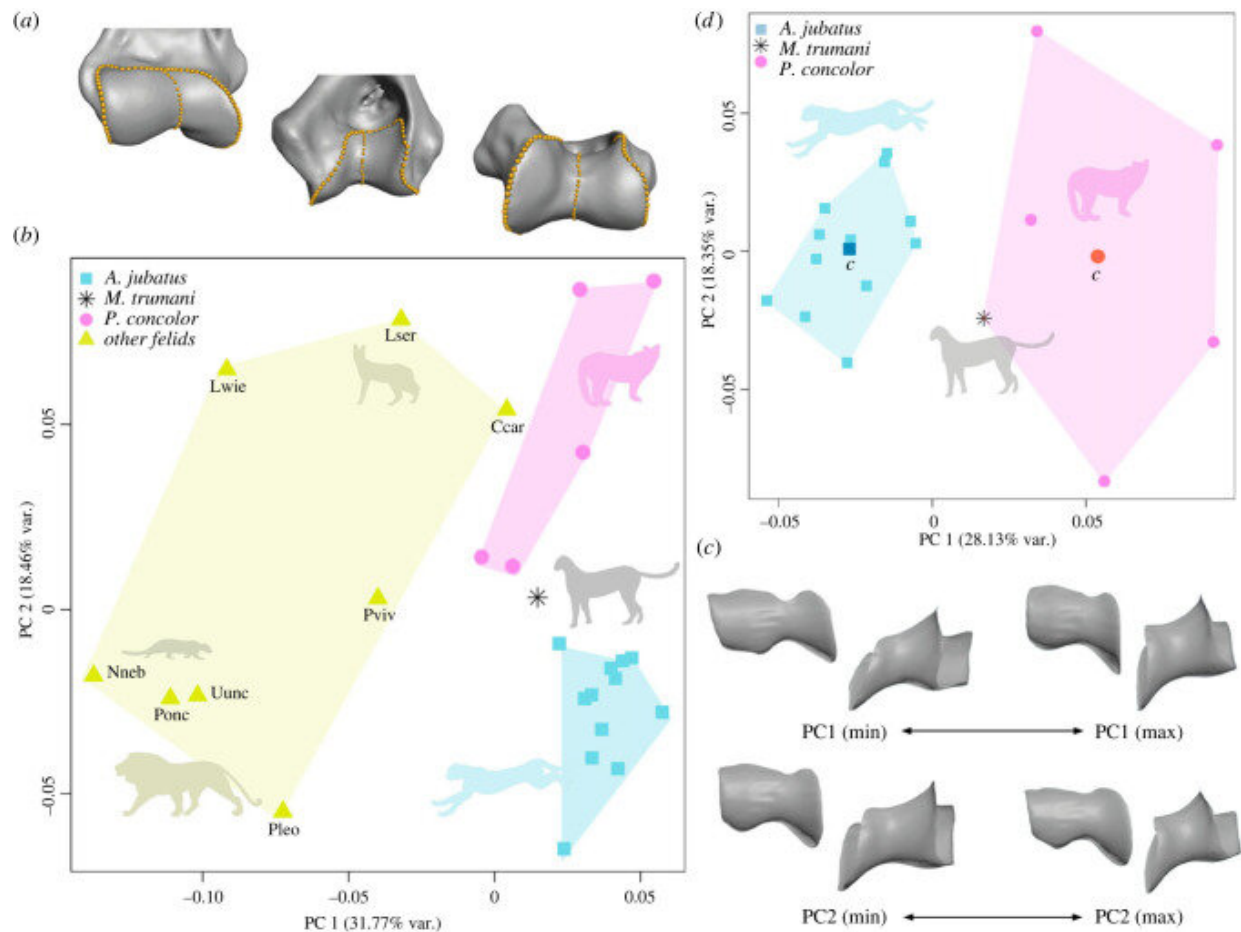


# Researchers uncover new characteristics of the extinct American cheetah 'Miracinonyx'

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Analysis of the elbow joint in *M. trumani* and other felids. (a) Landmarks digitized to capture the three-dimensional shape of the elbow joint. The elbow of *M. trumani* (mirrored) as an example. From top to bottom: anterior, posterior and inferior (distal) views. (b) Bivariate graph depicted from the first two eigenvectors obtained from PCA; (c) shape changes accounted for by the first two eigenvectors. (d) Bivariate graph depicted from the first two eigenvectors

obtained from PCA for the restricted sample of *M. trumani*, *P. concolor* and *A. jubatus*, where ‘c’ is the centroid. The convex hulls are defined according to the results obtained from K-means analysis—i.e. K-means analysis classified *M. trumani* with Puma and not with *Acinonyx*. Ccar, *Caracal caracal*; Lser, *Leptailurus serval*; Lwie, *Leopardus wideii*; Nneb, *Neofelis nebulosa*; Pleo, *Panthera leo*; Ponc, *Panthera onca*; Pviv, *Prionailurus viverrinus*. Silhouettes are not to scale. Credit: *Biology Letters* (2023). DOI: 10.1098/rsbl.2022.0483

The *Miracinonyx trumani*, commonly known as the American cheetah, lived in North America more than 13,000 years ago. Despite its name, recent studies conducted at the University of Malaga have revealed that it is more similar to the cougar than the living cheetah, but with its own characteristics that make it a unique species, of which there is no modern analogous feline today.

Paleontologists at the UMA, together with researchers at the University of Valladolid and the University of Wisconsin-Madison (U.S.), have cast light on the characteristics of this extinct feline, mainly by studying its hunting strategy, which has been the subject of discussion in recent decades.

## **Study of its hunting strategy**

This way, by analyzing its skeleton, the experts have proved that the *Miracinonyx trumani*, despite having long and light legs, was not as prepared as once thought to run after its preys, like the Old World cheetahs.

The results of the study, published in the scientific journal *Biology Letters*, also revealed that the claws of the *Miracinonyx* were retractable and it had the ability to grapple with its preys, like the rest of the felines,

with the exception of the cheetah.

"Although in appearance they were very like modern cheetahs, their way of hunting was more similar to that of a cougar," says Borja Figueirido, scientist of the Paleontology Area of the UMA, and main author of the study.

The experts focused specifically on the elbow-joint, which allows them to know whether the animal is adapted to hunt by holding its preys with its forelimbs or is able to chase them at high speed.

The humerus of the *Miracinonyx* was oval and elongated at the end closest to the elbow, which means that its forearm bones were further apart and, therefore, it had the ability to hunt its preys by grasping them, as cougars do.

"The case of cheetahs is really unusual; in a few seconds they can reach nearly 100 kilometers per hour. They are the supercars of the savanna," says Figueirido.

This is not the case of the *Miracinonyx*. Although it had greater manipulation capacity with its forelimbs, its physiognomy prevented it from reaching a speed similar to that of the living cheetah. It was not, therefore, such a sprinting predator, says Alberto Martín Serra, paleontologist at the UMA, and co-author of the paper.

## **Analysis of its bones**

To reach this conclusion, the scientists examined a skeleton of *Miracinonyx* found in a chasm in Wisconsin and compared it with the species of other modern felines, such as cougars, lions or lynxes.

"The detailed study of the bones was conducted at the UMA. What we

did was to scan in 3D the humerus of living felines and digitalize homologous points to quantify its form. The fossil was scanned using CAT scan at the University of Wisconsin-Madison," explains Figueirido.

## **Study of its brain architecture**

Another recent study by this research team of the University of Malaga, published in the scientific journal *iScience*, corroborates this hypothesis. The paleontologists analyzed if the brain architecture of *Miracinonyx* was similar to that of cheetahs, and results evidenced, again, clear differences between them.

Using 3D technology, the scientists virtually filled the intracranial space where the brain is housed, obtaining an endocast of the *Miracinonyx trumani*'s brain surface, which they compared to living cheetahs and cougars.

The *Miracinonyx*'s brain surface turns out to be more like the cougar's than the cheetah's: the Old World American cheetah was not cognitively prepared to hunt by high-speed chasing, among other things, because it had an underdeveloped nasal sinus, like cougars.

"The *Miracinonyx* was probably an intermediate version between the [cheetah](#) and the cougar," says Figueirido, who highlights that its "particular" way of hunting "is not currently represented in nature."

After these first two studies, the researchers at the University of Malaga, the University of Valladolid and the University of Wisconsin-Madison want to continue with this R&D line and study the complete forelimbs and the anatomy of the inner ear of the *Miracinonyx*, in order to answer the questions that remain unresolved around this unique North American fossil feline.

**More information:** Borja Figueirido et al, Elbow-joint morphology in the North American 'cheetah-like' cat *Miracinonyx trumani*, *Biology Letters* (2023). [DOI: 10.1098/rsbl.2022.0483](https://doi.org/10.1098/rsbl.2022.0483)

Borja Figueirido et al, The brain of the North American cheetah-like cat *Miracinonyx trumani*, *iScience* (2022). [DOI: 10.1016/j.isci.2022.105671](https://doi.org/10.1016/j.isci.2022.105671)

Provided by University of Malaga

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