



Annals and Magazine of Natural History

Series 7

ISSN: 0374-5481 (Print) (Online) Journal homepage: <http://www.tandfonline.com/loi/tnah13>

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To cite this article: R. I. Pocock (1904) XLV.—The Cape Colony Quaggas , Annals and Magazine of Natural History, 14:83, 313-328, DOI: [10.1080/03745480409443016](https://doi.org/10.1080/03745480409443016)

To link to this article: <http://dx.doi.org/10.1080/03745480409443016>



Published online: 01 Dec 2009.



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THE ANNALS

AND

MAGAZINE OF NATURAL HISTORY.

[SEVENTH SERIES.]

No. 83. NOVEMBER 1904.

XLV.—*The Cape Colony Quaggas.* By R. I. Pocock, Superintendent of the Zoological Society's Gardens, late Assistant in the Zoological Department of the British Museum.

[Plates IX. & X.]

I. INTRODUCTION.

IN an interesting and suggestive paper in the P. Z. S. for this year (vol. i. pp. 426-431), Mr. Lydekker discusses the presence of a preorbital pit in the skulls of recent horses, and incidentally attempts to establish two conclusions: (1) that all the genuine Quaggas known to us either from skins or photographs or figures, with the possible exception of the example at Vienna, are subspecifically identical, the admittedly great differences between some of the types being due either to individual variation or to fading from exposure to light or to carelessness in drawing; (2) that the species they constitute differs specifically from all the forms of the animal commonly known as Burchell's Zebra. These, presumably, are the views of the older generation of naturalists, to which Mr. Lydekker has reverted. But since I have long been of a different opinion on both these points, I avail myself of the opportunity afforded by the publication of Mr. Lydekker's paper to state at greater length

Ann. & Mag. N. Hist. Ser. 7. Vol. xiv. 22

than heretofore the reasons upon which my opinions are founded; and I do this the more readily because it seems to me that the data upon which Mr. Lydekker relies are demonstrably unsound or open to certain obvious and cogent criticisms, which leave the questions at issue practically in *statu quo ante*, unless, indeed, they may be claimed as strengthened on my side by the refutation of the first authoritative adverse arguments that have been levelled against my beliefs. Also it may help to elucidate the difficulties besetting the determination of what are called the "true Quaggas," if an attempt is made to point out the salient characteristics of the principal types which commonly pass under that name. Two of these, of which specimens have luckily been preserved, were, a year or two back, regarded by Mr. Lydekker himself as worthy of nominal subspecific distinction. To these the evidence compels me to add a third, which, although unfortunately, like the first described form, known only from figures and descriptions, is yet the best-marked type of the four and the one that is perhaps the most interesting in the matter of coloration to students of the equine family. Current descriptions of "the Quagga" have been drawn mainly from these four sources to the creation and fostering of forgetfulness of the characters of the original type.

II. THE TWO CHARACTERS ALLEGED TO BE DISTINCTIVE OF THE "QUAGGAS" AS COMPARED WITH THE "BURCHELL'S ZEBRAS."

(1) It is stated by Mr. Lydekker that the pattern on the forehead in *Equus quagga* forms a shorter and more regular diamond than in the Bonte Quagga (*E. Burchelli*), and that in the former the centre of the diamond is a pale stripe with four or five dark stripes on each side of it, whereas in all Bonte Quaggas or Burchell's Zebras the diamond is made up of from five to nine stripes, the middle line being black, with from two to four stripes on each side. This proposition is not in all cases true either of the "Quaggas" or the "Burchell's Zebras." In his very accurate description of the quagga in the Vienna Museum (P. Z. S. 1902, vol. i. p. 35), Dr. Lorenz says: "Eight narrow lines [*i. e.* dark stripes] run from between the eyes down to the back of the nose and up to the beginning of the mane; *from the middle of the front a ninth medial line runs to the back of the nose.*" This quagga, therefore, differs in this particular from the one in the British Museum. So far also as the Burchell's Zebras

are concerned, the following observations, based mostly upon a few living and stuffed animals, show that no value is to be attached to the presence or absence of a median fronto-nasal black stripe:—

1. *Equus quagga Burchelli* (in B.M.).—On the forehead there are three pairs of black stripes and one median black stripe. On the nose the latter is double. *Hence the centre of the diamond is in its upper portion a dark stripe, in its lower portion a pale stripe.*
2. *E. quagga Wahlbergi* (type stuffed in B.M.).—Three pairs of symmetrically disposed stripes on the forehead. On the nose the inner or admedian stripe on each side bifurcates, giving rise to four pairs of stripes. *Diamond with pale median line throughout its length.*
3. *E. quagga Chapmanni* (in Zool. Gdus.).—Four pairs of symmetrical stripes on forehead, the second and third from the outside fusing below the level of the eye. One median black stripe on forehead confluent above with the fourth on the right side, but splitting below the eyes and turning aside towards the left out of the middle line. *Thus the centre of the diamond is a dark stripe on the forehead, a pale stripe on the nose.*
4. *E. quagga Chapmanni* (Prof. Ewart's "Matoppo").—Forehead with three pairs of symmetrical stripes and the middle line pale. The second stripe on each side was divided inferiorly and its inner branch again divided on the left side, the nasal portion of the diamond consisting of nine stripes. *Hence the middle line of the diamond on the forehead was pale, on the nose black.*
5. *E. quagga Granti* (in B.M., from Lake Baringo).—Two pairs of symmetrical black stripes and a single median black stripe, making five in all. These stripes, however, show signs of reduplication which if completed would convert them into ten stripes, leaving the median line pale.
6. *E. quagga Granti* (in B.M., from Kilimanjaro).—Three pairs of black stripes and a median black stripe.
7. *E. quagga Granti* (in Zool. Gardens, from Kilimanjaro).—Three pairs of symmetrical stripes on forehead and nose, but the admedian on the right side

giving off a short branch between the eyes. The centre of the diamond might thus be described as consisting of a pale stripe above and below, and a black stripe in the middle where the symmetry is broken by the supernumerary branch. But in reality *the pale median line traverses the diamond from end to end.*

8. *E. quagga Selousi* (type in B. M.).—Two pairs of symmetrical black stripes and a single short isolated black stripe in the middle.

These facts prove that amongst the Burchell's or Bonto Quaggas the central line of the facial diamond may be either pale throughout or dark throughout, or dark on the forehead and pale on the nose, or pale on the forehead and dark on the nose, or pale in its upper and lower extremities and dark in the middle.

The animals above described were not in any way selected to prove or disprove a case. They were the first that came to hand when I wished to verify, in the readiest manner possible, the statement as to the colour of the central line of the diamond. The arrangement of the bars is sometimes quite simple, sometimes very complicated and requiring the greatest care to follow out with accuracy. Nevertheless, an attempt at symmetry is generally traceable, although the actual middle line of the diamond may not lie in the middle line of the face.

The explanation of the facts given above is, I believe, as follows:—

The forehead and nose were originally furnished with a large number of symmetrically disposed stripes, the median line therefore being pale. By fusion these stripes are reduced in number. When the fusion is regular the symmetry is retained; when irregular it is destroyed. When a dark stripe occurs in the middle line it may result from the fusion of the two original admedian stripes. This, I understand, is substantially Prof. Cossar Ewart's opinion. The bifurcation of the stripes, however, may also be explained on the hypothesis of the splitting of originally single broader stripes. In that case there may have been a median stripe on the forehead and head comparable to the spinal stripe in the middle of the back. But in any case I am persuaded that it is impossible to make the presence or absence of a dark median line a basis for splitting the Quaggine from the Burchelline species of *Equus*.

- (2) Mr. Lydekker also believes the "Quaggas" may be

distinguished from "Burchell's Zebras," using this term in its broadest sense to include such diverse forms as Grant's, Crawshay's, Chapman's, and the typical Burchell's, by the presence on the skull in front of the orbit of a depression, claimed to be the remains of a pit which in more archaic forms lodged a facial gland. Evidence of the existence of this depression in a quagga's skull was pointed out by Dr. Forsyth Major in 1880. It is also present, as Mr. Lydekker has shown, in the skull of the animal in the British Museum. This confirmation of Dr. Major's observation would, to a certain extent, justify a provisional generalization as to its occurrence in all "true Quaggas'" skulls, were it not that this pit belongs to the category of characters which are likely to appear sporadically as atavisms, and are, therefore, from the systematic standpoint, open to suspicion on the score of inconstancy. Such characters are of doubtful value as a basis for the formation of natural groups, for functionless vestiges have seldom much importance in taxonomy. This is the principal argument to be alleged *à priori* against the belief in the specific value of the depression in question. On *à posteriori* grounds I also find reasons for rejecting that belief.

Mr. Lydekker asserts that he found no trace of the depression in any of the Burchell or Bonte Quaggas' skulls, of which there are, he adds, a good number in the British Museum. I cannot find in that institution any skull known to be that of a typical Burchell. There are the skulls of *E. quagga Wahlbergi*; of two subspecifically unknown specimens received from the Zoological Society; of two labelled Crawshay's Quagga which were collected by Penrice and are therefore probably referable to *E. quagga Chapmanni*; and of three examples of Grant's Quagga, one (♀) obtained by Gregory, and two (♂ ♀) by Hinde on the Athi Plains. Presumably, these are the skulls that Mr. Lydekker refers to comprehensively as those of Bonte Quaggas'; but they hardly justify the conclusion that the facial pit was absent in the typical Burchell. They do, however, satisfy me that no great reliance can be placed on the character under discussion; for, although the skulls of the female Grant's Quaggas have practically no trace of the depression, it is very perceptible both to eye and touch in the skull of the stallion. It is certainly shallower than in the skull of the type of Grey's Quagga, which is also, by the way, that of a stallion; but it is quite unmistakably present, and supplies, so far as it goes, an almost exact mean between the skull of Grey's Quagga, on the one hand, and the remaining

skulls of Grant's, Chapman's, and Wahlberg's Quaggas, which are devoid of it, on the other.

III. THE RACES OF CAPE COLONY QUAGGAS.

Edwards's Quagga.

Equus quagga, Gmelin. (Pl. IX.)

(Typical subspecies.)

The Female Zebra, Edwards, Gleanings, v. ch. 13, p. 29, pl. 223 (1758)
(typo).

Equus quagga, Gmelin, Syst. Nat. i. Mammalia, p. 213 (1788).

The original description of this animal runs as follows:—
“For size and shape it is much like the last described [*E. zebra*]. To speak of its general colour (exclusive of its stripes, which are all black), the head, neck, upper part of the body, and thighs are of a bright bay-colour; its belly, legs, and the end of the tail are white. On the joints of the legs it had such corns as we see in horses; the hoofs are blackish; the head is striped a little different from the last described [*E. zebra*]; the mane is black and white; the ears are of a bay colour; it is a little white in the forehead; it hath several broad stripes round the neck, which become narrow on its under side: it hath a black list [stripe] along the ridge of the back and part of the tail, and another along the middle of the belly; the stripes on the body proceed from the list on the back and some of them end in forks on the sides of the belly, others in single points, and these have some longish spots between them. The hinder part of the body is spotted in a more confused irregular manner. The two sides of this, as well as the last described, were marked very uniformly.”

One or two additional points not mentioned in the description, but shown by the figure, are sufficiently interesting to record. The muzzle is blackish grey to about the same extent as in Burchell's Quagga. The facial diamond consists of three pairs of stripes (not four pairs, as stated by Mr. Lydekker), the two admedians uniting at their ends to form a long oval. Nine stripes are represented as passing from the mane across the neck. Close to the mane these are as broad as the interspaces, but towards the throat they become very narrow, the three nearest to the head failing to reach the middle line. None of the neck-stripes shows a sign of reduplication or fusion, and there is no trace of a

shadow-stripe except close to the head. Behind the shoulder-stripe, which is very thick and trifurcate, there are five vertical stripes, and behind the fifth a set of larger and smaller black blotches resolvable inferiorly into about four stripes and into perhaps twice that number on the summit of the hind-quarters. Only the distal half of the tail is furnished with long hairs.

On the plate is the following legend:—“*Zebra femina, sive asina sylvestris africana. Drawn from the living animal belonging to His Royal Highness the Prince of Wales.*”

Daniell's Quagga.

Subsp. *Danielli*, nov. (Pl. X.)

The Quahkah, Daniell's African Scenery, no. 15 (1804-1808) (type, stated to be drawn from life).

Equus quagga, Cornwallis Harris, Portraits of Game, &c., from Southern Africa, 1840, pl. 2 (stated to be drawn from life).

? *Hippotigris quacha*, Hamilton Smith, Nat. Library, vol. xx. Horses, p. 330 (1841) (stated to be drawn from life in Table of Contents).

Description of type.—Head, neck, upper part of shoulder and of hind-quarters chestnut. Head narrowly striped; muzzle black. Neck striped; the stripes sepia-brown, much narrower than the intervening areas, tapering and wavy inferiorly and sometimes bifurcating, but falling short of the middle line of the throat. Mane white, its stripes narrow, about thirteen in number from behind the ear. A few stripes on the withers like those on the neck and not reaching half-way down on the shoulder. Behind the withers there are also a few similar short stripes; but the posterior half of the body and the hind-quarters are neither striped nor spotted. Between the principal stripes on the neck and withers there are here and there a few narrow detached stripes. The lower half of the shoulder, of the body, and of the hind-quarters white. Legs also white, with a narrow dark rim above the hoof and a dark tuft on the back of the fetlock. Tail white, equine; the long hairs extending to the root.

Daniell's figure is accompanied by the following letter-press:—“This species of Wild Horse which the Hottentots call Quahkah, is one of the most common and abundant of the larger animals that are met with on the barren plains of Southern Africa. It is generally found in numerous herds that are mostly accompanied by a few harte-beests and ostriches. They are tolerably swift; but the boors sometimes succeed by stratagem to take them alive by throwing the noose of a rope over their heads. By domestication it soon becomes mild and tractable, and might be rendered

extremely useful by patient training; yet abundant as they are in the country, there are few instances of their being put to harness. They are stronger than the mule, live hardily, and are never out of flesh. They are variously marked; some with waved stripes on the neck only, others with bands across the shoulder, others marked on the haunches, somewhat like the Zebra, which gave rise to an idea that was long entertained of its being the female of that animal; from which, however, it differs in almost every particular, except in the stripes, being in its shape infinitely more beautiful. The large head, the long ears, and the slender legs of the Zebra partake very much of the character of the common ass. The mane of the Qualikah is curious, appearing as if trimmed by art. This animal is found on all the plains behind the first range of mountains beyond the Cape Peninsula."

This passage, written twenty years before the description of *E. Burchelli* was published, and at a time when, apart from vague pre-Linnean records, only two species of striped African horses were known in Europe—namely *E. zebra*, Linn., and *E. quagga*, Gmelin,—shows that Daniell was acquainted with certain equine forms resembling, if not identical with, some of the known subspecies of Burchell's Quagga in markings, form, and habitat. It is significant that with an artist's eye he regarded them all as "Qualikahs."

That Daniell was familiar with Cape Colony as far north as the Orange River, and at least as far east as Algoa Bay and Caffraria, is established by the letterpress and plates of his volume. He also visited Bechuanaland, where no doubt he met with the typical form of *Burchelli* and possibly also with *E. antiquorum* *.

The Quagga figured by Cornwallis Harris so closely resembles the one figured by Daniell as to need no description. Hamilton Smith's illustration, however, depicts

* According to the 'Dict. National Biography,' Samuel Daniell joined a mission for exploring Bechuanaland in 1801, in the capacity of Secretary and draughtsman; and in the preface to 'Sketches representing the Nature, Tribes, Animals, and Scenery of Southern Africa from drawings made by the late Samuel Daniell, 1820, William Daniell, his brother, says of him: "In order to extend the field of his research he went to the Cape of Good Hope, from whence he accompanied Dr. Somerville on two expeditions into the interior of the country . . . It was his constant care to see the animals alive, that he might make himself master of their actions and habits." With this information, so strong in confirmation of the evidence supplied by his own work, it is impossible to doubt that Daniell's statements were based upon actual experience and his figures derived from personal observation.

an animal differing in certain features from the other two. The forelock is equine and the tail asinine, the long hairs being confined to its terminal half. Moreover, the stripes on the neck are less sinuous and the narrow detached stripes absent. The chestnut tint extends considerably lower on the shoulder and fore part of the body, and the shoulder-stripe is correspondingly longer. In the hairiness of the tail and the straighter neck-stripes, this form exhibits an intermediate stage between Edwards's Quagga (*E. quagga quagga*) and Daniell's Quagga (*E. quagga Danielli*)—a gradation which, it may be assumed, was exemplified by living animals, if the hypothesis of the former existence of intermediate types between the various forms of S. African quaggas is founded on fact.

With some reservation in favour of Hamilton Smith's figure, the figures quoted in the above-given synonymy represent, I believe, specimens of one and the same form of quagga, which, according to the characters depicted, differs in my opinion more from the quaggas called *Greyi* and *Lorenzi* than the latter do from *Burchelli*. It appears impossible to explain away these differences, as Mr. Lydekker would do, on the plea of carelessness in the execution of the drawings. Three cogent reasons may be advanced against such a view. First, the drawings are distinctly stated to have been taken from living specimens; and this statement, which must be accepted as true, disposes of the objection that Harris and Smith may have copied Daniell or that Smith copied Harris. Second, it is almost incredible that these artists erred independently in the same direction. Third, the rest of the drawings in the three respective volumes are on the whole so good, often indeed so excellent and so full of life, that it is again incredible that the artists can have blundered in the case of the quaggas to the extent necessary for the establishment of Mr. Lydekker's hypothesis. Moreover, in Daniell's drawing there are certain details, like the whiteness of the mane, the presence of a tuft of black hair on the fetlock, and of a black rim above the hoof, which attest care and power of observation on the part of the artist incompatible with carelessness in the copying of the stripes on the neck and omitting them from the body, if the animal before him had resembled the typical quagga.

Again, it is significant that Cornwallis Harris, as Mr. Lydekker astutely detected, worded the legend to the figure of the quagga's skin attached as tailpiece to his description of this species, "Head and Skin of the Animal exhibited as a Quagga at the Zoological Gardens, Regent's Park." This may be interpreted as indicating a doubt in his mind as to

the correctness of the determination of the Society's specimen. One need only compare the two illustrations, both taken by the same artist from actual specimens, to find ample justification for any dubiety on the point that may have been felt.

Lorenz's Quagga.

Subsp. *Lorenzi*, Lydd.

Equus quagga, Lorenz, P. Z. S. 1902, vol. i. pp. 32-33, fig. 7.

Equus quagga Lorenzi, Lydekker, Knowledge, xxv. p. 221 (1902).

Nose clay-coloured (?), between the nostrils dark brown; chin and throat chestnut. Stripes on the sides of the head clay-brown (?=reddish brown), and very broad as compared with the narrow linear cream-coloured interspaces. Neck with eight very broad yellowish-brown stripes passing from the mane to the middle line of the throat, those lying towards the head and shoulder narrower than the rest; these stripes are entire, being undivided and are separated by relatively extremely narrow light creamy interspaces, which, broadly speaking, appear to be about one third the width of the stripes. Mane dark chestnut, with ten tufts of whitish hair at the sides.

In front of the shoulder-stripe run two narrower stripes to meet on the breast. The shoulder-stripe is broad and bifurcates inferiorly; in the angle thus formed there are about four transversely angular stripes. Behind the shoulder-stripe on the body there are seven distinct stripes, which become obsolete inferiorly where they bifurcate and become confluent with the buff colour of the adjacent interspaces. Of these stripes the first three have an extreme width of 8 or 10 cm., the width of the interspaces, which are sharply defined in their upper half, being from 1 to 1.5 cm. The fourth stripe, which seems to be double, sends a branch obliquely backwards to the croup and thus encloses a triangular area, of which the spinal stripe forms one side. Within this there is another broad longitudinal stripe anastomosing twice or thrice with the oblique one and with the spinal stripe. The triangles on both sides form a kind of saddle, as in Burchell's Zebras. The fifth and sixth bands run obliquely back over the haunches, both becoming gradually narrower at their upper ends and falling short of the spinal stripe. The seventh stripe, which is distinct, although narrow and twice interrupted, runs from the groin over the haunches towards the root of the tail. In front of it there is a short band, and behind on the back of the haunches three or four oblique and gradually fading stripes.

The breast, belly, legs, and tail are white, with the exception of the brown median ventral band; some black hairs on the back of the pastern and fetlocks and on the rim of the hoof. The tail is said to be furnished with elongated hairs from the root; but, judging from the photograph, the basal third is covered with short hairs.

This animal differs from *E. quagga Greyi* as exemplified by the specimens represented in York's photograph, and by those in the British and Amsterdam Museums, by the extreme narrowness of the interspaces between the stripes upon the head, neck, and shoulder, and by the sharpness of their definition upon the body, which enables the striping to be traced with certainty even back upon the hind-quarters. The regularity of the banding of the neck is also very noticeable.

From *E. quagga quagga* it differs by having the interspaces narrow and cream-coloured, the stripes very broad and brown, and by the presence of stripes upon the posterior half of the body and on the hind-quarters.

I have given the description of this quagga somewhat fully because, in my opinion, it is the one of all others which proves by the arrangement of the stripes upon the posterior half of the body and hind-quarters that these animals are nothing but extreme forms of Burchell's Quagga, differing from the typical race of that animal not more—in some cases, indeed, in my opinion, less—than the latter differs from its more northern relatives, and thus justifying the view I have already published that, as species are at present reckoned in the equine group, the various races of Burchell must be regarded as subspecies of *E. quagga* *.

Grey's Quagga.

Subsp. *Greyi*, Lydd.

Equus quagga Greyi, Lydekker, Knowledge, xxv. p. 221 (1902) (fig.).

This form seems to differ from *Lorenzi* in the following

* Vernacular names in zoology are of no great moment, except in so far as they are apt to fog the mind of the layman on the question of relationships. Tell him that *F. Greyi*, *E. zebra*, and *E. Burchelli* are zebras, and that *E. Lorenzi* is a quagga, and he very naturally infers that the first three are closely related and the last a quite distinct form. To obviate this error in part I have proposed to extend the term "Quagga" to all the Burchelline Equidae, and thus to bring the technical and vernacular terminology into accord; and I think that until it can be shown that there is a greater gulf between Lorenz's Quagga and Burchell's Quagga than there is between Burchell's and Grant's Quaggas, it is misleading to bracket the latter two as "Bonte Quaggas" and to restrict the term "Quagga" to the forms constituting the subject-matter of the present paper.

particulars:—The stripes on the head, neck, and shoulders (when present) narrow and separated by relatively wider interspaces. The neck irregularly banded, the stripes showing a tendency to split (in the British Museum and the Tring specimens), or fuse in pairs (in the Amsterdam specimen), or to be accompanied by shadow-stripes (as in the type in the British Museum). In the latter and the Tring specimen the creamy interspaces are discernible behind the withers for a short distance. In the Amsterdam specimen they stop short at the base of the neck. The posterior half of the body is at most confusedly banded, the stripes apparently losing their distinctness owing to their disintegration and fusion and to the evanescence of the interspaces, which have assumed the same colour as the stripes themselves. There is thus a sharp contrast between the coloration of the neck and that of the body. No stripes seem to be discernible upon the hind-quarters.

The following specimens are probably, I think, referable to this subspecies:—

1. The specimen in the Edinburgh Museum.
2. The specimen in the Amsterdam Museum, figured by Mr. Lydekker (P. Z. S. 1904, i. fig. 86, p. 430).
3. The specimen in the British Museum. This is the type of *E. quagga Greyi*, Lydd. It lived in the Zoological Society's menagerie from Sept. 4th, 1858, to June 10th, 1864, as recorded by Selater (P. Z. S. 1901, vol. i. pt. 2, p. 166).
4. The specimen in the museum at Tring, which lived in the Zoological Society's menagerie from May 15th, 1851, to July 7th, 1872 (figured P. Z. S. 1901, i. pt. 2, p. 166, from life).
5. ? Specimen purchased by the Zoological Society, Nov. 5th, 1831, and mentioned in Waterhouse's Cat. of Mamm. p. 37 (1838), and by Selater, P. Z. S. 1901, i. pt. 2, p. 165. This is, I suspect, the specimen from which was drawn the text-figure on p. 8 of Cornwallis Harris's 'Portraits of Game &c.,' 1840, which is stated to have been taken from a specimen exhibited in the Gardens.
6. ? Specimen belonging to Lord Morton, reproduced from a drawing by Agasse in Prof. Ewart's 'Penycuik Experiments,' p. 65 (1899).

Mr. Lydekker (*l. c.* p. 430), unless I misunderstand him, seeks to explain away the characters of this form as compared

with Edwards's and Lorenz's Quaggas by supposing that the original blackish-brown stripes all over the neck and body have faded to a brownish fawn, while the fawn intervals between the stripes have bleached to [creamy] white on the neck and retained their original colour approximately upon the rump, where the pigment of the interspaces was less susceptible to the action of light than upon the neck. I cannot find any reasons in favour of this explanation if the *à priori* assumption that all quaggas were originally coloured alike or nearly so be put on one side. There are, on the contrary, certain known facts so strongly opposed to it as to render its acceptance impossible without further evidence. In the first place, photographs may be trusted in matters of this kind; hence it is perfectly safe to maintain that if the living quagga photographed by York had been coloured like the specimen figured by Edwards, the dark stripes and paler interspaces upon the body and rump would have been shown exactly as they are shown upon the head, neck, and withers (see *P. Z. S.* 1901, i. p. 166). Surely this photograph proves conclusively that the specimen portrayed was *not* striped upon the barrel of the body and rump like the one depicted in Edwards's 'Gleanings,' but that these regions were at most indistinctly and confusedly banded, exactly like the specimens in the Amsterdam and British Museums. This conclusion is, I think, inescapable. Hence it follows that the difference in coloration between the neck and the body of the stuffed specimens mentioned above is not attributable to inequality in the fading of the two areas. It is, of course, probable that the skins in question have faded to a certain extent—to what extent we probably never shall know. So far as my memory serves, the Amsterdam specimen is of very much the same general tint as the specimen in the British Museum; yet the former died in 1883, and has presumably been exhibited for twenty years, whilst the latter died in 1864, and has probably been exhibited for forty years. Now the quagga of Edwards's 'Gleanings' with black stripes and bright bay interspaces very closely resembled in the matter of blackness of stripes a typical Burchell's Quagga or Wahlberg's race of that animal, and, without any evidence pointing the other way, it may be justifiably assumed that the pigment of the quagga described by Edwards was of the same nature—that is to say, as stable under the action of light—as the pigment of the skin of the type of *E. Wahlbergi*. The latter was received at the British Museum in 1846, and has presumably been exhibited for nearly sixty years. It is faded beyond doubt, but the fading has progressed uniformly all over the body, and, in spite of

the additional eighteen years' exposure to sunlight, is not in any sense comparable in extent to what must have taken place in the type of *E. quagga Greyi*, if the latter, as Mr. Lydekker thinks, also resembled the typical quagga in colour. Looking at the types of *Wahlbergi* and *Greyi* side by side, and bearing in mind the length of time the two have been exhibited in the public gallery at the British Museum, I find it impossible to attribute the present colour of the type of *Greyi* to extensive and unequal fading, and incredible that the body and neck were ever uniformly banded with black stripes separated by bay-, fawn-, or ochre-coloured interspaces of the same tone on the neck as on the body. A comparison between the type of *E. quagga Selousi* and the Amsterdam quagga, both of which date from 1883, enforces the same conclusion with regard to the last-named animal.

Finally, the specimen of the typical *E. Burchelli* in the Bristol Museum has been exhibited within my recollection for at least thirty years, and for a considerable portion of that time without even such protection as glass affords. It has thus been exposed to fading agencies for a much longer time than has the quagga in the Amsterdam Museum; yet the camera shows all the original stripes on the body and hind-quarters very clearly, as is attested by the photograph of the animal published in the Proc. Zool. Soc. 1903, ii. p. 197.

These facts prove that even after sixty years' exposure the stripes in quaggas of the Burchelline type remain sharply defined and fade merely from black to chocolate, and that the pigment of the interspaces upon the body and rump is as durable as that of the neck and head.

Mr. Lydekker's hypothesis, therefore, that the present coloration of the quaggas in the British and Amsterdam Museums is the result of forty and twenty years' exposure to fading influences acting upon skins formerly coloured like the quagga figured by Edwards, is discredited by what is known of the fading capacity of skins of specimens of various races of Burchell's Quagga exposed to similar influences for sixty, thirty, and twenty years respectively, and must, in my opinion, be regarded as entirely disproved by York's photograph of the living quagga, which shows an animal resembling the aforesaid stuffed examples in all respects essential to the argument.

For these reasons I resuscitate Mr. Lydekker's subspecies *E. quagga Greyi*.

The following table summarizes the characters of the four subspecies discussed above:—

- a. Stripes on neck narrow, narrower than interspaces, not reaching middle line of throat; body with only a few short stripes behind withers, its posterior portion neither striped nor spotted *Danielli.*
- a¹. Stripes on neck broad, as broad as interspaces, at least close to the mane, and extending to the middle line of the throat; body with more or less distinct long stripes behind the withers.
 - b. Stripes black, interspaces bright bay; neck-stripes thinning greatly towards middle line of throat; body with strongly marked black stripes, those on its hinder half broken up into spots *quagga.*
 - b¹. Stripes brown, interspaces, at least on neck, creamy yellow; body much less distinctly striped.
 - c. Stripes exceedingly wide, those on the neck entire, the interspaces forming distinct but very narrow lines on the head, neck, and at least the upper half of the body; stripes on the hind-quarters extending as far back and having the same direction as in *E. quagga Burchelli* *Lorenzi.*
 - c¹. Stripes narrower, those on the neck fused or interrupted, the interspaces forming moderately broad bands, except when interrupted by shadow-stripes; the interspaces on the body behind the shoulder almost as dark as the stripes, which are therefore scarcely distinguishable and do not extend on to the haunches *Greyi.*

As an alternative the following table perhaps better expresses the relationships of the four forms :—

- a. Ground-colour or interspaces bay or chestnut, stripes black or blackish brown.
 - b. Stripes on neck and shoulders very short and narrow, not reaching the middle line of the throat, and on the body scarcely passing beyond the withers *Danielli.*
 - b¹. Stripes broad and long, on the neck reaching for the most part the middle line of the throat and on the body extending to the white of the belly, those on its posterior half breaking up into large spots *quagga.*
- a¹. Ground-colour or interspaces, at least of the neck, creamy yellow; stripes brown.
 - c. Stripes exceedingly wide, &c. (as above) *Lorenzi.*
 - c¹. Stripes much narrower, &c. (as above) *Greyi.*

It is not easy to point out the exact relationship between these four forms. The two that depart farthest from the typical *Burchelli* are *Danielli* on one side and *Greyi* on the other, *Lorenzi* holding an intermediate position between *Burchelli* and *Greyi*, and *quagga* a similar position between *Burchelli* and *Danielli*. *Quagga* may have been derived from *Burchelli* by an increase in the rufescence of the interspaces all over the body, neck, and head, by the disappearance of the stripes on the hind-quarters, and by the splitting into spots of those on the posterior half of the body. The

wide interval between this form and the typical *Danielli* is to a certain extent bridged by the specimen figured by Hamilton Smith. On the other hand, *Lorenzi* may have been derived from *Burchelli* by the widening and rufescence of the stripes, and *Greyi* from *Lorenzi* by the almost complete obliteration of all lines of demarcation between the stripes on the body behind the shoulder.

Thus the available facts seem to point to the conclusion that the ruddiness of Cape Colony quaggas was acquired by two totally different processes. In the case of *Danielli* by deepening of the red of the ground-colour or interspaces and the reduction in the length and width of the black stripes on the neck and shoulder concomitantly with their suppression on the body, the result being a chestnut- or bay-coloured animal with narrow black stripes on its fore parts. In the case of *Greyi* by an increase in the width and brownness of the stripes, followed by their fusion and loss of definition on the body, the result being a ruddy-brown animal marked with narrow pale bands (the interspaces) upon the head, neck, and shoulder. Finally, I do not see how to bridge the difference between *Lorenzi* and *quagga* without reference to an intermediate form which must have very closely resembled a typical *Burchelli*. In that case the Cape Colony quaggas have had a dual origin from a Burchelline quagga or quaggas; and if this be so, how are we to regard them as a single species distinct from *Burchelli*?

The objection may perhaps be raised that this classification of the Cape Colony quaggas does not include all the forms represented by figures scattered through the literature, and that a large number of the latter cannot be referred to any of the types here named. For instance, the examples figured from life in the 'Knowsley Menagerie,' though standing in some particulars midway between the typical Quagga and Grey's Quagga, are certainly distinct from both. It is the assumed existence of such intermediate types as these that justifies the subspecific rank assigned to the quaggas discussed in this paper.

EXPLANATION OF THE PLATES.

PLATE IX.

Edwards's Quagga (*Equus quagga*, typical form). Reduced uncoloured copy of the coloured plate, taken from life, of the typical Quagga in Edwards's 'Gleanings.'

PLATE X.

Daniell's Quagga (*Equus quagga Danielli*, subsp. n.). Reduced uncoloured copy of the coloured plate, taken from life, of the "Quahkah" in Daniell's 'African Scenery.'