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Zebry i kwaggi
Zebras and quaggas

[Pl. XIX—XXXIV, 4 Text-figures and 2 Tables

Since 1924, when ZUKOWSKY described the last two varieties of zebras, there was in the literature a superabundance of established forms of zebras. This happened, because every zebra, ever so slightly differently striped, on getting into the hands of a scientist was readily described as a new subspecies. Not only single specimens, often of unknown origin, but even particular parts of their body, the head for instance, gave occasion to create a new subspecies. In this way the number of described subspecific forms rose to over thirty!

Some authors have lately criticised this state of things. ST. LEGER, CABRERA, ANTONIUS, SHORTRIDGE, after having acquired better knowledge of the material at hand, and after a revision of some features, formerly considered to be stable and of racial value, came to the conclusion that the number of subspecific forms ought to be reduced, and the particular forms differently grouped. This is why we have now in modern literature several different classifications of zebras used simultaneously by various authors.

In my opinion none of the classifications presently used give a true picture. This leads me to try to establish a clear new one, as near to reality as possible and at the same time easily applied in practice.

My work is based not only on material already published but also on my own observations, abundant photographic material, and

information obtained direct from Africa in reply to an enquiry circulated among Government and Scientific Institutions and among persons investigating the African fauna or well acquainted with it.

The questionaire was despatched in July, 1939. As the war made for a long time all correspondence with Africa impossible, I had to send out the questionaire a second time in 1947.

The results obtained surpassed my expectations. Replies came from most places. The only ones I could not get replies from were Mozambique and Katanga in Belgian Congo.

I consider it a pleasant duty to express here my warmest gratitude to all Government and Scientific Institutions as well as to private persons who took the trouble to answer my questionaire or gave me assistance in any other way. I wish to thank particularly: the National Parks Board of Trustees, Pretoria; Dr. A. ROBERTS, Professional Assistant of the Transvaal Museum, Pretoria; W. H. J. RANGELEY, District Commissioner, Kotakota, Nyassaland; Capt. G.C. SHORTRIDGE, Director of the Kaffrarian Museum, Kingswilliamstown; South African Railways Publicity and Travel Departament, Johannesburg; Dr. Ir. E. C. N. VAN HOEPEN, Director of the National Museum, Bloemfontein; Mr. H. B. POTTER, Game Conservator, Mtubatuba, Zululand; Dr. R. BIGALKE, Director of the National Zoological Gardens of South Africa, Pretoria; Lt.-Col. A. FORBES, Game Warden, Khartoum; H. BAYNE, Director of the Hermann Eckstein Park, Johannesburg; Dr. E. GILLMAN, Act. Curator of the King George V Memorial Museum, Dar-es-Salaam; the Director, Game and Tsetse Control, Lusaka, N. Rhodesia; Major J. STEVENSON-HAMILTON, former Director of the Kruger National Park; Dr. E. BOURDELLE, Prof. Honor. du Musée National d'Histoire Naturelle à Paris; J. A. B. SANDENBERGH, Game Warden, Kruger National Park; Dr. G. M. VEVERS, Superintendent of the Zoological Society of London; L. S. B. LEAKEY, Curator of the Coryndon Museum, Nairobi; H. ANDREWS, Curator, Nairobi National Park; Dr. A. PRATAS, Chefe dos Serviços de Veterinária e Indústria Animal, Luanda, Angola; Capt. A. MOORE, Game Warden, Lyamungu, Tanganyika Terr.; Eng. Jerzy MORZE, Government Forest Nursery, Lusaka, Northern Rhodesia.

I wish to thank most heartily Dr Erna MOHR whose kind assistance enabled me to collect exceedingly valuable photographic material from the European Zoological Gardens.

Photographs taken in Africa were of course most valuable to me, while those from the zoological gardens were only then of importance when they represented animals brought from definite territories or those of pure breed.

I fully realise that there must be serious gaps in the material I collected, as I was not able to obtain data from all the areas inhabited by zebras. However, I believe that with the help of the available material it is already possible to make some highly probable corrections in the knowledge we had hitherto acquired.

To begin with I do not divide the genus *Equus* L. into subgeneric units, the phylogenetic relation of several equid groups not being sufficiently clear as yet. The nomenclature I use comprises: *Equus zebra*, *Equus quagga* and *Equus grevyi*. That is also why I do not introduce the subgeneric name *Dolichohippus* proposed by HELLER. I do not either use the subgeneric name *Hippotigris*, which emphasises the striping of animals, because it could lead to a quite unjustified supposition of a very close relationship of all zebras with one another. We frequently meet in literature a division of zebras into two groups: the donkeylike group to which belong the Mountain and Grévy zebras and the horselike group comprising the quaggas, but this division being founded on rather superficial observations should not be used. The same view was expressed by ANTONIUS, 1930. BOURDELLE, 1934—1936, wrote about the likenesses and differences of various forms of zebras, of the donkey and of the horse. After comparative studies of skeletons and of inner organs he came to the conclusion that the Hartmann zebra (and probably the mountain one which he did not examine) was the only one possessing the majority of asinine features. All other zebras are more like horses in their constitution. Among other features BOURDELLE mentions the asinine bowels being shorter than the equine ones but those of the Hartmann zebra are even shorter than those of the donkey (superasinine feature).

I. MOUNTAIN ZEBRAS

Owing to a characteristic colour pattern, a dewlap and a reversed direction of hair on the middle line of the back, the Mountain Zebras form a distinct, well defined group.

1. *Equus zebra zebra* LINN., 1758

Equus zebra LINN., 1758;
E. montanus BURCHELL, 1822;
E. zebra frederici TROUESSART, 1904.

Native names: Wilde Paard, dauw.

Height 120 cm. Big head. Long ears. Mane short, standing up, without frontal tuft. Tail donkeylike. Hair in the tail tuft white on the outside and black on the inside. Dewlap at the throat. Crupper round, horselike. Nostrils more extending than those of a quagga and of a donkey. Callosities flat, 12 × 7 cm, on forelegs only. Hoofs narrow, high, very hard, donkeylike. Striping black. Ground colour white. Dark stripes always broader than the adjacent interspaces. On the forehead and on the nose rust-brown striping. Muzzle brownish-black. Nostril patches reddish-brown. Between the eyes 10—12 stripes. A hair whirl on the forehead at the level of the lower eyelids. Ear tips white. On the ear below the tip one broad stripe, lower down some narrower ones. Ear below the white tip dark bordered. Tail transversally striped. Along the midline of the belly a broad greyish-brown stripe. Very narrow dorsal stripe extending down the tail. In the middle part of the dorsal stripe the hair grows in the reversed direction. This feature has never been met with in cases of other *Equidae* and has not hitherto been explained. Broad cheek stripes. Twelve stripes on neck. Two or three cervical stripes bifurcate or unite with one of adjacent stripes. The shoulder stripe bifurcated in its lower part. Between the shoulder-blade and the hip 10—12 vertical stripes, the lower parts of which end far from the ventral midline; several of these vertical stripes are bifurcated in their upper parts. On the crupper the short transversal striping forms a so called gridiron pattern. Thigh stripes very broad, much broader than the interspaces. Legs circularly broadly striped down to the hoof. The lower part of the fetlock black, owing to a fusion of stripes.

The voice of the montain zebra resembles the neigh of a horse. ANTONIUS, 1930, defines it as follows: „ein hohes, helles Gewieher, das sich von dem des Hauspferdes eigentlich nur dadurch unterscheidet, dass es weniger abgehackt hervorgestossen wurde".

Equus zebra zebra L. inhabited formerly all the mountainous regions of the west and south parts of the Cape Colony extending east as far as the Dragon Mountains.

The mountain zebra, formerly very numerous, was the first to succumb to the destructive influence of European colonisation and is now on the verge of extinction.

HAAGNER, 1921, wrote: "The Mountain Zebra ..... inhabits the mountainous country of Central plateau of Cape Colony, and localized in four districts of Province, viz., George (4 farms), 330; Oudtshorn (3 farms), 50; Sutherland (1 farm), 20, and a few in the Cradock District, making a total of not much more than 400 individuals left alive in the Cape Colony today".

In 1934, E. WARREN, director of the Natal Museum at Pietermaritzburg, kindly informed me that: "There are only some 150 animals on the Outeniqua Mountains, Cape Province, and 12 or less number at Cradock".

Equus zebra zebra L. is protected all over the Cape Colony. In 1937, the Mountain Zebra National Park was founded a few miles west of Cradock.

In reply to my enquiry the Secretary of the National Parks Board of Trustees in Pretoria kindly informed me on the 26th July, 1947, that:

"With regard to the number of Mountain Zebras protected by my Board in the little National Park for them, I regret to advise that there are only three Zebras in this Park namely two stallions and one mare, but do not feel concerned about this small number as a farm three miles away from National Park has a herd of over 50 Zebras. My Board is negotiating with the owner of this herd to obtain some from him for preservation in the Zebra Park, and we hope that our negotiations will be successfully concluded before long. In addition there are between 20 and 30 Mountain Zebras roaming in the Outeniqua Mountains between George and Oudtshoorn. To some extent these Zebras are enjoying protection by the Government as they are to be found mostly on crown land which is vested in our Government. To sum up the whole position, I think one can safely claim that there are still between 100 to 150 Mountain Zebra to be found in the Union of South Africa and one could therefore feel quite safe about their continued future existence for posterity".

In the "Cape Times" of Dec. 2nd, 1949, we read that the Scientific Advisory Council for National Parks and Nature Reserves is going to investigate the establishment in the Outeniqua Mountains of a national park where, among others, mountain zebras are to be preserved. The "Cape Times" of Oct. 26th, 1949, reports that in the private farm Dornhoek in Cradock, owned by two brothers Noel and Cecil MICHAU, the breeding of mountain zebra has proved to be most successful. From five mares and two stallions of 25 years ago their number has increased to 52 and the last season has brought no less than 10 foals.

It seems that the cooperation of the Government with private breeders may be most favourable to the preservation of the almost extinct subspecies.

In zoological gardens the mountain zebra is exceedingly rare.

In the Supplement to his Catalogue of 1904 E. L. TROUESSART records a new subspecies of the mountain zebra: "*zebra frederici*, Colonia Cap. sept. (extinctus)". This form has been based on a description of F. CUVIER and the drawing of a female zebra which lived in the Jardin des Plantes in Paris. There is no difference between the description of CUVIER and other known descriptions of the mountain zebra. The particular features of the *Zebra frederici* are only noticeable on the drawing published by CUVIER.

Of those particular features quoted by TROUESSART and later by ZUKOWSKY and ANGHI such as: the irregularity of striping on head and the gridiron pattern, the unbending downwards of the thigh stripes and the reaching of the first four body stripes as far as the ventral midline, — I think that the last one may only be considered to be of some importance; all the other — are most probably due to the inaccuracy of the drawing.

The Polish Zoological Museum in Warsaw possessed a stuffed skin of a very young foal of the mountain zebra, purchased in 1818 and described by myself in 1930, which looked like the drawing of *Zebra frederici*. That specimen could have been considered to represent the subspecies described by TROUESSART but this seemed to me at that time already rather dubious. That skin was destroyed by a fire at the museum in 1935. Its photograph is to be found in my paper. Besides this foal the features of *Zebra frederici* could be observed in the following specimens: a female from the Berlin Zoo,

a photograph of which was published in 1899 by HECK; a stuffed skin from the Museum of Stuttgart described by ANGHI in 1935; some photographs published by ANTONIUS in 1937; the stuffed skin of a stallion shot in Cradock in 1910, now exhibited at the Museum of Pietermaritzburg.

ANTONIUS, 1937, came to the conclusion that *Zebra frederici* TROUESSART cannot be considered as a separate subspecies, because its distribution area cannot be determined. In case of *Zebra frederici* TROUESS. there can only be the question of an aberration within the species *Equus zebra* L. all the more so because the most, and perhaps even the only important feature, that of the first vertical stripes reaching the ventral midline is also sometimes met in some specimens of the subspecies *Equus zebra hartmannae* MATSCHIE. A proof of the above was the mare "Hanka" from the Warsaw Zoo to which I drew the attention of ANTONIUS at the time of his visit at that zoo. He mentioned this in his later work. I fully agree with the conclusion reached by ANTONIUS and I consequently think that there is neither reason for nor possibility to separate *Zebra frederici* from *Equus zebra zebra.*

A different subspecies inhabits South West Aftrica and Angola. This one differs from *E. zebra zebra* L. by its larger size, sandy-brown ground colour and narrower striping.

2. *Equus zebra hartmannae* MATSCHIE, 1898

E. hartmannae MATSCHIE, 1898;
E. penricei THOMAS, 1900;
Hippotigris hartmannae matschiei ZUKOWSKY, 1924.

Native names: dauw, ongoro, ngolo.

Type at the Berlin Museum from the area between the Hoanib and Uniab Rivers, Kaokoveld. In 1898 MATSCHIE described a new form of the mountain zebra from S. W. Africa and named it in honour of the discoverer's wife *Equus hartmannae.*

Height 130 cm. Colour pattern, throat dewlap, reversed direction of hair along the middle line of the back, hoofs, tail, ears and callosities exactly like those of *E. zebra zebra* L. Chocolate coloured striping (MATSCHIE), yellowish brown ground colour (according to SHORTRIDGE rufous buffy, according to BLAINE "warm tone of ochraceous or sandy-buffy"). Muzzle brownish black. Nostril

patches rust-brown. Stripes on forehead, nose and front part of cheeks rust-brown (according to BLAINE liver-brown). Between the eyes 8—10 longitudinal stripes. Ground colour of the head (with the exception of the forehead), ears, chest, belly, innerside of the legs and below the "knees" and hocks — white. Light bands of the mane and light hair of the tail tuft also white. Eleven to thirteen vertical body stripes narrower (rarely broader) than the light interspaces. The oblique stripes of the hind quarters narrower as a rule than the light interspaces. Twelve broad cervical stripes. According to MATSCHIE the cheek stripes are at least as broad as the light interspaces. In my opinion this feature was of an individual character in the typical specimen because in all the other specimens which I have seen alive or on photographs the cheek stripes were always narrower than the light interspaces. The gridiron stripes narrow, pale and fading, mostly not reaching the first oblique stripes. Upstanding mane much longer than that of the *E. zebra zebra* L. According to ANTONIUS, 1930, the Hartmann zebra has a frontal tuft which makes it differ from the true mountain zebra. I believe this is a misunderstanding. The Hartmann zebras have no more of a tuft than the mountain zebras. Hartmann zebras have often long manes the front parts of which fall down the forehead thus giving an impression of genuine frontal tufts. While the mane of quaggas begins on the forehead 2—3 finger breadth below a line joining the front edges of the ears and forms the frontal tuft, the mane of Hartmann zebras, true mountain zebras, Grévy zebras and asses begins between the ears and forms no tuft. This may be seen on enclosed fig. 1.

According to BLAINE, 1922, the voice of the Hartmann zebra is like a "loud snuffing neigh or whinny".

O. THOMAS, probably ignoring the publication of MATSCHIE, 1898, described a new zebra from southern Angola and named it *Equus Penricei.* The typical specimen, a stallion, was shot by PENRICE in 1900 on the shore of the Mohingo River near Providentia, 70 km. north east of Mossamedes. A comparison of the descriptions of THOMAS and MATSCHIE does not give us any hints as to the difference of these two forms. That is why MATSCHIE, LYDEKKER, TROUESSART, SCHWARZ, BLAINE, SHORTRIDGE, MONARD and RZĄŚNICKI identify them. The remarks of BLAINE, 1922, deserve special attention because he has studied the fauna in Angola. The

specimens shot by BLAINE at the same place as the type of *E. penricei* do not differ at all from the zebra described by MATSCHIE. BLAINE lays stress on the coloration of zebras: the skin has a faded rusty appearance.

In 1924 ZUKOWSKY described a new zebra and named it *Hippotigris hartmannae matschiei*. The type a mare from the Namib near Swakopmund, Kaokoveld, lived at HAGENBECK's, 1924. According to ZUKOWSKY this form differs from *E. z. hartmannae* MTSCH. by broader black body stripes and cheek stripes narrower than the light interspaces. I have already mentioned the breadth of the cheek stripes.

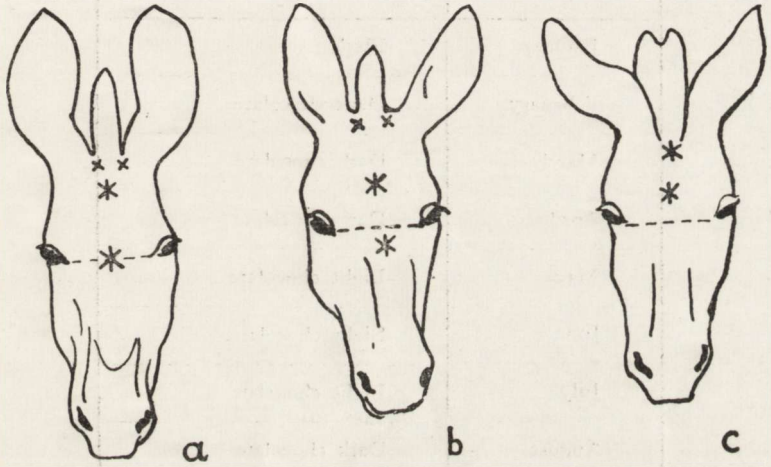

Fig. 1. Hair whirls and position of the frontal tuft in different forms of zebras: a — *E. grevyi*, b — *E. z. hartmannae*, c — *E. qu. chapmani*. (Original).

According to SHORTRIDGE, 1934, the ground colour of the Hartmann zebras of S. W. Africa becomes the darker the farther south they live. The striping may be black, sepia or liver-brown. That is why SHORTRIDGE identifies *H. h. matschiei* ZUK. with *E. hartmannae* MTSCH.

The Warsaw Zoo possessed a female zebra from the neighbourhood of Dunker Sand, Namib Desert, 180 miles eastwards from Walfishbay, that is to say from the same locality as the typical specimen of *H. h. matschiei* ZUK. and having the same appearance.

The mare came to Warsaw pregnant and soon after brought forth a filly. Both zebras lived in the zoo for over two years. Obser-

vations over a period of several years enabled me to see that mountain zebras were subject to seasonal change of coloration. The ground colour remained the same, while the colour of the stripes changed with the seasons and varied from pure black to light chocolate. The rust-brown striping on the forehead and black striping on the legs remained unaltered.

Table 1.

The changes of coloration of the stripes of the Hartmann zebra observed by the author in the course of one year.

Month	Colour of the stripes
January	Black
February	Dark chocolate
March	Dark chocolate
April	Dark chocolate
May	Light chocolate
June	Light chocolate
July	Light chocolate
August	Dark chocolate
September	Dark chocolate
October	Black
November	Black
December	Black

I am sure that the difference in coloration of the stripes cannot be a sufficient reason for establishing a separate subspecies and therefore I identify *H. h. matschiei* ZUK. with *E. zebra hartmannae* MTSCH.

The Hartmann zebra occurs in the littoral zone from Angola, at least as far north as Elephant Bay, 100 miles north of Mossa-

medes, to Little Namaqualand south of the lower Orange River. In the Kunene Valley we can meet the Hartmann zebras as far inland as the Rua Cana Falls. In the Namib Desert the zebras occur 50 miles away from the seacoast. In the northern part of S. W. Africa the Hartmann zebra occurs eastwards approaching the neighbourhood of the Otjitundua, where the quaggas predominate.

SHORTRIDGE, 1934, mentions the following localities where Hartmann zebras occur: Outjo District near Franzfontein; Otjiwarongo D. south-western part; Omaruru D. near Ugab River; Windhoeck and Swakopmund D. D. chiefly in the canyons of the Kuiseb and Swakop Rivers; Rehobot D. at the western boundary; Maltahohe D. plenty in the northern and western parts; Luderitz D. plenty, chiefly in the north; Bethanie D. in the northern and southern parts; Warmbad D. only in the western part, on both sides of the Fish River Mouth.

Results of my reaserches lead me to the conclusion that there is only one species of the Mountain Zebra (*Equus zebra* L.) with two subspecific forms: *Equus zebra zebra* LINN. and *Equus zebra hartmannae* MATSCHIE.

II. QUAGGAS

I am a decided adherent of POCOCK's view on the specific unity of the true Cape Colony quagga and all bonte quaggas or "Burchell zebras". I shall not repeat the arguments of POCOCK and ANTONIUS, because I suppose that they are known to all those who are working on zebras. All quaggas have the same form, height 130 cm, common type of striping, short erect mane, hoofs of the same shape, tail with long tuft and voice resembling the barking of a dog. Ears shorter than those of the mountain zebras but longer than horse's, with a broad black band and some blotches at the base. Tips of the ears white. Muzzle black. Nostril patches black or brown. The colour of these patches can be different even in the same herd (MATSCHIE, HAAGNER, St. LEGER, ANTONIUS, SHORTRIDGE). Dorsal line in the hind part usually broad with light border on both sides, extending over the root of the tail. On the belly a longitudinal dark band. Certain races of quaggas have the vertical body stripes connected with the middle band of the belly. The fourth, sometimes the third or fifth, vertical stripe forms with the upper

oblique stripe the so-called „saddle". The development and the extension of the shadow-stripes changes individually, hence this feature is of no systematic value. Between the eyes eight longitudinal stripes. Cheek stripes broad. Ten cervical stripes. Single or double shoulder stripe. In various races of quaggas the legs are differently striped: circularly densely and broadly down to the hoofs, or faintly and only in the upper parts; sometimes the legs are completely free of striping (in the most southern races). The fore hoofs are horselike, the hind ones are donkeylike (narrow).

The central part of the mane formed of black hair. This black hair is always longer than the white lateral tufts. The hair of the mane and tail is shed annually. Chestnuts small and flat, only on the fore legs. On the prepuce there are two warts. All zebras, asses, hemions and some races of ponies have such warts. The Przewalski horse and the domestic horse have none.

In natural environment, even at small distance, a zebra standing motionless is almost invisible because the striping obliterates the outline of its body; stripes of various width and directions break up the shape of the animal and make it inconspicuous.

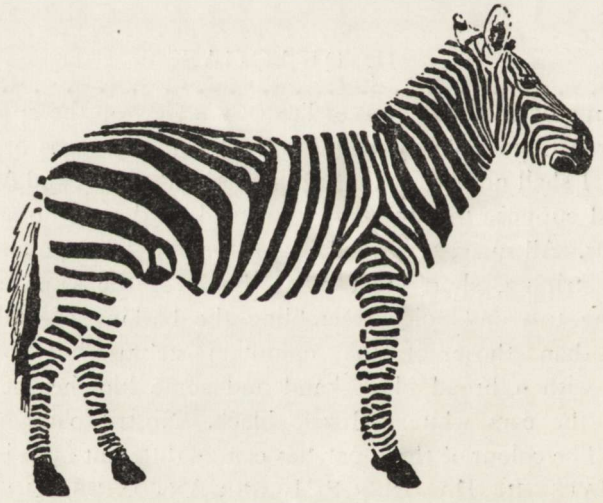

Fig. 2. The diagram of striping of the East African quagga. (From A. RZĄŚNICKI "Zebry", 1931).

The voice of a quagga sounds like a rhytmically repeated *a-ha* or *qua-ha.*

The following observation proves that the voice of the quagga is very similar to the barking of a dog.

My grandson Peter aged 1 year and 4 months who was with me during the Warsaw Rising in 1944, was certainly the smallest citizen able to imitate the voice of a zebra.

When asked: "How does the zebra cry?" he shouted in a funny way "*a — ha, a — ha, a — ha!*". Once, when we were indoors, we heard the barking of a spaniel in the street. To my astonishment little Peter began immediately to imitate the voice of the quagga. Since the child never had heard the barking of a dog the voice he heard now associated itself in his mind with the well-known notion of a zebra and an immediate reaction followed.

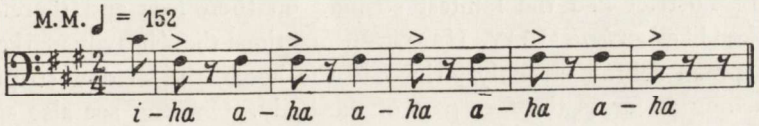

Fig. 3. The voice of the Chapman zebra noted by the author. (From A. RZĄŚNICKI, 1933).

The ground colour of the quaggas depends on their geographical distribution. The eastern races are striped black and white, while the western and southern ones have black striping on a sandy-brown ground. On the belly and legs the ground colour is pure white. The limit of the occurrence of yellowish-brown coloured quaggas in the north is the Zambesi River. This, however, must be taken only approximately, because according to the kind information of Eng. J. MORZE from Lusaka specimens from the left bank of the river in Northern Rhodesia have the same yellowish ground colour as the quaggas from the Kafue Flats. Some specimens, as for instance the mare shot by HOLUB in Barotseland, have a white ground colour. Eastwards of the Loangwa River occur quaggas with a white and black pattern. They belong to the subspecies *E. qu. crawshayi* WINT.

After shedding the hair, the brownish striping becomes always black.

The foals of the southern races differ from adult animals in their coloration.

In the Warsaw Zoo I observed the change of coloration of young Chapman zebras. The foals from birth till their second year

were of yellowish-brown ground colour with chocolate striping except the head where the stripes were black. From their second year on, the ground colour turned white and the striping light chocolate, but after the shedding the hair became brownish-black. Animals three years old had always the same coloration as adults.

CABRERA in his work on „Burchell zebras" says that "it is impossible to find two zebras exactly alike, not only in the same locality but in the same herd". Many authors confirm this view. HAAGNER, 1920, tells that the Pretoria Gardens had at times 6—8 specimens from the same herd and among those some could be determined as typical *chapmani* LAY., some as *selousi* POC., and some as intermediate forms between these two races. The zebras from the Rustenburg District had the faintest striping on their legs and therefore looked like *burchelli* GRAY. HAAGNER mentions the "heavily marked" Chapman zebras, strongly striped to the hoofs, the shadow-striping reaching as far as the fore part of the body. One can see also specimens with extremely broad striping. In those specimens the shadow-striping is always feebly developed. I believe that very broad striping is an individual feature. The Warsaw Zoo had a pair of Chapman zebras from Northern Transvaal near Messina Mine. The stallion was exceedingly broad striped. From three offsprings only one resembled the father. Among the zebras of Zululand with mostly narrow body striping there occur specimens even very broadly striped (ANTONIUS, 1934). NOACK, 1902, informs that in the herds of Kilimanjaro zebras one can see together broadly striped animals and some very narrowly striped specimens. In the Kruger National Park the zebras belong to the Chapman variety of the common „Burchell zebras"(STEVENSON—HAMILTON, 1946). The same author reported 1912 that "some animals show heavy, wide and deeply tinted shadow stripes, while others display only the slightest indications of them. Some are strongly ringed down to the fetlocks, while others have no signs at all of any markings below the knees and hocks. In some cases the body stripes are continued right round the barrel to the ventral stripe, in others they stop far short of it. The striping is usually carried right round the buttocks, but in, I should say, 20 per cent at least of the animals in each herd this is not the case". The present Game Warden of the Kruger National Park J. A. B. SANDENBERGH kindly informed me in 1947 as follows: "The zebra we have in the Park is the "*Hippotigris Burchelli Trans-*

vaalensis" (it seems that this name is used in the geographical meaning) and it abounds from the southern to the most northern portion of the Park. To the North of the Park that is in Southern Rhodesia we have the "Selous" zebra, which ..... is heavily banded right down to the hoofs. A few hundred miles South of the Park we have "Wahlberg" zebra which is very seldom banded below the knee. I have no data as to the origin of our Transvaal zebra in the Park, but if there were any influence from any of the other species, I would say most emphatically that such influence comes from the "Wahlberg" zebra and not the "Selous". In my opinion however, I think that our zebras are of a fairly pure breed, as for many years civilisation has intervened between them and the "Wahlberg" species. By the way, I note the shadow stripes between the black markings on the posteriors. It may also be of interest to know that their light colour varies from white to pale yellow or cream".

A photograph of a stuffed skin of a zebra shot near Rietfontein-West published by SCHWARZ, 1912, and a second photograph of a zebra from the vicinity of Lake Ngami published by HAAGNER, 1920, prove that some specimens occuring even in the West can outstrip in their coloration the majority of their subspecies and be phenotypically like *burchelli* GRAY which is more advanced in the development of the quagga coloration.

Major STEVENSON — HAMILTON wrote me kindly, 1933, as follows:

"I saw a Burchell zebra from Bechuanaland with unstriped legs. It was sent to the Pretoria Zoological Gardens in 1910 by Chief Khama. At the time considerable interest was aroused, but as no other of the same type was found, it was concluded that the animal (a young mare) was a "freek". It is not uncommon here to see individuals of the local Chapman type of Burchell zebra with legs nearly free from any striping, while in the same herd others are striped to the fetlocks".

ANTONIUS, 1928, in his paper on "Burchell zebras" reports that the southern races vary much more not only locally but also individually than the northern ones. Therefore it is very difficult to draw a line between the separate races.

"In diesen Tieren haben wir eine Formengruppe vor uns, die man nur verstehen kann, wenn man sie weniger vom rein deskriptiv-systematischen Standpunkt als vom phylogenetischen aus betrach-

tet. Mit anderen Worten: es handelt sich... zum Teil um einigermassen geographisch fixierte Entwickelungsstufen einer stammesgeschichtlichen Reihe, deren Anfangs- und Endglied uns vorliegt. So können diese Tiere nicht nur das rechte Kreuz des Systematikers sein, der nicht imstande ist, die Lokalrassen schärfer zu definieren, sondern auch das Entzücken des Phylogenetikers, der an ihnen ein lebendes Beispiel für eine augenblicklich in sehr deutlicher Umformung begriffene Art vor sich hat". (ANTONIUS).

I believe that the opinion of ANTONIUS is the only right one It appears therefore that the only possible way is to divide all quaggas into a few distinct subspecific groups and retain several former names for phaenotypical varieties. I retain thus the subspecific name *E. qu. böhmi* MTSCH. with the phaenotypical designation *granti*, *E. qu. chapmani* LAY. with *wahlberi* and *selousi*, and *E. qu. burchelli* GRAY with *antiquorum*.

1. *Equus quagga böhmi* MATSCHIE, 1892

Equus Böhmi MATSCHIE, 1892;
E. Burchelli Granti de WINTON, 1896;
E. burchelli subsp. *mariae* PRAZAK, 1898;
E. chapmani selousi NOACK, 1902;
E. chapmani jallae CAMERANO, 1902;
E. muansae MATSCHIE, 1906;
E. quagga var. *goldfinchi* RIDGEWAY, 1911;
E. quagga cuninghamei HELLER, 1914;
E. borensis LÖNNBERG, 1921.

Native names: common zebra, punda milia, ol-oitigo, nyagi.

MATSCHIE described this zebra after a skin brought by the painter KUHNERT from the vicinity of the Pangani River, East Africa, and after some descriptions and water colour drawings of BÖHM.

The Böhm zebra has black or brown striping on a white ground. Legs circularly, densely banded down to the hoofs. The lower part of pasterns black owing to fusion of the stripes. The striping on the hindquarters very broad, at least as broad as the white interspaces or even broader. Vertical stripes connected with longitudinal band of the belly. The dorsal stripe broad; its hind part has white borders. The root of the tail strongly marked. The tail tuft black. On the thighs faint shadow - striping. On the ears a broad dark band; tips of the ears white. Muzzle black.

The type locality of Böhm zebra is the basin of the Pangani River.

L. HECK, 1925, defined as Böhm zebras all East African quaggas which possess shadow-striping on the hindquarters and legs strongly banded down to the hoofs. ANTONIUS, 1928, defines as Böhm zebras all black stripped quaggas with white ground colour which live north of the Zambesi River. His definition is independent of the shadow-striping, though he admits that the northern specimens usually are devoid of it.

In 1896 DE WINTON described a new variety of the quagga from the Thika River Valley, Masailand, British East Africa, and named it *Equus Burchelli Granti*. Type in the British Museum.

According to the description of DE WINTON, Grant zebra has a general pattern of the stripes as the Chapman zebra but has much narrower light spaces between the broader black or chocolate coloured stripes on the haunches with no intermediate shadow stripes.

It follows from the descriptions of other authors that the so called Grant or common zebra has circularly and densely striped legs down to the hoofs, the dorsal longitudinal band usually very broad, the vertical body stripes connected with the longitudinal middle band of the belly. The root of the tail striped. The tail tuft black.

I examined 190 zebras from Southern Abyssinia, British Sudan, Uganda, Kenya Colony and the Tanganyika Territory: 36 animals (18,9%) had shadow-striping on the hindquarters. According to their geographical distribution 11 out of 103 Grant zebras (10,6%) had the shadow stripes and 25 of the 87 (28,7%) Böhm zebras had none.

In 1947 Curator H. ANDREWS, Nairobi, sent me kindly the following information about zebras from the Nairobi National Park and the Olorgesaile Prehistoric Site.

The zebras all over that area belong to the same variety. The ground colour white, striping black. The stripes are broad on hindquarters about the same breadth as the white interspaces (Olorgesaile) or slightly narrower (Nairobi National Park). The lower ends of vertical stripes reach the midline of the belly. The zebras in the Nairobi National Park have a shadow-striping; in Olorgesaile Site only one individual in a herd of 20 had shadow stripes on hindquarters. All four legs striped down to the hoofs circularly, rather

narrowly. The colour of the legs just above the hoofs is dark. Tail striped. Tail tuft black. Hind part of the spinal stripe broad.

I must state that shadow-striping of the East African zebras is of no racial value.

I believe that the zebras from Abyssinia, Sudan, Uganda, British East Africa and the Tanganyika Territory all belong to the same subspecies of the quagga and should be named *Equus quagga böhmi* MATSCHIE, 1892.

ST. LEGER, CABRERA and ANTONIUS identify *E. quagga granti* WINT. with *E. quagga böhm* MTSCH.

In my opinion the phaenotypical name of *granti* could be used for broad striped specimens without shadow-striping on the thighs.

In 1898 PRAZAK described a new variety of zebra from the region between L. Victoria and L. Tanganyika and named it *E. burchelli mariae*. This zebra was exceedingly narrowly striped. In 1910 ROUX described and placed in the same subspecies a zebra specimen from the vicinity of L. Naivasha (Aberdare Range). The stuffed skin of that zebra is at present in the Bâle Museum. For geographical reasons the zebra described by ROUX must be referred to *böhmi (granti)*. The zebra described by PRAZAK comes from the range of typical Böhm zebras and differs from others by its narrower striping only. Therefore the variety *mariae* PRAZAK should not be discriminated.

In the Torino Museum there is a skin of a zebra from the southern part of Abyssinia described by CAMERANO, 1902, as a new subspecies *Equus chapmani jallae*. This zebra is black striped and has one or two more vertical stripes than *granti*. According to CAMERANO the range of *jallae* lies between L. Zwai, the Omo River, L. Rudolf and the Northern Guaso Nyiro River. Thence the zebras from the Kajsoot Desert, in the same range must have 4 to 5 vertical stripes. As we can see on the photograph of Martin JOHNSON (Safari, 1928) no animal is different from the common Grant zebra. On the other hand, the stallion from the steppe near Nairobi which lived in the Washington Zoo had even five vertical body stripes. In my opinion *E. chapmani jallae* CAM. is a synonym of *E. qu. böhmi* MATSCHIE.

LYDEKKER, ROUX, CABRERA and ANTONIUS identify this form with the Böhm zebra.

The different head striping of a zebra shot in the vicinity of the Duma River, flowing into the L. Victoria Nyanza, made MATSCHIE, 1906, to describe it as a new subspecies of zebra which he named *Equus muansae*. I agree with GRIFFINI in that the difference of the striping of the head only of a single specimen is by no means a sufficient reason to establish a new subspecies.

RIDGEWAY, 1911, described *Equus quagga* var. *goldfinchi* from the vicinity of L. Nakuru. The zebra was shot by GOLDFINCH. It belonged to a herd all the specimens of which had a large white patch on their backs. LYDEKKER (DOLLMAN), 1926, and CABRERA consider this zebra as an abnormally coloured specimen of the common zebra. I think that these animals must have been partial albinos.

The Washington Museum possesses a skin of a young zebra stallion shot at Archer's Post near the Northern Guaso Nyiro River. Owing to its different coloration HELLER, 1914, established a new subspecies of quagga and named it *Equus quagga cuninghamei*. This zebra has a bistre or light chocolate striping on yellowish ground. "The lighter colour of the dark stripes is no doubt due to the arid conditions to which the Northern Guaso Nyiro race is subject. The old specimens are darker striped but not so deep black as in *granti*". (HELLER).

The range of *cuninghamei* is according to HELLER between the Lorian Swamp, the Loroghi Mountains and the Tana River.

The Polish Zoological Museum in Warsaw possesses the skin of the head and neck of a stallion shot by T. HALPERT, 1913, near the Northern Guaso Nyiro River. This zebra is light chocolate striped on white ground and resembles the original description of DE WINTON.

ST. LEGER and CABRERA are quite right identifying *E. qu. cuninghamei* with *E. qu. böhmi* MATSCHIE.

LÖNNBERG, 1921, described a new variety of a zebra and named it *Equus borensis*. The type is a skin of a stallion shot 30 miles eastwards from the Bor River in the southern part of the British Sudan. This zebra differs from the common race in that it has no mane. A mare with a foal, also without mane, accompanied the stallion.

In reply to my letter Lt. Col. A. FORBES, Game Warden, Khartoum, informed me kindly that in the Southern Sudan in the same herd some specimens have manes, others have none.

He writes: "The zebras are all one species in this area which extends from a line drawn west through Akobe over to the Nile and south to Uganda and Kenya border. They migrate at certain seasons of the year. Ground colour is white. The stripes black but go rather brown at certain seasons. Striping is broad, getting narrower down legs and neck. Black stripes are broader than white on neck and legs". Unfortunately Lt. Col. A. FORBES does not explain the lack of the mane in some specimens. I suppose that it is an anomaly in the shedding of the hair. It is possible that the annual shedding of the hair of the mane does not occur simultaneously for all the animals of the herd. I saw zebras of the "common" race some of which had at times a mane partly long and partly short. I think that *E. borensis* LÖNNBERG is a synonym of *E. qu. böhmi* MATSCHIE.

The range of *E. quagga böhmi* MATSCHIE begins in the Southern Sudan and Southern Abyssinia and extends over Uganda, Kenya Colony and the Tanganyika Territory. The southern limit of the Böhm zebra cannot be defined exactly. South from the Rowuma River occurs probably the *crawshayi* race, i. e. the same race as in the Nyasaland. In Northern Rhodesia *E. qu. böhmi* meets the Zambesian race which we find as far east as the basin of the Loangwa River.

2. *Equus quagga zambesiensis* (PRAZAK) TROUESSART, 1898

Basing himself on an unpublished work of PRAZAK, TROUESSART, 1898, described a zebra from Barotseland, north bank of upper Zambesi (Northern Rhodesia) and named it *Equus Burchelli* subsp. *zambesiensis*. Type (a stuffed skin), shot by HOLUB in Mashupia Umgwesi Valley, is in the Paris Museum.

This zebra has black striping on a yellowish ground. The stripes are of nearly the same breadth as the light interspaces and join the longitudinal band on the belly. All four legs circularly densely striped down to the hoofs. The fetlocks black. Tail tuft black. Muzzle dark brown. Shadow-striping sometimes distinguishable on the thighs.

TROUESSART compares *E. qu. zambesiensis* with *selousi* POCOCK and *crawshayi* DE WINTON. He considers these races to be closely allied. The described form differs from *selousi* by its black stripes, which even on the hindquarters are of the same breadth as the light

interspaces, by black fetlocks and black tail tuft. It also differs from *crawshayi* by narrower and less dense body striping (four vertical stripes instead of four to seven), by darker fetlocks and a lighter ground colour. In consequence TROUESSART considers *zambesiensis* as a new subspecies of the quagga.

TROUESSART's data require some correction. It follows from POCOCK's original description of *selousi* that this form has also black fetlocks and a black tail tuft. From the description of DE WINTON it appears that the ground colour of *crawshayi* is nearly white or pale fawn, but never "très foncé" as thinks TROUESSART.

Besides the two Paris skins HOLUB brought to Europe two more skins from the same locality, viz.: one of a female zebra which is now stuffed in the Budapest Museum and was determined as *böhmi*, and another of a stallion, stuffed and exhibited in the Vienna Museum, identified as *selousi*.

C. G. ANGHI informed me kindly that the ground colour of the mare in Budapest is dirty white. As far as I can judge from a photograph the animal has uniform striping, broader than the light interspaces, without any shadow-striping. The Vienna specimen has on the upper parts of the body yellowish ground colour and a black, also more or less uniform, body striping.

BRASIL and PENNETIER, 1910, identified as *zambesiensis* a female zebra shot in 1900 by G. VASSE on the right bank of the Pungwe River (Mosambique). Skin in the Rouen Museum. The skull of this specimen was described by RICHARD in 1942.

From Eng. J. MORZE at Lusaka I received an excellent photograph of the skin of an adult female zebra shot by him on the Kafue Flats, Mumbwa District, Northern Rhodesia. J. MORZE gives the following information on the coloration of that zebra. The ground colour all over the body light sandy-grey, on the belly white. Striping uniform, black broader than the light interspaces, reaching on all four legs down to the hoofs. On the forehead striping yellowish brown. Vertical body stripes four to five, connected with the longitudinal band of the belly. No shadow-striping.

A second photograph which I have received from the Direction of Game and Tsetse Control at Lusaka represents a zebra foal approximately five weeks old, typical for the race occurring on the Kafue Flats, Northern Rhodesia. The photograph was accompanied by an explanation: the ground colour of the skin is dirty white, al-

most cream, and the horizontal flank stripes are red-brown, while the rest are black. The shadow stripes on the thighs disappear as the animal matures. The foal is relatively narrow striped. The leg striping circular, dense, reaching down to the hoofs. Fetlocks black. Probably the white colour depends on the young age of the animal.

ST. LEGER recorded that a zebra skin from Namwala District of Northern Rhodesia, southern bank of Kafue River, collected by Cpt. PITMAN should be considered as belonging to the subspecies *zambesiensis*.

I think that the zebras found all over Northern Rhodesia are quite different from *böhmi*, *crawshayi* and *chapmani*: therefore they ought to be considered as a separate subspecies of the quagga.

The range of *E. qu. zambesiensis* (PRAZAK) TROUESSART reaches eastwards the Loangwa basin; southwards it extends to the range of *chapmani* (phaenotype *selousi*).

Both CABRERA and ANTONIUS determine all four HOLUB's skins as *böhmi* and the sk'n from the Rouen Museum as *selousi*. We must take into consideration that CABRERA's "*selousi*" is quite different from the original description of POCOCK used by ANTONIUS and thus the same sk'n was designated by the same name taken in two different meanings.

HAAGNER states that in the basin of the Pungwe River lives Crawshay zebra. I therefore consider that the skin preserved at Rouen belongs to the subspecies *crawshayi* WINT.

3. *Equus quagga crawshayi* DE WINTON, 1896

E. Burchelli Crawshayi DE WINTON, 1896;
Equus annectens ROTHSCHILD, 1906;
Equus Foai TROUESSART and PRAZAK, 1899.

Native name: mbidzi.

Type: a skin from Henga, Nyasaland (British Museum).

According to DE WINTON *E. qu. crawshayi* occurs in the highlands of Nyasaland west of L. Nyasa.

"General pattern of the stripes as in *E. Burchelli Chapmani*, but having the dark stripes upon the haunches of about the same width or slightly broader than the intervening spaces with no intermediate shadow-stripes whatever ..... Stripes of the body almost pure black; ground-colour varying from nearly pure white to pale fawn".

These features are not sufficient to recognize the subspecies *crawshayi*. GREGORY distinguishes in his paper two forms: *crawshayi* and *granti* but makes a mistake in the identification of the published photographs of the same animal, saying first that the picture represents Grant and then that it is Crawshay zebra. It is evident that he had no sufficient knowledge of the features of the two forms necessary to differentiate them.

We can explain the value of the features of *E. qu. crawshayi* only when we know the descriptions of many other authors.

According to the opinion of POCOCK, 1897, and of ST. LEGER the striping of *crawshayi* is everywhere broader than the light interspaces. ST. LEGER determines *crawshayi* as a comparatively narrow striped zebra, narrower than *böhmi*. "Ground-colour cream, white to buffy; dark stripes seal-brown to almost black. Dark and light stripes nearly equal in width". The root of the tail striped. Legs heavier striped than in *selousi*. LYDEKKER ascertains that *crawshayi* has more vertical stripes than *granti*.

From the above mentioned descriptions we can very well picture the zebra from Nyasaland, namely: a white or buffy coloured zebra strongly striped black down to the hoofs, with four to seven vertical stripes and comparatively narrow striping. That is the Crawshay zebra!

The same subspecies lives in the northern part of Mozambique. The range of this zebra extends probably southwards as far as the environs of Beira and the Pungwe River while in the North its limit is the Rowuma River.

The available photograph of Crawshay zebra was published by EWART, 1897, and after him by GRIFFINI, 1913.

CABRERA does not distinguish the northern specimens of *crawshayi* from *böhmi* and the southern specimens from the "narrow striped" *selousi* and named these zebras "the Zambesian race".

I should say that the „Zambesian race" of CABRERA is quite different from the description of *E. qu. zambesiensis* PRAZAK and TROUESSART. Selous zebra as POCOCK ascertained has very broad striping on the thighs.

ROTHSCHILD, 1906, described a new zebra *Equus annectens* from the vicinity of Fort Jameston, N. W. Rhodesia. This zebra has comparatively broad striping and narrow light interspaces. Type in the Tring Museum.

HAAGNER published in his book a photograph of a young zebra stallion from the steppe between L. Mweru and L. Bangweolo. This animal was identical with the above described *Equus annectens*. HAAGNER determined it as *crawshayi*. SCHWARZ identifies *annectens* with *crawshayi*. LYDEKKER says that *annectens* is probably very closely related to or identical with the Nyasa zebra. I think that *E. annectens* is a synonym of *E. qu. crawshayi* WINT.

In 1899 TROUESSART and PRAZAK described a zebra shot by E. FOA in the mountainous country of Angoni on the northern bank of the lower Zambesi River and named it *Equus Foai*. The skin and the skull are in the Paris Museum. This zebra is very strongly striped. Vertical stripes, eight to nine, are connected with the longitudinal band of the belly. Legs circularly striped down to the hoofs. A drawing of this zebra was reproduced by GRIFFINI in his book.

SCHWARZ supposed that *E. foai* may be a new species of zebra.

LYDEKKER believes that *E. foai* is "nearly allied to *crawshayi* or *selousi* or it may be only an abnormally marked specimen of one of these races". CABRERA identifies *E. foai* with *selousi* (nec POCOCK!).

Since we know no other specimen resembling the zebra shot by FOA I suppose on ground of geographical considerations that *E. foai* is an abnormally striped Crawshay zebra.

In 1947 W. H. J. RANGELEY, District Commissioner, Kotakota, Nyasaland, informed me kindly that "in the Nyasaland Protectorate lives only one race of zebra (*crawshayi* = *annectens*) with possible intergradation at northern and southern limit of territory. Northern limit of *crawshayi* and southern limit of East African *böhmi* not ascertained. If these two races are distinguishable, intergradations probable. The approximate number of zebras in the region perhaps two thousand in Kotakota and Kasungu Districts and one thousand in rest of Nyasaland. Ground-colour white to creamy, striping broad, black. Dark stripes are broader than the pale interspaces. The lower ends of the vertical stripes connect the midline of the belly. The legs striped down to the hoofs broad, dense and circularly. The colour of the legs just above the hoofs is dark. Tail tuft mostly black. Spinal stripe narrow. The shadow stripes not applicable".

J. MORZE, 1948, informed me that in the mountainous part of the Mpika District lives a white and black striped zebra commonly named *crawshayi*.

4. *Equus quagga chapmani* LAYARD, 1865

Equus Chapmanni LAYARD, 1865;
Equus Burchelli Selousi POCOCK, 1897;
Equus Burchelli Wahlbergi POCOCK, 1897;
Equus Burchelli transvaalensis EWART, 1897;
Equus Burchelli Pococki BRASIL et PENNETIER, 1908;
Equus (Hippotigris) kaufmanni MATSCHIE, 1912.

Native names: dube, chabese, bihe, ongolo, ongoro, kangolo.

Type (no longer in existence) skin of a female zebra shot in Northern Bechuanaland "about half way between Mafeking and Botletle River" sent by T. BAINES to Sir J. E. GRAY (British Museum) together with drawings and a description. Sir GRAY determined it as the skin of a mountain zebra. At present neither the skin nor BAINES' photograph and drawings are available, therefore the determination of this subspecies described and named by LAYARD *Equus Chapmanni* must be based on the opinion of CHAPMAN and BAINES.

I do not think it is possible to disregard the opinion of SCLATER who, after hearing a communication at the meeting of the Zoological Society of London, remarked that the female zebra in the Society's Gardens, presented in 1861 by Sir George GRAY which he referred to as *Equus burchelli*, "appeared to answer the description above given in every way and most probably be referred to *Equus chapmani*". SCLATER showed a drawing by WOLF representing that animal.

CABRERA is against considering the animal on this drawing as a neotype, because it represents an animal of unknown origin, while "neotypes must logically be topotypes". I venture to say that the view of CABRERA is not correct. WOLF's drawing corresponds exactly to the description of CHAPMAN and BAINES. Therefore it may be considered as representing the neotype of *E. qu. chapmani*. Otherwise we should logically ask why does *antiquorum* H. SMITH represent a type: the drawing published by H. SMITH on which *antiquorum* is based, represents an unknown specimen, and CABRERA does not question it.

CHAPMAN met the zebras, which later received his name, between Damaraland and Matabeleland. The specimens with striped legs were first met inland from Walfish Bay about 200 miles from the coast.

The following extracts from J. CHAPMAN'S diary dated 1862, and from that of T. BAINES, 1862—63, quoted by LAYARD characterize very well the zebra discovered by CHAPMAN.

„The Quaggas here ....., are different to any we see described in books of natural history ..... The stripes are of a very deep rich brown, nearly black; while the ground-colour is raw sienna on the upper parts ....., but gradually fading into white on the lower parts ..... The pastern joints are brown ..... On the thighs the stripes are alternately pale brown and deep brown ..... A longitudinal dark band traverses the whole length of the belly ..... From out of this ventral line diverge the transverse lines tending towards the dorsal line, but not connected therewith. On the legs the stripes ..... are distinctly, though sometimes only faintly, visible to the hoofs in this specimen (shot by CHAPMAN). Others are more strongly marked". (CHAPMAN).

"This was at Dakà .....".

"Thursday, 17th, Matietue River. CHAPMAN had shot a Quagga mare; ..... The general colour was yellowish or raw-sienna brown on the upper parts, and deepest on the rump, fading into white on the neck, belly and legs; the stripes were of the deepest brown or nearly black, and the difference between this and the known varieties consisted in their being continued quite down to the hoof on all four legs, slightly fainter on the inside; the belly was marked by a broad black band along the centre, to which all the side stripes were joined; on the back was a similar black line, but only the stripes above the shoulder were connected with its ..... There are intermediate brown stripes between the black ones on the hind legs above the hough".

"Saturday, July 19th ..... CHAPMAN brought down a fine young Quagga stallion of the same kind as the mare previously killed; but age, I suppose, not having deepened the colours, its whole body was of the purest white, marked with jet-black bands down to every hoof, in the manner of the other but slightly fainter on the inside of the legs, and also where the stripes of the sides joined to the longitudinal line of the belly, some of those on the flanks having these points so faintly marked that the junction could not be called complete .....".

"Tuesday, 14th April, 1863 (after our return to the salt-pan on the elevated plain between the Zambesi and Botletle Rivers).

I shot ..... a well-grown, handsomely marked filly of the first year. It is perfectly marked after the manner of Quaggas in this locality, but not so fully as those of Daká and the Zambesi ..... the legs ..... are marked with transverse bands, quite down to the hoofs; ..... the dark stripes on the rump are alternated with others of a medium brown, but those on the fore part of the body and neck are of a full deep black".

The skin of this filly was sent by BAINES to Sir GRAY ands came to London in a very bad state.

Now we can see that the subspecies of *E. qu. chapmani* LAYARD has a very distinct appearance and therefore deserves to be considered as a separate form.

ANTONIUS, 1940, decidedly separates this subspecies from other. CABRERA and ST. LEGER unite it with *antiquorum*. ST. LEGER gives the name *chapmani* to the zebras from the Daká and the Wankie Districts. As for all other zebras met south and west of the above mentioned localities, regardless their complying with the original description, ST. LEGER refers them to the subspecies *antiquorum* H. SMITH, and asserts that the typical skin and the drawing of WOLF are identical with the drawing of SMITH.

CABRERA agrees with ST. LEGER as to the identity of *chapmani* and *antiquorum*, but he calls attention to the erroneous use by ST. LEGER of the name *chapmani* for the strongly striped zebras from the Daká and Wankie Districts only. They must be called *selousi* (nec POCOCK!).

The identification by CABRERA and ST. LEGER of the two above mentioned subspecies is the result of a wrong definition used by these authors, which differs considerably from the one generally accepted. „*Antiquorum*" ST. LEGER — CABRERA is quite different from *antiquorum* H. SMITH!

The occurence of Chapman zebras in Angola must be thoroughly discussed. IVEN and CAPELLO (quoted by MATSCHIE, 1898) recorded that in Angola there are quaggas with legs striped down to the hoofs. MONARD, 1935, states definitely that in Angola, besides the mountain zebras, there are quaggas belonging to two different subspecies, namely (according to the classification of SCLATER) *chapmani* and *antiquorum*. MONARD says that the Chapman zebra with legs fully striped down to the hoofs is the variety „la plus fréquente dans la

colonie". Formerly these animals could also be met in the northern and central parts of Angola. Now they live in the South only.

— "Nous l'avons vu en plusieurs endroits et nous pouvons affirmer sa présence dans les points suivants: environ de Kasinga, région de Luséké et de Kapelongo, surtout rive droite du fleuve; région de Huila et le long du Kunene, de Dongoena à Ruacana; région de Nauilla (Dombodola); région du Kuvelai supérieur et du Mui".

The Polish Museum of Zoology in Warsaw received in 1931 from Mr. DEKAŃSKI a skin and a skull of a stallion shot near the Boer settlement Humpata, Huila District. The skin is very much like that of a stallion from Northern Transvaal, which was in the Zoo in Warsaw. Both zebras have the same raw-sienna brown ground-colour and black striping with brownish intermediate striping on the hindquarters. The legs striped down to the hoofs. The skull measurements are nearly identical.

Table 2

Skull measurements of zebra stallions from Transvaal and from S. Angola.

Nr.	Measurements in cm.	*chapmani* Transvaal	*chapmani* S. Angola
1	Basilar lenght	48	48
2	Vertex lenght	53	55
3	Frontal width	20	20
4	Cephalic index	42	41
5	Cranial length	18	19
6	Craniocephalic index	39	40
7	Facial length	38	38
8	Faciocephalic index	79	79
9	Foramen magnum to vomer	13	13
10	Vomer to palate	12	12

A photograph of a zebra foal from a farm near Mossamedes (PASZKOWICZ) shows legs striped down to the hoofs.

S. NEWTON SILVA, 1942, published a photograph of zebras from Angola and determined them as "*H. q. antiquorum*", perhaps following CABRERA's classification. I believe that this photograph is one more proof of the existence of Chapman zebras in Angola: all the specimens shown on the photograph have strongly striped legs.

ANTONIUS, 1940, wrote: „Eine offene Frage bleibt noch die geographische Abgrenzung von *antiquorum* gegenüber dem am oberen Sambesi räumlich benachbarten nordsambesischen Typus. Am Inquisi (Umgwesi) — Fluss nördlich der Victoriafälle kommt bereits das typische Böhmzebra vor, denn die von HOLUB dort erbeuteten Stücke der Museen von Paris, Wien und Budapest, für die der Artname "*zambeziensis*" aufgestellt wurde, fallen, wie auch CABRERA betont, durchaus in den Rahmen von *böhmi*. Anderseits bekam ich von O. GRAEBER das Bild eines aus dem Hinterland von Angola stammenden, über Lobito in den Handel gekommenen Zebras, das in seiner sehr starken Streifung fast an *selousi* erinnert (Abb. 8). Es bleibt also noch festzustellen, ob der Oberlauf des Sambesi tatsächlich die Verbreitungsgrenze zwischen *antiquorum* und *böhmi* bildet, wie ich in Übereinstimmung mit CABRERA bisher angenommen habe, oder ob nicht auch dort eine dem östlichen *selousi* entsprechende Übergangsform vorhanden ist".

I am of a different opinion. I define the zebras of Northern Rhodesia as belonging to a separate subspecies named *E. qu. zambesiensis* which differs both from *böhmi* and from *chapmani*.

I informed ANTONIUS that there was evidence that far to the West, in Southern Angola there were quaggas with legs striped down to the hoofs; ANTONIUS replied that my statement that there were Chapman zebras in Angola agreed with what he had expected. In 1912, MATSCHIE described a new zebra from the Caprivi Stripe, S. W. Africa as *E. (Hippotigris) kaufmanni*. The type specimen in the Berlin Museum, shot between the Chobe and the Zambesi Rivers, differs from *zambesiensis* by the head striping, broader neck striping and narrower white hair tufts in the mane. On the head the ground colour is white. I have reasons to suppose that the above mentioned zebra has legs striped down to the hoofs, because MATSCHIE compares his *kaufmanni* with the fully striped Zambesian race. ZUKOWSKY, 1924, says that Kaufmann zebras were met by

WILHELM in Kungweveld near the Okawango River, in Hukweveld and in Angola. These zebras differ from *antiquorum* by blacker striping only. Since the ground colour of *antiquorum* is said to be brownish, I can assert that Kaufmann zebras have also the same coloration. SHORTRIDGE identifies *kaufmanni* with *zambesiensis*, and CABRERA with *antiquorum*. In my opinion this zebra must be considered as belonging to the subspecies *chapmani*.

The zebra shot by SELOUS near the Manyami River, Mashonaland, S. Rhodesia, was described by POCOCK, 1897, as belonging to a new subspecies, named *Equus Burchelli Selousi*. Type: skin in the British Museum.

Ground colour yellowish, striping brownish-black, on the neck broad, on the body broader than the light interspaces, on the haunches twice broader than the interspaces. The tail tuft black. The leg striping does not any distinct reduction. ANTONIUS affirms that the reduction of striping on the legs can also be observed in *selousi*. According to POCOCK Selous zebra differs from Chapman zebra by its stronger striping and darker coloured fetlocks only.

CABRERA's definition does not correspond to the original description of POCOCK. CABRERA says that in case of *selousi* „stripes and interspaces on neck and body narrow and numerous, cervical stripes 10—13, vertical 4—8". Therefore CABRERA's "*selousi*" belongs to the narrowly and densely striped form. CABRERA gives for his "*selousi*" the following range: the steppes on both banks of the lower Zambesi River, east of the Victoria Falls and Portugese East Africa be ween the Rowuma and the Limpopo Rivers.

I believe that CABRERA's determination is wrong: southward from the Rowuma River as far as the Pungwe River occurs Crawshay zebra and in Southern Rhodesia, south of the Zambesi River the Selous zebra. Since we cannot separate geographically *selousi* POC. from *chapmani* LAY. and we often meet the phaenotype of *selousi* in the same herds with *chapmani* I suppose that we can unite both these phaenotypical forms — *selousi* and *chapmani* — and regard them as one subspecies, namely *Equus quagga chapmani* LAYARD. The phaenotypical name *selousi* may be retained for strongly marked specimens.

The Rouen Museum possesses a skin of a broadly striped quagga from an unknown locality with quite stripeless legs, white tail tuft and a well developed „saddle". The skin was described by BRASIL and PENNETIER, 1908, and named *Equus Burchelli Pococki*. A simi-

lar specimen, a stallion, also from an unknown locality, purchased by C. HAGENBECK was in the Jardin d'Acclimatation in Paris. I have in my collection a photograph of a quagga which was from 1907 to 1909 in Stellingen. ZUKOWSKY informed me that the animal came from the eastern part of British Bechuanaland and was determined as a true Burchell zebra, owing unstriped legs. This specimen resembles *E. Burchelli Pococki.*

This animal could be regarded, for geographical reasons, as one of the last representatives of the subspecies *burchelli*, but its appearance resembling that of the Rouen specimen compels us to define it rather as a faintly striped Chapman zebra just as the two specimens held for *E. Burchelli Pococki.*

SHORTRIDGE believes that the Pocock zebra lived formerly in the Great Namaqualand.

POCOCK, 1897, described a new zebra from Zululand and named it *Equus Burchelli Wahlbergi.* Type-skin in the British Museum.

The vertical stripes broader than the light interspaces; the stripes on the hindquarters narrow, nearly of the same width as the shadow stripes. Shadow-striping extends sometimes as far as the shoulder-blade. The ground colour whitish or yellowish-brown, on the belly and legs white. The striping brown and black. The body stripes connected with the longitudinal band of the belly.

ANTONIUS recorded that 50% of the Zulu zebras have an irregular netlike pattern on the thighs. I must say that the same pattern may be seen in some typical Chapman zebras. Legs faintly striped. Fetlocks white. Spinal stripe narrow.

ANTONIUS says that the Zulu zebras though living in an isolated area do not belong to a uniform type. Together with the typical *wahlbergi* we may see in the same herds phaenotypical specimens of the *chapmani* and even *burchelli* race. Some animals have an intermediate pattern of striping.

CABRERA refers the Zulu zebras as well as the Chapman zebras to *antiquorum* SMITH.

ANTONIUS, 1934, considers the Umfolozi Game Reserve to be the type locality of *wahlbergi.* In May, 1947, I received the following information from H. B. POTTER, Game Conservator, Mtubatuba, Zululand: "At present the zebras only occur in the Hluhluwe Game Reserve. They had lived formerly in the Umfolozi Game Reserve, thirty miles south of the Hluhluwe Reserve; but these have all been

shot as part of the Nagana Research Policy. A few Wahlberg zebras are still to be found in the Mkuzi Reserve, sixty miles north of the Hluhluwe Reserve. Ground-colour creamy, striping black, broad on hindquarters and neck. The lower ends of the flank-stripes reach as far as the midline of the belly. Shadow-stripes only on hindquarters, very strong and distinct in the Wahlberg zebras, extending to neck very plainly in the *transvaalensis*, fainter in the *chapmani*. Legs striped only in their upper part; few stripes very occasionally between „knee" and fetlock. Spinal stripes narrow. Tail laterally spotted. Tail tuft white with a few black hairs".

As we see POTTER distinguishes three subspecies of zebras in Zululand. The common native name of all zebras is dube.

The subspecies *E. burchelli transvaalensis* was based by EWART, 1897, on a female zebra from northern Transvaal similar to *wahlbergi* but with shadow stripes reaching as far as the neck.

In my opinion *transvaalensis* is a synonym of *chapmani* because the degree and extent of the shadow-striping is of no racial value. In Africa the subspecific name *transvaalensis* is often used to define the Transvaal zebras.

Summing up the above I have reached the conclusion that there is only one subspecies *Equus quagga chapmani* LAYARD with three phaenotypical forms, namely: *chapmani*, *selousi* and *wahlbergi*.

The range of the subspecies *E. qu. chapmani* LAY. comprises: the greater part of Southern Angola, the northeastern part of S. W. Africa, Northern Bechuanaland, Southern Rhodesia, Southern Mozambique, Orange Free State, Transvaal and Zululand.

5. *Equus quagga burchelli* GRAY, 1825

Asinus Burchelli GRAY, 1825;
Hippotigris antiquorum H. SMITH, 1841;
Equus burchelli paucistriatus HILZHEIMER, 1912;
Hippotigris chapmani kaokensis ZUKOWSKY, 1924.

Some native names: bonte quagga, mbidzi, ngolo, ongorlo-ondongama, sivaradi, bihe, quaha.

In 1825 GRAY described the bonte quagga met by BURCHELL on both banks of the Vaal River.

The type specimen shot near Little Klibbolikhoni Fontein (Modder River, Bechuanaland) is no longer available in the British Museum.

From GRAY's original description we know that the ground colour in this race is whitish (on the enclosed plate yellowish), on the belly and legs white; striping narrow, not reaching the midline on the belly; ten cervical stripes, one shoulder stripe and four vertical stripes. On the hindquarters below the oblique stripe which extends to the base of the tail there are some narrow stripes. The legs entirely free of striping. The shadow-striping either absent or heavily marked, reaching even the neck. In reality the ground colour of the Burchell zebra is often sienna-brown. (ANTONIUS, 1928). A strong reduction of the leg and thigh striping is the most characteristic feature of this subspecies.

CABRERA says: "I regard as typical *burchelli* all the members of the species having all 4 legs white from the elbow and the stifle joint, except for the occasional presence of few short markings across the hocks and with the thighs free of complete and well designed stripes".

In the last years of the XIX century Burchell zebras were very common in European zoological gardens. Now the phaenotype of the true *burchelli* is brought to Europe only accidentally. In its native country the true Burchell zebra has completely disappeared, but in herds of other races we may come across single specimens which resemble the true Burchell zebra.

E. burchelli paucistriatus described by HILZHEIMER, 1912, who had at his disposal one specimen only (a stuffed skin in the Mainz Museum) from an unknown locality, differs from the typical *burchelli* by lacking even the stifle stripe. A. BURR, 1922, published a photograph of a foal (a stuffed skin in the Strassburg Museum) resembling completely the *paucistriatus* HILZ. ANTONIUS, 1935 determined the quagga from a farm near Bloemfontein photographed by FRITSCH 1863, as *paucistriatus*. Since we cannot localize this form I believe that it could be held rather for an individual variation of *E. qu. burchelli* GRAY.

From the firm L. REICHE, Alfeld a. L., I received a photograph of a bonte quagga with unstriped legs and striping gradually disappearing on the hindquarters. This zebra resembles the stuffed specimen described by LYON WARD jr. and cannot be regarded as a very typical *burchelli*. These specimens represent the intermediate stage between the Burchell zebra and the Cape Colony quagga.

In 1841 H. SMITH described a new zebra resembling the well known Burchell zebra with legs striped "downwards to the knees and hocks and even to the pastern joint", living in Angola. He named it "Angola Dauw" or *Hippotigris antiquorum*. H. SMITH published in his work a drawing of this animal. MATSCHIE, 1894, is of the opinion that the bonte quaggas of Damaraland are the same as the *antiquorum* H. SMITH. "Das Damara Zebra, *E. antiquorum* SM., steht am nächsten BURCHELL's Zebra, unterscheidet sich aber von demselben durch einen rötlichbraunen Fleck über den Nüstern, durch gestreifte Schwanzwurzel und bis zu den Knieen gebänderten Körper; von *chapmanni* ist es leicht dadurch zu unterscheiden, dass die Beine vom Knie herab weiss sind mit kaum angedeuteter Bänderung und die Querbinden der Körperseiten nach dem Bauch zu bei weitem nicht so weit herunter gehen, dass sie die Mittelbinde des Bauches berühren. Die Körperfarbe ist hellgelb, mit etwas Ocker verwaschen; zwischen den breiten Binden befinden sich schmale braune Streifen".

The description of POCOCK, 1897, and LYDEKKER, 1926, correspond to MATSCHIE's description.

ANTONIUS, 1940, wrote: "Der Unterschied gegenüber dem eigentlichen Burchellzebra besteht einzig in der stärkeren Entwicklung der Beinstreifung, die bei *E. qu. burchelli* bekanntlich ganz fehlt".

SCHWARZ, 1912, recorded that the lower ends of the vertical stripes in *antiquorum* reach as far as the midline of the belly; the tail may be striped; the tail tuft sometimes consists of white and black hair; the vertical stripes a little broader and the oblique stripes very much narrower than the light interspaces. Distinct shadow-striping on the thighs.

In my opinion the connection of the body stripes with the midline of the belly is rather an exceptional feature in *antiquorum*.

I cannot overlook the opinion of ST. LEGER and CABRERA. ST. LEGER from the description of the skins collected by SHORTRIDGE in Angola, S. W. Africa and in Matabele Flats (Bechuanaland) determines all quaggas from these localities as *H. antiquorum* SM. CABRERA however writes: "The Burchell zebras found north of these countries (Griqualand West and Orange River Colony — The author's note), from Benguela to the extreme west of South Rhodesia and to Zululand, differ from the typical subspecies in having the limbs striped at least as far as the vicinity of the "knee" and the hock, the stripes, sometimes reaching the pastern joints". "The oldest available name

for this form is „*Hippotigris*" *antiquorum*, given by HAMILTON SMITH 1841". "The same subspecies was found in Damaraland and Bechuanaland by CHAPMAN and BAINES, and named *Eq.chapmani* by LAYARD, 1865, who regarded it as new. *Antiquorum* and *chapmani*, indeed, generally were considered to represent different races but their identity has been definitely settled by SAINT LEGER (1932)".

We shall see how little reliable are these statements of CABRERA. First of all I must point out that the suggestion made by Miss ST. LEGER as to the identity of the races *antiquorum* and *chapmani* is not correct because she considers the quagga from the Mohango Drift, Okawango River, to belong to *antiquorum*. The description given by ST. LEGER agrees completely with the original description of CHAPMAN quoted by LAYARD. Only the description of the quagga from Otjitundua, Central Kaokoveld, quite different from the description of the previously mentioned specimen, may be considered as that of an *antiquorum*. According to her definition ST. LEGER says: „the range of *antiquorum* extends from the east of Angola and Damaraland eastwards across Northern Bechuanaland as far as the borders of the Wankie District of Southern Rhodesia". This assertion is also erroneous as it is based on defective observation. It is very difficult to understand why does CABRERA consider the quaggas striped down to the hoofs to be *Hippotigris antiquorum* H. SMITH and confirms that CHAPMAN and BAINES had met in Damaraland quaggas belonging to this subspecies, though from the diary of those authors it appears that all quaggas in the eastern part of Damaraland have fully striped legs. CABRERA's reference to "the evidence" of ST. LEGER is not at all convincing because the conclusion drawn by the latter is incorrect. The „*antiquorum*" of ST. LEGER is not identical with *antiquorum* H. SMITH. Just as according to CABRERA ST. LEGER's "*chapmani*" is quite different from *chapmani* LAYARD. I believe that there is no doubt whatever that *antiquorum* is a completely different form from *chapmani*. The *antiquorum* H. SM. is nearest to the Burchell zebra described by GRAY and should be considered as a phaenotypical variety of *E. qu. burchelli* thus being an intermediate link between the Burchell and Chapman zebras.

Hippotigris chapmani kaokensis ZUKOWSKY, 1924, is a quagga striped black on yellowish ground, with white fore legs striped down to the "knee" only and hind legs striped to the fetlocks, with a whit tail tuft and vertical body stripes not joined to the longitudinal belly band.

Although ZUKOWSKY determines this form as a variety of Chapman zebra, I see no sufficient reasons for separating it from the phaenotype *antiquorum* and I therefore determine the latter as a Burchell zebra.

The range of the typical Burchell zebra comprised the Orange River Colony, Griqualand West, Bechuanaland and perhaps also Great Namaqualand. By now the true Burchell zebra is extinct. The most resembling nearest relative of this zebra, named *antiquorum* lives in the western part of Angola, in Kaokoveld, eastern part of Damaraland, Ovamboland and in the Etosha Pan region, wherefrom they migrate as far eastwards as the Namutoni Game Reserve.

6. *Equus quagga quagga* GMELIN, 1788

Equus quagga GMELIN., 1788;
E. quagga lorenzi LYDEKKER, 1902;
E. quagga greyi LYDEKKER, 1902;
E. quagga Danielli POCOCK, 1904;
E. quagga typica POCOCK, 1904;
E. quagga trouessarti CAMERANO, 1908.

Native name: kwaha.

Type does not exist. It is highly improbable that this animal should still be found in its native country, as no reliable confirmation could be obtained on its occurrence in South West Africa near the Kunene River and in Angola. The last survivor of the true quagga, an old mare died in 1883 in the Zoological Garden at Amsterdam.

There still exist three photographs taken of a true quagga, a mare which lived in the menagerie of the London Zoological Society from 1851 to 1872. These are: two photographs taken by F. YORK and one by HAES.

There are also some old drawings of the Cape Colony quagga, but not all of them are reliable because they are sometimes quite fantastic. Therefore it is not possible to accept them as they are, but certain authors do. Fully reliable material for the study of the Cape Colony quaggas are the skins and skeletons of those animals preserved in the museums, as well as descriptions provided by authors who had personally seen the true quaggas (for instance SELIGMANN, quoted by BUFFON, and C. HARRIS).

The description by Sir Cornwallis HARRIS of the Cape Colony quagga, as he knew it in 1837, is as follows:

"The adult male stands 4 feet 6 inches at the withers and measures 8 feet 6 inches in extreme length. Form compact. Barrel round. Limbs robust, clean, and sinewy. Head light and bony, of a bay colour, covered on the forehead and temples with longitudinal, and on the checks with narrow transverse stripes, forming linear triangular figures, between the eye and mouth. Muzzle black. Ears and tail strictly equine; the latter white and flowing below the hocks. Crest very high, arched, and surmounted by a full standing mane, which appears as though it had been hogged, and is banded alternately brown and white. Colour of the neck and upper parts of the body dark rufous brown, becoming gradually more fulvous, and fading off to white behind and underneath. The upper portions banded and brindled with dark brown stripes, stronger, broader, and more regular on the neck, but gradually waxing fainter, until lost behind the shoulders in spots and blotches. Dorsal line dark and broad, widening over the crupper. Legs white, with bare spots inside above the knees. Female precisely similar." (LYDEKKER, 1926).

Owing to the dark coloration of neck and body the true quagga looks like a dark animal brightly striped.

Since all quaggas represent one uninterrupted chain of forms of the same species changing gradually in coloration from the strongly striped in the north to the nearly one-coloured animals in the south, there must be some common principle to explain this geographical variation.

Sir H. JONHSTON, 1898, says: the zebra is a dark brightly marked animal just as the okapi. The dark hairs of the mane and the dark muzzle of the zebra form strictly speaking the ground-colour of the animal, while the light coloured hairs constitute the peculiar pattern. This view allows to understand the ways by which the nearly uniform colour of the Cape Colony quagga arose as well as of all the other *Equidae*, which lost the striped garment of their ancestors.

The most strongly marked East-African zebra loses its contrast coloration in the south. The darkening of the ground colour on the upper parts of the body, the appearance of shadow-striping, the passing of stripes into blotches on the hindquarters, the development of uniform white colour on the legs are preparatory stages towards uniformity of coloration. The one-coloured appearance of the animal may be considered the result of a levelling of colours. The mixing of dark and light hair gradually gives a brownish colour. Where the

ground colour remains the pattern is black (e. g. the dark muzzles of zebras, the dark legs of some horses, the dark dorsal-band of horses, donkeys and zebras, the cross on the shoulder-blades of donkeys, the dark hairs in the inner part of the mane of zebras). The white pattern is left on those parts where the striping did not fuse with the original black ground colour (e. g. the white muzzle, the white belly of donkeys and of their relatives).

If we admit that the zebras are light coloured, dark striped animals, there would be no explanation of the fact the Cape Colony quagga has a darker ground colour of the body than of the head and neck.

All skins of the Cape Colony quaggas preserved in museums of the whole world ought to be considered as belonging to one subspecies. I do not see any sufficient reason for establishing new subspecific forms. We may now arrange all the above mentioned material i. e. the skins available in museums into three groups, corresponding to the three phaenotypes of *E. quagga quagga* GM.

Phaenotype I: striped head and neck with stripes extending occasionally as far as the shoulder-blades.

Phaenotype II: striped head, neck and forequarters.

Phaenotype III: stripes extending from head and neck to lumbar region (RZĄŚNICKI, 1949).

The last phaenotype stands nearest to the subspecies *burchelli* GRAY.

ANTONIUS, 1931, described a very interesting animal the stuffed skin of which was preserved in the British Museum. This specimen was determined by H. SMITH as *Hippotigris isabellinus*.

The animal resembles the Cape Colony quagga, but differs from it by a yellowish-brown ground colour, scarce brown striping on the head and white stripes on the neck and body. It is possible that these were the very animals that LE VAILLANT had met in the Cape Colony together with "zebras and quaggas" and which he defined as wild unstriped asses. I suppose that the enigmatic animal is a differently variegated quagga. However, I have no definite view on this matter.

Till about 1870 the distribution range of the true or Cape Colony quagga — *E. quagga quagga* GM. extended over Central and South Orange Free State and the Karroo Plains of the Cape Province and was limited in the west by a line running from the

mouth of the Vaal River to the environs of Swellendam, in the south by the sea, in the east by the Kei River and in the north by the Vaal River.

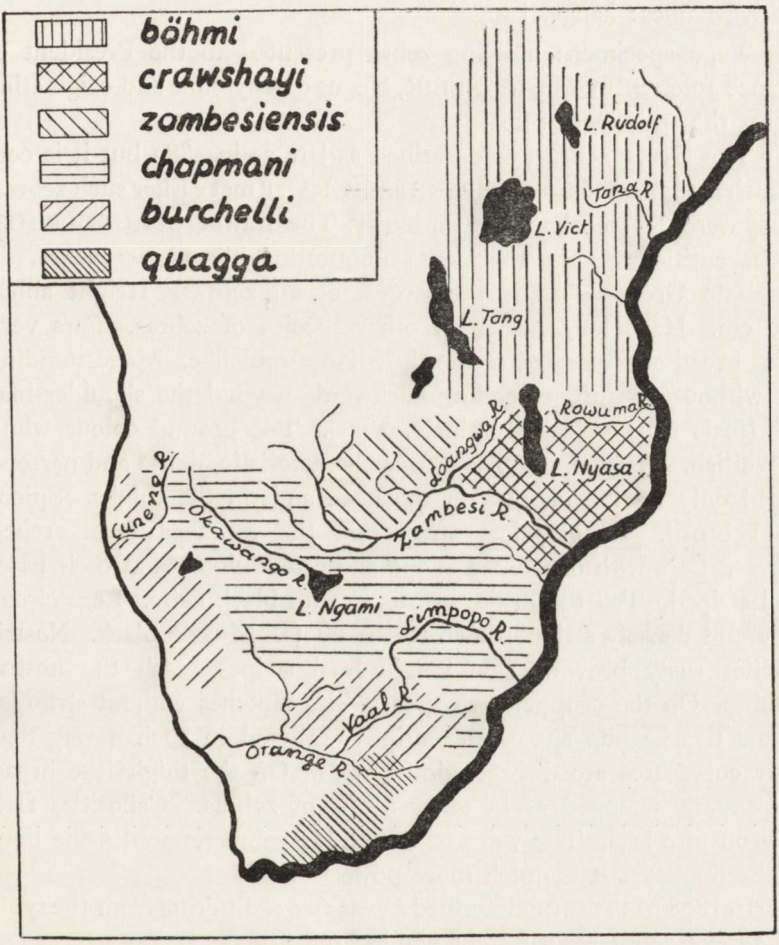

Fig. 4. Map showing distribution of subspecies of *Equus quagga* GM. (Drawn by Jerzy RZĄŚNICKI).

III. *EQUUS GREVYI* OUSTALET, 1882

Equus grevyi Oustalet, 1882;
Equus faurei MATSCHIE, 1898;
Equus grevyi berberensis POCOCK, 1902;
Megacephalon grevyi HILZHEIMER, 1912;
Dolichohippus grevyi HELLER, 1912.

Native names: kanga, kangani.

Type specimen: a living zebra presented to the President of France Jules GRÉVY by MENELIK, Negus of Abyssinia and originating from the province Shoa.

The Grévy zebra was described as late as in 1882 but it is certain that the expedition of SPEKE and GRANT met earlier such zebras. They were also well-known in antiquity. The drawing of LUDOLPHUS, 1682, entitled *Zecora* represents unquestionably Grévy zebra.

The Grévy zebra is the largest of all zebras. Height about 150 cm. Head longer than of other species of zebras. Ears very long, broad and rounded at the tips. Hoof mulelike. Mane standing up without foretuft, extending backwards beyond the shoulder-blades (foals have so called spinal manes). The ground colour white or whitish. The striping black, very characteristic, dense and narrow, broad only on the cheeks, on the neck and on the thighs. Spinal band broad. Longitudinal stripes on the forehead form arched curves. Ears with one broad stripe and a few blotches at their base. Tail striped. Tail tuft white or mixed with black hairs. Legs circularly and densely striped down to the hoofs. Muzzle black. Nostril patches rusty brown. The longitudinal stripes reach the nostril patches. On the crupper two great white blotches without striping. Below these white spaces the stripes arranged in such a way that their curvatures are directed downwards. On the thighs the broad stripes are arranged as in other forms of zebras. Callosities flat, only on fore legs. The voice of the Grévy zebra resembles the bray of the donkey but is much more powerful.

In 1898 MATSCHIE described *Equus faurei* differing from the typical Grévy zebra by a purely white tail tuft.

I believe that *faurei* as well as *berberensis* described by POCOCK as a desert form of the Grévy zebra, are synonyms of *E. grevyi* OUSTALET.

The range of Grévy zebra is limited in the east by the Somaliland, in the north by the line running across the Lake Zwai in Abys-

sinia, in the west by Shoa, Lake Rudolf and Lake Baringo, in the south by the Northern Guaso Nyiro River and the Lorian Swamp.

In the southern part of this area Grévy zebras associate with common zebras but they never give any hybrids in the wild state.

A careful study of all the described varieties of zebras and quaggas lead me to the conclusion that there are three species, two of which only should be divided into subspecies.

I propose therefore the following classification:

I. Species *Equus zebra* LINN., 1758, with two subspecies:
   1. *Equus zebra zebra* LINN., 1758;
   2. *Equus zebra hartmannae* MATSCHIE, 1898.

II. Species *Equus quagga* GMELIN, 1788, with six subspecies:
   1. *Equus quagga böhmi* MATSCHIE, 1892;
   2. *Equus quagga zambesiensis* TROUESSART et PRAZAK, 1898;
   3. *Equus quagga crawshayi* DE WINTON, 1896;
   4. *Equus quagga chapmani* LAYARD, 1865;
   5. *Equus quagga burchelli* GRAY, 1825;
   6. *Equus quagga quagga* GMELIN, 1788.

III. Species *Equus grevyi* OUSTALET, 1882.

I believe that the above classification is nearest to reality, clear and easy to apply in practice.

IV. THE ZEBRA BASTARDS

J. C. EWART, 1904, described a zebra—new as he thought — resembling the mountain zebra. The description was based on a skin, said to come from East Africa, which was in the possesion of Rowland WARD. The stuffed skin of this zebra is preserved in the Scottish Museum, Edinburgh.

Ward zebra differs from the mountain zebra in that it has a broad dorsal band, all the hairs of which are directed backwards, ground colour of a rich cream tint, fewer vertical stripes connected with the dorsal band, a shadow-striping on the thighs and no dewlap on the throat. Ward zebra has a gridiron pattern and legs striped down to the hoofs, though not so heavily as the mountain zebra.

EWART thought at first that the zebra he described came from Lomori Hills near L. Naivasha. Later, however, it appeared that

the skin belonged to a zebra which fell in the menagerie of BARNUM and BAILEY. The owners asserted that their zebra was originally brought from Somaliland.

EWART's discovery of a new form of the mountain zebra in the north aroused great interest and controversies which lead to many publications in which RIDGEWAY and POCOCK took part. The latter, 1909, maintained that the "Ward zebra" was a hybrid bred in captivity and issued from Chapman zebra stallion and a mountain zebra mare. He based his statement on the information received from L. HECK sen., Director of the Zoological Garden at Berlin, who pretended to have seen a bastard, identical with the "Ward zebra" at HAGENBECK's, purchased by the latter from the Jardin des Plantes in Paris and determined as *E. qu. chapmani* crossed with *E. zebra zebra*. This fact made POCOCK think that BARNUM and BAILEY had purchased their zebra, the skin of which was described by EWART, in Paris. I think that POCOCK's opinion is probable but requires some correction.

According to TROUESSART, 1910, three bastards of *E. qu. burchelli* × *E. zebra zebra* were bred in the Jardin des Plantes.

A. MOUQUET and GUYESSE — PELLISSIER in their paper (1922) recorded that a mountain zebra mare which was in the Jardin des Plantes from 1894 till 1919, gave birth to four bastards: in 1899, 1901, 1903 and in 1905. The first, second and fourth foal issued from an *E. qu. burchelli* stallion and the third from an *E. qu. chapmani* stallion. "Ward zebra" was described in 1904, therefore the bastard born in 1905 does not come into consideration. One of the Paris bastards was seen by L. HECK at Stellingen in 1902, hence it could have been born either in 1899 or in 1901. It is possible that one of these bastards had been bought by BARNUM and BAILEY and later described by EWART. If this was the case the father of the „Ward zebra" would have been *E. qu. burchelli* and not *E. qu. chapmani* as it was according to POCOCK.

The fact that a bastard of *E. qu. chapmani* × *E. z. hartmannae* bred at the Warsaw Zoo in 1938 and described by myself resembled closely the "Ward zebra" confirms POCOCK's assertion that "Ward zebra" was a bastard. It also explains definitely the status of the form, described by EWART.

I published in 1931 a photograph of a similar bastard which lived in the menagerie of the Zoological Society of London and was *E. qu.*

chapmani × *E. zebra zebra.* The likeness of these two animals did not seem to be affected by their mothers belonging to different subspecies.

ANTONIUS, 1944, bred a bastard of *E. qu. antiquorum* × *E. z. hartmannae* the description of which together with a number of photographs was published in 1950. Unfortunately the foal was still born. This bastard was exactly like the one at the Warsaw Zoo.

In this case, again, the different subspecies to which the respective fathers belonged had no influence on the striping of the bastards: both of them had their legs strongly striped down to the hoofs. This may be explained by the fact a hybrid inherits the striping of its legs from that one of its parents which has stronger, i. e. more primitive striping.

Unfortunately we do not know so far any bastards of the *E. zebra* × *E. quagga* combination.

The skin of the Warsaw "Ward zebra" is kept in the Polish Zoological Museum at Warsaw, while that of the Vienna "Ward zebra" in the Naturhistorisches Museum there.

In 1942 ANTONIUS obtained a highly interesting bastard of *E. grevyi* × *E. z. hartmannae* which he described in 1944.

Most of its features have been inherited from its father: the shape of the ears, numerous dense striping, mane reaching beyond the shoulder-blades. The influence of the mother was visible in the character of the crupper striping. The bastard had the gridiron pattern, characteristic for mountain zebras. It had no dorsal mane found always in the foals of Grévy zebras.

I reproduce here the photograph of this bastard at the age of two years. This photograph has been kindly lent to me by Prof. ANTONIUS.

The question of bastards between different species of zebras has not yet been sufficiently studied. The breeding of a larger number of such bastards and in different combinations will give an opportunity to investigate the laws of heredity and the transfer of paternal features to the bastards.

The question of fertility of zebra bastards has not yet been solved, though in the last paper of ANTONIUS we find a note by H. HECK reporting that the London bastards might have possibly been fertile.

From the Department of Acclimatization and Domestication of Animals Institute of Zootechnique.

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EXPLANATION OF PLATES

Pl. XIX. *E. zebra zebra* LINN.; Zoo London. Phot. by F. W. BOND.

Pl. XX. *E. zebra hartmannae* MTSCH. Zoo Warsaw. Phot. by A. RZĄŚNICKI.

Pl. XXI. *E. quagga böhmi* MTSCH. Phaenotype *granti*. Kenya Colony. Phot. by M. JOHNSON.

Pl. XXII. Above. *E. quagga zambesiensis* TROUESS.; Kafue Flats, N. Rhodesia. Photo by courtesy of Game and Tsetse Control, Lusaka.
Below. A skin of *E. quagga zambesiensis* TROUESSART. Kafue Flats, Mumbwa D., N. Rhodesia. Phot. by J. MORZE. Lusaka.

Pl. XXIII. Above. *E. quagga crawshayi* DE WINTON. Pretoria. After A. HAAGNER.
Below. A skin of *E. quagga crawshayi* DE WINTON. After J. C. EWART.

Pl. XXIV. *E. quagga chapmani* LAYARD. Kruger National Park. Phot. by P. W. WILLIS.

Pl. XXV. *E. quagga chapmani* LAYARD. Kruger National Park. Phot. by P. W. WILLIS.

Pl. XXVI. Above. *E. quagga chapmani* LAYARD. Kruger National Park. Photo by courtesy of South African Railways.
Below. *E. quagga chapmani* LAYARD. Stellingen. Phot. by Dr. Erna MOHR. Hamburg.

Pl. XXVII. Above. *E. quagga chapmani* LAYARD. From N. Transvaal. Zoo Warsaw. Phot. by A. RZĄŚNICKI.
Below. *E. quagga chapmani* LAYARD. Angola. After S. Newton SILVA.

Pl. XXVIII. *E. quagga chapmani* LAYARD. Phaenotype *wahlbergi*. Phot. by J. W Mc DONALD, Johannesburg. By courtesy of J. A. B. SANDENBERGH

Pl. XXIX. A foal of the Chapman zebra from N. Transvaal. Zoo Warsaw Phot. by A. RZĄŚNICKI.

Pl. XXX. Above. *E. quagga chapmani* LAYARD from S. Rhodesia. Zoo Dresden. Phot. by Dr. J. ŻABIŃSKI, Warsaw.
Below. *E. quagga burchelli* GRAY. Phaenotype *antiquorum*. From Etosha Pan region. Zoo Warsaw. Phot. by Dr. J. ŻABIŃSKI.

Pl. XXXI. Above. Typical *E. quagga burchelli* GRAY. After BREHM.
Below. *E. quagga quagga* GMELIN. After BREHM.

Pl. XXXII. Above. *E. quagga quagga* GM. Photo by courtesy of Senkenb. Naturfor. Gesellschaft, Frankfurt a/M.
Below. *E. quagga quagga* GM. Photo by courtesy of Munich Museum.

Pl. XXXIII. *E. grevyi* OUSTALET. Photo Zoo Paris.

Pl. XXXIV. Above. *E. qu. chapmani* × *E. z. hartmannae*. Zoo Warsaw. Phot. by A. RZĄŚNICKI.
Below. *E. grevyi* × *E. z. hartmannae*. Phot. by R. WEISSENBACH By courtesy of Prof. Dr. O. ANTONIUS, Vienna.

STRESZCZENIE

Na podstawie krytycznej oceny piśmiennictwa, dotyczącego zebr, dużego materiału fotograficznego, obserwacji własnych oraz wiadomości otrzymanych z Afryki drogą ankiety rozesłanej do zarządów rezerwatów fauny afrykańskiej, instytucji jako też osób obeznanych z terenami, na których zebry żyją, autor przychodzi do wniosku, że wszystkie, dotychczas używane, klasyfikacje zebr nie odpowiadają rzeczywistości. Spośród opisanych form wiele nie zasługuje na wyodrębnienie i musi być zaliczonych do synonimów. Znacznej redukcji form podgatunkowych wymaga gatunek *E. quagga*, który, zdaniem autora, powinien być traktowany, jako szereg rozwojowy, posiadający określony kierunek zmienności, wyraźnie zarysowujący się w miarę posuwania się z północy na południe i w którym formy sąsiadujące, zwłaszcza na terenach pogranicznych, występują w zmieszaniu. Gatunek *E. quagga* winien być zredukowany do 6 form podgatunkowych, wyraźnie różniących się między sobą. Redukcję form podgatunkowych przeprowadza autor również w gatunkach *E. zebra* i *E. grevyi*.

Autor proponuje następujący podział systematyczny zebr:

Gatunek I. *Equus zebra* LINN. z 2 podgatunkami:
1. *E. zebra zebra* LINN.,
2. *E. zebra hartmannae* MATSCHIE.

Gatunek II. *Equus quagga* GMELIN z 6 podgatunkami:
1. *E. qu. böhmi* MATSCHIE,
2. *E. qu. zambesiensis* TROUESSART,
3. *E. qu. crawshayi* DE WINTON,
4. *E. qu. chapmani* LAYARD,
5. *E. qu. burchelli* GRAY,
6. *E. qu. quagga* GMELIN.

Gatunek III. *Equus grevyi* OUSTALET.

Podział ten, zdaniem autora, najlepiej odpowiada rzeczywistości, jest przejrzysty i łatwy do praktycznego zastosowania.

Na końcu autor opisuje mieszańców otrzymanych ze skrzyżowania zebr, należących do odmiennych gatunków, a mianowicie: *E. quagga* × *E. zebra* i *E. grevyi* × *E. zebra*.

Z prac Oddziału Aklimatyzacji i Udomowienia Zwierząt Instytutu Zootechniki

ZAKŁ. GRAF. PAŃSTWOWYCH ZAKŁADÓW WYDAWNICTW SZKOLNYCH, BYDGOSZCZ
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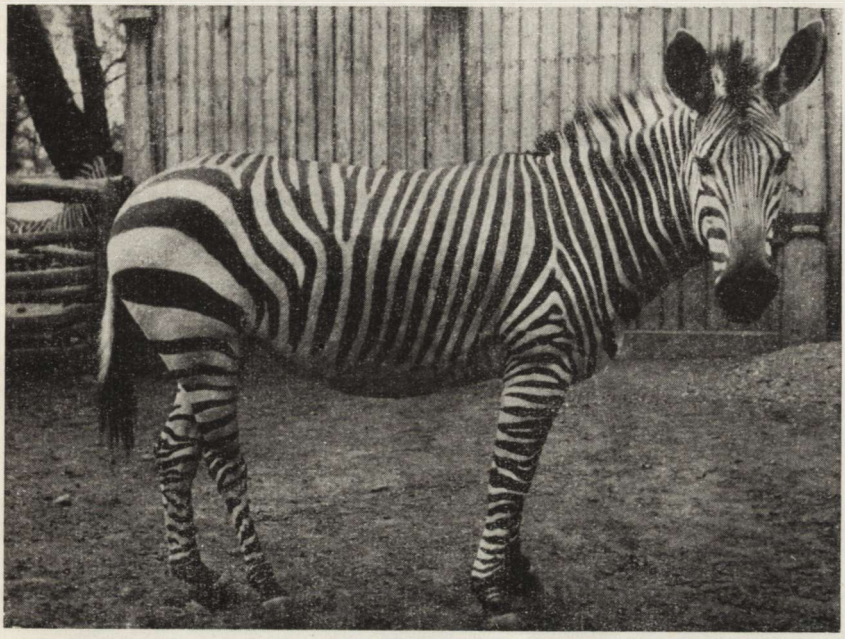

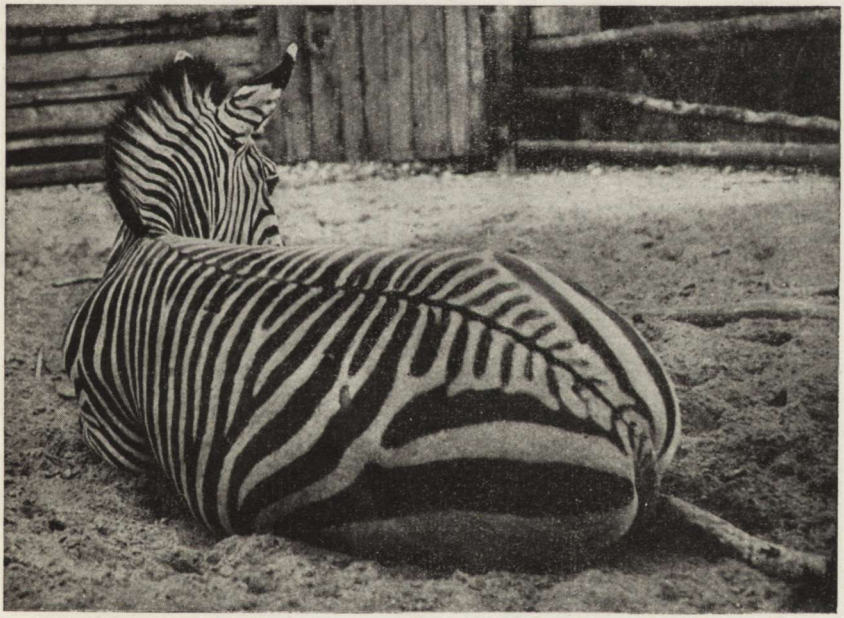

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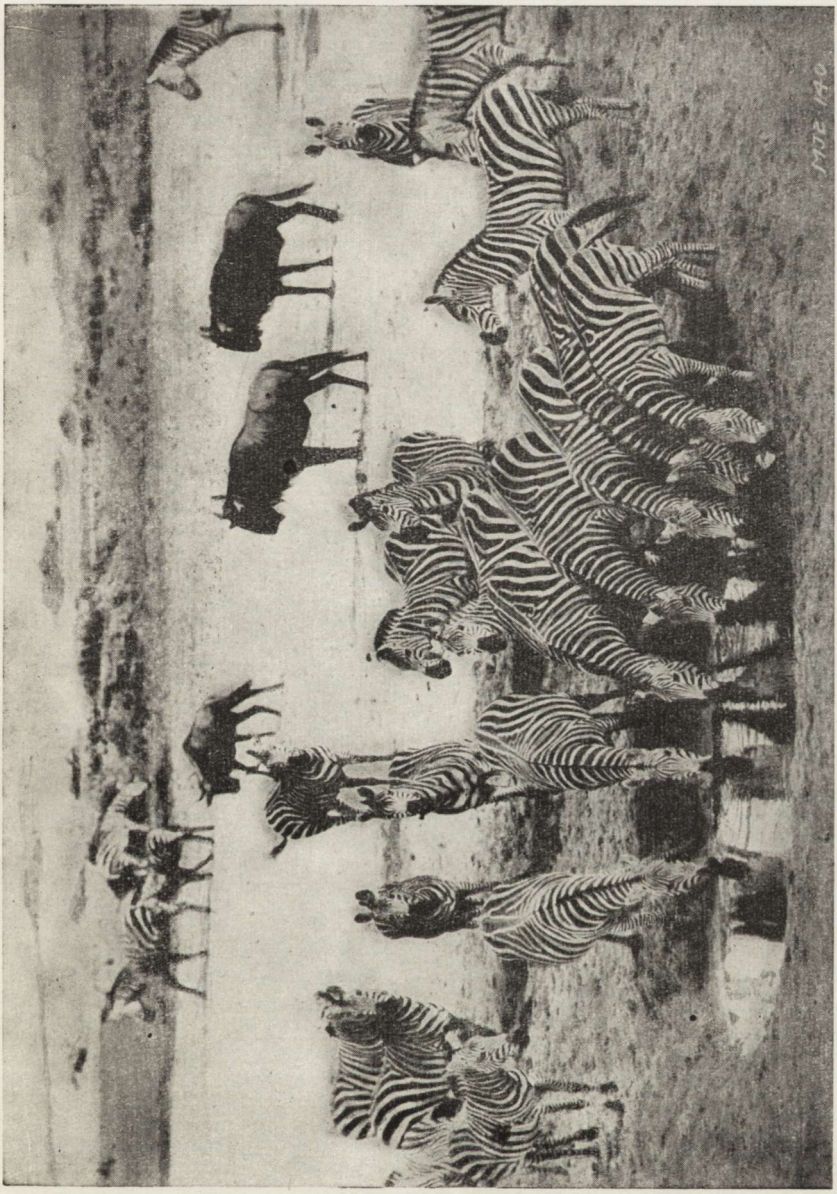

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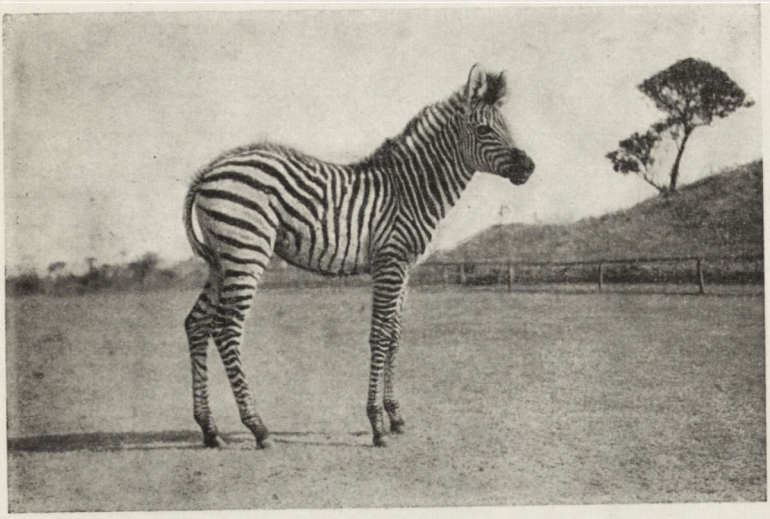

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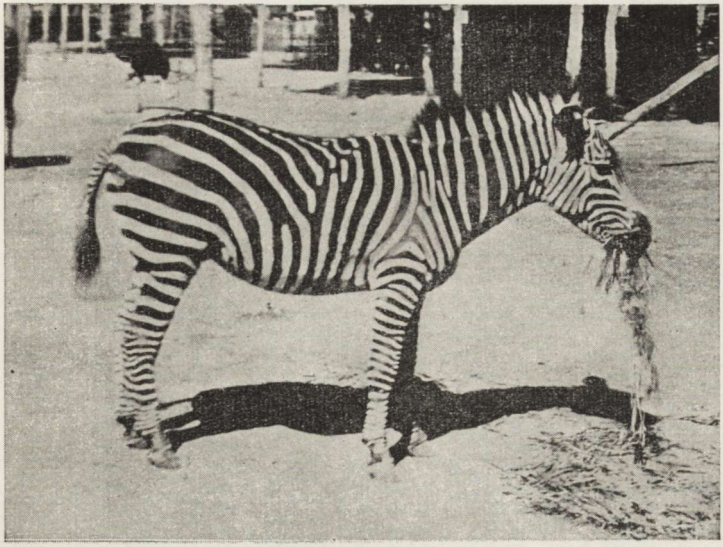

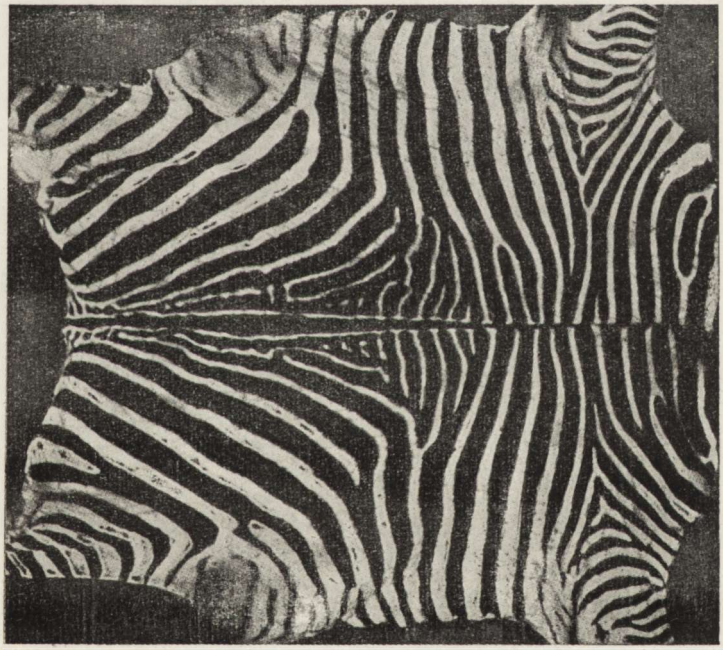

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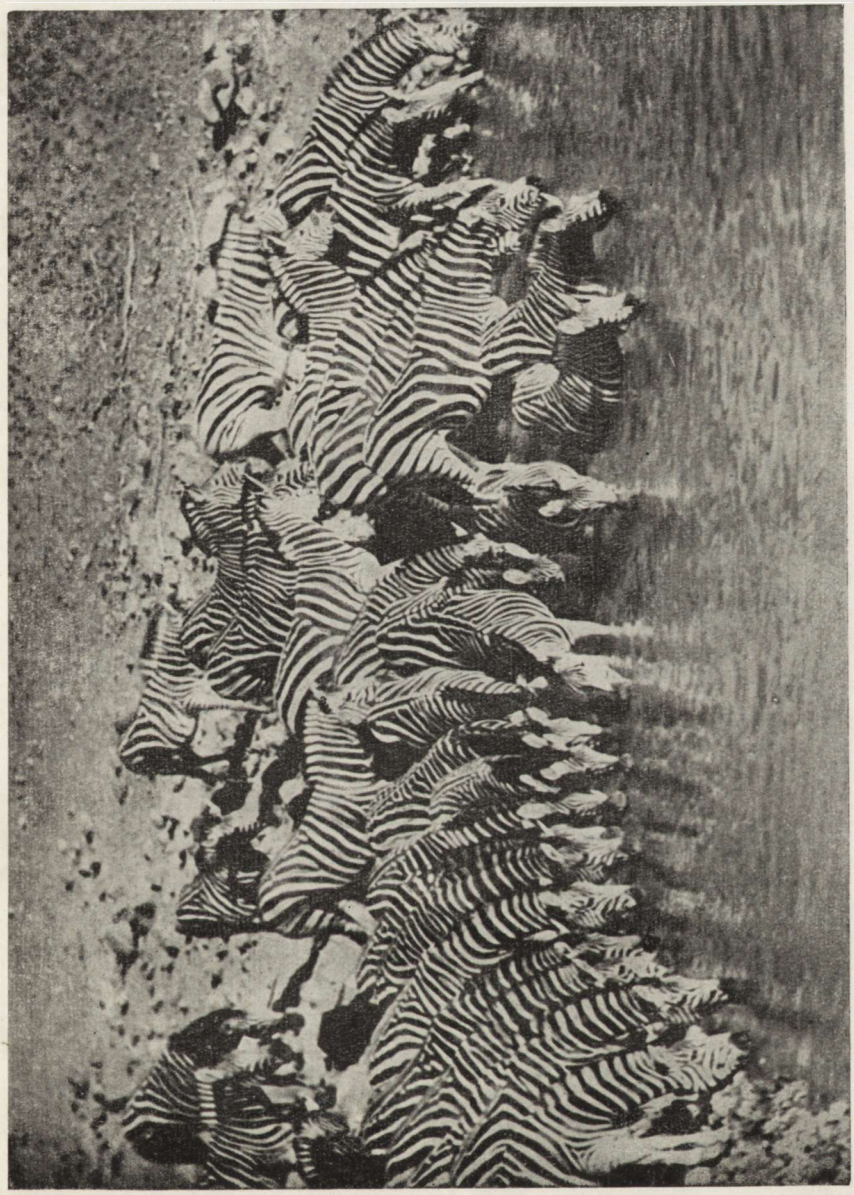

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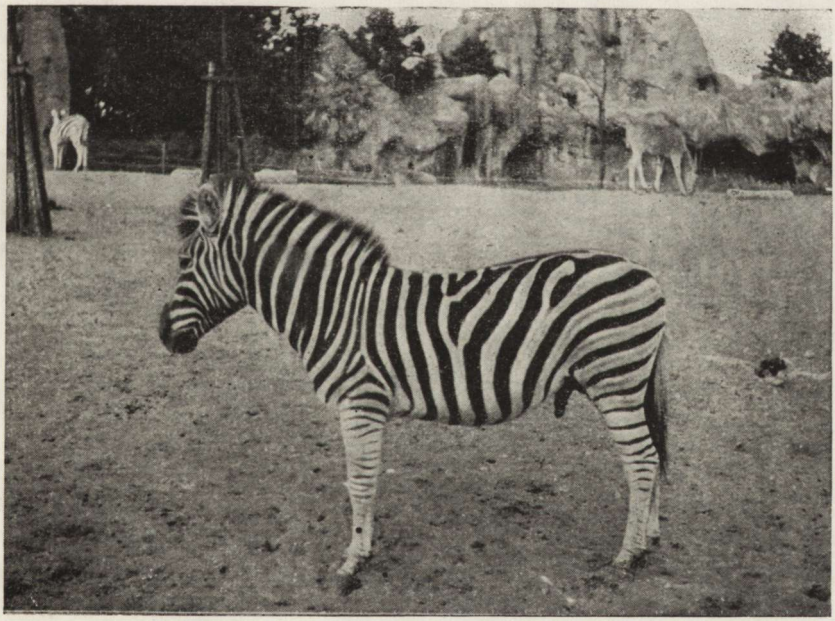

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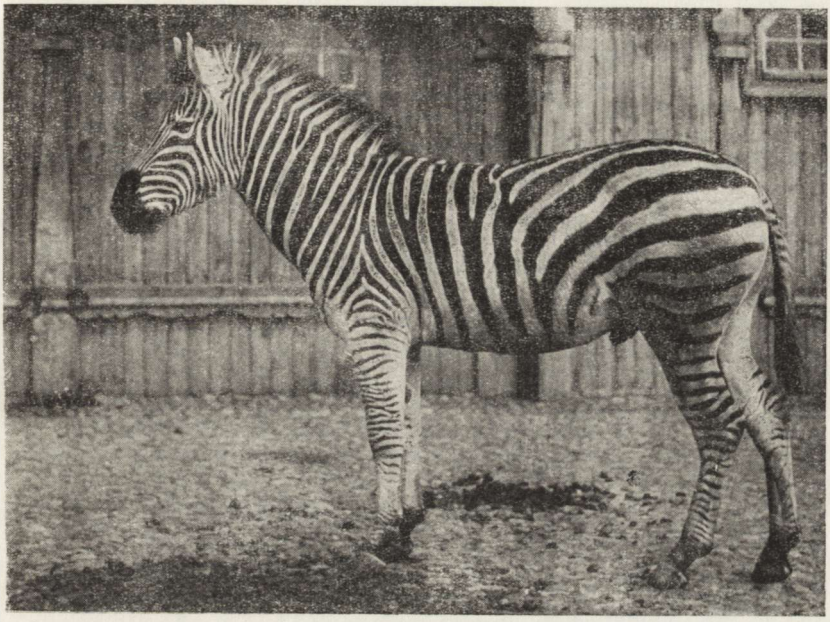

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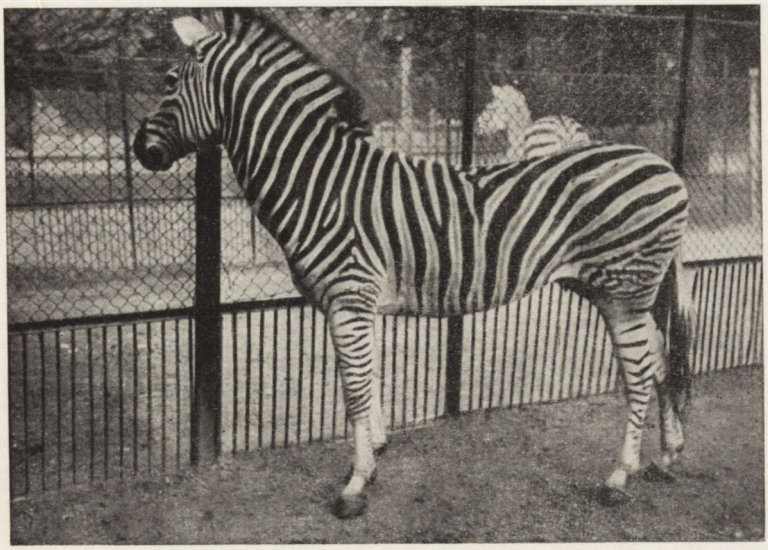

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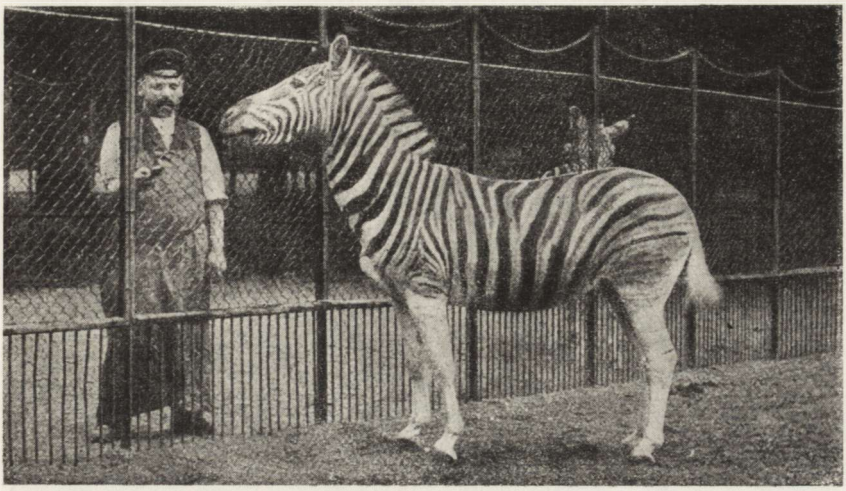

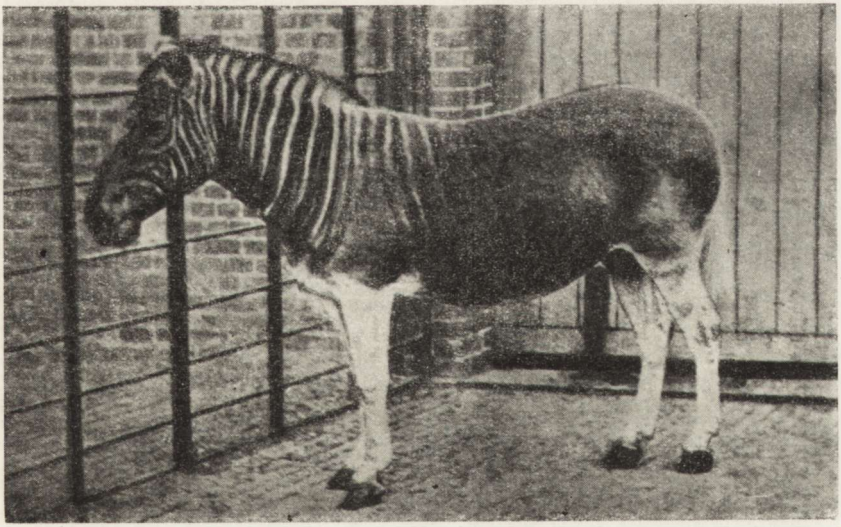

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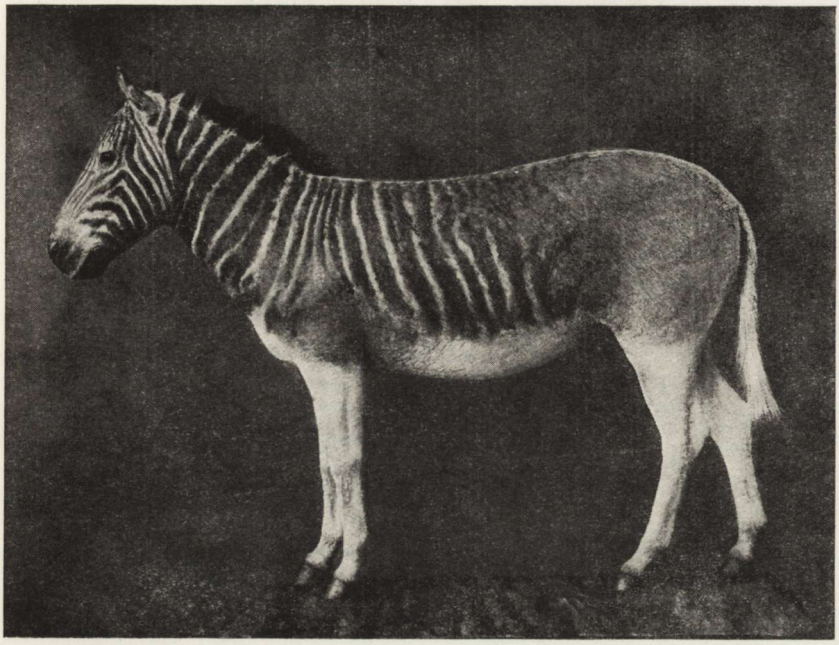

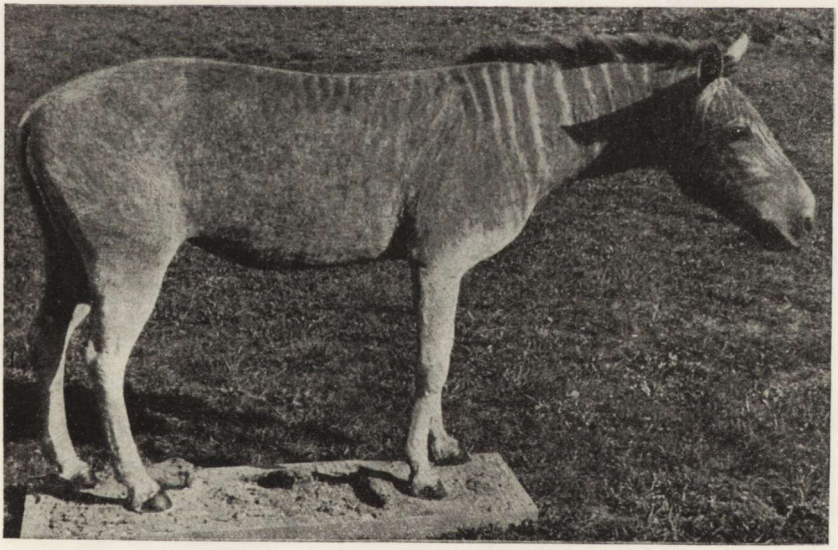

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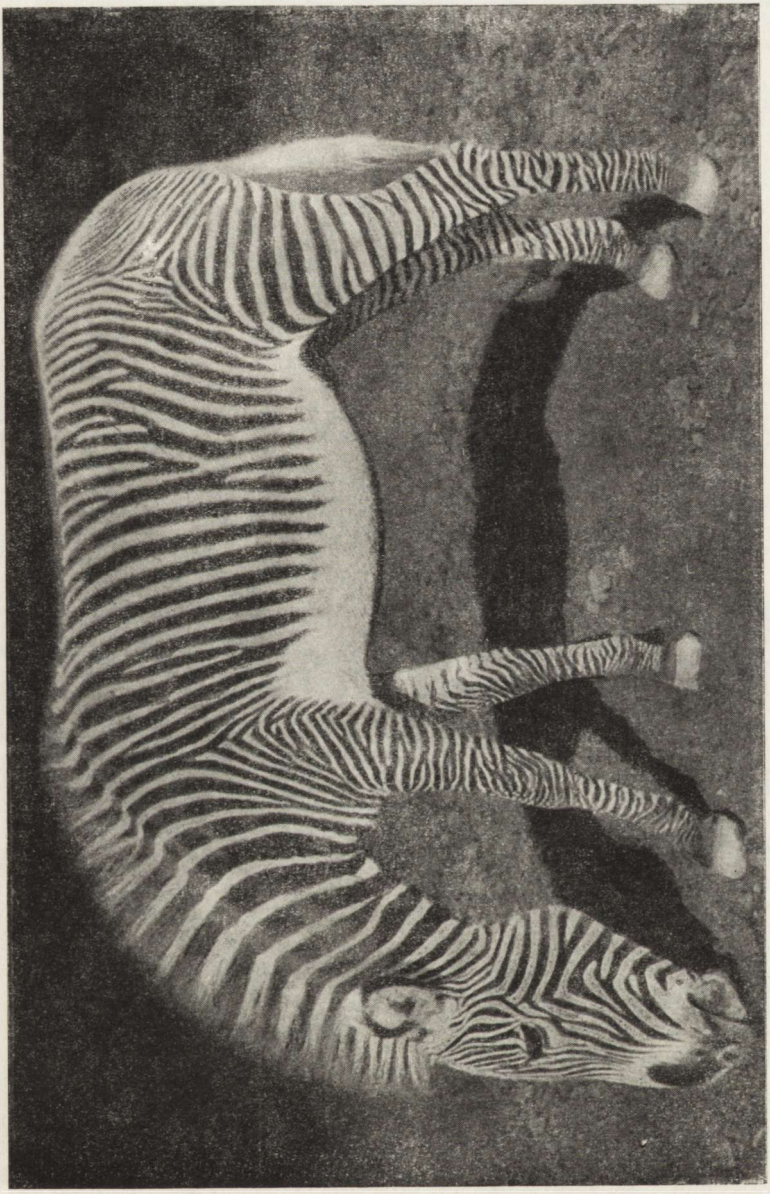

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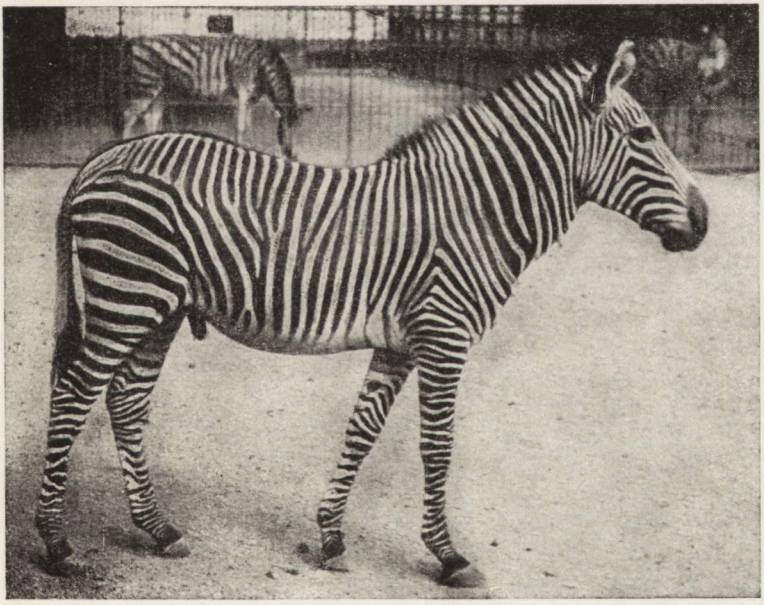

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