



The Leopard *Panthera pardus* (Linnaeus, 1758) in Bulgaria. A Review of the Paleontological Record and Archaeological Finds

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Abstract. The study is an attempt to collect and present all direct and indirect information about the former existence of the leopard in Bulgaria. Data on 2 Pleistocene sites (Bacho Kiro Cave and Triagalnata Cave) of bone remains, as well as 14 archaeological monuments - 6 prehistoric (Neolithic and Chalcolithic) and 8 historical (antique and medieval) - representing objects of prehistoric and ancient art (statuettes, images) that contain or represent (presumed) images of leopards, are presented (according to literature data). The archaeologists' original interpretations of the primary sources are accompanied by the author's assessment of the reliability of their identification as leopards. It can be concluded that the leopard existed in Bulgaria until the end of the Pleistocene (until about 15,000 years ago). So far, there is no irrefutable evidence of its existence during the Holocene (Neolithic and Chalcolithic), despite the assumptions made in the literature about this. Some of the examined prehistoric monuments (Eleshnitsa, Dolnoslav, Golyamo Delchevo) probably represent statuettes of leopards, but most of the later images from antiquity were most likely borrowed from the southern provinces of the Roman Empire and cannot serve as evidence for the distribution of the leopard in Bulgaria in historical times.

Key words: Large carnivores, Subfossil fauna, history of Balkan wildlife, European fauna, Zooarchaeology.

Introduction

The modern leopard *Panthera pardus* (Linnaeus, 1758) is the species with the the most extensive range among felids. Therefore, it is understandable that on the two continents it still inhabits, its range is fragmented and in the individual areas the species exists through different and well-differentiated (eight) subspecies (Kitchener et al., 2017). Despite its extensive range, the leopard is today a globally vulnerable species according to the categorization of the International Union for Conservation of Nature (Red List Status: VU - Vulnerable, A2cd (IUCN version 3.1) (Stein et al., 2015).

The Fore-Asian (Caucasian) subspecies of the leopard *Panthera pardus*

tuliana Valenciennes 1856 is still found in Transcaucasia in Georgia, Armenia and Azerbaijan, as well as in Russia in the North Caucasus. These are the regions that are geographically closest to the Balkan Peninsula and the territory of Bulgaria.

According to Stein & Hayssen (2013) the species arose 0.47-0.85 Mya ago in Africa. Later (about 0.17-0.30 Mya) it migrated to Asia. The oldest (3.5 Mya) reliable leopard fossils came from the Laetoli site in Tanzania. The oldest fossils in Asia were found in Iran (Siwalik site) and dated 2.0 Mya. Werdelin et al. (2010) state that the oldest leopard remains in Africa are dated about 2 Mya, and those of Eurasia came from 1 Mya.

Material and Methods

For the first time, an attempt has been made to summarize and present completely the archaeological and paleozoological direct and indirect evidences for the former presence of the leopard in today's Bulgarian lands. Some ancient depictions and monuments are analyzed and the paleontological localities of the species are presented. For each of them, data on their locations and dating are presented.

Results and Discussion

Former distribution in Europe

In Europe the earliest known fossils are dated 0.6 Mya (the mid Middle Pleistocene) (Ghezzeo & Rook, 2015). In the Pleistocene in the north the leopard reached as far as Derbyshire (United Kingdom). The Province of Berlin (Germany) marks other northern limit in Europe. The deposits of Pleistocene leopards are most numerous in the periphery of the Alps, both to the north and to the south of the mountain massif. It is the same with the deposits around the Pyrenees in Spain and France. The leopard also penetrated the Apennine Peninsula and its spread to the south is documented to the Province of Rome (Italy). Data of Fischer (2000) show that the leopards inhabited a total of 18 (out of a total of 44) countries in Europe: Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, France, Georgia, Germany, Great Britain (including Gibraltar), Greece, Hungary, Italy, Portugal, Serbia, Slovenia, Spain, and the Netherlands. At least six sites, the Naciekowa, Obok Wschodniej, Radochowska, and Wschodnia Caves from the Sudety Mountains and the Biśnik and Dziadowa Skala Caves from the Kraków-Częstochowa Upland, have documented the presence of the leopard in Poland between MIS 10/9 and MIS 3. (Marciszak et al., 2011, 2022; Krajcarz

et al., 2014). As summarized by Marciszak et al. (2022) the Pleistocene history of *P. pardus* in Europe has been documented from 312 localities.

Diedrich (2013) lists four Pleistocene leopard subspecies in Europe: *Panthera pardus begoueni* (Fraipont, 1923), *Panthera pardus sickenbergi*, Schütt, 1969, *Panthera pardus antiqua* (Cuvier, 1835), and *Panthera pardus spelaea* Bächler, 1936. The oldest lived 0.6 Mya, and the youngest (*P. p. spelaea*) appeared at the beginning of the Late Pleistocene. It survived until about 0.024 Mya in some parts of Europe (Diedrich, 2013).

After Diedrich (2013) in the mid Middle Pleistocene in Europe appeared *P. p. sickenbergi* around 0.6 Mya. Schütt (1969) and Khalaf-von Jaffa (2013) assume that *P. p. sickenbergi* in Europe was replaced by the modern form in the Middle Pleistocene. *P. p. sickenbergi* is considered “a member of a fully interglacial forest fauna” (Khalaf-von Jaffa, 2013: p. 6).

In addition a new subspecies *Panthera pardus vraonensis* Nagel, 1999) was described from Holocene deposits of Attica (Southern Greece), dated 9375±1105 BP (Bachmayer et al., 1988) and 0.025-0.007 Mya (Diedrich, 2013). The last author considered *P. p. vraonensis* a younger synonym of *P. p. spelaea*.

The youngest European leopard records came from Ukraine (1st c. AD) and Italy (Sommer & Benecke, 2006). These authors note that the question on the natural distribution of *P. pardus* in the sub-Atlantic in Europe remains unresolved.

It is believed that the last European Ice Age leopards (*P. p. spelaea*) survived in Europe until 0.025-0.024 Mya (Diedrich, 2013; Pajmans et al., 2018). The Iberian Peninsula was the last European refuge for the species (Marciszak et al., 2022). Pajmans et al.

(2018) found a deep split between African and Eurasian lineages (~0.71 Mya), with European ancient samples being sister to all Asian lineages (~0.48 Mya).

At present in Europe the leopard (*P. p. tulliana*) survived only in the North Caucasus.

***Panthera pardus spelaea* on the Balkans and Western Anatolia**

So far, 15 Quaternary localities of leopards are known from the Balkan Peninsula. Pleistocene bones of *P. p. spelaea* were excavated in 7 localities in Greece: (1) Loutra Arideas Bear Cave – Macedonia (Tsoukala et al., 2006; Symeonidis et al., 1980); (2) Vraona Cave – Attica (Fischer, 2000; Diedrich, 2013; Symeonidis et al., 1980; Nagel, 1999); (3) Petralona Cave – Chalkidiki (Baryshnikov & Tsoukala, 2010); (4) Dryos Cave – Eastern Macedonia and Thrace (Diedrich, 2013; Georgiadou-Dikaioulia et al., 2002); (5) Klisoura Cave – Western Peloponnese (Koumouzelis et al., 2001); (6) Apidima Cave – Mani Peninsula (Fischer, 2006; Diedrich, 2013) and (7) Kitseli karst – Alea, Nemea, Peloponnese (Diedrich, 2013). Bone remains and partial skeletons have been excavated also in Serbia in (8) Baranica II Cave – south-eastern Serbia (Dimitrijevic, 2011); and Bosnia and Herzegovina in (9) Vjetrenica Cave – southern Bosnia and Herzegovina (Diedrich, 2013; Miculinic, 2012).

Holocene records of leopard remains are known also from: Greece – Vraona Cave – Attica (Symeonidis et al., 1980), Montenegro – Crvena Stijena (March et al., 2017), and Late Pleistocene (Paleolithic) from Romania – Northern Dobrudja (Ștefan & Dumitrașcu, 2022). After Spassov and Stoytchev (2005) “The supposition that it inhabited South-Eastern Europe until

the Holocene is indirectly supported by the discovered Neolithic and Eneolithic figurines of leopards in Bulgaria and Romania.” (Spassov & Stoytchev, 2005: p. 13).

Recently in the neighboring Turkey after Başkaya et al. (2022) 84 new records (of *P. p. tulliana*) were obtained from 54 localities, most of them from the northeastern parts of the country, i.e. the spread of the species has been conclusively proven.

Late Pleistocene Anatolian records came from Karain Cave – SW Anatolia (Diedrich, 2013).

Fossil record of *Panthera pardus* in Bulgaria

The fossil record of *P. pardus* in Bulgaria came from two Late Pleistocene localities, one in northern, and the other in southern Bulgaria (Fig. 1).

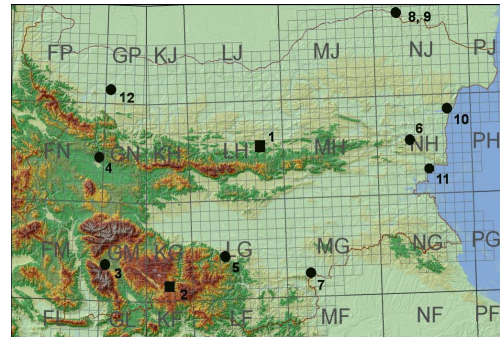


Fig. 1. Location of the Pleistocene sites of *Panthera pardus* and the prehistoric and ancient monuments of leopard images in Bulgaria: Squares – fossil record: Bacho Kiro Cave (1), Triagalnata Cave (2); Circles – archaeological monuments: Eleshnitsa (3), Gnilyane (4), Dolnoslav (5), Golyamo Delchevo (6), Mezek (7), Silistra (8, 9), Varna (10), Nesebar (11), Gradeshnitsa (12).

The first remains of leopards in the country have been uncovered in the

Bacho Kiro Cave (near town of Dryanovo, Gabrovo Province). They are dated to the Late Pleistocene (47,000 - 29,000 BP) (Wiszniewska, 1982). In 2019 Nikolay Spassov (NMNHS - BAS) identified new finds (limb bones) of *P. pardus* in this cave.

In 1997 in the Triagalnata Cave in the Western Rhodopes Mts. (near the village of Borino, Smolyan Province) were found mandibles of two leopards (male and female). They have been dated to the Late Glacial age (15,570±310 BP), ones of the youngest finds of *P. p. spelaea* in Europe (Spassov & Raychev, 1997). Based on detailed comparisons of teeth as well as other features, the authors found that "Rhodopean" leopard completely fitted the characteristics of previously known Mediterranean leopards. These authors believe that at least the eastern Mediterranean leopards were identical to those of the Middle East and probably belonged to the same subspecies.

***Panthera pardus* in the monuments of prehistoric and ancient art in Bulgaria**

***Panthera pardus* in the prehistoric (Neolithic and Chalcolithic) monuments**

At the beginning of the 1980s, a ceramic figurine depicting a leopard was excavated in the area of "Delnitsi" near the village of Eleshnitsa (vicinity of town of Razlog, Blagoevgrad Province) in the valley of the Mesta River (Fig. 2). It is dated 6000 BC (Early Neolithic) (Nikolov & Maslarov, 1987). The figure is so realistic that it is believed that the ancient sculptor was well acquainted with the depicted large predator. According to the authors, only the front part of the sculpture (head and neck) was found. "The ancient sculptor skillfully depicted the characteristic features of the

head of this predator. To a high degree, this is due to the successfully modeled nose and the eyes elongated into slits. The mouth is represented slightly open. The ears are elongated to the sides and upwards. The animal's expression shows attention, tension. The head was covered with a red engobe of which only traces have survived. The same goes for decorating with white paint. Remains of it can be seen in the mouth (probably the teeth of the predator were shown) and also around the eyes (probably the spotted fur of the leopard was depicted)" (Nikolov & Maslarov, 1987: p. 10-11). The authors state that no other Neolithic figurines of leopards are known in that part of the Balkans. After them in Asia Minor and Anatolia, the cult of the leopard is attested from the early Neolithic and continued until the Iron Age (6th – 2nd millennium BC). Commentary: The statuette fragment undoubtedly represents a carnivore mammal of the cat family. Characteristic features in habit such as coloration, limb proportions, length and shape of ears of (theoretically) possible species exclude caracal *Caracal caracal* (Schreber, 1776), serval *Leptailurus serval* (Schreber, 1776), lynx *Lynx lynx* (Linnaeus, 1758), tiger *Panthera tigris* (Linnaeus, 1758), cheetah *Acinonyx jubatus* (Schreber, 1775) and wildcat *Felis silvestris* Schreber, 1777. The statuette of the head has the greatest similarity with a lion (lioness) *Panthera leo* (Linnaeus, 1758) and a leopard. The patterns, which can be seen as marks on the head, have served archaeologists as proof that it is a leopard. We can only tentatively accept this. It seems less likely to depict a female lion (lioness) than a leopard.

Another miniature statuette of a (presumed) leopard (Fig. 3) was found in the Okol Glava Locality, near the former village of Gnilyane (now part of the

town of Novi Iskar, Sofia Province), dated 3000-1900 BC, i.e. from the late Neolithic (referred to s. c. Kurilo culture) (Spasov & Raychev, 1997).



Fig. 2. Leopard figurine head from Eleshnitsa village. Early Neolithic (after Nikolov & Maslarov, 1987).

After these authors “The eyes of the depicted beast of prey from Gnilyane are specially emphasized. They are big and bulging, typically feline. The proportions are those of a large felid - rather those of a leopard - without even a hint of a lion mane.” (p. 86). Commentary: The statuette fragment appears eroded and particular details on it are difficult to discern. A relatively small head set on a thick neck is noticeable. The maxillary part of the skull is relatively short. This at least distinguishes it from the canids and approaches to the felids. Determining the species affiliation of this find is quite speculative.

“Images of leopard were also found in Slatino (in the Struma Valley), and in the lowest layer of the settlement mound in Sedlare (in the Arda Valley) a female ceramic statuette “sits” on an inlay,

which in Anatolia scholars always interpret like leopard skin. In all three cases the connection with Hajilar and Çatalhöyük, where the cult of this animal existed for quite long period (VII-II millennium BC), is beyond any doubt.” (Nikolova & Genov, 2013: p. 274).

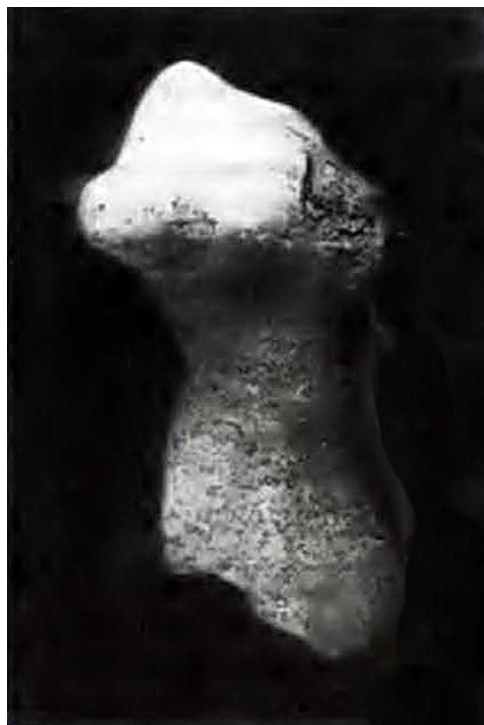


Fig. 3. ?Leopard figurine head from Gnilyane. Late Neolithic (town of Novi Iskar; after Spasov & Raychev, 1999).

In Bulgarian archaeozoology the locality near Slatino village is known with its bone remains of European lion *Panthera leo persica* (Meyer, 1826). The site is dated the end of the early Chalcolithic (middle of the 5th millennium BC (Ninov, 1989). Commentary: Despite the published information about images of leopards from the vicinity of the Slatino village, the images themselves have not been published and we cannot comment on

the reliability of their identification as leopards.

After Raduncheva (1994) for now, only one female statuette dressed in leopard skin is known from Bulgarian lands. It was discovered in the Chalcolithic production center near the mentioned above Sedlare village, Kardzhali region. Commentary: Despite the published information about images of leopards from the vicinity of the Sedlare village, the images themselves have not been published and we cannot comment on the reliability of their identification as leopards.

“In some of the temples of Dolnoslav, altars reminiscent of the outline of the "cat's" head were found. In one of the temples, a three-meter figure of a lying leopard was cleared. Despite the large schematization of the image, the small dimples covering the back of the animal allowed us to identify its species affiliation [as leopard - Z. B.]” (Raduncheva, 1994). “That is why the presence of leopard figurines and relief images of the same animal in a temple complex, such as the one near the village of Dolnoslav, is of great importance.” (Raduncheva, 1994). Radiocarbon dating 5530 and 5480 ± 60 BP confirm the reference to Late Chalcolithic (Boyadzhiev, 1992). Commentary: Unfortunately, we could not come across any published images of the analyzed finds. Undoubtedly, "a three-meter figure of a lying leopard" would be of great interest, but at this stage any comments would be unwarranted. Another publication by Raduncheva & Koleva (1987) presents a fragment of a miniature ceramic statuette representing the head of a large felid - lion or leopard (Fig. 4). Deliberately placed dots (round dark spots) are noted at least on the lower jaw. There is one in the area of the nose and another under the left eye. The sickle-shaped depiction of the left eye

matches the leopard's short cross-eyed black belt. The slope of the snout and the straight section of the left mandible also correspond to those of the leopard. The resemblance to a leopard cannot be completely ruled out. It even seems plausible.



Fig. 4. Ceramic sculpture (fragment) of the head of a large felid from Dolnoslav. Late Chalcolithic (after Raduncheva & Koleva, 1987).

An impressive statuette of a big cat (Fig. 5) was found in the settlement mound next to the village of Golyamo Delchevo, Varna region. “The paws, the tail and especially the decoration of the statuette from Ploska Mogila speak for the belonging of the depicted specimen to the group we are interested in. The graphite decoration applied to the body gives reason to assume that this is an animal with banded skin decoration. Therefore, we believe that it may be an image of a tiger. The statuette from Golyamo Delchevo is a specimen with an unprecedentedly good and accurate rendering of the facial features and the silhouette of the entire figure (Raduncheva, 1994: p. 48). Commentary: The first cervical vertebra of a lion was also found in the Neolithic settlement near Golamo Delchevo. The leopard in this locality has not been identified by

bone remains (Ivanov & Vasilev, 1975). The proportions of the head, the position of the forelegs, the length and roundness of the posterior part of the body and the inception of the tail (which is not preserved) point to a large felid. The most likely possible species are leopard and lion. Definitely not an adult male lion with a mane. A leopard is more likely to be depicted.

“In the museum in the city of Vratsa, a large clay vessel is preserved, the upper part of which is decorated with highly schematic images of leopards, which are repeated rhythmically over the entire circumference of the vessel 13.” (Fig. 6). “They are used as a decorative motif.” (Raduncheva, 1994: p. 48). Commentary: In fact, it is a find from the 5th millennium BC from Gradeshnitsa (Pleven region) (Nikolov, 1974). The rounded head, the spotting of the whole body with circular black dot-like spots, the two front legs (also completely spotted) are clearly visible. The body is slender, but the front legs are not elongated as in the cheetah. It is not excluded that a decorative motif was depicted, in which images of a leopard were also included.



Fig. 5. Statuette of a leopard from Golyamo Delchevo (Varna Region). Neolithic (after Raduncheva, 1994).

According to Spassov & Raychev (1997), the Neolithic images of leopards

suggest that during the Neolithic it still inhabited Bulgarian territory.



Fig. 6. Stylized image of a leopard. Gradeshnitsa. 5th millennium BC (after Raduncheva, 1994).

***Panthera pardus* in the historic (Antiquity) monuments**

In the decorating of the red-figured bell-shaped crater (Fig. 7) from Milkova Mogila near Mezek village (Haskovo Province), dated end of 2nd quarter of 4th c. BC after Lazarov (1990) the “second satyr, bearded, naked, slung on left thigh leg leopard skin, in profile to right” (Lazarov, 1990: p. 110). Commentary: The curve of the posterior part of the tail, its rounded tip, as well as the evenly spaced round dotted black markings on the light background of the skin match those of the leopard.

Another bell-shaped krater (vessel) of 360-340 BC, found in 1958 in the necropolis of Messambria (now Nesebar), depicts Dionysus semi-recumbent on a bed covered with leopard skin. About another red-figured crater (Fig. 8), dated 4th c. BC Bakalova-Delijska (1960) mentions “a young maenad, ... clothed

in leopard skin (p. 254)”, “the tossed leopard skin with heavily flared ends (p. 254)”, and “bed covered with leopard skin (p. 258)”. Commentary: Regardless of the (bad) quality of the illustration (Fig. 8), two details are clearly visible - the light background of the skin with the dark point-like spots (some of which have a light central part), as well as the skin of the skinned two legs (?forelegs) of the animal.

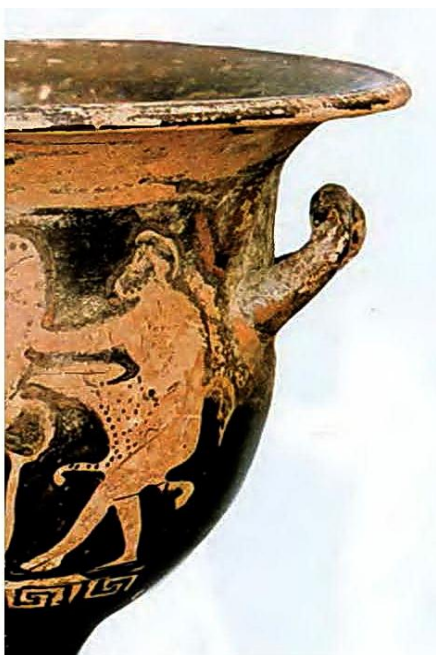


Fig. 7. Red-figured bell-shaped crater from Milkova Mogila near Mezek village. End of 2nd quarter of 4th c. BC. (Haskovo Province; After Lazarov, 1990).

However, this plot, as noted by Lazarov (1990), was very widespread in the Hellenistic world in antiquity. It is quite common on the ancient painted ceramics in Bulgaria. Commentary: The leopard skins were a widespread detail in the pictures representing the life of the ancient Hellenes. This means (regardless of the reliable identification of the skins

as leopard skins) that in our case this ancient monument from Nessebar could not have any relation to the past distribution of the leopard in Bulgaria.

In one of the most significant monuments of Roman art in Bulgaria, the late antique Roman tomb in Silistra (dated the middle of the 4th c. AD; during the reign of Emperor Theodosius, 379-395 AD) on the vault we find realistic depictions of leopards (Fig. 9). According to Georgi Alexandrov (unpubl. data), this plot is often present in the iconography of Roman art as a certificate of noble origin, power and might. However, no one doubts the presence of leopards on Bulgarian lands, brought from the Roman provinces of Asia Minor and Syria. After (Atanasov, 2014) “... on the vault four times [the owner of tomb – Z.B.] is ... shown ... while hunting leopard, boar, bear, and birds.” (p. 17). Commentary: The round head, the rounded ears, the short muzzle, the position of the forelegs, the clear dotted dark markings on the body point to a leopard. On the other hand, the elongated nasal part is characteristic of canids rather than felids. There are other images in this ancient monument that most archaeologists identify as leopards.

An excellently preserved bronze statuette of a leopard (Fig. 10) is found in the same Roman tomb in Silistra. It has been identified by archaeologists as leopard. Commentary: The powerful body, the strong legs, the long curved tail ending without a tassel like a lion's tail, as well as the markings on the body (although not dots, but elongated) point to the leopard.

“Completely in the spirit and aesthetics of “Developed Style” is one of the most impressive engravings among the early graffito ceramics from Bulgaria. The vessel [from Varna – Z.B.] is wide open and the entire inner plane is occupied by a figure of a running leopard.” (Fig. 11).



Fig. 8. Red-figured crater of necropolis of Nessebar. 4th c. BC (after Bakalova-Delijska, 1960).



Fig. 9. Image of ? a leopard from a sgraffito fresco on the ceiling of a Roman tomb in the city of Silistra. Middle of the 4th century AD (after Atanasov, 2014).

“The silhouette is engraved with a fine line, the spots are recreated by multi-

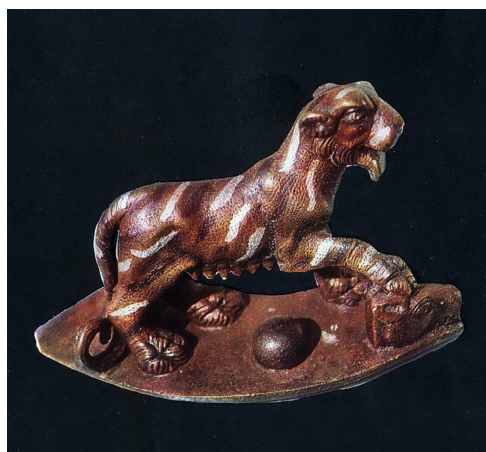


Fig. 10. Statuette from a chariot of a noble Roman from Durostorum representing a leopard. Late 3rd - early 4th century (after Atanasov, 2014).

ple concave points, the head is comparatively small, and the animal has a wide open mouth and a prominent tongue. The strong ones legs and strong neck emphasize the physical power of the predator. The body ends with a long tail, the tip of which is shaped like a palm tree. The image is made with exceptional skill, a sense of proportion and movement plasticity.” (Manolova-Voikova, 2003: p. 215). This monument is dated 2nd half of 11th to 12th c. AD. Commentary: The image is highly stylized. The contours of individual parts of the body are depicted by arcs. The mottling of the body is carefully represented by arranged black spots on a light (white) background. The head is also highly stylized, but the animal's right eye, two ears, upper and lower jaw, teeth and tongue are well distinguished. The two front legs are thin and strongly elongated. They look more like the legs of a cheetah. However, the vertical black patch over the eyes is very characteristic of the cheetah, which is clearly absent here. Of the hind legs of the image, only their upper (proximal, femoral) part is

preserved. The dating (11th -12th c.) in itself shows that it is not a depicted animal, delivered from nature. This monument also has nothing to do with clarifying the past distribution of the leopard in Bulgaria.



Fig. 11. Pottery ceramics from Varna. Middle of 12th c. AD. (after Manolova-Voikova, 2003).

In the "Great Lavra" Monastery in the town of in Veliko Tarnovo a clay candlestick was found. It has "... a heraldic image on the bottom of a clay vessel - two leopards facing each other, and between them - a stylized double-headed eagle..." (Popov, 1983: p. 118). Commentary: The find is dated 12th c. AD. The publication for this monument contains no illustration, but its dating clearly indicates that it could not serve the purposes of the present study.

Conclusions

From the presented data for 2 Pleistocene sites, 6 prehistoric (Neolithic and Chalcolithic) and 8 historical (antique and medieval) monuments, it can be concluded that the leopard existed in Bulgaria until the end of the Pleistocene (until about 15,000 years ago). So far, there is no irrefutable evidence of its existence during the Holocene (Neolithic and Chalcolithic), despite the assumptions made in the

literature about this. Some of the examined prehistoric monuments (Eleshnitsa, Dolnoslay, Golyamo Delchevo) probably represent statuettes of leopards, but most of the later images from antiquity were most likely borrowed from the southern provinces of the Roman Empire and cannot serve as evidence for the distribution of the leopard in Bulgaria in the historical times. So far, no leopard bone remains have been found in Neolithic and Chalcolithic settlements in the country, but lion remains have been found in a number of sites. As noted above, other researchers state that the leopard could inhabited South Eastern Europe until the Holocene (Spassov & Raychev, 1997).

The analysis also showed something else: the archeozoological and art history literature in Bulgaria is to a certain extent "contaminated" by arbitrary interpretations of archaeologists or specialist in arts, which probably distorts our ideas about the past distribution of some animals. In such cases, the relevant finds (archaeological monuments) must be re-examined by zoologists, taking into account characteristic morphological details in habitus of animals, as well as their fossil/subfossil record.

References

- Atanasov G. 2014. *The Roman tomb in Durostorum - Silistra. Silistra, Bulgaria: Bulgartransgaz*. pp. 1-32. (in Bulgarian).
- Bachmayer F., Malez V., Symeonidis N., Theodorou G., Zapfe H. 1988. Die Ausgrabung in der Hohle von Vraona (Attika) im Jahre 1985. *Sitzungsberichte der Akademie der Wissenschaften mathematisch-naturwissenschaftliche Klasse*, 197: 287-307.
- Bakalova-Delijska M. 1960. Trouvailles de ceramique du littoral occidental

- de la Mer Noire. *Bulletin de L'Institut d'Archeologie*, 23: 353-260. (in Bulgarian, French summary).
- Baryshnikov G., Tsoukala E. 2010. New analysis of the Pleistocene carnivores from Petralona Cave (Macedonia, Greece) based on the Collection of the Thessaloniki Aristotle University. *Geobios*, 43: 289-402.
- Başkaya Ş., Arpacik A., Sari A., Gündoğdu E. 2022. New records of the Anatolian leopard (*Panthera pardus tulliana* Valenciennes 1856) in Turkey. *The European Zoological Journal*, 89 (1): 991-1001, DOI: 10.1080/24750263.2022.2105963.
- Boyadzhiev Y. 1992. The transition between the Eneolithic and the Bronze Age in the light of radiocarbon dating. *Arheologiya BAS*, 2: 51-52. (in Bulgarian, English summary).
- Chatzopoulou K. 2005. The Small Mammal Fauna from the Loutra Aridea Bear Cave (Pella, Macedonia, Greece) with Emphasis on the Third Chamber. *Neue Forschungen zum Hohlenbaren in Europa*, 45: 57-64.
- Diedrich C. G. 2013. Late Pleistocene leopards across Europe – northernmost European German population, highest elevated records in the Swiss Alps, complete skeletons in the Bosnia Herzegovina Dinarids and comparison to the Ice Age cave art. *Quaternary Science Reviews*, 76: 167-193. DOI: 10.1016/j.quascirev.2013.05.009.
- Dimitrijevic V. 2011. Late Pleistocene hyaena *Crocota crocuta spelaea* (Goldfuss, 1823) from Baranica Cave (Southeast Serbia): competition for a den site. In: Toskan, B. (Ed.). *Fragments of Ice Age environments. Proceedings in Honour of Ivan Turk's Jubilee*. Ljubljana, Slovenia, pp. 69-84.
- Fischer K. 2000. Ein Leoparden - Fund, *Panthera pardus* (L., 1758), aus dem jungpleistozänen Rixdorfer Horizont von Berlin und die Verbreitung des Leoparden im Pleistozän Europas. *Mitteilungen aus dem Museum für Naturkunde in Berlin, Geowissenschaftliche Reihe*, 3: 221-227.
- Georgiadou-Dikaoulia E., Symeonidis N. K., Theodorou G. E. 2002. *Palaiontologia, Spondylota. Part C*. University of Athens, Greece. (in Greek).
- Ghezzeo E., Rook L. 2015. The remarkable *Panthera pardus* (Felidae, Mammalia) record from Equi (Massa, Italy): taphonomy, morphology, and paleoecology. *Quaternary Science Reviews*, 110 (110): 131-151. DOI: 10.1016/j.quascirev.2014.12.020.
- Ivanov S., Vasilev V. 1975. Studies of the animal bone material of the prehistoric settlement mound near Golyamo Delchevo. In: Todorova H., Ivanov, St., Vasilev, V., Hopff, M., Kwitta, K., Koll, G. (Eds). *Settlement mound near Golyamo Delchevo. Razkopki i prouchvaniya*, 5: 245- 302 (In Bulgarian).
- Khalaf-von Jaffa N. 2013. Der Europäische Leopard (*Panthera pardus sickenbergi*, Schütt 1969). *Gazelle. The Palestinian Biological Bulletin*, 102: 1-17.
- Kitchener A. C., Breitenmoser-Würsten C., Eizirik E., Gentry A., Werdelin L., Wilting A., Yamaguchi N., Abramov A.V., Christiansen P., Driscoll C., Duckworth J. W., Johnson W., Luo S.-J., Meijaard E., O'Donoghue P., Sanderson J., Seymour K., Bruford M., Groves C., Hoffmann M., Nowell K., Timmons Z., Tobe S. 2017. A

- revised taxonomy of the Felidae: *The final report of the Cat Classification Task Force of the IUCN Cat Specialist Group. Cat News (Special Issue)*, 11: 73-75.
- Koumouzelis M., Ginter B., Kozłowski J. K., Pawlikowski M., Bar-Yosef O., Albert R. M., Lityńska-Zajac M., Stworzewicz E., Wojtal P., Lipecki G., Tome, T., Bochenski Z. M., Pazdur A. 2001. The Early Upper Paleolithic in Greece: The Excavations in Klisoura Cave. *Journal of Archaeological Science*, 28, 515-539.
- Krajcarz M. T., Krajcarz M., Marciszak A. 2014. Paleoecology of bears from MIS 8-MIS 3 deposits of Bišnik Cave based on stable isotopes (513C, 518O) and dental cementum analyses. *Quaternary International*, 326-327: 114-124.
- Lazarov M. 1990. *Antique painted ceramics in Bulgaria*. Sofia, Bulgaria: Balgarski Hudozhnik Publishing House, 143 p. (in Bulgarian).
- Manolova-Voikova M. 2003. Early graffiti pottery from Varna. *Bulletin du Musée National de Varna*, 34-35 (49-50) 1998-1999: 208-225.
- March R. J., Whallon R., Morley M. W. 2017. Chapter 18. Studying Neanderthal Fire Structures from Crvena Stijena. In: Whallon, R. (Ed.). *Crvena Stijena in Cultural and Ecological Context*. Multidisciplinary Archaeological Research in Montenegro. National Museum of Montenegro. Montenegrin Academy of Sciences and Arts. Podgorica, Montenegro, pp. 340-449.
- Marciszak A., Krajcarz M.T., Krajcarz M., Stefaniak K. 2011. The first record of leopard *Panthera pardus* Linnaeus, 1758 from the Pleistocene of Poland. *Acta Zoologica Cracoviensia*, 54A (1-2): 39-46.
- Marciszak A., Lipecki G., Gornig W., Matyaszczyk L., Oszczepalińska O., Nowakowski D., Tala S. 2022. The first radiocarbon-dated remains of the leopard *Panthera pardus* (Linnaeus, 1758) from the Pleistocene of Poland. *Selected Papers from the 3rd Radiocarbon in the Environment Conference, Gliwice, Poland, 5-9 July 2021*. Radiocarbon, 64 (6): 1359-1372. DOI:10.1017/RDC.2022.33
- Miculinic K. 2012. Fossil remains of leopard (*Panthera pardus*) from Vjetrenica Cave, Popovo polje, BiH (PhD thesis). Zagreb, Bosnia and Herzegovina: Zagreb University.
- Nagel D. 1999. *Panthera pardus vraonensis* n. ssp., a new leopard from the Pleistocene of Vraona/Greece. *Neues Jahrbuch für Geologie und Paläontologie Monatshefte*, 1999 (3): 129-150. DOI: 10.1127/njgpm/1999/1999/129.
- Nikolov B. 1974. *Gradeshnitsa*. Sofia, Bulgaria: Nauka i izkustvo Publishing House. 143 p. (in Bulgarian).
- Nikolov V., Maslarov K. 1987. *Ancient settlements near Eleshnitsa*. Sofia, Bulgaria: Sofia Press Publishing House. 18 p. (in Bulgarian).
- Nikolova R., Genov N. 2013. *1000 pages Bulgaria*. Sofia, Bulgaria. Ciela Norma AD. Multiprint. 1008 p. (in Bulgarian).
- Ninov L. 1989. Remains of a lion in the Bulgarian lands. *Arheologiya BAS*, 2: 55-60. (in Bulgarian).
- Paijmans J., Barlow A., Förster D., Henneberger K., Meyer M., Nickel B., Nagel D., Worsøe Havmøller R., Baryshnikov G., Jøger U.,

- Rosendahl W., Hofreiter M. 2018. Historical biogeography of the leopard (*Panthera pardus*) and its extinct Eurasian populations. *BMC Evolutionary Biology*, 18 (156): 1-12. DOI: 10.1186/s12862-018-1268-0
- Popov A. 1983. Excavations of the "Great Lavra" in Veliko Tarnovo. In: Velkov, V. (Chief Ed.). Archaeological Discoveries and Excavations in 1982. Summaries. Archaeological Institute with Museum - BAS. Directorate "Museums" - KK. District Council for Culture — Pleven. "KIN" Directorate. Pleven, Bulgaria, pp. 117-119. (in Bulgarian).
- Raduncheva A. 1994. "Big Cats" in Prehistoric Religion Reconsidered. In: Borisov, B. (Ed.). Maritsa - East. *Archaeological studies*. 2: 47-50. (in Bulgarian, English summary).
- Raduncheva A., Koleva B. 1987. The riddle of the village of Dolnoslav. *Kurorti*, 4: 28-29. (in Russian).
- Schütt G. 1969. *Panthera pardus sickenbergi* aus den Maurer Sanden. *Neues Jahrbuch für Geologie und Paläontologie Abhandlungen*, 5: 299-310.
- Sommer R. S., Benecke N. 2006. Late Pleistocene and Holocene development of the felid fauna (Felidae) of Europe: a review. *Journal of Zoology*, 269: 7-19.
- Spassov N., Raychev D. 1997. Late Wurm *Panthera pardus* Remains from Bulgaria: the European Fossil Leopards and the Question of the Probable Species Survival until the Holocene on the Balkans. *Historia naturalis bulgarica*, 7: 71-96.
- Spassov N., Stoytchev T. 2005. In the shadow of the cave lion and other cats: leopards and snow leopards in the prehistoric rock art of Europe, Caucasus and Central Asia. *Annuary of Department of Archaeology - New Bulgarian University*, 6: 5-15.
- Ștefan V., Dumitrașcu V. 2022. Zooarchaeological analysis of the faunal remains from the Palaeolithic site of La Adam Cave (Dobrogea, SE Romania) – new data from recent excavations. In: Materiale și cercetări arheologice (Serie nouă), H-S 2021. Scripta praehistorica. Miscellanea in honorem Mariae Bitiri dicata. pp. 361-372; doi: 10.3406/mcarh.2021.2217.
- Stein A., Hayssen V. 2013. *Panthera pardus* (Carnivora: Felidae). *Mammalian Species*, 45 (900): 30-48.
- Stein A. B., Athreya V., Gerngross P., Balme G., Henschel P., Karanth U., Miquelle D., Rostro-Garcia S., Kamler J. F., Laguardia A., Khorozyan I., Ghoddousi A. 2015. *Panthera pardus*. The IUCN Red List of Threatened Species 2016. https://www.researchgate.net/publication/308899520_Panthera_pardus_The_IUCN_Red_List_of_Threatened_Species_2016 (Accessed on 04.02.2023).
- Symeonidis N., Bachmayer F., Zapfe H. 1980. Ergebnisse weiterer Grabungen in der Höhle von Vraona (Attika, Griechenland). *Annales Gaeologiques des Pays Hellaeniques Athaenes*, 30: 291-299.
- Werdelin L., Yamaguchi N., Johnson W. E., O'Brien S. J. 2010. Phylogeny and evolution of cats (Felidae). In: Macdonald, D. M., Loveridge, A. (Eds.) *The Biology and Conservation of Wild Felids*. Oxford: Oxford University Press, pp. 59-82.
- Wiszniowska T. 1982. Carnivora. In: 1982. Kozłowski, J. K. (Ed.).

Excavation in the Bacho Kiro Cave
(Bulgaria). Final Report.
Państwowe Wydawnictwo
Naukowe. Warszawa, pp. 52-55.

Tsoukala E., Bartsiokas A.,
Chatzopoulou K., Lazaridis G.
2006. Quaternary mammalian
remains from the Kitseli Pothole
(Alea, Nemea, Peloponnese).
Scientific Annals, School of
Geology. Aristotle University of
Thessaloniki (AUTH).
Thessaloniki. Special volume 98:
273-284.

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