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SUPPLEMENTARY ONLINE MATERIAL FOR

New remains and paleoecology of uruguaytheriine astrapotheres (Mammalia)
from the Middle Miocene of Bolivia

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Supplementary Online Material

SOM 1. Body mass and body-mass-specific diet-bioapatite enrichment factor (ϵ^*) for Oligocene and Miocene herbivores from Bolivia and astrapotheres from Argentina. Species are in alphabetical order, and enrichment factors are based on the average linear regression equation for hindgut fermenters of Tejada-Lara et al. (2018: table 2a).

SOM 2. Measurements and data sources for astrapothere m3s and deciduous premolars plotted in Figs. 4 and 5, respectively.

SOM 3. Photos and MorphoSource links for astrapothere specimens from Nazareno, Bolivia.

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SOM 1. Body mass and body-mass-specific diet-bioapatite enrichment factor (ϵ^*) for Oligocene and Miocene herbivores from Bolivia and astrapothers from Argentina. Species are in alphabetical order, and enrichment factors are based on the average linear regression equation for hindgut fermenters of Tejada-Lara et al. (2018: table 2a).

Taxon	Locality	Mass (kg)	ϵ^*	BM Source	Comments
<i>Anayatherium</i> sp.	Salla, Bolivia	300	13.6	Nelson et al. (2023)	Midpoint of range for <i>Leontinia</i> , which is of similar size (Shockey 2005: fig. 1)
<i>Astrapothericulus iheringi</i>	Pinturas Fm., Argentina	285	13.6	Geometric similarity based on <i>Astrapotherium magnum</i> (below)	<i>Astrapotherium</i> is not found in the Pinturas Fm. (Kramarz et al. 2019). <i>Astrapothericulus</i> is ~30% smaller than <i>Astrapotherium magnum</i> in linear dimensions (Kramarz 2009)
<i>Astrapotherium magnum</i>	Santa Cruz Fm., Argentina	850	14	Calculated using non-selenodont equations for p4-m3 length and head-body length from Damuth (1990)	This is the common Santa Cruz species
<i>Eurygenium pacegnum</i>	Salla, Bolivia	42.5	12.9	Similar in size to <i>Rhynchippus</i> sp. (below)	
<i>Hegetotherium trilobus</i>	QHB, Bolivia	9	12.3	Nelson et al. (2023)	Midpoint of range
<i>Microtyotherium choquecotense</i>	Micaña, Bolivia	12.5	12.4	Nelson et al. (2023)	Midpoint of range
<i>Olisanophus</i> spp.	QHB, Bolivia	35	12.8	Cassini et al. (2012: table 14.3)	Midpoint of range of <i>Tetramerorhinus</i> , which is similar in size based on m1 length (McGrath et al. 2020: table 1)
<i>Palyeidodon</i> sp.	Cerdas, Bolivia	550	13.8	Geometric similarity based on <i>Toxodon platensis</i> (Nelson et al. 2023)	Braincase of <i>Palyeidodon</i> is ~20% smaller than <i>Toxodon platensis</i> (Madden 1990: table XXVI). Midpoint of range of <i>T. platensis</i> used.
<i>Plesiotypotherium</i> sp.	Quehua, Bolivia	35	12.8	Assumed to be <i>Plesiotypotherium achirensense</i>	
<i>Plesiotypotherium achirensense</i>	Achiri, Bolivia	35	12.8	Nelson et al. (2023)	Midpoint of range
<i>Pyrotherium macfaddeni</i>	Salla, Bolivia	750	13.9	Shockey and Anaya (2004)	
<i>Pyrotherium</i> sp.	Salla, Bolivia	750	13.9	Assumed to be <i>Pyrotherium macfaddeni</i> (above)	
<i>Rhynchippus</i> sp.	Salla, Bolivia	42.5	12.9	Nelson et al. (2023)	Midpoint of range of <i>Rhynchippus equinus</i>
<i>Trachytherus alloxus</i>	Salla, Bolivia	17.5	12.6	Geometric similarity based on <i>Plesiotypotherium achirensense</i>	Skull length = 17.4 cm (Billet et al. 2008: table A3) vs. 21.8 cm in <i>P. achirensense</i> (Villarroel 1974: p. 22)
Toxodontidae sp. indet.	Achiri, Bolivia	550	13.8	Nelson et al. (2023)	ID uncertain; based on <i>Palyeidodon</i> .
Toxodontidae sp. indet.	QHB, Bolivia	550	13.8	Nelson et al. (2023)	ID uncertain; based on <i>Palyeidodon</i> .
<i>Xenastrapotherium</i> sp. nov.	QHB, Bolivia	850	14	Based on <i>Astrapotherium magnum</i> (above)	A. magnum is similar in size (present study)

SOM 2. Measurements (in mm) and data sources for astrapothere m3s and deciduous premolars plotted in Figs. 4 and 5, respectively.

Species	ID	DP2 Length	DP2 Width	DP3 Length	DP3 Width	DP4 Length	DP4 Width	Reference
<i>Astrapotherium burmeisteri</i>	MACN-A 3299-3300	2.4	1.9	-	-	3.89	4.57	Kramarz et al. (2019: SI 1-2), ImageJ
<i>Astrapotherium magnum</i>	YPM VPPU 15332	-	-	1.8	2.1	3.4	3.8	Scott (1928: p. 339)
<i>Astrapotherium? ruderarium</i>	FMNH PM 13429 (left)	-	-	-	-	2.44	2.82	Our measurements, calipers
<i>Astrapotherium? ruderarium</i>	FMNH PM 13429 (right)	-	-	-	-	2.38	2.92	Our measurements, calipers
<i>Granastrapotherium snorki</i>	UCMP 38007	-	-	-	-	5.56	2.34	Our measurements, ImageJ
<i>Xenastrapotherium chaparralensis</i>	UCMP 37836	-	-	-	-	4.26	3.28	Our measurements, ImageJ
<i>Xenastrapotherium kraglievichi?</i>	IGM 2061-F	2.3	1.1	-	-	-	-	Our measurements, ImageJ
<i>Xenastrapotherium kraglievichi?</i>	IGM 2061-F	-	-	2.5	1.7	-	-	Our measurements, ImageJ
QHB astrapothere	MNHN-BOL-V-003672	2.4	1.5	3.7	2	4.3	3.1	Our measurements, ImageJ
QHB astrapothere	UATF-V-002013	2.4	1.4	3.3	1.5	-	-	Our measurements, calipers

Supplementary Online Material 3

Specimens from Nazareno, Bolivia

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UATF-V-001052

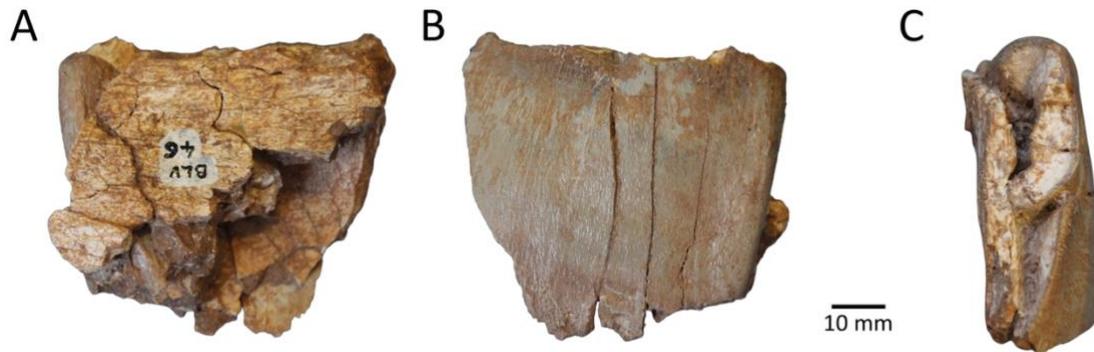
Photogrammetry (3D) scan available on MorphoSource via [this link](#).



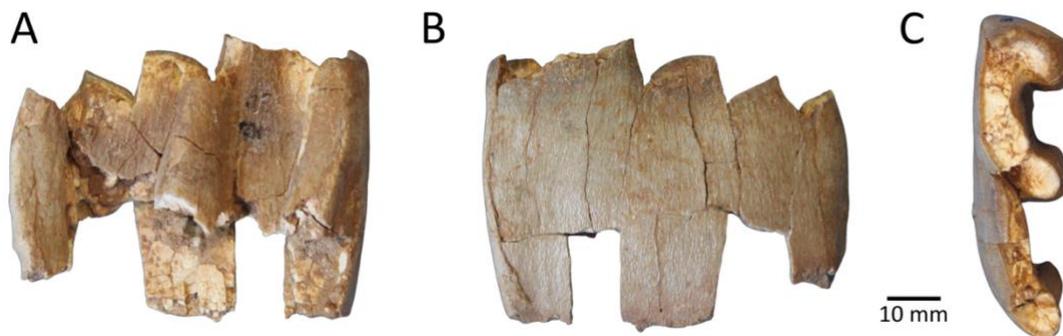
UATF-V-001054

Photogrammetry (3D) scan available on MorphoSource via [this link](#).

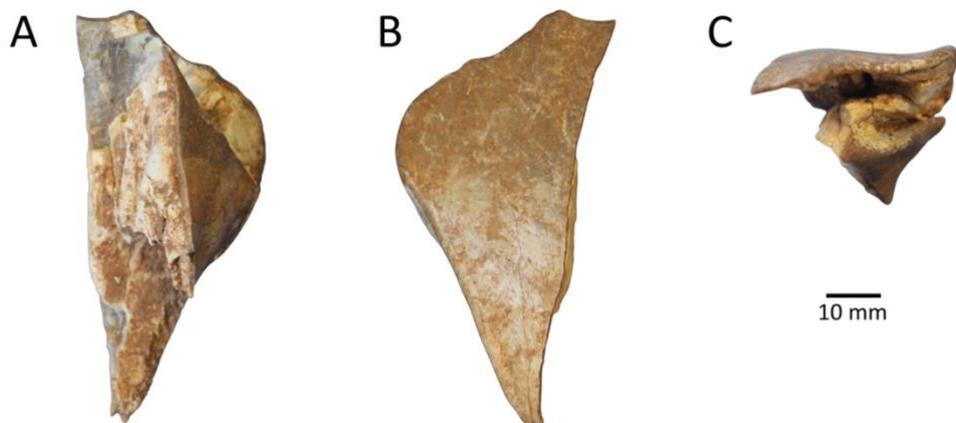
SOM 4. Photos and MorphoSource links for MNHN.F.BLV 46, astrapothere upper and lower teeth from the Quebrada Honda Basin



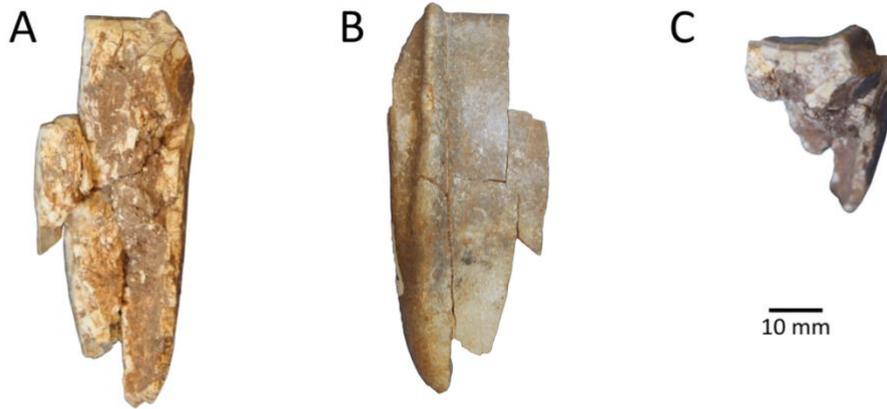
Right m3 in lingual (A), buccal (B) and occlusal (C) views.
Photogrammetry (3D) scan available on MorphoSource via [this link](#)



Left m3 in lingual (A), buccal (B) and occlusal (C) views.
Photogrammetry (3D) scan available on MorphoSource via [this link](#)



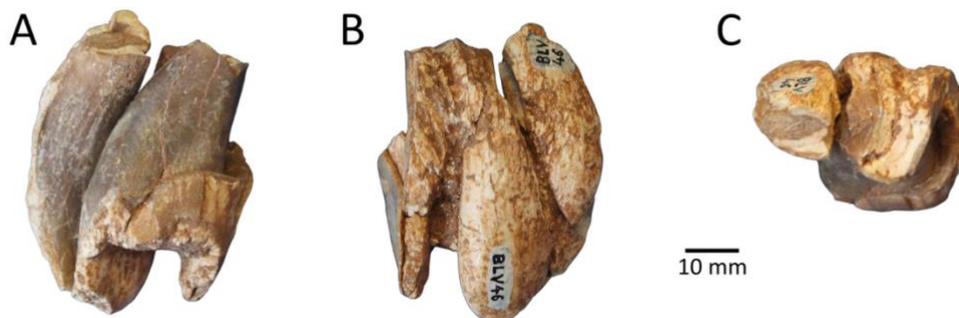
Left M3 in lingual (A), buccal (B) and occlusal (C) views.
Photogrammetry (3D) scan available on MorphoSource via [this link](#)



Anterobuccal fragment of right M3 in lingual (A), buccal (B) and occlusal (C) views.
Photogrammetry (3D) scan available on MorphoSource via [this link](#)

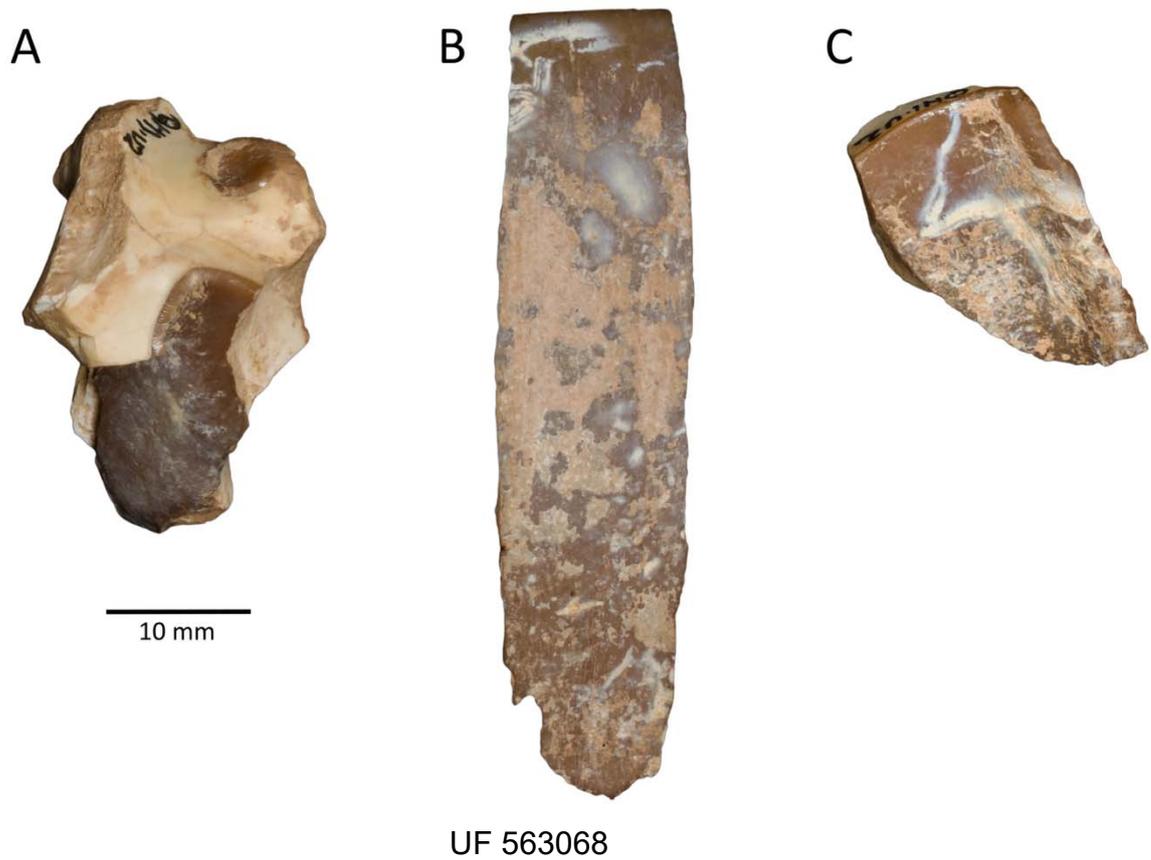


Posterobuccal fragment of right M3 in lingual (A), buccal (B) and occlusal (C) views.
Photogrammetry (3D) scan available on MorphoSource via [this link](#)



Lingual fragment of right M3 in lingual (A), buccal (B) and occlusal (C) views.
Photogrammetry (3D) scan available on MorphoSource via [this link](#)

SOM 5. Photos of UF 563068, astrapothere tooth fragments from the Quebrada Honda Basin.



Specimen UF 563068. A. Distolingual portion of a left upper molar fragment in anterolingual view. B. Fragment of an upper molar ectoloph in lateral view. C. Mesial fragment of an upper molar ectoloph in lateral view.

SOM 6. Data for stable carbon isotope samples from the Quebrada Honda Basin.

Taxon	Specimen No.	Sample	Weight Mass (mg)	$\delta^{13}\text{CVPDB}$ (‰)
<i>Hemihegetotherium trilobus</i>	UATF-V-000890	90.1	0.253	-12.1
<i>Hemihegetotherium trilobus</i>	UATF-V-000890	90.2	0.243	-12.0
<i>Hemihegetotherium trilobus</i>	UATF-V-000890	90.3	0.139	-12.4
<i>Hemihegetotherium trilobus</i>	UATF-V-000890	90.4	0.162	-11.7
<i>Hemihegetotherium trilobus</i>	UATF-V-000890	90.5	0.198	-11.5
<i>Hemihegetotherium trilobus</i>	UATF-V-000890	90.6	0.260	-11.4
<i>Olisanophus</i> indet.	UATF-V-000951	151.2	0.256	-10.6
<i>Olisanophus</i> indet.	UATF-V-000951	151.3	0.236	-10.4
<i>Olisanophus akilachuta</i>	UATF-V-000978	178.1	0.158	-11.9
<i>Olisanophus akilachuta</i>	UATF-V-000978	178.2	0.254	-9.6
<i>Olisanophus akilachuta</i>	UATF-V-000978	178.3	0.236	-9.9
<i>Olisanophus akilachuta</i>	UATF-V-000978	178.4	0.174	-10.2
<i>Olisanophus akilachuta</i>	UATF-V-000978	178.5	0.250	-10.1
<i>Hemihegetotherium trilobus</i>	UATF-V-000986	186.4	0.228	-10.9
<i>Hemihegetotherium trilobus</i>	UATF-V-000986	186.5	0.260	-10.2
<i>Hemihegetotherium trilobus</i>	UATF-V-000986	186.6	0.172	-10.4
Toxodontid indet.	UATF-V-001028	228.1	0.268	-9.1
Toxodontid indet.	UATF-V-001028	228.2	0.263	-9.4
Toxodontid indet.	UATF-V-001028	228.3	0.257	-9.2
Toxodontid indet.	UATF-V-001028	228.4	0.260	-9.4
Toxodontid indet.	UATF-V-001028	228.5	0.234	-10.2
Toxodontid indet.	UATF-V-001028	228.6	0.247	-10.2
Toxodontid indet.	UATF-V-001028	228.7	0.124	-10.9
Toxodontid indet.	UATF-V-001028	228.8	0.250	-10.0
<i>Hemihegetotherium trilobus</i>	UATF-V-001131	331.1	0.256	-10.0
<i>Hemihegetotherium trilobus</i>	UATF-V-001131	331.3	0.160	-10.3
<i>Hemihegetotherium trilobus</i>	UATF-V-001131	331.4	0.258	-10.1
<i>Hemihegetotherium trilobus</i>	UATF-V-001131	331.5	0.252	-10.3
<i>Hemihegetotherium trilobus</i>	UATF-V-001131	331.6	0.250	-10.2
<i>Hemihegetotherium trilobus</i>	UATF-V-001209	409.1	0.195	-11.6
<i>Hemihegetotherium trilobus</i>	UATF-V-001209	409.2	0.186	-10.8
<i>Hemihegetotherium trilobus</i>	UATF-V-001209	409.3	0.245	-10.6
<i>Hemihegetotherium trilobus</i>	UATF-V-001209	409.4	0.268	-10.0
<i>Hemihegetotherium trilobus</i>	UATF-V-001209	409.5	0.272	-10.1
<i>Hemihegetotherium trilobus</i>	UATF-V-001209	409.6	0.273	-9.9
<i>Hemihegetotherium trilobus</i>	UATF-V-001236	436.1	0.240	-10.1
<i>Hemihegetotherium trilobus</i>	UATF-V-001236	436.4	0.260	-9.9
<i>Hemihegetotherium trilobus</i>	UATF-V-001236	436.5	0.255	-9.9
<i>Hemihegetotherium trilobus</i>	UATF-V-001236	436.6	0.260	-10.0

<i>Olisanophus riorosarioensis</i>	UATF-V-001287	487.1	0.246	-10.2
<i>Olisanophus riorosarioensis</i>	UATF-V-001287	487.2	0.252	-10.0
<i>Olisanophus riorosarioensis</i>	UATF-V-001287	487.4	0.250	-9.9
<i>Olisanophus riorosarioensis</i>	UATF-V-001287	487.5	0.258	-9.6
<i>Olisanophus riorosarioensis</i>	UATF-V-001287	487.6	0.254	-10.3
Toxodontid indet.	UATF-V-001290	490.1	0.260	-10.6
Toxodontid indet.	UATF-V-001290	490.2	0.112	-9.5
Toxodontid indet.	UATF-V-001290	490.3	0.167	-9.4
Toxodontid indet.	UATF-V-001290	490.4	0.233	-9.1
Toxodontid indet.	UATF-V-001290	490.5	0.102	-9.8
Toxodontid indet.	UATF-V-001290	490.6	0.179	-9.5
Toxodontid indet.	UATF-V-001290	490.7	0.248	-9.4
Toxodontid indet.	UATF-V-001290	490.8	0.266	-9.5
Toxodontid indet.	UATF-V-001528	728.1	0.249	-8.7
Toxodontid indet.	UATF-V-001528	728.2	0.270	-8.8
Toxodontid indet.	UATF-V-001528	728.3	0.256	-8.9
Toxodontid indet.	UATF-V-001528	728.4	0.264	-9.1
Toxodontid indet.	UATF-V-001528	728.5	0.244	-9.1
Toxodontid indet.	UATF-V-001528	728.6	0.025	-10.6
Toxodontid indet.	UATF-V-001528	728.7	0.148	-9.6
Toxodontid indet.	UATF-V-001528	728.8	0.246	-9.4
Toxodontid indet.	UATF-V-001588	788.1	0.250	-10.0
Toxodontid indet.	UATF-V-001588	788.2	0.256	-9.2
Toxodontid indet.	UATF-V-001588	788.3	0.254	-9.6
Toxodontid indet.	UATF-V-001588	788.4	0.252	-9.6
Toxodontid indet.	UATF-V-001588	788.5	0.248	-9.4
Toxodontid indet.	UATF-V-001588	788.6	0.252	-9.0
Toxodontid indet.	UATF-V-001588	788.7	0.260	-9.4
Toxodontid indet.	UATF-V-001588	788.8	0.258	-9.2
Toxodontid indet.	UATF-V-001769	969.1	0.256	-9.0
Toxodontid indet.	UATF-V-001769	969.2	0.256	-9.2
Toxodontid indet.	UATF-V-001769	969.3	0.250	-9.2
Toxodontid indet.	UATF-V-001769	969.5	0.254	-9.3
Toxodontid indet.	UATF-V-001769	969.6	0.256	-9.3
Toxodontid indet.	UATF-V-001769	969.7	0.256	-9.4
Toxodontid indet.	UATF-V-001769	969.8	0.252	-9.6
<i>Olisanophus akilachuta</i>	UATF-V-001780	980.1	0.256	-11.4
<i>Olisanophus akilachuta</i>	UATF-V-001780	980.2	0.254	-11.9
<i>Olisanophus akilachuta</i>	UATF-V-001780	980.3	0.178	-11.7
Toxodontid indet.	UATF-V-001933	1133.1	0.250	-9.7
Toxodontid indet.	UATF-V-001933	1133.2	0.240	-9.5
Toxodontid indet.	UATF-V-001933	1133.3	0.247	-9.8
Toxodontid indet.	UATF-V-001933	1133.4	0.238	-9.7

Toxodontid indet.	UATF-V-001933	1133.5	0.262	-9.5
Toxodontid indet.	UATF-V-001933	1133.6	0.247	-9.5
Toxodontid indet.	UATF-V-001933	1133.7	0.247	-9.8
Toxodontid indet.	UATF-V-001933	1133.8	0.263	-9.4
Toxodontid indet.	UATF-V-001956	1156.1	0.258	-11.0
Toxodontid indet.	UATF-V-001956	1156.2	0.248	-9.8
Toxodontid indet.	UATF-V-001956	1156.3	0.242	-8.6
Toxodontid indet.	UATF-V-001956	1156.4	0.240	-7.6
Toxodontid indet.	UATF-V-001956	1156.5	0.244	-7.8
Toxodontid indet.	UATF-V-001956	1156.6	0.240	-10.8