

III MOUNTAIN ZEBRA (*EQUUS ZEBRA*)

(Achim Winkler & Jaroslav Zima)

Other names German: *Bergzebra*. French: *Zébra de montagne*. Afrikaans:
Bergquagga.

3.1 Biology and Field Data

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3.1.1 Morphology

Mountain zebras are the smallest of the three zebra species. Fully grown animals reach a shoulder height of 120 to 150 cm, with a maximum weight rarely exceeding 300 kg. Adult males are slightly larger and heavier than adult females (Skinner & Smithers 1990).

Mountain zebras have a narrow black and white stripe pattern somewhat intermediate between the Grevy's zebra and the plains zebra (Lloyd 1984). The black stripes reach all the way down to the hooves, while the stomach is always white. A distinguishing feature of the mountain zebra is a characteristic gridiron pattern on the rump, formed by narrow black and white stripes. A further characteristic feature is a small dewlap on the throat, while the mane is rather short in comparison to the other zebra species. Contrary to the Grevy's zebra and the plains zebra, which largely inhabit open plains, mountain zebras live primarily in mountainous terrain. As a result the hooves of the mountain zebras are rather slim and narrow in comparison to the broad hooves of the other zebra species, so as to allow for a good grip when climbing the rocky mountains.

Two subspecies of the mountain zebra have been described: the Hartmann's mountain zebra (*Equus zebra hartmannae*) and the Cape mountain zebra (*Equus zebra zebra*). The Hartmann's mountain zebra is considerably larger and heavier, and more slender in body stature than the Cape mountain zebra. In its overall appearance the Hartmann's mountain zebra has a slightly brown colour tone, whereas the Cape mountain zebra is purely black and white in colour, apart from a distinct orange muzzle. Characteristically the white stripes on the flanks of the Hartmann's mountain zebra are always broader than the black stripes, while the contrary is true for the Cape mountain zebra, which has white stripes on the flanks that are always more narrow than the black stripes.

3.1.2 Longevity

In the wild mountain zebras rarely reach an age of more than 20 years. The oldest animal on record died at the age of 26 years (National Parks Board, unpublished records). In the captive environment mountain zebras have been known to attain an age of up to 30 years.

3.1.3 Zoogeography, Ecology, and Conservation

Mountain zebras are confined to the mountainous regions of southern and southwestern Africa, with a distribution ranging from southern Angola to the Eastern Cape Province of South Africa. The Hartmann's mountain zebra subspecies inhabits the northern regions of the species' distribution, reaching as far south as the Fish River Canyon near the border between Namibia and South Africa. The Cape mountain zebra subspecies today only occurs in fragmented populations in some of the mountain ranges in the Eastern Cape Province of South Africa. Both subspecies prefer broken or mountainous terrain, but they are also found on hilly plateaus and on open plains, such as in the Etosha National Park in Namibia, where Hartmann's zebras coexist with plains zebras (Joubert 1972). Historically the Cape mountain zebra coexisted in some regions with the quagga, the southernmost subspecies of the plains zebra, which became extinct as a result of over hunting at the end of the last century (Millar 1970).

3.1.3.1 Conservation Status

Mountain zebras are listed on Appendix B of CITES. The IUCN classifies Hartmann's mountain zebras as Vulnerable and Cape mountain zebras as Endangered. Total numbers of Hartmann's zebras are estimated at approximately 8,000 animals (Novellie et al. 1992). Of these, about 4,000 animals live in protected areas in Namibia. The remaining animals live on private lands in northern or central Namibia or in the vast deserts of the Damaraland and the Kaokoveld, while only a few hundred animals survive in the southern regions of Angola, and on some private farms in South Africa outside the subspecies' natural range of existence. The Cape mountain zebra was once widespread in the mountains of South Africa's Cape Province, but came close to extinction in the 1940s, when less than 80 animals survived as a result of excessive hunting (Novellie et al. 1992). The subspecies was saved from extinction with the proclamation of the Mountain Zebra National Park in the Eastern Cape Province in 1936, which provided a refuge for some of the remaining animals and an important basis for a breeding nucleus (Grobler & Hall-Martin 1982). Starting from only a few mountain zebras at the time of its proclamation, zebra numbers in the park have increased continuously over the years. By the year 1981 the population has risen to over 200. In the same year the first mountain zebras from the park were relocated to other protected reserves, which have been proclaimed within the subspecies' former range of existence. Today the total number of Cape mountain zebras has increased to over 1,000 animals, which inhabit a number of protected reserves and private farms within the Cape Province (National Parks Board, unpublished records).

3.1.3.2 Threats

The major threats for both mountain zebra subspecies are the loss of available habitat and the competition with livestock for food and water. Large tracts of the zebras' former range

have been cultivated or have been fenced off for livestock. As a result of this conflict between the zebras and the domestic animals, Hartmann's zebras in particular were excessively hunted throughout most of their range, and have been described as the most ruthlessly persecuted large mammal in southern Africa (Joubert 1973). From a former high of well over 50,000 animals Hartmann's zebra numbers have dramatically declined before legal protection was finally granted. Cape mountain zebras have also been excessively hunted in the past, but have been granted full protection as early as the late 1930s (Grobler & Hall-Martin 1982). Periods of prolonged droughts have always been another major threat to the survival of the mountain zebras in their arid and semi-arid environments, particularly for the Hartmann's zebra in the harsh Namibian desert.

3.1.3.3 Current Legal Protection

Both subspecies are legally protected with hunting being prohibited. Free-roaming Hartmann's mountain zebras, particularly in central Namibia, are nonetheless under the threat from farmers, who consider the zebras as pests competing with their livestock for food and water, and who continue to illegally pursue the animals. Only occasionally hunting licenses are granted to certain game farmers, who specialize in big game hunting on their property. The remaining populations of the Hartmann's mountain zebra in southern Angola have been under severe threat from ongoing civil wars, which have greatly depleted some of the local subpopulations, while others have been wiped out entirely. Only 50% of the present population of the Hartmann's mountain zebra is safeguarded in protected reserves, while the remaining animals roam free outside these protected areas, where they can easily be persecuted (Novellie et al. 1992). Cape mountain zebras today only survive in protected areas in the Eastern Cape, where they are safe from any outside pressures (Novellie et al. 1992).

3.1.3.4 Captive Herds

Of the two subspecies only Hartmann's mountain zebras are presently held in captivity. In 1998 a total of over 300 Hartmann's zebras were held at more than 40 institutions in Europe, America, Asia, and Africa. The EEP for the Hartmann's mountain zebra is coordinated by Zoo Usti/Czech Republic. No Cape mountain zebras are presently held in captivity. The last animals of this subspecies were kept in a zoo in South Africa in the early 1990s, but have since died. Upon recommendation of a Population and Habitat Viability Analysis on the Cape mountain zebra in 1993 it is presently not required to establish any herds of Cape mountain zebras in the zoo environment. The population in the wild is constantly increasing, with a continuing demand to re-establish Cape mountain zebras within areas of their former existence, so that these relocation projects are given priority in relation to establishing any captive herds. However, in order to guarantee a genetic pool outside the animal's small range in the wild, the establishment of a captive population needs to be considered in the future.

3.1.4 Diet and Feeding Preferences

Mountain zebras are primarily grazers, which feed on a variety of different grass species, favouring sweet grasses of a medium to tall height (50 to 200 mm) (Grobler 1983, Winkler 1992). In a study on the diet of Cape mountain zebras more than 20 different grass species were recorded to be consumed, while forbs and shrubs never formed more than 9% of the animals' diet at any month of the year (Winkler 1992). Mountain zebras show marked seasonal migrations in response to changes in the available grass biomass, to changes in the nutritional contents of the preferred food plants, and in response to severe climatic conditions (Novellie et al. 1988, Penzhorn 1982, Winkler & Owen-Smith 1995). Mountain zebras generally drink on a daily basis but can tolerate two or three days without water.

3.1.5 Social Systems and Reproduction

The social structure of mountain zebras consists of either breeding herds or bachelor groups (Klingel 1968, 1969, Penzhorn 1984). Breeding herds, which comprise of one stallion and one to six mares with their foals, form a tight unit and remain stable for many years. The individual animals of the group recognize each other by means of their stripe patterns, their voices and their scents. The mares of a breeding herd usually remain together throughout their lives, while the herd stallion can be displaced by a younger stallion, once he is getting too old or too weak to lead a herd. Following a short but often severe fight between the herd stallion and its challenger, the new stallion takes over the entire group including any foals that might be present, while the old herd stallion will join a bachelor group. A new stallion will not necessarily be accepted immediately by all the mares within the breeding herd, and it often takes a few weeks before the new male has established its rank within the herd.

Within a stable breeding herd a clear dominance hierarchy can be observed. The herd stallion is the dominant animal of the group, although the most dominant female usually leads the group to new feeding sites, while the herd stallions brings up the rear, particularly when the herd moves away from danger. The dominance hierarchy among the mares can change throughout the year, once a female has produced a foal. The status of a lactating female rises, until a female, which was previously dominant to her, also produces a foal. Foals usually stay with their maternal herd until the age of two to three years, commonly leaving the herd once their mothers have produced a new foal. The herd stallion actively tries to prevent his foals from moving away from the herd. Female foals, however, are regularly abducted by stallions from existing breeding herds, or from bachelors to form a new breeding group. The young fillies may associate with several stallions before they finally settle down as a permanent member of a group when reaching their sexual maturity. Male foals usually associate with bachelor groups after leaving their maternal group.

Breeding herds do not occupy territories, which they defend against other mountain zebras, but they use fixed home ranges, which can vary in size during the course of the year and according to the available food resources (Joubert 1972, Penzhorn 1982). Home ranges of

individual breeding herds commonly overlap, particularly in regions where food resources are at an optimum. However, individual breeding herds do not join up with other breeding herds, as is commonly observed among migrating plains zebras, which often form herds of several hundreds or thousands of animals. Among mountain zebras individual breeding herds are always clearly spaced apart, with the females of the different breeding herds never coming into contact with each other. The herd stallions, however, often leave their herds to interact and play with stallions of neighbouring breeding herds or with bachelors. Also contrary to the plains zebras, which often form mixed herds with wildebeest or certain antelope species, mountain zebras never closely congregate with other grazing animals.

Bachelor groups are not as rigidly structured as breeding herds, although occasionally some core groups can be identified (Joubert 1972, Penzhorn 1984). Bachelor groups consist of young males after they have left their maternal herd, and of old stallions, which can no longer keep their status as a herd stallion. These bachelor groups can change in numbers on a daily basis and usually comprise of two to well over ten animals. Bachelors can succeed in becoming herd stallions when they are fully grown at an age of five years.

In free-ranging mountain zebras breeding occurs throughout the year with a peak corresponding to the summer rainy season, when food resources are at an optimum and climatic conditions are favourable (Joubert 1974, Penzhorn 1985). The first oestrus in mountain zebra mares, which lasts for 3 to 7 days, and which is repeated every 16 to 22 days, occurs at the age of 2 years, when most females leave their maternal herd to join a breeding group. The minimum age at first foaling is recorded to be 3 years, with a gestation period of 364 to 391 days. One foal is born, which weighs approximately 30 kg at birth. The weaning of the foal is complete at the age of 1 year. Foaling intervals can vary from 1 to 6 years. Adult mares usually come into oestrus again 5 to 9 days after parturition.

3.1.6 Mortality

Mortality of free-ranging mountain zebras is largely related to ecological factors. Hartmann's mountain zebras commonly die during periods of severe drought, when food is in short supply. Individual zebras, such as young foal as well as old, weak, or sick animals, are occasionally taken by large predators, such as lions and hyenas. Cape mountain zebras are not affected by predation, since all animals live in protected reserves free off large predators. The major cause of death in Cape mountain zebras is a deterioration of the physical state of the animals at the end of the dry season, when food resources are scarce and climatic conditions are severe, with temperatures in the higher mountain regions commonly dropping well below freezing (Penzhorn 1984).

3.2 Husbandry

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Similar to the other zebra species, individual mountain zebras can be identified by means of their unique stripe patterns, with no two zebras looking alike (Lloyd 1984). Photo documentation can be used for identification without the need for any additional identification methods, such as ear tags. Photos should be taken of both sides of the animals, with special emphasis on the stripe patterns on the hind quarters, the shoulder regions and the face. If required, transponders can be used as an additional source of identification.

3.2.1. Social Behaviour of Captive Mountain Zebra

In the captive environment mountain zebras show similar behavioural patterns as in the wild. Breeding herds depict a strong social structure with a defined dominance ranking among the females. Older females are usually dominant over younger females, while younger females in turn are dominant over the youngest members in the group. As in the wild, older and more experienced females commonly lead the group. Very old mares with a weakening physical condition do not interact any longer in the dominance displays, but rather stand aside of the group, being tolerated by all the members of the breeding herd.

In view of the pronounced social structure and dominance ranking, and in view of the fact that female mountain zebras never closely congregate, sufficient space needs to be made available to the animals in order to prevent excessive aggressive encounters.

Individual relationships between certain females within a breeding herd, as commonly noted among plains zebras, are rarely observed among mountain zebras, where individual females usually maintain a marked distance from each other. The closest relationship are noted among females and their foals, and among the foals themselves. Herd stallions can occasionally show a strong affiliation to certain females within his group, while neglecting other mares.

3.2.2 Recommended Social Units for Mountain Zebra in Captivity

Mountain zebras, as all equid species, are social animals, for which reason one should refrain from keeping single animals.

The social unit most recommended for mountain zebras in captivity is the breeding herd, which should comprise of one adult stallion and up to six adult females with their foals of up to two to three years of age. The number of animals to be kept in such a breeding herd depends on the size and the structure of the available exhibit. It is not advisable to keep too many adult mares in a herd, since this might lead to excessive aggression within the group. Female mountain zebras depict a clear dominance hierarchy, which is strictly respected and maintained by regular aggressive displays and conflicts. Usually older and more

experienced mares are the most dominant females in the group. Displays of dominance are more evident in mountain zebras than in plains zebras, resulting in the fact that female mountain zebras are commonly more spaced apart than the females in a breeding herd of plains zebras.

In view of the strict dominance ranking among the adult mountain zebra females it is not advisable to separate individual females from the group for too long a period, such as, for example, prior to parturition or when a female is under veterinary care. Upon reintroduction to the group the female will have to re-establish her social rank, which can lead to excessive aggression within the group. For this reason it is advisable that a visual contact between the animal to be separated and its group members is guaranteed at all times, possibly by separating the animal in a smaller yard immediately adjoining the main exhibit. The same principle applies at night, when mountain zebras should ideally be kept in individual stables, which allow a visual contact between each group member. Animals which are separated without providing any such visual contact commonly show aggressive behaviour patterns in re-establishing the social hierarchy once the animals are allowed together again.

It is also not without problems to introduce a new mare to an existing breeding herd. This female will have to establish a place in the dominance hierarchy, which will not happen without aggressive interactions.

No such aggressive displays, however, are to be noted when a female, which has given birth to a foal away from the breeding herd, is to be reintroduced to the group. Females with newborn foals aggressively defend their foals against other group members and are generally accepted by all members of the herd regardless of the dominance status of the mare.

Aggression within a breeding herd can also be related to the herd stallion. The herd stallion is the most dominant animal in the group, who does not tolerate any other adult male near his group. For this reason it is important to separate semi-adult males from their maternal herd before they develop their first sexual activities at the age of approximately two years. Contrary to the wild, where herd stallions tolerate their sons even when reaching sexual maturity, it is not uncommon for captive stallions to chase and attack young male foals within their group. Semi-adult females should also be taken out of the breeding herd before reaching the age of two years, since the herd stallion might turn aggressive towards his daughters when they reach their first oestrus. On rare occasions the herd stallion might also become aggressive towards individual adult females which he dislikes.

An excessively aggressive herd stallion can be kept separate from his breeding group in an adjoining enclosure. This offers the advantage that mating can be influenced, with the females being introduced to the male whenever breeding is desired. However, a herd stallion on his own can develop abnormal behaviour patterns, such as pacing along his exhibit boundaries. Castration of aggressive males is a common practice among domesticated equids in particular, but no experience is available on the behaviour of castrated mountain zebras.

Apart from the breeding herd, mountain zebras can also be kept in bachelor groups. However, while breeding herds in plains zebras have been kept successfully at a number of

institutions, little experience has thus far been gained with all-male groups among mountain zebras.

3.2.3 Breeding

As in the wild, breeding among captive mountain zebras can occur throughout the year. The time and rate of foaling, however, can be influenced, if the herd stallion is kept separate from the mares and only allowed to the females when breeding is desired. It is not recommended, however, to send individual females to other zoos for breeding purposes only. In view of the close bond between the females within a breeding herd, taking individual females out of a stable group can lead to excessive stress-related behaviour, while it is uncertain if a strange stallion will be accepted by the female. In addition, problems can occur upon reintroducing the female to her original herd, when the female will have to re-establish her social rank within the group.

As in free-roaming mountain zebras the oestrus cycle of captive mountain zebras is repeated every 16 to 22 days, each oestrus period lasting approximately 3 to 7 days. A female in oestrus is more restless than normal, she urinates frequently, and she commonly separates herself from the rest of the group. When in oestrus the mare assumes a characteristic facial expression (the oestrus face), with the lips pulled back to expose the incisors, the corners of the mouth drawn up, and the ears pulled back tightly against the head. In addition the female assumes a typical posture with the head held low, the hind legs straddled, and the tail held partially erect. Older mares assume this posture only immediately prior to copulation, but young mares readily display this oestrus posture when in heat.

During courtship the female in oestrus approaches the herd stallion and presents her posterior while showing the oestrus face. The stallion usually responds by rubbing his head and body against the mare's flanks and hindquarters. Copulation only lasts a few seconds and takes place repeatedly during the day at almost hourly intervals. The female's last foal commonly observes the mating behaviour without interfering, while other mares in a breeding herd usually take little notice of the mating pair. At times the mating ritual can be rather vigorous with the herd stallion chasing the female in heat. This can lead to injuries, particularly if the available exhibit is rather limited in size. Herd stallions might also turn aggressive towards their own fillies, once these show their first oestrus period. To avoid any risks of injuries and to prevent any likely inbreeding, young female foals should be separated from the breeding herd prior to them reaching sexual maturity.

Foals are born after a gestation period of 364 to 391 days. The mare and her new-born foal can be separated from the herd for the first few days after parturition to strengthen the bond between the mother and her foal, and to avoid any risk of the foal being accidentally injured by other members of the breeding herd. If the mare and her foal are allowed to stay in the group, the mare commonly chases away all group members which approach the foal too closely.