendaguru Middle Saurian	0.374574	0.997084	0.512756	0.400480	0.265705	0.676128	0.459546	0.150100	0.316536	0.584942	0.224745	0.444105	0.215951	0.146504	0.353097	0.940091	0.624235	0.617877	0.041149	0.021409	
Tendaguru Upper Saurian	0.042956	0.301782	0.286120	0.068232	0.420487	0.297738	0.341519	0.012289	0.303296	0.294756	0.028903	0.013324	0.051354	0.426099	0.426638	0.102374	0.135281	0.075643	0.470513	0.177315	
Trempealeau	0.478846	0.814986	0.578149	0.492269	0.085261	0.434289	0.228213	0.199589	0.100915	0.661170	0.283944	0.614634	0.271525	0.021791	0.165616	0.824215	0.316632	0.778701	0.001494	0.000398	
Upper Elliot	0.032941	0.280442	0.268264	0.053548	0.252880	0.254417	0.301173	0.008198	0.228091	0.277269	0.019693	0.008736	0.040697	0.312647	0.215375	0.078295	0.107299	0.060107	0.347201	0.107440	
Wadhurst Clay	0.089513	0.467570	0.348253	0.125013	0.581508	0.610220	0.704930	0.028216	0.999374	0.369960	0.058549	0.045859	0.083690	0.618222	0.614992	0.251333	0.407035	0.159696	0.448865	0.022857	
Wahweap	0.071672	0.381830	0.333442	0.108922	0.957783	0.456591	0.509440	0.023645	0.637118	0.343382	0.054680	0.029614	0.077546	0.940300	0.936196	0.184703	0.252562	0.123525	0.936711	0.043215	
Xianxiamiao	0.268549	0.769893	0.448039	0.308792	0.573105	0.948850	0.807274	0.106114	0.653355	0.498202	0.176093	0.282293	0.168980	0.459803	0.640067	0.709594	0.999074	0.449838	0.276769	0.184856	
Xinjiangou	0.111611	0.510091	0.356947	0.148489	0.706195	0.727330	0.798874	0.035448	0.926440	0.384303	0.070539	0.073647	0.091109	0.670633	0.746051	0.349873	0.539202	0.203470	0.503878	0.196893	
Yixian Lufeng	0.072107	0.384113	0.334159	0.109410	0.939909	0.459093	0.514081	0.023786	0.643860	0.344311	0.054894	0.029864	0.077862	0.955548	0.918512	0.185586	0.250605	0.124278	0.917481	0.031735	
Yixian Lufeng	0.356913	0.941384	0.508498	0.391452	0.386938	0.766606	0.559520	0.149467	0.434907	0.570356	0.231768	0.407641	0.217819	0.244270	0.479177	0.878994	0.736029	0.580443	0.092704	0.059350	
Yixian Lufeng	0.330960	0.847367	0.477055	0.368051	0.556242	0.887962	0.728156	0.140272	0.615470	0.534601	0.220485	0.371885	0.199569	0.433624	0.626426	0.801310	0.903243	0.533459	0.251524	0.184618	
Yixian Lufeng		0.452720	0.769241	0.942016	0.208158	0.385717	0.158278	0.620495	0.193284	0.906555	0.694687	0.109194	0.556090	0.087749	0.287142	0.528074	0.224554	0.727007	0.016412	0.018967	
Yixian Lufeng			0.564147					0.682720	0.305348	0.653870	0.408346	0.650529	0.326473	0.524233	0.699092	0.967817	0.805447	0.756151	0.352369	0.319817	
Yixian Lufeng				0.777010	0.394401	0.492021	0.240084	0.916118	0.354629	0.860065	0.922979	0.510007	0.942165	0.230625	0.487802	0.533715	0.306850	0.575409	0.085106	0.109864	
Yixian Lufeng					0.192364	0.354642	0.443809	0.132877	0.682494	0.173391	0.943443	0.749126	0.629253	0.599558	0.075233	0.281110	0.480613	0.190293	0.663442	0.012092	0.015230
Yixian Lufeng						0.443809	0.494597	0.023020	0.605639	0.340630	0.053567	0.028293	0.076393	0.897459	0.973162	0.178718	0.241454	0.120237	0.984887	0.039313	
Yixian Lufeng							0.850461	0.072886	0.579942	0.470148	0.131724	0.171765	0.144498	0.331036	0.525886	0.573236	0.900123	0.345145	0.159955	0.058768	
Yixian Lufeng								0.065602	0.793753	0.436711	0.118937	0.168754	0.125413	0.594590	0.723701	0.549040	0.786799	0.32			

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Materials Design Analysis Reporting (MDAR) Checklist for Authors

The MDAR framework establishes a minimum set of requirements in transparent reporting applicable to studies in the life sciences (see Statement of Task: [doi:10.31222/osf.io/9sm4x](https://doi.org/10.31222/osf.io/9sm4x)). The MDAR checklist is a tool for authors, editors and others seeking to adopt the MDAR framework for transparent reporting in manuscripts and other outputs. Please refer to the MDAR Elaboration Document for additional context for the MDAR framework.

Materials

Antibodies	Yes (indicate where provided: page no/section/legend)	n/a
For commercial reagents, provide supplier name, catalogue number and RRID, if available.		x
Cell materials	Yes (indicate where provided: page no/section/legend)	n/a
Cell lines: Provide species information, strain. Provide accession number in repository OR supplier name, catalog number, clone number, OR RRID		x
Primary cultures: Provide species, strain, sex of origin, genetic modification status.		x
Experimental animals	Yes (indicate where provided: page no/section/legend)	n/a
Laboratory animals: Provide species, strain, sex, age, genetic modification status. Provide accession number in repository OR supplier name, catalog number, clone number, OR RRID		x
Animal observed in or captured from the field: Provide species, sex and age where possible		x
Model organisms: Provide Accession number in repository (where relevant) OR RRID		x
Plants and microbes	Yes (indicate where provided: page no/section/legend)	n/a
Plants: provide species and strain, unique accession number if available, and source (including location for collected wild specimens)		x
Microbes: provide species and strain, unique accession number if available, and source		x
Human research participants	Yes (indicate where provided: page no/section/legend)	n/a
Identify authority granting ethics approval (IRB or equivalent committee(s), provide reference number for approval.		x
Provide statement confirming informed consent obtained from study participants.		x
Report on age and sex for all study participants.		x

Design

Study protocol	Yes (indicate where provided: page no/section/legend)	n/a
For clinical trials, provide the trial registration number OR cite DOI in manuscript.		x
Laboratory protocol	Yes (indicate where provided: page no/section/legend)	n/a
Provide DOI or other citation details if detailed step-by-step protocols are available.		x
Experimental study design (statistics details)	Yes (indicate where provided: page no/section/legend)	n/a
State whether and how the following have been done, or if they were not carried out.		
Sample size determination	Materials and Methods: lines 354-356	
Randomisation	Materials and Methods: line 379	
Blinding		X
Inclusion/exclusion criteria	Materials and Methods: lines 335-340	
Sample definition and in-laboratory replication	Yes (indicate where provided: page no/section/legend)	n/a
State number of times the experiment was replicated in laboratory		x
Define whether data describe technical or biological replicates		x
Ethics	Yes (indicate where provided: page no/section/legend)	n/a
Studies involving human participants: State details of authority granting ethics approval (IRB or equivalent committee(s), provide reference number for approval.		x
Studies involving experimental animals: State details of authority granting ethics approval (IRB or equivalent committee(s), provide reference number for approval.		x
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Dual Use Research of Concern (DURC)	Yes (indicate where provided: page no/section/legend)	n/a
If study is subject to dual use research of concern, state the authority granting approval and reference number for the regulatory approval		x

Analysis

Attrition	Yes (indicate where provided: page no/section/legend)	n/a
State if sample or data point from the analysis is excluded, and whether the criteria for exclusion were determined and specified in advance.	Tables S3 – S4 Materials and Methods: lines 335-340	
Statistics	Yes (indicate where provided: page no/section/legend)	n/a
Describe statistical tests used and justify choice of tests.	Materials and Methods: lines 377-385	
Data Availability	Yes (indicate where provided: page no/section/legend)	n/a
State whether newly created datasets are available, including protocols for access or restriction on access.	References: line 224	
If data are publicly available, provide accession number in repository or DOI or URL.		x
If publicly available data are reused, provide accession number in repository or DOI or URL, where possible.		x
Code Availability	Yes (indicate where provided: page no/section/legend)	n/a
For all newly generated code and software essential for replicating the main findings of the study:		
State whether the code or software is available.		x
If code is publicly available, provide accession number in repository, or DOI or URL.		x

Reporting

Adherence to community standards	Yes (indicate where provided: page no/section/legend)	n/a
MDAR framework recommends adoption of discipline-specific guidelines, established and endorsed through community initiatives. Journals have their own policy about requiring specific guidelines and recommendations to complement MDAR.		
State if relevant guidelines (eg., ICMJE, MIBBI, ARRIVE) have been followed, and whether a checklist (eg., CONSORT, PRISMA, ARRIVE) is provided with the manuscript.		x