



http://app.pan.pl/SOM/app67-HernandezDelPino_etal.pdf

SUPPLEMENTARY ONLINE MATERIAL FOR

New craniodental material of the tyotherian notoungulates from the upper Oligocene of Mendoza, central-western Argentina and their taxonomical importance

Santiago Hernández Del Pino, Federico D. Seoane, and Esperanza Cerdeño

Published in *Acta Palaeontologica Polonica* 2022 67 (4): 983-997.
<https://doi.org/10.4202/app.00974.2022>

Supplementary Online Material

SOM 1. Additional figures for geographic location and for other specimens of tyotherian notoungulates from Quebrada Fiera, Mendoza, Argentina, not figured in the main text.

Fig. S1. Geographical location of the Quebrada Fiera fossiliferous deposits

Fig. S2. Details of the skull and mandible MCNAM-PV 5076 of “*Prohegetotherium*” *schiaffinoi* from Quebrada Fiera, Mendoza, Argentina; late Oligocene, Deseadan SALMA.

Fig. S3. Dental remains of hegetotheriids from Quebrada Fiera, Mendoza, Argentina; late Oligocene, Deseadan SALMA.

Fig. S4. Dental remains of *Archaeohyrax suniensis* (“Archaeohyracidae”) from Quebrada Fiera, Mendoza, Argentina; late Oligocene, Deseadan SALMA.

Fig. S5. Dental remains of *Argyrohyrax proavus* (Interatheriidae) from Quebrada Fiera, Mendoza, Argentina; late Oligocene, Deseadan SALMA.

SOM 2. Specimens of tyotherian notoungulates from Quebrada Fiera, Mendoza, Argentina, not detailed in the respective ‘Material’ sections within the main text.

SOM 3. Tables of cranial, mandibular and dental dimensions of tyotherian notoungulates from Quebrada Fiera, Mendoza, Argentina, included in the main text.

Table 1. Skull and upper dental dimensions of Hegetotheriidae from Quebrada Fiera, Mendoza, Argentina.

Table 2. Mandibular and lower dental dimensions of Hegetotheriidae from Quebrada Fiera, Mendoza, Argentina.

Table 3. Upper dental dimensions of *Archaeohyrax suniensis* (Archaeohyracidae) from Quebrada Fiera, Mendoza, Argentina.

Table 4. Lower dental dimensions of *Archaeohyrax suniensis* (Archaeohyracidae) from Quebrada Fiera, Mendoza, Argentina.

Table 5. Upper dental dimensions of *Argyrohyrax proavus* and Interatheriinae indet. (Interatheriidae) from Quebrada Fiera, Mendoza, Argentina. Interpretation of first premolar as DP1 according to Fernández et al. (2021), see main text.

Table 6. Lower dental dimensions of *Argyrohyrax proavus* (Interatheriidae) from Quebrada Fiera, Mendoza, Argentina.

SOM 1. Additional figures for geographic location and for other specimens of tyotherian notoungulates from Quebrada Fiera, Mendoza, Argentina, not figured in the main text.

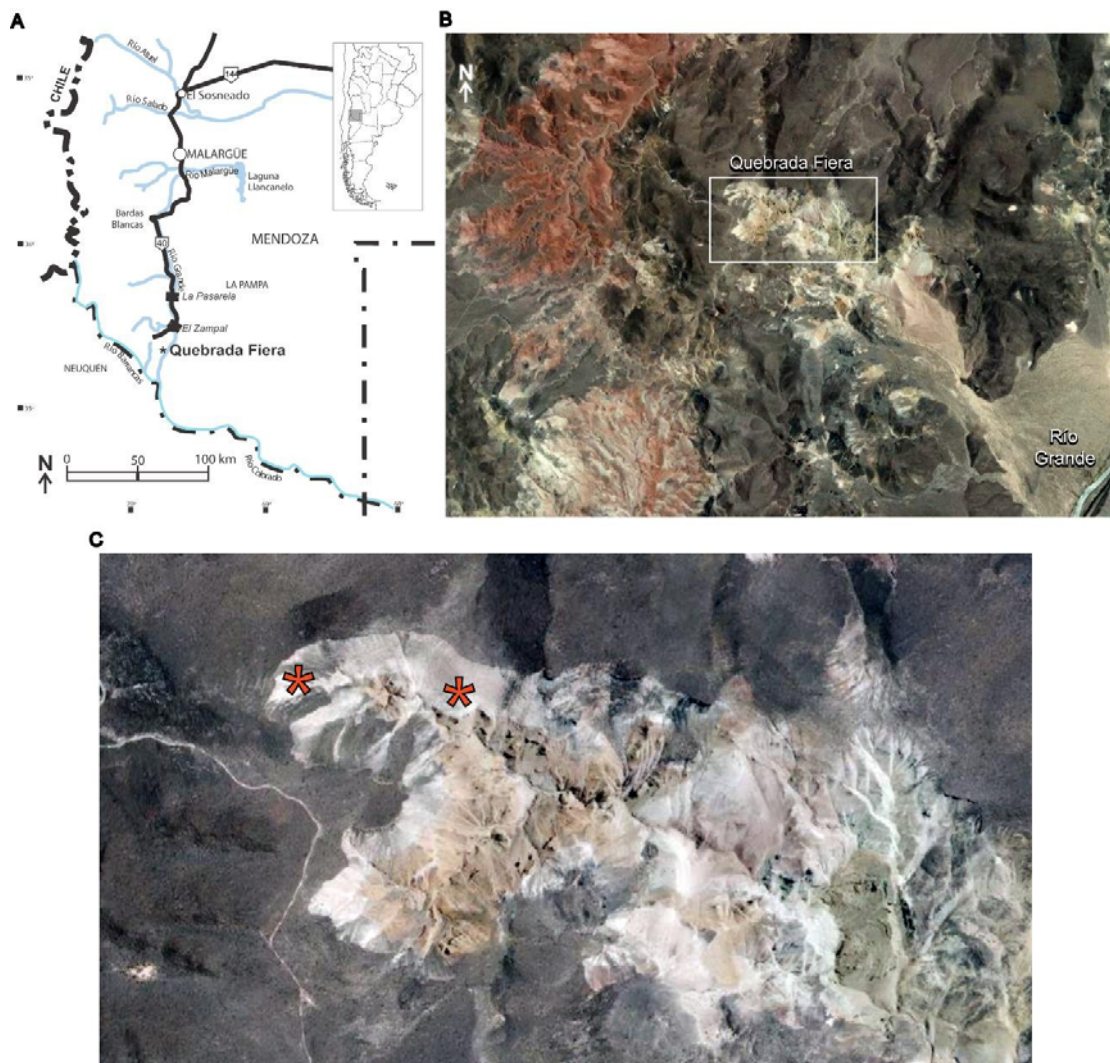


Fig. S1. Geographical location of the Quebrada Fiera fossiliferous deposits on the map of Argentina (A). Earth Explorer views of the study area (B), and a detail showing the approximate location of the most fossiliferous areas indicated by asterisks (C).

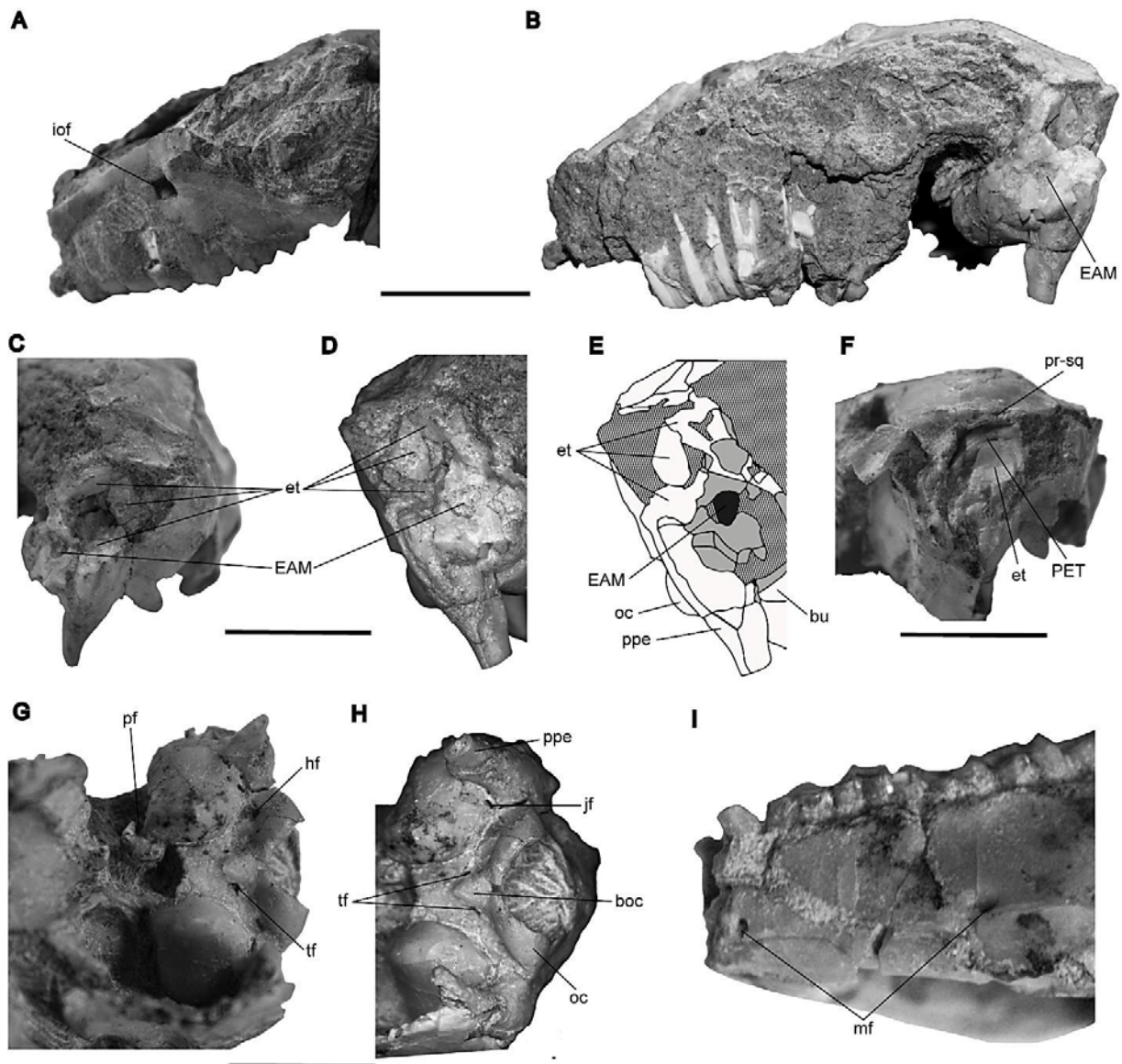


Fig. S2. Details of the skull (A-H) and mandible (I) MCNAM-PV 5076 of “*Prohegetotherium*” *schiaffinoi* (Hegetotheriidae) from Quebrada Fiera, Mendoza, Argentina; late Oligocene, Deseadan SALMA. A. Left anterolateral view. B. Right lateral view (reversed). C. Left tympanic area, posterolateral view. D-E. Original and schematic drawing of the left tympanic area (reversed), lateral view. F. Right tympanic area (reversed), posterolateral view. G–H. Basicranium, ventral views. I. Detail of the mental foramina in the left ramus of the mandible. Gray areas indicate broken bone or teeth; striped areas indicate matrix. Abbreviations: boc, basioccipital crest; bu, bulla; EAM, external acoustic meatus; et, epitympanic theca; hf, hypoglossal foramen; iof, infraorbital foramen; jf, jugular foramen; mf, mental foramen; oc, occipital condyle; PET, petrosal bone; pf, pyriform fenestra; ppe, paracondylar process of the exoccipital; pr-sq, parieto-squamosal suture; tf, transclival foramen. Scale bars 20 mm.

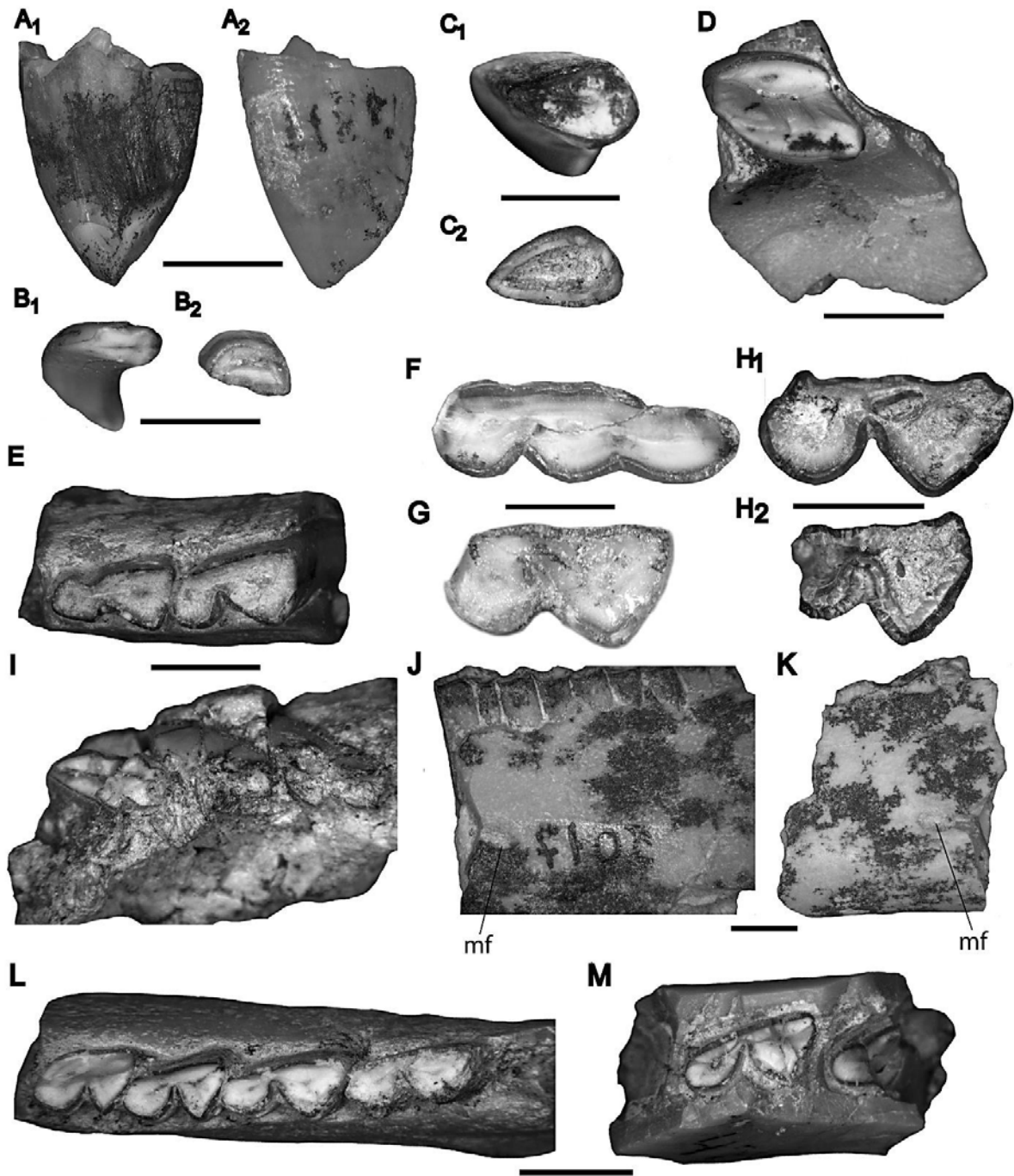


Fig. S3. Dental remains of hegetotheriids from Quebrada Fiera, Mendoza, Argentina; late Oligocene, Deseadan SALMA. A-E. *Prohegetotherium schiaffinoi*. A. MCNAM-PV 4811, Left I1, lingual (reversed) (A₁) and labial (A₂) views. B. MCNAM-PV 4684, left P1, occlusal (B₁) and opposite (reversed) (B₂) views. C. MCNAM-PV 4763, right P2, occlusal (reversed) (C₁) and opposite (C₂) views. D. MCNAM-PV 4947, left maxillary fragment with P4, occlusal view. E. MCNAM-PV 4657, left mandibular fragment with p3-4, occlusal view. F-H. Hegetotheriinae indet. F. MCNAM-PV 4621, right m3 (reversed), occlusal view. G. MCNAM-PV 3854, left m2, occlusal view. H. MCNAM-PV 4798, right molar (m1?), occlusal (reversed) (H₁) and opposite (H₂) views. I-M. *Prosotherium garzoni*. I. MCNAM-PV 4818, left maxillary fragment with M1-3, occlusal view. J. MCNAM-PV 5017, detail of mental foramen, labial view (reversed). K. MCNAM-PV 4992, detail of mental foramen, labial view (reversed). L. MCNAM-PV 4993, right mandibular fragment with p3-m2 (reversed), occlusal view. M. MCNAM-PV 4716, left mandibular fragment with broken m1 and trigonid of m2, occlusal view. Scale bars 5 mm. Abbreviation: mf, mental foramen.

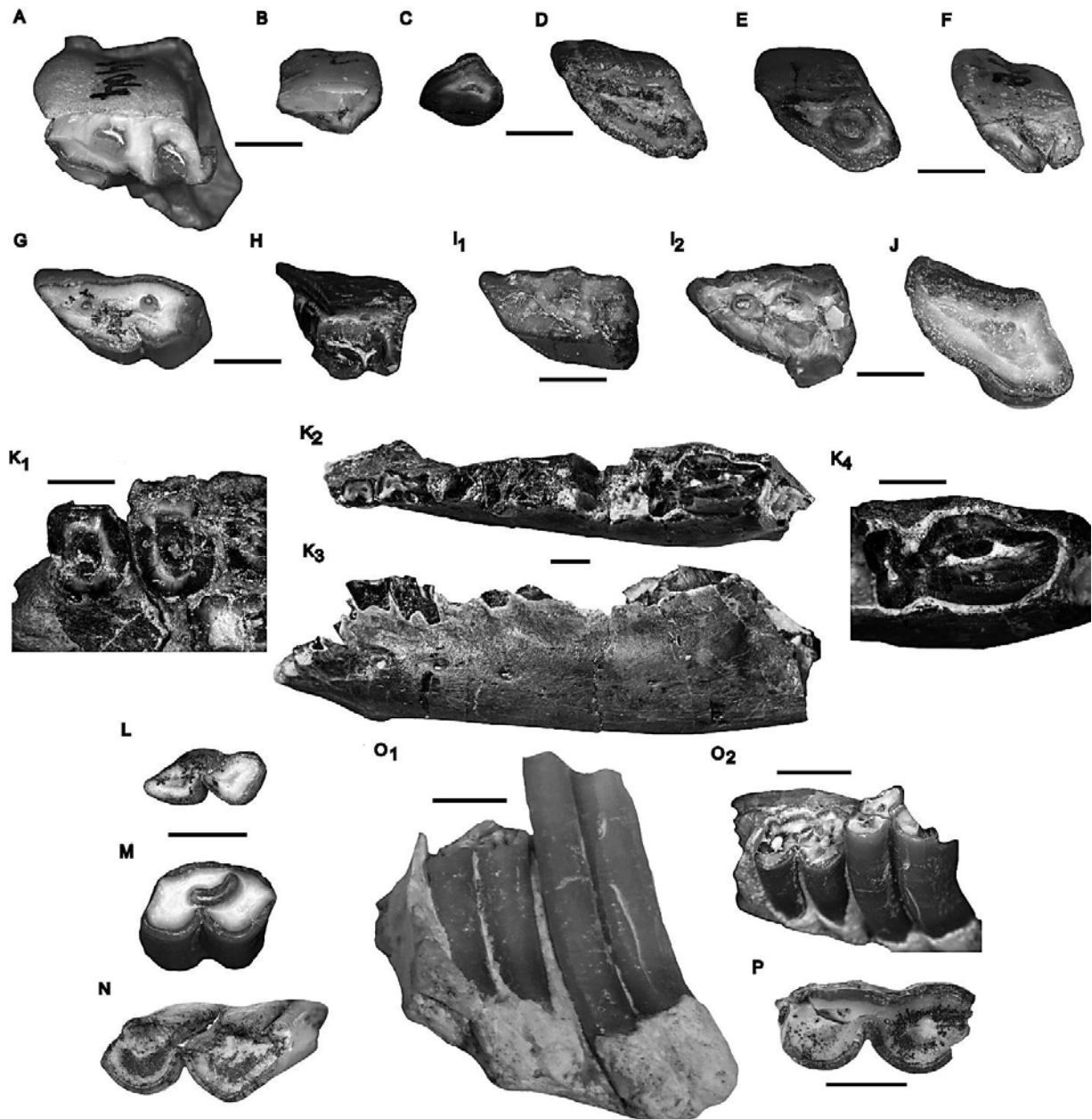


Fig. S4. Dental remains of *Archaeohyrax suniensis* (“Archaeohyracidae”) from Quebrada Fiera, Mendoza, Argentina; late Oligocene, Deseadan SALMA. A. MCNAM-PV 4404, fragment of left DP3 or DP4, occlusal view. B. MCNAM-PV 4616, right P1? (reversed), occlusal view. C. MCNAM-PV 4338, right P2 (reversed), occlusal view. D. MCNAM-PV 4624, right P4 (reversed), occlusal view. E. MCNAM-PV 4625, left P4, occlusal view. F. MCNAM-PV 4636, right upper premolar (P4?) (reversed), occlusal view. G. MCNAM-PV 4945, left upper molar (M3?), occlusal view. H. MCNAM-PV 4630, incomplete right upper molar (reversed), occlusal view. I. MCNAM-PV 4633, left upper molar, occlusal (I₁) and opposite (reversed) (I₂) views. J. MCNAM-PV 4968, right P4 (reversed), occlusal view. K. MCNAM-PV 4352, associated maxillary and mandibular fragments: left upper P3-4 (K₁), occlusal view, left hemimandible with p2-3, broken m3, and remains of other teeth, occlusal (K₂) and labial (K₃) views, and detail of m3 (K₄), occlusal view. L. MCNAM-PV 4619, right dp2 (reversed), occlusal view. M. MCNAM-PV 4944, left m1, occlusal view. N. MCNAM-PV 3980, left m1, occlusal view. O. MCNAM-PV 4603, right mandibular fragment with incomplete m1-2 (reversed), labial (O₁) and occlusal-labial (O₂) views. P. MCNAM-PV 3981, left molar (m3?), occlusal view. Scale bars 5 mm.

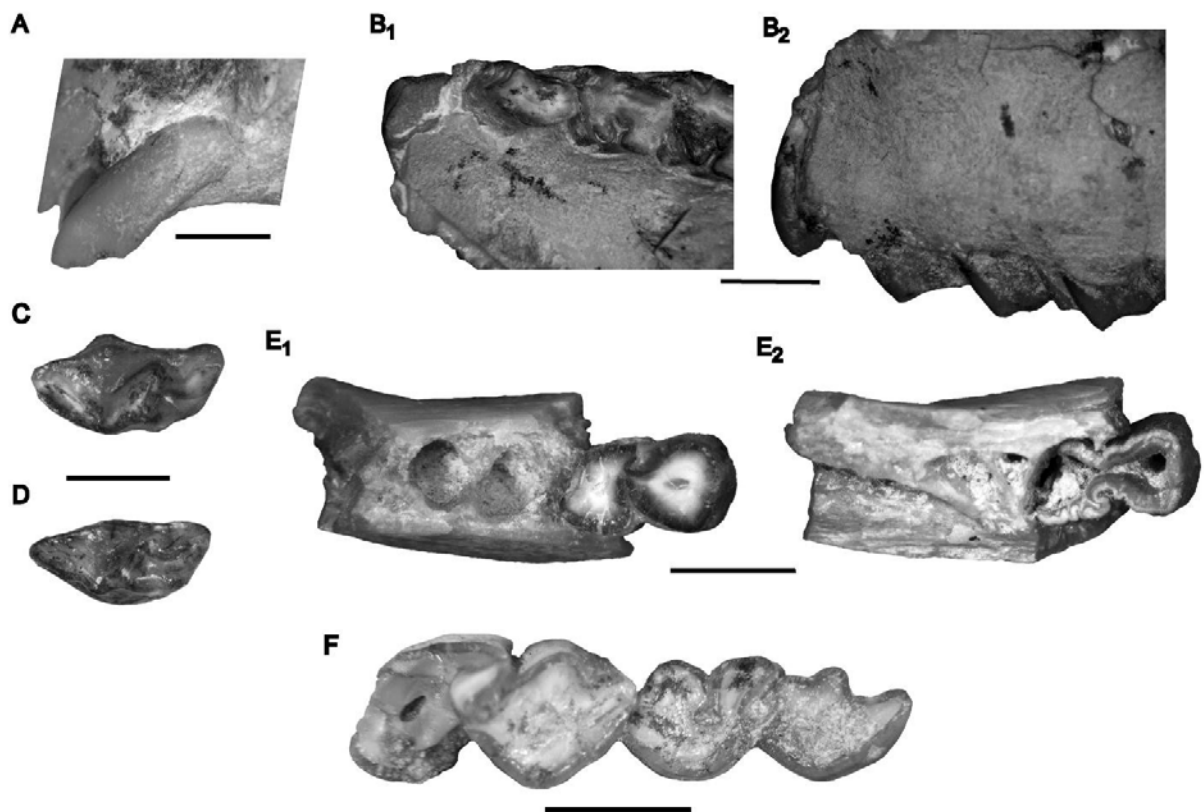


Fig. S5. Dental remains of *Argyrohyrax proavus* (Interatheriidae) from Quebrada Fiera, Mendoza, Argentina; late Oligocene, Deseadan SALMA. A. Detail of MCNAM-PV 4962, showing the rooted first premolar. B. Detail of left upper dentition, including the erupting canine, of MCNAM-PV 4961, occlusal (B₁) and labial (B₂) views. C. MCNAM-PV 4677, left p2?, occlusal view. D. MCNAM-PV 4678, left p2?, occlusal view. E. MCNAM-PV 4970, right mandibular fragment with p4, occlusal (reversed) (E₁) and opposite (E₂) views. F. MCNAM-PV 4607, right m2-3 (reversed), occlusal view. Scale bars 5 mm

SOM 2. Specimens of tyotherian notoungulates from Quebrada Fiera, Mendoza, Argentina, not detailed in the respective ‘New referred material’ heading within the main text. The corresponding ontogenetic stage is added for each archaeohyracid specimen (when possible), comparing with the stages established for the Bolivian sample of *Archaeohyrax suniensis* (Billet et al., 2009). For the other two families, only the juvenile or young adult individuals are specified. Some isolated or incomplete teeth cannot be confidently assigned to full adult individuals.

1.1 Hegetotheriidae

“*Prohegetotherium*” *schiaffinoi*

MCNAM-PV	Description	Ontogenetic stage
4222	Right mandibular fragment with m1-2?	
4640	Left m2?	
4657	Left mandibular fragment with p3-4	
4664	Right p3	
4680	Right m1	
4681	Left p4?	
4682	Right m1?	
4683	Right m1?	
4684	Left P1	
4715	Incomplete right lower molar (m3?)	
4763	Right P2	
4766	Left lower molar (m1?)	Young adult
4796	Left mandibular fragment with m1-2 and broken m3	
4800	Right m1?	
4807	Left p4	
4808	Left m1	
4811	Left I1	
4947	Left maxillary fragment with P4	
4964	Left m2 and m3, likely of the same individual	Young adult
4965	Probable right P3	
4975	Right upper tooth (P4?)	
4976	Right M1	
4977	Left P2	
4978	Left mandibular fragment with m1?	Young adult
4979	Right m1	
4981	Fragmented right P2	
4983	Left m1-2	Young adult
5018	Left mandibular fragment with p4-m3	Young adult
5019	Left mandibular fragment with p4-m3	Young adult
5020	Right mandibular fragment with m1-2	Young adult
5021	Left M1 or M2	
5022	Left mandibular fragment with p4-m2	Juvenile
5076	Incomplete skull and mandible	
5083	Left mandibular fragment with p1-m3 (p1 and p2 separated, and m3 in a separated fragment)	Young adult
5086	Right maxillary and mandibular fragments with P4-M1, M3 and p3-m3 dental series	Young adult

Hegetotheriinae indet.

MCNAM-PV	Description	Ontogenetic stage
3854	Left m2	
3984	Left M1 or M2	
4185	Left M1 or M2	Young adult
4612	Left P4 or M1	
4621	Right m3	
4669	Left mandibular fragment with two incomplete molars (m1-2?)	
4703	Left p4?	
4798	Right lower molar (m1?)	Young adult
4809	Left M1 or M2	Young adult
4964b	Incomplete lower molar (m2?)	
4980	Fragment of left p3	

Prosotherium garzoni

MCNAM-PV	Description	Ontogenetic stage
4609	Left mandibular fragment with talonid of p4 and m1-2	
4643	Left lower tooth (m1?)	
4716	Left mandibular fragment with broken m1 and trigonid of m2	
4818	Left maxillary fragment with M1-3 (M2 complete)	
4991	Right maxillary fragment with M1-2	
4992	Right mandibular fragment with p3-4	
4993	Right mandibular fragment with p3-m2	
5016	Right maxillary fragment with erupting P2 and P3-M1	Young adult
5017	Right mandibular fragment with p4-m3	

1.2 Archaeohyracidae*Archaeohyrax suniensis*

MCNAM-PV	Description	Ontogenetic stage (number after Billet et al., 2009)
3975	Fragment of right m2	
3979	Right mandibular fragment with broken p4	Stage 12
3980	Left mandibular fragment with m1	Juvenile or young adult
3981	High and curved left molar (probably m3)	Stage 12
3983	Isolated right DP3 and DP4, same individual	Juvenile. Stage 2
4093	Right lower molar (m2?)	
4192	Right lower molar (possibly m2)	
4199	Left mandibular fragment with alveoli of anterior teeth and fragments of p2-3, and associated left m3	Stage 7 (m3)
4204	Left DP4	Juvenile. Stage 4
4217	Left mandibular fragment with a broken premolar (probably p3)	
4231	Left mandibular fragment with p3-4	Stage 12
4255	Left mandibular fragment with broken m3	
4338	Right P2	
4352	Associated maxillary and mandibular fragments (left P3-M2?, right P4?, left p2-3 and m3, right p2-4, and minor remains)	Stage 11 or 12
4357	Anterior cranial fragment with remains of nasal bones and a natural endocast of the nasal cavity, right P2-M3 and left P2-M2	Stage 9

4379	Palatal fragment with right DP2-4-M1-2 and left DC, DP2-4-M1-2	Juvenile. Stage 3
4404	Fragment of left DP3 or DP4	Juvenile
4407	Right p3	
4603	Right mandibular fragment with incomplete m1-2	Juvenile or young adult
4605	Left mandibular fragment with remnants of c-p1 and p2-4	Stage 6
4608	Left mandibular fragment with alveolus of p4 and m1-2	
4611	Right lower molar (m1 or m2)	
4613	Right lower premolar (probably p4)	Younger than PV 4618
4614	Right lower molar (m1 or m2)	Juvenile or young adult
4615	Right lower molar (m1 or m2)	
4616	Possibly right P1	
4617	Right lower molar (m1 or m2)	Juvenile or young adult
4618	Right lower premolar (probably p4)	
4619	Right dp2	Juvenile
4624	Right P4	Older than PV 4625
4625	Left P4	
4626-4629	Fragments of upper teeth	
4630	Incomplete right upper molar (M1?)	Young adult. Stage 8
4631-4632	Fragments of upper teeth	
4633	Left upper molar (unworn; probably M1)	Juvenile or young adult
4636	Right upper premolar (probably P4)	Young adult
4647	Left maxillary fragment with remnants of two teeth (P4-M1 or M1-2)	
4658	Right p3	
4661	Left p3	Stage 7?
4719	Left mandibular fragment (in two portions) with incomplete p4-m3	Stage 12
4721	Right mandibular fragment with m1-3	Stage 12
4727	Right m2 and m3 of the same individual	
4765	Right lower molar fragment (probably m1)	Stage >9
4794	Associated right premolars (possibly p2-p3) and m3	Young adult
4799	Right m2?	
4801	Right m3	Stage 12
4944	Left m1	Young adult
4945	Incomplete left upper molar (possibly M3)	Stage 8
4968	Right P4	
4971	Left p4?	
4972	Left m1 or m2	
4973	Right lower molar	
4974	Right lower molar	Young adult

1.3 Interatheriidae

Argyrohyrax proavus

MCNAM- PV	Description	Ontogenetic stage
4221	Left mandibular fragment with incomplete m3	
4245	Symphysis fragment with roots of both i1-3	
4308	Right, little worn lower molar (m3?)	Young adult
4607	Right mandibular fragment with m2-3	Young adult
4622	Left m3	Young adult
4623	Right m3	
4646	Right mandibular fragment with broken dp1-p2-3	
4676-	Three left anterior teeth, likely p2	
4678		
4704	Left lower molar (probably m2)	
4705	Left mandibular fragment with incomplete m2?	
4712	Left mandibular fragment with m2-3	
4714	Left mandibular fragment with m1-2	
4720	Right lower molar (m1?)	
4806	Right p4?	
4961	Maxillary fragments with left C (erupting), DP1-P2-M2 and right P2-M2	
4962	Right maxillary fragment with DP1-4-M1	Juvenile
4963	Right mandibular fragment with dp3-p4-m2 and separated m3	Young adult
4967	Probable right first upper premolar	
4969	Left mandibular fragment with incomplete m2	Young adult
4970	Right mandibular fragment with p4	Young adult
4986	Left maxillary fragment with incomplete M1-2	
5081	Right mandibular fragment with one molar (m1 or m2)	
5082	Right mandibular fragment with p2-m1	
5403	Lingual fragment of right M1?	

SOM 3 Tables of cranial, mandibular and dental dimensions of tyotherian notoungulates from Quebrada Fiera, Mendoza, Argentina, included in the main text. Abbreviations: *He.*, *Hegetotheriopsis*; l, left; L, length; max., maximal; *P.*, *Prohegetotherium*; *Pr.*, *Prosotherium*; r., right; W, width. Values in parentheses are approximate.

Table 1. Skull and upper dental dimensions (in millimeters) of Hegetotheriidae from Quebrada Fiera, Mendoza, Argentina.

Skull MCNAM-PV 5076 of “ <i>P.</i> ” <i>schiaffinoi</i>													
Max. cranial length (preserved)												78.5	
Max. cranial width [from the half width= 19.6]												(40)	
Nasal length												>26	
Occipital height (middle line)												23.3	
Occipital width [estimated from the half width=18.5]												(37)	
Width at occipital condyles												20.2	
Foramen magnum height												8.4	
Foramen magnum width												10.4	
Width at paraoccipital processes												34.7	
Length bulla												12.5	
Height bulla												11.9	
Width bulla												14.6	
Length P1-M3 series												33.5	
Length P1-4 series												16.5	
Length M1-3 series												17.9	

MCNAM-PV		P1		P2		P3		P4		M1		M2		M3	
		L	W	L	W	L	W	L	W	L	W	L	W	L	W
“ <i>P.</i> ” <i>schiaffinoi</i>															
4763				4.7	3.9										
4947								5.5	(3.0)						
4965						4.8	3.0								
4975								4.8	3.2						
4976										5.7	3.7				
4977				4.7	2.4										
5021										6.4	4.0				
5076	1.	3.8	2.4	4.0	2.9	5.1	3.7	6.0	4.0	6.6	4.3	6.4	4.3	5.6	3.5
5086								5.1	3.3	6.0	3.8	-	-	5.5	3.3
“ <i>P.</i> ” cf. “ <i>P.</i> ” <i>schiaffinoi</i>															
4982										5.5	3.8	5.9	3.9	5.3	3.3
Hegetotheriinae indet.															
4185	occlusal									8.1	4.5				
	opposite									6.5	5.0				
4612	occlusal									8.3	6.2				
	opposite									7.5	6.0				
4809	occlusal									8.1	5.2				
	opposite									6.2	5.8				
<i>Pr. garzoni</i>															
4818												4.5	2.7		
4991										5.9	4.2	5.4	3.8		
5016				3.7	2.5	4.3	2.9	4.4	3.3	5.2	4.0				

<i>Prosotherium garzoni</i>							
4609				(4.5)	2.7	4.6 2.5	4.4 2.3
4643						4.6 2.7	
4716							(5.4) (3.0)
4992				4.9 (2.6)	(4.2) (2.6)		
4993				(4.7) (2.5)	4.1 2.6	4.8 2.7	4.7 2.3
5017					4.6 2.8	4.6 2.8	4.9 2.7 5.7 2.6

Table 3. Upper dental dimensions (in millimeters) of *Archaeohyrax suniensis* (Archaeohyracidae) from Quebrada Fiera, Mendoza, Argentina. *Deciduous teeth [DP2-4]

MCNAM- PV	P1		P2		P3		P4		M1		M2		M3	
	L	W	L	W	L	W	L	W	L	W	L	W	L	W
3983*					[(5.5) -]		[(5.9) -]							
4204*							[6.8 6.9]							
4338			4.3	4.2										
4352 l.					6.5	8.6	(7.4)	10.5	(9.8)	(9.8)	-	-		
r.							(5.0)	10.0						
4357 l.			-	-	6.0	6.6	6.7	7.7	8.3	9.1	(9.9)	8.0	-	-
r.			5.4	4.9	6.7	7.5	6.9	8.7	(7.8)	9.0	(9.2)	(7.4)	(12.8)	(6.8)
4379* l.			[8.9	6.4]	[8.2	7.2]	[9.3	7.3]	10.8	6.0	>9.2	-		
r.			[8.3	6.6]	[8.7	7.0]	[9.1	7.0]	10.7	5.4	>8.7	-		
4404*					[(11) >8.0]									
4616	6.8	2.8												
4624							7.5	7.2						
4625							6.6	6.7						
4630									>9	6.1				
4633									8.7	5.3				
4636							8.0	5.8						
4945													10.4	4.9
4968							8.7	7.2						

Table 4. Lower dental dimensions (in millimeters) of *Archaeohyrax suniensis* (Archaeohyracidae) from Quebrada Fiera, Mendoza, Argentina. *[deciduous: dp2]

MCNAM-PV	p2		p3		p4		m1		m2		m3	
	L	W	L	W	L	W	L	W	L	W	L	W
3975									-	4.5		
3979					(7.8)	4.6						
3980							7.6	3.9				
3981											>7.8	3.7
4093									>8.5	4.1		
4192									7.5	4.4		
4199	4.5	2.4	5.2	2.7							11.9	3.9
¹ basal											13.8 ¹	4.5 ¹
4217			(5.5)	(3.7)								
4231			6.4	4.8	7.6	5.7						
4255											(8.3)	3.5
4352	r.		6.1	4.3	7.9	5.4	<10.9	(6.9)	-	>7.0	-	-
	l.		6.1	4.5	(7.3)	(4.8)	>8.5	>6.0	-	-	(15.3)	(7.4)
4407			6.1	4.4								
4603							7.5	(5.0)	9.4	4.1		
4605	7.9	3.2	7.8	4.0	7.4	4.2						
4608					(8.0)	(4.9)	8.0	5.5	8.5	5.7		
4611							8.6	4.8				
4613					8.0	5.6						
4614							6.9	4.1				
4617									8.9	4.3		
4618					7.4	6.3						
4619		*[7.8	3.9]									
4658			6.0	5.4								
4661			5.7	4.5								
4719					(6.6)	4.7	6.9	5.2	(8.3)	4.8	10.5	3.3
4721							(7.5)	5.3	7.9	5.1	>9.0	4.1
4727									(7.5)	4.0	>7.5	3.9
4765							6.9	5.4				
4794	5.4	3.6	5.6	4.6							-	3.7
4799									8.0	4.6		
4801											11.0	3.9
4944							7.5	4.9				

Table 5. Upper dental dimensions (in millimeters) of *Argyrohyrax proavus* and Interatheriinae indet. (Interatheriidae) from Quebrada Fiera, Mendoza, Argentina. Interpretation of first premolar as DP1 according to Fernández et al. (2021), see main text. *Deciduous teeth [DP1-4]

MCNAM-PV		C		DP1		P2		P3		P4		M1		M2	
		L	W	L	W	L	W	L	W	L	W	L	W	L	W
4961	l.	(5.3)		4.9	3.2	5.2		6.2		6.7	5.4	7.0	4.9	6.6	4.7
	r.	(2.1)		-	-	4.1		4.9		6.3	5.1	7.0	5.1	6.5	4.5
						4.7		5.6							
						4.1		4.9							
4962				*[6.0		6.7		7.6		7.7	4.5]	7.6	4.1		
				2.9		4.1		4.7							
4967				6.0	2.9										
4986												6.4	5.4	(6.7)	(5.8)
5403												>6.3	-		
Interatheriinae indet.															
4724	occlusal												6.0	3.3	
	opposite												5.9	4.4	

Table 6. Lower dental dimensions (in millimeters) of *Argyrohyrax proavus* (Interatheriidae) from Quebrada Fiera, Mendoza, Argentina. Interpretation of first premolar as dp1 according to Fernández et al. (2021), see main text. *Deciduous tooth (dp3).

MCNAM-PV		dp1		p2		p3		p4		m1		m2		m3	
		L	W	L	W	L	W	L	W	L	W	L	W	L	W
4308														8.9	3.6
	¹ basal													9.1 ¹	4.5 ¹
4607												(7.2)	4.0	8.7	3.5
4622														8.4	3.6
4623														7.2	3.3
4646		(2.9)	(2.0)	(5.5)	(2.0)	-	>3.4								
4676				6.5	2.9										
4677				7.1	3.2										
4678				(6.8)	3.4										
4704												(7.3)	4.1		
4705												7.5	4.1		
4712												7.5	4.2	(8.9)	3.6
4714										6.6	4.0	7.0	(3.0)		
4720										6.7	4.4				
4806								5.8	4.4						
4963						>5.6	(2.7)*	5.8	3.9	5.9	3.9	5.1	3.7	5.8	3.5
4969												6.7	3.9		
4970								6.3	3.7						
5081												6.8	3.9		
5082				(5.7)	(3.0)	5.7	3.3	5.9	3.5	6.3	3.3				