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UCT-led study confirms four giraffe species, paving the way for urgent conservation efforts



Large study of the skull shape of giraffe confirms that there are four distinct species of giraffe. Photo: Supplied

The giraffe is one of the world's most iconic and unique mammals and has captured the human imagination through the ages. Surprisingly, only a few years ago, scientists discovered four distinct species of giraffe - based on their genetics - and not, as previously assumed, only one giraffe species.

This distinction of four giraffe species was further confirmed in a recently published study that analysed the skull morphology of giraffes. With only 117 000 giraffes remaining in the wild in Africa, these findings are vital and highlight the importance of finally shining a light on the silent extinction of these gentle giants. The findings were published in [PLOS One](https://doi.org/10.1371/journal.pone.0238888) journal.

Researchers from the University of Cape Town (UCT) and the Giraffe Conservation Foundation embarked on a mammoth collaborative research project with key collaborators from the Universidad Autónoma de Madrid, other European universities, and many African government partners.

Giraffe taxonomy and evolution have been discussed, and different theories have emerged. However, genomic research by the Giraffe Conservation Foundation, Senckenberg Biodiversity and Climate Research Centre, and other partners has shown the distinction of four species for almost a decade: the Masai, northern, reticulated, and southern giraffe. While there were theories of differences in the appearance of different giraffe species, no study had ever analysed this systematically.

"This study is a fantastic example of successful interdisciplinary collaboration in science that has made an important contribution to giraffe conservation and hopefully will go a long way to saving giraffes in Africa," said Professor Anusuya Chinsamy-Turan, a palaeobiologist in the [Department of Biological Sciences](#) at UCT and one of the study's authors.

In this latest state-of-the-art study, the team assembled the largest known dataset for any medium to large wildlife by 3D-scanning 515 giraffe skulls from African national parks, game farms, taxidermists, and museum collections globally. Using 3D geometric morphometrics analysis, it was not surprising that the study showed distinct differences between male and female giraffe skulls. However, it was rather unexpected that the results confirmed the existence of four distinct giraffe species in line with previous genetic analysis: the four genetically distinct giraffe species also have distinct cranial morphologies, largely linked to their ossicones (bony horn-like structures on their skulls).

Dr Nikolaos Kargopoulos, lead author and post-doctoral fellow at UCT and the Giraffe Conservation Foundation, travelled the world to 3D scan giraffe skulls. He commented: "This groundbreaking research highlights the value of science to increase our understanding of our natural world. When I embarked on this project, I did not expect to find such clear differences in the skull shapes of giraffe – before I started looking more closely, I thought a giraffe is just a giraffe."

The development and evolutionary significance of ossicones is key in understanding giraffe diversity and the dynamics between the different taxa. Dr Jesús Marugán-Lobón, Professor at the Universidad Autónoma de Madrid, and co-author of the study explained: "The study further shows that ossicone variation in each species is closely linked to the giraffe's eye sockets (orbits), which tells us that ossicones and field of vision, very likely evolved together".

The existence of four distinct giraffe species has clear implications for their conservation, and these results highlight the importance of better understanding the science behind it as a critical step to applying these findings to biodiversity conservation.

Dr Julian Fennessy, director of Conservation at the Giraffe Conservation Foundation, and co-author shared: "For almost a decade our genetic research has proven that four giraffe species exist, and now our collaborative morphological research has further confirmed this. It is about time that the world stands tall for giraffes, in particular the International Union for Conservation of Nature (IUCN) and changes the outdated taxonomy of giraffe that some still hang on to. Conservation efforts need to urgently target all four giraffe species – in

particular those with precariously low numbers – before it is too late. Science is science and facts are facts. I hope that any debate around giraffe taxonomy is now finally put to bed, as we must act now to save each of these iconic giraffe species and the Giraffe Conservation Foundation will remain on the forefront of this battle.”

Stephanie Fennessy, executive director at the Giraffe conservation Foundation, and co-author concluded: “Ultimately, the old adage remains true: we can only save what we know. And now that any doubts can be put to rest as to how many giraffe species there are, it is about time that we take action and secure their future in the wild before it is too late. As a small and impactful organization, we have and continue to make a big difference for giraffes in Africa. This study is a great example: many people have theorized about differences in the morphology of the various giraffe species. We grabbed the giraffe by the ossicones – so to speak - and figured it out. We hope that the world will now join us in drawing attention to these iconic animals and help us save them in the wild.”

“As our knowledge of biodiversity continues to increase, such taxonomic changes are critical to provide the most appropriate conservation actions as was recently highlighted in the proposal by the United States Fish and Wildlife Service (USFWS) that recommends the listing all four species of giraffe on the USA Endangered Species Act.”

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