



***Panthera onca* (Carnivora, Felidae) in the late Pleistocene-early Holocene of northern Argentina**

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With 2 figures and 1 table

Abstract: The most northern fossil record of *Panthera onca* (LINNAEUS, 1758) from Argentina is here reported. The specimen, PVE-F 130, represented by an articulated and well preserved cranium and mandible, atlas and a fragment of left humerus, was exhumed from levels assigned to the Río Bermejo Formation (late Pleistocene-early Holocene; ca. 12.0-9.7 ka), near Villa Escolar, Formosa Province. The associated paleofauna, comprised mostly of large and megafaunal mammals, has a clear taxonomic similarity to that of the Pampean region of Argentina, and suggests open arid to semiarid environments. Indeed, previous analyses of plant remains associated with these vertebrates support the predominance of mega/mesothermal grasslands characterized by C₃/C₄ grass species.

Key words: Felidae, Quaternary, Formosa, Eastern Chaco, South America, Río Bermejo Formation.

1. Introduction

Panthera onca (LINNAEUS, 1758) is among the largest felids and the single living representative of the genus in the Americas, whereas numerous species are currently distributed throughout the Old World. Up to sixteen subspecies of *P. onca* have been described primarily on the basis of cranial characteristics (NELSON & GOLDMAN 1933), though other authors regard them as variations within populations (LARSON 1997; EIZIRIK et al. 2001).

From an historical viewpoint, *P. onca* was widely distributed in the Americas, from southern North America to Rio Negro province in southern Argentina (SEYMOUR 1989; NOWAK & PARADISO 1991). However, this species currently occupies less than 50% of that territory and it is classified as *Near Threatened* by the IUCN (CASO et al. 2008). It should be noted that until

recently the southernmost record of the species were the fossils recovered from the “Cueva del Milodon” in southern Chile (see CABRERA 1934), dated between 13560 ± 180 and 10200 ± 400 ry BP (TONNI et al. 2013). However, recently CHIMENTO & AGNOLIN (2017) indicated that these materials actually correspond to the extinct American lion (*Panthera atrox*).

The oldest records of *P. onca* are those from the Irvingtonian (early to middle Pleistocene) of North America (SCHULTZ et al. 1985). Based on mitochondrial DNA, EIZIRIK et al. (2001) stated that *P. onca* originated between 280 ka and 510 ka BP, whereas the fossil record suggests this event was probably older, around 850 ka BP (EIZIRIK et al. 2001).

Felidae arrived in South America during the Great American Biotic Interchange (GABI) after the arrival of other carnivorans such as Procyonidae (Huayquerian; late Miocene), Galictinae, and Canidae (Marplatan; late

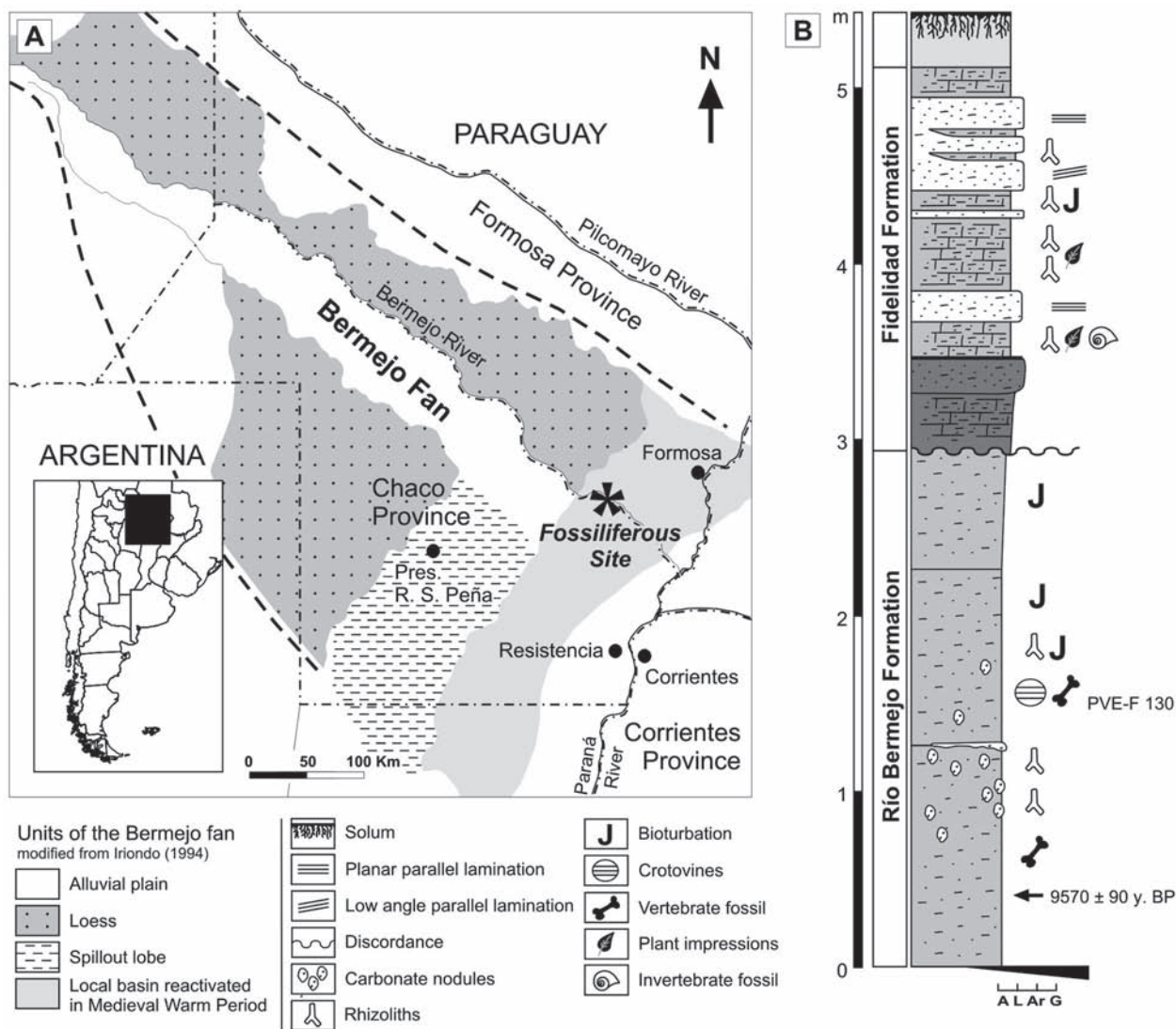


Fig. 1. A – General outline of the megafan of the Bermejo River showing the location of the fossiliferous locality; **B** – Geological section exposed in the margins of the Bermejo River at the Villa Escolar, Formosa Province, with the provenance of *Panthera onca* remains (PVE-F 130).

Pliocene) (Cione et al. 2015). The Felidae were one of the most successful of the placental carnivorans that dispersed from Central and North America during GABI, with at least seven invasions to South America (Sunquist & Sunquist 2002; Johnson et al. 2006; Prevosti 2006; Soibelzon & Prevosti 2007; Prevosti & Soibelzon 2012). The oldest South American records of Felidae are those of the Pleistocene, together with Lutrinae, Mephitidae and Ursidae (Berta & Marshall 1978; Soibelzon & Prevosti 2007; Prevosti & Soibelzon 2012).

The large Felidae are represented in the fossil record of the current territory of Argentina by *Smilodon populator* LUND, 1842 and *Puma concolor* (LINNAEUS, 1771) since the early Pleistocene (Soibelzon et al. 2008; Chimento & Dondas 2017), and by *Panthera onca* (LINNAEUS, 1758) since the late Pleistocene, according to Seymour (1983) and Arroyo-Cabrales (2002). However, other authors (e.g., Van Valkenburgh 1991; Berman 1994; Cione et al. 1999; Soibelzon et al. 2008) stated that *P. onca* is recorded since the early Pleisto-

cene. During the late Pleistocene and early Holocene, *P. onca* is recorded in Argentina, Bolivia, Brazil, Chile, Ecuador, Peru, Uruguay, and Venezuela (WINGE 1895; HOFFSTETTER 1952; BERTA & MARSHALL 1978; OCHSENIUS 1980; BERMAN 1994; CIONE et al. 1999; SAN ROMAN et al. 2000; UBILLA & PEREA 1999; UBILLA et al. 2004; LABARCA & LOPEZ 2006; SOIBELZON & PREVOSTI 2013). In Argentina, fossil records of *P. onca* are present in the provinces of Córdoba, Entre Ríos, Corrientes, Tucumán and numerous localities of Buenos Aires (BONAPARTE & BOBONICOV 1974; BERTA & MARSHALL 1978; BERMAN 1994; SCILLATO-YANÉ et al. 1998; CIONE et al. 1999; FERRERO 2008; CRUZ et al. 2012; FRANCIA 2014; ZURITA et al. 2014; among others).

An associated cranium and mandible, together with post-cranial remains, are here assigned to *Panthera onca* and were found in outcrops of the Río Bermejo Formation (late Pleistocene-Holocene) on the banks of the Bermejo River (Formosa Province) in an excellent state of preservation. The main objective of this contribution is to report this specimen (PVE-F 130), representing the most northern fossil record of *P. onca* for Argentina (Fig. 1A, B) and discuss its paleoenvironmental framework.

2. Geological setting

The material analyzed in this contribution (PVE-F 130; Fig. 2) comes from the margins of the Bermejo River, near to Villa Escolar (26°37' S; 58°40' W), Formosa Province (Argentina) of the Chaco Region. The Chaco Region is a plain that corresponds to an extremely large sedimentary basin limited by the Andes and the Brazilian Region. The Paraguay and Paraná rivers flow along the eastern boundary, in association with four other principal rivers (Parapetí, Pilcomayo, Bermejo, and Juramento-Salado) that cross the Chaco plain from northwest to southeast (IRIONDO 1987, 2010); there, permanent and temporary swamps are crossed by ancient fluvial channels (IRIONDO 1984, 2010; ORFEO & IRIONDO 2012).

The eastern part of this region belongs to the Eastern Chaco Ecoregion of the Chacoan phytogeographical Province (CABRERA 1971; MORRONE 2014). This includes the east of Chaco and Formosa provinces, northwest of Corrientes and north of Santa Fe provinces. In particular, the fossiliferous site is located within the distal sector of the Río Bermejo megafan (Fig. 1A).

From a stratigraphic viewpoint, the material comes from the levels of the Río Bermejo Formation (Fig. 1B)

that according to IRIONDO (2010) represent swamp deposits from the overflows produced by the aforementioned river during the Last Glacial Maximum (LGM). These swamp deposits levels are massive, formed predominantly by clay sediments, bioturbated, with the presence of rhizoliths and crotonines and abundant remains of vertebrates (ZURITA et al. 2009, 2014; MÉNDEZ et al. 2017). A radiocarbon dating on bivalves from this section of the Río Bermejo Formation yielded 9570 ± 90 ry BP (ZURITA et al. 2011) (Fig. 1B), whereas two others from the type locality of this unit (Las Lomitas) yielded ca. 12,400 and 11,800 ry BP (KRUCK et al. 2011). In accordance with these dates, the fossils collected in this unit are typically considered a late Pleistocene-early Holocene faunal assemblage (ZURITA et al. 2009, 2014). Overlying this unit is the Fidelidad Formation, which represents the paleo-channel of the Bermejo River, accumulated by avulsion from the Holocene to the present. These are formed by intercalations of clay-silty levels with abundant bioturbation and the presence of stem and leaf impressions intermixed with mollusks and ostracods (CONTRERAS 2010; ZAMUDIO 2013; CONTRERAS & LUTZ 2014), which would correspond to floodplain deposits, while sandy silt levels finely laminates would correspond to deposits of channels.

3. Material and methods

The specimen described was thoroughly compared with modern and fossil specimens of both *Panthera onca* and *Puma concolor*. This is because the latter is the only other sympatric felid of comparable size and similar morphology. *Smilodon*, the other large felid recorded in the area, was ruled out as an option based on the morphology and development of the upper canines, the lateral compression of the braincase, and the particular morphology of the zygomatic arches, among others. For other hand, the recently published large felid from southern Chile (*Panthera atrox*, CHIMENTO & AGNOLIN, 2017) duplicates in size fossils and current *P. onca* (PREVOSTI & MARTIN 2014; CHIMENTO & AGNOLIN 2017); for this reason we do not take in account for the comparisons.

Skull, dental and humeral measurements were taken with a digital caliper with an accuracy of 0.01 mm. Measurements follow those proposed by MORALES & GIANNINI (2010), MARTIN et al. (2011), and RUIZ-GARCÍA & PAYAN (2013).

The Multidimensional Test of the XLSTAT software was used. The tests are used to compare

samples described by several variables. Instead of comparing the average of two samples as with the Student t test, we compare here simultaneously for the same samples averages measured for several variables. Compared to a procedure that would involve as many Student t tests as there are variables, the method proposed here has the advantage of using the structure of covariance of the variables and of obtaining an overall conclusion, reducing significantly the probability of commit a Type I error. Here the significance was analyzed by the Wilks' Lambda Test (through Rao's approximation).

Institutional abbreviations: **MACN:** Museo Argentino de Ciencias Naturales "Bernardino Rivadavia", Buenos Aires, Argentina. **MLP-Ma:** Museo de La Plata, División Zoología de Vertebrados, Sección Mastozoología, Facultad de Ciencias Naturales y Museo, Universidad Nacional de La Plata, Buenos Aires, Argentina. **LHS:** Colección personal L. H. Soibelzon. **PVE-F:** Museo Provincial de Ciencias Naturales, Villa Escolar, Formosa, Argentina. **PVL:** Colección de Paleontología de Vertebrados del Museo de Ciencias Naturales "Miguel Lillo", Tucumán, Argentina.

Dental abbreviations: **Upper:** I1, first incisor; I2, second incisor; I3, third incisor; C, canine; PM2, second premolar; PM3, third premolar; PM4, fourth premolar. **Lower:** i1, first incisor; i2, second incisor; i3, third incisor; c, canine; pm3, third premolar; pm4, fourth premolar; m1, first molar.

Measurements (see Table 1): Skull: TL, total length; POW, postorbital width; IOW, interorbital width; UCL, upper canine length. **Dental:** MWUC, mesiodistal width of upper canine; MWUPM3, mesiodistal width of upper third premolar; MWUPM4, mesiodistal width of upper fourth premolar; UCPM4L, upper canine-fourth premolar length; LCL, lower canine length; MWLC, mesiodistal width of lower canine; MWLPM3, mesiodistal width of lower third premolar; MWLPM4, mesiodistal width of lower fourth premolar; LPM3PM4L, lower third premolar-fourth premolar length; MTL, mandible total length. **Humerus:** MWD, mesiodistal width of diaphysis; AWD, anteroposterior width of diaphysis; DEW, distal epiphysis width.

Reference material: *Panthera onca*: MLP-Ma 24-IX-01-6, MLP-Ma 24-IX-01-7, MLP-Ma 24-IX-01-8, MLP-Ma 119, MLP-Ma 294, MLP-Ma 456, MACN 7.7, MACN 7.8, MACN 8-42, MACN 8.43, MACN 17.1, MACN 17.2, MACN 253, MACN 25.66, MACN 992, MACN 21622, MACN 25778, MACN 26.217, MACN 33.168, MACN 38.265, MACN 51.147, LHS s/n. *Puma concolor*: MLP-Ma 1633, MLP-Ma 1306, MLP-Ma 292, MLP-Ma 1312, MLP-Ma 455, MLP-Ma 552, MLP-Ma 1309, MLP-Ma 14-IV-48-2, MLP-Ma 14-IV-48-3, MLP-Ma 14-IV-48-4, MLP-Ma 1770, MLP-Ma 1310, MLP-Ma 9-X-92.2, MLP-Ma 2-VI-60.4, MLP-Ma 694, MLP-Ma 31.VIII-98-2, MLP-Ma 3.IX.01.15, MLP-Ma 3.IX.01.18, MLP-Ma 3-IV.01.16, MLP-Ma 13.IV.99.45, MLP-Ma 16.XII.98.18.

4. Systematic paleontology

Order Carnivora BOWDICH, 1821
Family Felidae FISCHER v. WALDHEIM, 1817
Subfamily Pantherinae POCKOCK, 1917
Genus *Panthera* OKEN, 1816

Panthera onca LINNAEUS, 1758
Fig. 2

Referred material: PVE-F 130. Articulated cranium and mandible, associated with a fragment of cervical vertebra (atlas), and a large portion of the diaphysis with complete distal epiphysis of the left humerus (Fig. 2). The specimen was found in sediments of the Río Bermejo Formation, Villa Escolar (26°39'39.3" S 58°38'19.6" W), Formosa Province, Argentina (Fig. 1A). Lujanian Stage/Age (late Pleistocene-early Holocene).

Remarks: PVE-F 130 is among the best preserved and most complete specimens known. This preservation suggests scarce or negligible *post mortem* transport, little exposure to weathering, and rapid burial. The closure of cranial sutures and that of the humeral epiphysis, coupled with the strong wear of the apex and lingual side of the lower canines, suggest that it corresponds to an adult individual.

Description and comparison: The cranium is very well preserved on the right side, and the left is somewhat weathered, lacking most of the zygomatic arch and basicranium. The left hemimandible has no angular apophysis, and both tympanic bullae and nasals are missing. As for the upper teeth, the right I1-3, C, and PM 2-4 as well as the left C and PM2-4 are preserved. In the mandible, the right c, pm4 and m1, and the left i1-2, c pm3-4 and m1 are preserved. The humerus preserves the distal epiphysis and a large part of the diaphysis, missing only the center portion of the bridge that defines the entepicondylar foramen.

The cranium of PVE-F 130 differs from that of *Puma concolor* because it is anteroposteriorly elongated (as in *Panthera onca*) and not globose; the dorso-posterior end of the skull (where the sagittal and lambdoidal crests merge) is dorsoposteriorly oriented as in *P. onca*, and not postero-ventrally as observed in *P. concolor*. The posterior angle of the zygomatic arch is well defined (as in *P. onca*), whereas the zygomatic arch of *P. concolor* describes almost a circumference arch. In addition, the cranium length of PVE-F 130 (271.00 mm) falls within the range of *Panthera onca* following ranges established by CHIMENTO & DONDAS (2017) (*P. onca*, 253.00-300.00 mm; *Puma concolor*, 171.00-228.81 mm). The mandible of PVE-F 130 is similar to that of *P. onca*, which clearly differs from that of *P. concolor* due to the greater relative development of the ventral edge of the masseteric fossa, morphology that is notoriously laterally expanded in the former species.

The atlas of PVE-F 130 preserves only a portion of the body, featuring the dorsal and ventral arches, the right posterior articular facet, and a small part of the right transverse

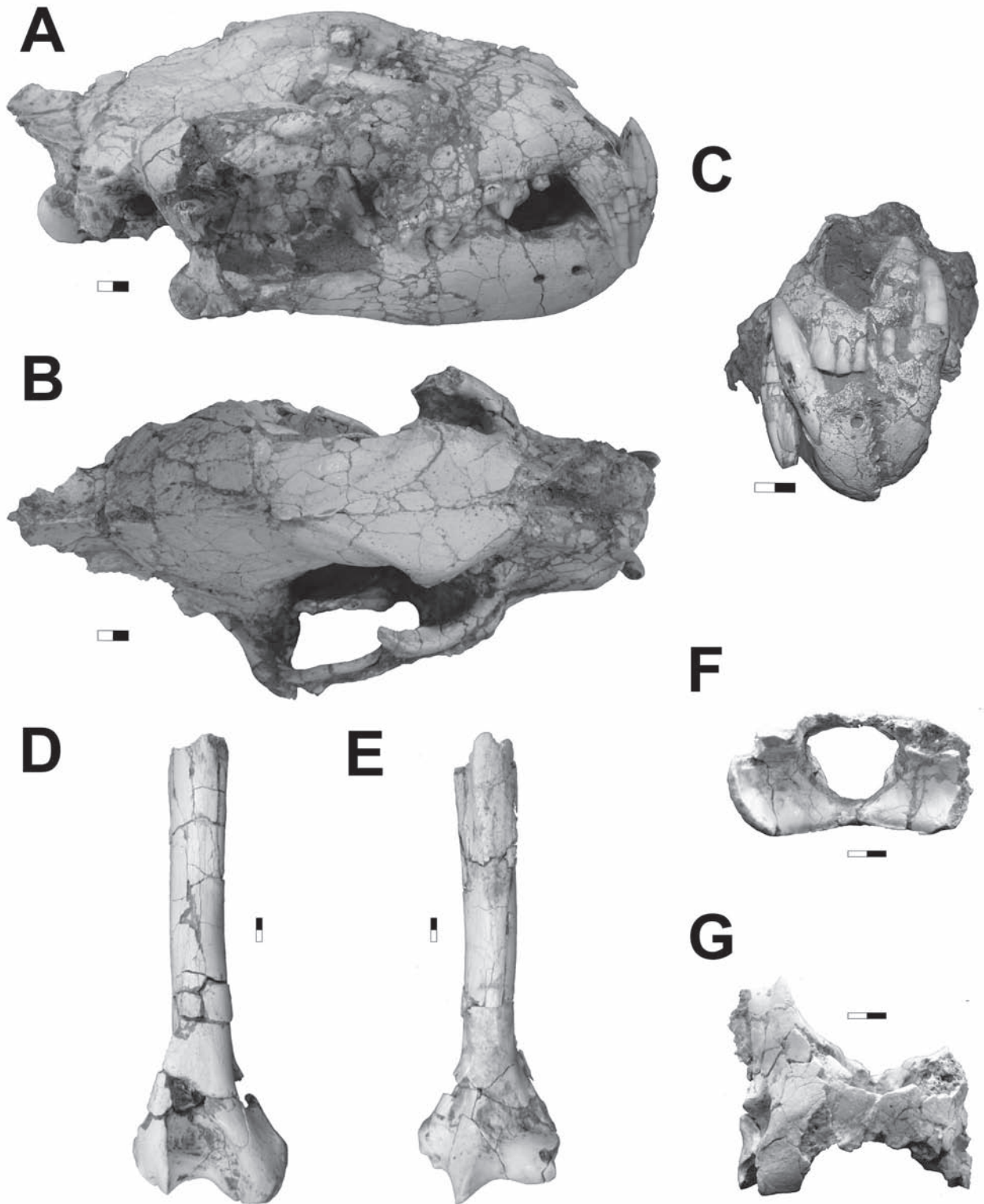


Fig. 2. A-C – Skull of PVE-F 130 in lateral, dorsal and anterior views, respectively; D-E – left humerus of PVE-F 130 in posterior and anterior views, respectively; F, G – atlas of PVE-F 130 in anterior and dorsal views, respectively. Scale equals 1 cm.

apophysis. Due to the fragmentary state of the material it cannot reliably be compared with *P. concolor*.

The condyle of the humerus of PVE-F 130 is more mediolaterally expanded than in *Puma concolor*, as observed in *Panthera onca*. The *capitulum* is relatively more developed than the trochlea, as in *P. onca*, whereas these structures are subequal in size in *P. concolor*. In *P. concolor* the trochlea extends more distally respect to the *capitulum* than in PVE-F 130 and *P. onca*. The entepicondyle of PVE-F 130, as well as that of *P. onca*, is a little more developed than in *P. concolor*. The lateral crest is more laterally developed in PVE-F 130 and in *P. onca* compared to *P. concolor*.

When comparing the measurements of PVE-F 130 with those of several specimens of *Panthera onca* (Table 1), six fall within the range of this species, three are below the lower limit, and eight exceed the upper limit.

Based on the above descriptive and quantitative morphological comparisons, PVE-F 130 is here assigned to the species *Panthera onca*. In agreement with this interpretation, the Wilks Lambda Test results suggested that fossil PVE-F 130 and modern specimens of *Panthera onca* are not significantly different ($P = 0, 8$).

5. Paleoenvironment

The mammal assemblage of the late Pleistocene-early Holocene of the Río Bermejo Formation is mostly “Pampean-Patagonian” in origin, and is characterized by, among others, the Artiodactyla *Hemiauchenia paradoxa* and *Morenelaphus lujanensis*, the Xenarthra *Megatherium* sp., *Glyptodon* sp., *Neosclerocalyptus paskoensis*, *Pampatherium typum* and the Notoungulata *Toxodon* sp. (ZURITA et al. 2009; ALCARAZ & FERRERO 2011). To date, the single taxon with tropical affinities recorded in this unit is *Holmesina paulacoutoi* (Pampatheriidae, Cingulata).

ZURITA et al. (2014) stated that, from a paleoenvironmental point of view, most taxa found in Formosa Province indicate the development of open environments, suitable for the settlement of large mammals, with an arid to semiarid climate. This interpretation is congruent with palaeoclimatic inferences established for the late Pleistocene-early Holocene (TONNI et al. 1999; CIONE et al. 2007; TONNI 2009). In addition, phytolitic analysis of the strata associated with these vertebrates showed mega/mesothermal mesophytic grasslands (especially Panicoideae (C_3/C_4) and Chloriroideae (C_4) subfamilies); with some herb and shrub or wood dicot species (CONTRERAS & ZUCOL 2018). C_4 grass species tend to occupy dryer niches than C_3 grasses (TAYLOR et al. 2011). The presence of Podostemaceae and sponge spicules suggests that a floodplain with water bodies such as rivers or streams were also present. In additions, during this period, the Chaco environment was characterized by

temperate/warm-temperate and semiarid/subhumid climates with seasonal conditions and open environments dominated by mixed grasslands, suitable for the large mammals (CONTRERAS & ZUCOL 2018).

The presence of *P. onca* together with the taxa listed above is further evidence of the diversity of habitats to which this taxon is adapted. LABARCA & LÓPEZ (2006) stated that it is difficult to infer paleoenvironmental conditions based solely on the presence of *P. onca* due to the high adaptive capacity of this felid. The species inhabits myriad environments including rain forests with tropical vegetation, areas with ephemeral marshes, grasslands, shrubby regions, and dry deciduous forests (NOWELL & JACKSON 1996). In modern ecosystems, *P. onca* depends large on water resources and has a marked preference for rivers and lagoons (MONDOLFI & HOOGESTEIJN 1986). Hence, the tolerance for different climatic-environmental conditions by *P. onca* is evident. Noteworthy, carnivorans exhumed at levels assignable to the Río Bermejo Formation include the procyonid *Procyon cancrivorus* (SOIBELZON et al. 2010), and the canid *Protocyon* cf. *troglodytes* (PREVOSTI et al. 2005).

From a paleoecological perspective, the recorded taxa were likely adapted to diverse climatic and environmental conditions during the Pleistocene-Holocene. In this scenario, short humid and warm pulses may have stimulated the presence of taxa with intertropical affinities, whereas arid and cold pulses would have favored the presence of taxa of Pampean “origin” (CARLINI et al. 2008, 2004). Such a combination of species is comparable to the fossil record of Dique “Los Quiroga” in the Santiago del Estero Province where a “mix” of typically Pampean and Brazilian taxa is recorded (CHIMENTO & AGNOLIN 2011). Similar situation was observed throughout the Mesopotamian region of Argentina. In this area, some taxa suggest open grasslands with cold and arid/semiarid climate (e.g., *Neosclerocalyptus paskoensis*, *Glyptodon reticulatus*), while others suggest warm and humid environments with tropical to subtropical climate (e.g., *Holmesina paulacoutoi*, *Boa constrictor*, *Tayassu pecari*, and *Tapirus* sp.) (ZURITA et al. 2014).

6. Conclusions

The most northern record of *Panthera onca* from the late Pleistocene-early Holocene of Argentina is reported. PVE-F 130 is a very well preserved specimen found in the Formosa Province. *Panthera onca* represents a new taxon added to the list of fossil fauna of the

Eastern Chaco, and joins the small number of species not typically considered Pampean, such as *Holmesina paulacoutoi* and *Procyon cancrivorus*, present in this region. *Panthera onca* is recorded in a wide diversity of habitats, suggesting a high degree of environmental plasticity for this taxon.

The excellent state of preservation of this specimen will allow future contributions, including systematic review of the taxon as well as geomorphometric and phylogenetically-informed analyses to determine and quantify intraspecific variation within fossil and modern specimens of *P. onca*.

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Table 1. Comparative measurements of specimens of *Panthera onca* and PVE-F 130 (see Materials and Methods). Measurements in mm.

	MLP-Ma 119	MLP-Ma 24-IX-01-7	MLP-Ma 456	MLP-Ma 24-IX-1-8	MLP-Ma 294	MLP-Ma 24-IX-01-6	LHS s/n	MACN 992	MACN 8-42	MACN 25778
TL	272	282	291	302	271	260	253	279	285	295
APO	49.8	51.9	62.35	66.8	47.2	51.5	57	68.6	53.2	63.4
AIO	51.53	50.1	57.72	58.5	49.7	46.1	51	54.9	50.1	57
LCS	21.68	24.5	23.58	25.9	21.9	22.3	20.2	22.1	23.7	24
ACS	16.9	19.6	20.02	23.1	16.7	17.4	17	17.4	20.2	20.5
APM3	19.83	20.09	20.8	20.6	19.9	19.2	19.4	20.8	20.6	19.5
APM4	30.1	29.8	31.07	29.9	29.7	27.5	29.2	31.2	29.9	29.7
LCPM4	81.49	84.1	86.9	87.55	82.8	80.8	81.48	88.4	87.8	89.2
LCI	22.58	22.4	23.1	x	21.1	21.3	20.5	19.3	23.4	23
ACI	14.83	16.1	15.9	x	18.6	15.7	14.9	16.8	17.3	16.8
APM3I	15.25	16.99	15.86	x	15.3	15.03	14.5	16.7	16.6	15.8
APM4I	20.45	22	22.46	x	18.8	20.1	21.8	22.6	22.5	20.8
LPM3PM4I	35.7	37.9	37.85	x	34.6	35.4	37.2	38.3	42.1	35
LTM	183	193	187	x	174	172	165	190	186	188
ADH	22.36	x	x	x	x	x	x	x	x	x
AEH	63.1	x	x	x	x	x	x	x	x	x
AAPH	x	x	x	x	x	x	x	x	x	x

Table 1. (continued)

MACN 253	MACN 17.1	MACN 17.2	MACN 8.43	MACN 25.66	MACN 7.7	MACN 21622	MACN 51.147	MACN 38.265	MACN 33.168	MACN 26.217	MACN 7.8	Range	PVE-F 130
247	266	270	241	246	266	244	269	229	265	263	231	229-302	271
46.88	50.4	46.3	45.9	45.1	47.9	47.3	x	48.6	46.6	55.2	48.4	45.1-68.6	42.1
46.6	51.7	52.5	47.6	43.2	46.2	40.4	49.3	43.3	49.9	56.6	43.5	40.4-58.5	46.8
20.76	22.7	24.8	26.2	24.3	24.8	16.2	18.9	18.9	20	22.4	19	16.2-26.2	21.3
16.3	18	18.1	19.8	18.1	18.2	12.7	x	14	15.7	16.5	14.8	12.7-23.1	18.2
19.7	18.8	20.2	19.7	21.1	19.9	16.7	x	19	20.5	21.2	18.7	16.7-21.2	21.5
27.9	26.8	30.8	29.3	29.2	30	25.3	28.4	25.7	29.3	29.2	29	25.3-31.2	33.7
75.9	77.8	82	82.2	82	83.3	74.6	x	75.1	81	81.3	75.9	74.6-89.2	93.2
21.4	23.7	22.9	20.8	22.5	24	17.7	20.7	17.5	19.8	21.5	19.8	17.5-23.7	16.8
15.9	15.8	18.7	14.7	16.3	17.8	11.7	14.4	13.1	15.6	14.8	15.8	11.7-18.7	15.2
16.1	14.3	16.5	16.9	17	17.3	12.7	15.3	15.2	15.4	16.4	14.9	12.7-17.3	19.6
22	19	21.6	22.3	21.2	22.3	18.6	20.7	19.4	20.6	22.4	20.2	18.6-22.6	22.8
40.6	33.3	41.7	42	39.8	42	34.8	36.7	36.7	40.8	40.9	38.8	33.3-42.1	44.3
161.5	169	162	154	162	176	154	166	148	167	176	155	148-193	187
x	x	x	x	x	x	x	22.4	x	x	x	x	22.36-22.4	22.2
x	x	x	x	x	x	x	63.7	x	x	x	x	63.1-63.7	65.7
x	x	x	x	x	x	x	34	x	x	x	x	34	38.2

