

The Quagga (*Equus quagga quagga*): Historical Distribution & Selective Breeding

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The quagga (*Equus quagga quagga*) is an extinct subspecies of the plains zebra (*Equus quagga*). Hunted to extinction by early settlers, the quagga vanished from the wild around 1878. The last captive quagga, a mare, died on 12 August 1883 in Amsterdam Zoo. They mainly occurred south of the Orange and Vaal rivers and west of the Drakensberg. "Quagga" is an imitation of the animals' call, which it shared with the other plains zebras (The Quagga Project, n.d.).

The quagga's nearest relative, the Burchell's zebra (*Equus quagga burchellii*), found to the north of the quagga's distribution (north of the Orange River), became known as the "bont quagga". Unfortunately, this distinction has often been omitted, and both forms were simply referred to as "quagga" by the Boers of the interior (The Quagga Project, n.d.).

The quagga's extinction is attributed to ruthless hunting and planned extermination by colonists. Additionally, the confusion caused by indiscriminate use of the term 'quagga' for both the Burchell's zebra and the true quagga by hunters and traders hindered last-minute efforts to save the quagga from extinction. This caused a great deal of confusion, as many people thought that the rarer true quagga were still plentiful in the distant territories beyond the Orange River (The Quagga Project, n.d.).

Zebras with coat coloration resembling quaggas are now being bred by The Quagga Project through selective breeding.

When the Dutch established Cape Town during the 1650s, they became familiar with two locally occurring zebra species, namely the quagga (called "wilde esel") and the Cape mountain zebra (called "wilde paard", and is a smaller distinct species of zebra). The historical documentation about the presence of both the quagga and mountain zebra near Cape Town is unclear and confusing, making it difficult to extract meaningful information from the early records (Skead, 2011). Both were present not far from Cape Town; however, their occurrence on the Cape Peninsula is doubtful. Jan van Riebeeck's journal makes no comment on any form of equine there and it is only when his men started exploring the immediate interior that reports start appearing. Before that, comment concerned 'zebras' or their skins brought from beyond the Peninsula. The first mention of a wild equine in the Jan van Riebeeck journal did not appear until 1657. They found footprints and dung of "horses" (zebra) a few kilometres north-east from Paarl, itself 50 km from Cape Town. Thereafter there are various written accounts of mountain zebra and quagga found in the interior. During the early period of exploration some thought that the mountain zebra was the male and the quagga the female of the equines they knew and saw (Skead, 2011).

When travellers reached the vicinity of the Orange and Vaal rivers, in the central part of South Africa, they came across a "new" zebra occurring in "mixed herds" with quagga (Skead, 2011). Observers believed it was a hybrid between the quagga and the Cape mountain zebra, primarily based on coloration. The Boers called this "new" zebra the "bonte quagga" (loosely meaning partly-coloured or pied zebra). It was later known as the Burchell's zebra, the most common zebra in South Africa today. This zebra was confined to the region north of the Orange River, but there may be proof that it also wandered south of this river. In August/September 1779, Robert Jacob Gordon went west of the Augrabies Falls in that part of the Gordonia district that extends south of the Orange River. He saw

within the arc of a semi-circle 12 giraffes, 50 elephants, 5 rhinoceroses, a troop of 20 ostriches, a troop of 13 kudus, one large troop of zebras, and hippos swimming and playing in the river. Why should he have used the word 'zebras' if he meant 'quaggas'? Could they have been mountain zebras far beyond their normal range? The distinct possibility exists that they were, in fact, Burchell's zebras (Skead, 2011). On 24 November 1801, when William Somerville was near the Matlhwareng River and about 25 km north-east of Kuruman, he describes zebra that strongly resembles that of Burchell's zebra (Skead, 2011). In October 1836, JE Alexander was near Bontkoe on the Buffels River in Namaqualand. He "...saw traces of ostriches and zebras..." about 130 km south of the Orange River. The animals he saw as zebras would have been taken to be mountain zebras, but later in his book he describes the wild horse, zebra and quagga. Based on his descriptions of each animal we conclude that when Alexander refers to a zebra in his book he means a Burchell's zebra, and when he writes of a wild horse he means a mountain zebra. On this basis, and from his own pen, we must assume that the animals he saw at Bontkoe were Burchell's zebras as he called them "zebras" (Skead, 2011).

HA Bryden noted that quaggas were generally distributed in the Cape Colony, Orange Free State, and part of Griqualand West, with rare sightings north of the Vaal River (Bryden, 1889). Accepting Bryden's statement suggests the possibility of quaggas occurring north of the Orange River, considering Griqualand West's coverage of that region. When William Somerville was at a place called "Hatalakomoo" (probably today's Gatlalakgomo), on 25 November 1801, he mentioned "quachas" drinking at a "brook". In 1837, Cornwallis Harris found the quagga inhabiting the plains south of the Vaal (in the Orange Free State) in immense herds (Skead, 2011). In 1850, Thomas Baines saw mixed herds of quagga and Burchell's zebra south of the Vaal River: "The plains, about two miles from the [Vaal] River, presented a scene that must be witnessed to be conceived: innumerable herds of quaggas, both of the bonte (striped) and half-striped varieties, stood quietly gazing as we passed or cantered leisurely out of our way, sometimes crossing the road within a hundred yards of us" (Baines, 1964).

Only WJ Burchell gives a reasonable indication that the quagga were found west of the Vaal River when, on 25 October 1811, he described quaggas at Spuigslang Fontein. The location seems to have been about 23 km south of Campbell in that part of the Herbert District west of the confluence of the Vaal and Orange rivers (Skead, 2011).

In 1984 the quagga achieved scientific distinction as the first extinct animal to have its DNA partially sequenced by Higuchi et al. (1984).

A demonstration by Higuchi et al. (1987) showed that the mitochondrial DNA of the quagga is identical to that of other plains zebras. Only 229 nucleotides of the mitochondrial genome were sequenced that is over 16,000 nucleotides long. They found differences at two nucleotides but possibly these were caused by post mortem changes in the DNA. This meant that the quagga and Burchell's zebra was one and the same species of zebra. There was a large area of overlap where both the quagga and Burchell's zebra ecotypes co-occurred and freely interbred over many 100's of kilometres (Van der Merwe, 2017). In this area each individual was classified either as quagga or Burchell's zebra entirely based on the

amount of stripes. There was no natural mate selection based on striping between quagga and Burchell's zebra (Van der Merwe, 2017).

The six plains zebra 'subspecies' are more part of a north to south cline than an actual subspecies (Van der Merwe, 2017). A subspecies forms after a period of isolation from the other sub populations when there is a geographical barrier partially separating the populations. In the case of the plains zebra there was no geographical barrier separating the different populations, which meant that they could have interbred and lived alongside each other in the areas of overlap (where the different phenotypes integrated steadily into each other). The same could be said about the quagga and Burchell's zebra. The quagga populations in the northern section of their original habitat (Orange Free State) came in contact with Burchell's zebra in the area of overlap and have interbred (Van der Merwe, 2017).

The quagga populations south of the Cape Fold Mountains were partly isolated from the quagga populations north of these mountains (Van der Merwe, 2017). These quagga (south of the mountains) could have been the 'purest' form of quagga with a unique genotype. Although, it must also be remembered that there were small, narrow migration routes through the mountains to the northern parts. With past sea level changes the quagga could have also migrated around the mountains along the eastern coast of South Africa (there are theories of plants and reptiles following this route). The quagga could then have exchanged gene-flow with other quagga populations from north to south and south to north (Van der Merwe, 2017).

Although the quagga was only part of a cline/subspecies, the fact that a portion of the quagga population lived in isolation (away from Burchell's zebra) meant that their genotype could have been a bit different from that of the Burchell's zebra and other plains zebra. Some quagga lived alongside the Burchell's zebra (northern territories) and some lived more in isolation (south of the Cape Fold Mountains) (Van der Merwe, 2017).

There are some people who speculate that the genotype of the quagga might have been the same throughout their historical range. Groves and Bell (2004): "On the face of it, we might conclude that quagga populations were the same throughout their range, varying everywhere from minimally striped to fairly well-striped; but the exact evidence is now forever lost."

Most quagga skins in museums today came from the Karoo and Orange Free State (northern sections). The reason for this is that the Europeans hunted extensively in the Cape Peninsula and surrounding areas during the first 150 years of colonisation. Only in the later stages, when the southern population of quagga were exterminated, did naturalists arrive and collected a few coat samples (Van der Merwe, 2017).

In 1987, a natural historian and taxidermist named Reinhold Rau started The Quagga Project. The goal of the project was to breed zebras into quaggas by the selective breeding of Burchell's zebra which visually resembles the extinct quagga and then reintroduce it into reserves in its former habitat (The Quagga Project, n.d.).

The Project's initial foal was born on December 9, 1988. On January 20, 2005, Henry, a foal recognized as the first quagga-like individual due to reduced striping, was born (The Quagga Project, n.d.). Foals are scored according to their visual stripe pattern and only foals with no stripes on the hind body and legs are called Rau quagga. Rau quagga is the name the Project chose to apply to zebras which meet the criteria of no scorable stripes on the hind body and effectively none on the legs (Darwin recorded a quagga with stripes on its hocks, so the project allow that in the hind legs). Although the Rau quagga looks very much like the extinct quagga, they will probably never (though arguable) exactly be actual quagga, as their genetic makeup (genotype) is slightly different (Harley et al., 2010 & The Quagga Project, n.d.).

Groves and Bell (2004) did analysis based on Cranial morphology and pelage and found no difference between the quagga and plains zebra.

Genetic studies in 2005 by Leonard et al. revealed a 1.5% difference in DNA between the quagga and Burchell's zebra, indicating their close genetic proximity. This is why the phenotype (coat pattern) of the quagga could be recovered so quickly through selective breeding in The Quagga Project (Leonard et al., 2005).

The Quagga Project maintains a studbook of all the animals in their project over various private reserves and farms. Every now and then, in a bid to obtain funding, they sell some of the less quagga-like animals (ones with more striping) to other private reserves that are stocked with Burchell's zebra. Individuals integrate readily into other plains zebra groups (The Quagga Project, n.d.).

The objective is to reintroduce a population of approximately 50 Rau quaggas into a reserve within their natural habitat. The Quagga Project has released these animals into private nature reserves and farms located in the southernmost range of the "original quagga," where zebras have been hunted to extinction. In addition to having fewer stripes on the hind body and legs, the latest animals in the Project also exhibit a darker brown/chestnut background colour, which is very encouraging.

Breeding groups of animals resembling quaggas now inhabit former quagga habitats on properties that are part of the Project. As of January 2024, there were 16 breeding groups located at the following properties: Elandsberg, Nuwejaars Wetlands Special Management Area (SMA), Vlakkenheuwel, Pampoenvlei, Vergelegen, and Kloovenburg. Single nomad stallions were based at Arc en Ciel, Bontebok Ridge, and Wedderwill (The Quagga Project, n.d.).

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