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### XLIV.—On the colours of horses, zebras, and tapirs

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Differs from genuine *X. varians*, Sm. (S. Brazil), by being less stout, with a narrower abdomen; tegulæ black (red in *variens*); abdomen yellower and with more pale hair. The oblique spine on outer side of hind tibia is practically as in *variens*. Wings orange-tinted as in *variens*.

Differs from *X. ornata*, Sm. (S. Paulo), by being larger, with the abdomen very much darker and less golden, and the face much narrower.

Differs from *X. viridis*, Sm., by the dark hair of thorax, and the abdomen without bands. Easily known from *X. barbata*, Fabr., by the colour, and the absence of the shining silver-white hair which covers the cheeks of *barbata*. Distinguished from *X. electa*, Sm., by the light hair on legs, colour of abdomen, &c.

*Hab.* Guayaquil, Ecuador (British Museum, 96. 119).

*Xylocopa lunulata minensis*, subsp. n.

♂. Agrees exactly with Lepeletier's description of his *X. lunulata* from China, except that the clypeus (except its broad lower border) is dull white. Length a little over 30 mm.; anterior wing  $25\frac{1}{2}$ ; face broad, the inner orbits parallel; face-markings greyish-ivory colour, including in addition to the clypeus a semicircular supraclypeal mark, a lunule on each side of anterior ocellus, and broad lateral marks. The face is thinly clothed with black hairs. The general appearance of the insect is like that of *X. dissimilis*, Lep., which also occurs in China, and in view of what Pérez has written concerning the variability of *dissimilis* it is quite possible that *lunulata* and *minensis* are both local races of that insect.

*Hab.* Sharp Peak, island at mouth of Min River, June 16, 1909 (*James Percy Grant*).

At the same time and place Mr. Grant took *Anthophora zonata* (L.), and species of *Argynnis* and *Papilio*, the latter of a tropical type.

Boulder, Colorado.

Sept. 11, 1909.

XLIV.—On the Colours of Horses, Zebras, and Tapirs. By R. I. Pocock, F.L.S., F.Z.S., Superintendent of the Zoological Society's Gardens.

IRRESPECTIVE of breed, the commonest types of colours in domestic horses are the following:—Bays with black "points" are rufous-brown horses, with mane, tail, and lower

half of the legs black. Chestnuts are paler reddish brown, with the mane and tail and the lower half of the legs the same colour as the body or even paler. Blacks, as the name suggests, are black all over. Browns are intermediate between bays or chestnuts and blacks. Duns are pale yellow-brown or fawn-coloured horses, typically resembling bays in having the mane, tail, and lower parts of the legs black, but, apart from the colour of the body, generally also differing from them in having a black spinal stripe running from the mane to the tail, those presenting this feature being known as "eel-backed" duns. Roans have the neck and body covered with a mixture of white and black or white and red hairs. A peculiarity about this type is the absence of white hairs, at all events as a rule, from the head, mane, tail, and the lower parts of the legs. Greys are mostly of two kinds, "dappled" when marked with a network of black, and "flea-bitten" when the black or brown is distributed as small specks over a white ground. Greys pass into whites; but it is by no means necessary to assume that whites are always exaggerations of the grey type. Analogy suggests that they may be abrupt variations from bays or chestnuts. Finally, there are piebald and skewbald horses blotched with white and brown or black in varying proportions.

Now these types of colour seem to be reducible to three categories: the first containing bays, blacks, chestnuts, roans, and piebalds; the second duns; and the third greys and the majority of whites. Blacks appear to be melanistic and chestnuts erythristic variations of bays with black points. That chestnuts are "red" sports is attested by the colour of the mane and tail being the same as that of the body or lighter; for in all wild species of the horse family, like Kiangs, Chigetais, and Onagers, whatever shade of chestnut or fawn the coat may be, the bulk of the mane and of the tail-tuft is black. The frequency, too, with which chestnuts have a white blaze and white "stockings" or "bracelets" shows a strong tendency to albinism in this type. In these horses, as well as in bays and blacks, albinism usually shows itself first by a white spot, called the "star," on the hair-whorl of the forehead. This may be the only white mark to be detected. It varies considerably in size, and may spread over the forehead and down the nose, to constitute the "blaze." When the blaze involves the end of the muzzle it is accompanied by a pink tinge of the lips, a sure sign of albinism and certain evidence that the whiteness of this area in domestic horses is not properly comparable to the whiteness of the muzzle in Kiangs and Onagers, in which the area of the

muzzle in front of the nostrils and the lips is never pink, but some shade, darker or lighter, of ashy black or grey.

A second very common sign of albinism is the appearance of white in varying amount on the area of one or more of the legs below the knees and hocks. When the white affects only the fetlocks and pasterns it forms a "bracelet," when it extends to the knees and hocks it is called a "stocking." The albinistic nature of bracelets and stockings is betrayed by the whiteness, partial or complete, of the hoofs; for, reverting once more to the Asiatic asses, not to mention the true Quagga, however nearly white the legs may be, the hoofs are always black with a narrow rim above them darker than the colour of the rest of the fetlock.

When in blacks, bays, or chestnuts the white appears as patches on the body, it gives rise to piebalds and skewbalds.

Thus it appears certain that the white star, blaze, bracelets, stockings, and blotches on the body in all domestic horses are evidences of partial albinism, and cannot be regarded as characters inherited from one or more wild ancestral types\*. The same may probably be said of the white that appears in roans. That roan colour belongs to the same category as bay and black is suggested by the dark tint of the head, mane, tail, and legs in typical roan-coloured horses; but in these the white is distributed all over the body, without affecting, however, all the hairs. Thus, eliminating from this category blacks as melanistic and chestnuts as erythristic sports, roans and piebalds as exhibiting partial albinism, and, for the same reason, all horses showing white marks upon the head or legs, there only remain, as perhaps representing a primitive unaltered type of coloration, bays with black points.

Reasoning from different premises, Prof. Ridgeway † has come to the conclusion that there was at one time a wild horse of this colour in Libya, from which the so-called Arabs of English literature are descended. And if, as I believe, chestnuts are erythristic sports, Mr. Wilfrid Blunt's ‡ opinion that chestnut is the original colour of Arabs (Kehailans) is untenable. Moreover, if the above-given explanation of "black," "chestnut," and "white" is correct, it does not, in

\* Precisely the same conclusion has been independently reached by Prof. Ewart, who states (P. R. Soc., Oct. 9, 1909), in a paper not seen by me until after mine was in the printer's hands, that his experiments in horse-breeding show that "stars" and bracelets are not ancestral traits, as Prof. Ridgeway supposed them to be.

† 'Origin and Influence of the Thoroughbred Horse,' 1905.

‡ "Arabian Horse," in the 'Standard Cyclopaedia of Modern Agriculture,' i. p. 180 (1908).

my opinion, follow that the occurrence of horses of these colours in any locality or breed justifies, without further evidence, the belief that intermixture of strains has taken place.

Although true dun—that is to say, cream-brown or fawn—is at least as pale a shade as chestnut, there is no reason to regard it as indicating incipient albinism, as is the case with chestnut, because the mane and tail and hoofs are typically black. The lower parts of the legs are also blackish and very frequently show transverse stripes. There is also usually a black spinal stripe extending from the mane to the tail, and not uncommonly a dark stripe or stripes across the shoulders and elsewhere. To this colour some of Prjevalsky's horses closely approximate, and it is believed by Prof. Ewart to have been the colour of a stout wild forest horse of Scandinavia and other parts of Western Europe, the domestic representative of which he has identified as the typical *Equus caballus* of Linnæus\*.

As regards greys and whites, the latter may be set aside at once as deviations from the primitive style of colouring, because outside arctic and subarctic latitudes so few species of mammals are perennially white that it may be confidently assumed no wild species of horse was ever of that conspicuous colour. Greys with white manes and tails may be also disregarded as albinistic. But dappled greys with black or mostly black manes, tails, and "points" are more deserving of attention, because, in the first place, horses that are true to this type do not show convincing signs of albinism and because, in the second place, they possess a very definite pattern.

As has been very well known for many years, domestic horses are marked with patterns of two kinds, namely stripes and dapples. Stripes, which are more usually present in duns than in horses of other breeds, although they are sometimes seen in bays and chestnuts, are obviously comparable to the stripes of asses, both African and Asiatic. The stripe most commonly developed is the spinal. Next in order of frequency are short stripes on the legs, especially across and above the knees and hocks. Now and again also there are one or more stripes on the shoulder and adjacent part of the neck, and sometimes narrow stripes on the head resembling in general arrangement those of some zebras. In dun horses

\* Tr. Highland and Agric. Soc. Scotland, pp. 32-38 (1904). Prof. Ewart does not, however, now think that the name *caballus* should be fixed to this horse.

all these stripes may coexist in one individual. Some exhibit only the spinal stripe, but when the legs or shoulders are barred the spinal stripe appears to be always present as well; just as in the Asiatic asses, while stripes on the legs and shoulders may or may not be detectable, the spinal stripe is of invariable occurrence.

It is also known that the foals of some horses, especially duns, may show on parts of the body other than those specified faint stripes which usually disappear with the first moult; and Hagenbeck recorded the presence of such evanescent stripes upon the foals of the wild Mongolian Prjevalsky's horses. With the exception of this last circumstance, all the above enumerated facts connected with the striping of horses were well known to Darwin \*, and he drew from them the conclusion that domestic breeds of horses are descended from a single wild species which was dun in colour and marked more or less with dark stripes. That portion of this view which relates to the presence of black stripes in the ancestral stock is generally accepted at the present time. Nevertheless it must be remembered that dappling or pummel-marking, as it is sometimes called, is a far more usual pattern in domestic horses than stripes. It occurs commonly in bays and blacks, more rarely in chestnuts, is not unknown in duns, and attains its highest perfection in dapple-greys.

In horses of this colour the pattern may be described as consisting of white spots upon a black or blackish-grey ground, or of a black or blackish-grey network with white interspaces, in just the same way as zebras have been stated to be black-striped or white-striped according to the fancy of the describer. When dappling occurs in bays the network is black on the bay ground, and in blacks the dappling stands out against the dark ground-colour on account of the greater intensity of its tone or of a difference in the sheen of the hairs, precisely as is the case in the spots of black leopards or the marbling of tabby cats.

Now it is admittedly possible that "dappling" is a sport without phylogenetic significance. This, however, has not been always held. Darwin suspected that dappling was a modification of the striped pattern † with which he believed

\* For a more recent and detailed discussion of this subject, see Prof. Ewart's 'Penycuik Experiments,' pp. 100-134 (1899).

† This is not exactly Prof. Ewart's opinion. He said: "Dappling, I believe, has been acquired since the ancestral stripes were all but lost. When dappling coexists with more or less distinct stripes it is at once evident . . . that the one has not been derived from the other. The

the wild forerunner of domestic horses was marked, and he cites in support of this opinion the alleged fact that in several species of the cat family stripes pass into spots. In opposition to this it must be urged that a pattern of transverse stripes is a very unusual style of coloration in Mammalia, and that in members of the cat family, in the tiger for instance, it is tolerably certain that the stripes owe their origin to the fusion in transverse lines of solid spots or of large irregularly disposed rosette-shaped or subcircular blotches \*. Therefore, adopting Darwin's analogy, if dapples and stripes in horses stand in the same relation to one another as spots and stripes in jaguars and tigers, it follows that the dappled pattern preceded the striped pattern in the evolution of equine coloration. It is at all events possible, perhaps indeed more likely than not, that this is the true explanation of the persistence with which the dappled pattern crops up in diverse breeds of domesticated horses. As Dr. Bonavia, perhaps exaggeratedly, said, "the very fact that the dappling is so persistently inherited, either wholly or vestigially, would indicate that it comes from the very foundation of horse evolution" †.

Darwin, moreover, cites a case of a donkey marked in this way, a fact which shows, assuming the truth of the hypothesis, that the dappling has not wholly died out in the asinine line of descent.

The black-and-white-striped coloration of zebras shows that there is nothing intrinsically improbable in the supposition of the existence in former days of a wild horse mottled with black and white. There seem to be no reasons to think that with a slightly different environment the dappled or mottled pattern would not be as beneficially procryptic as the striped is known to be. Perhaps it would lend itself especially to concealment in horses accustomed to shelter in woods through the foliage of which the sun-rays passed, dappling the leaves and tree-trunks with spots of light.

It appears to me to be impossible to say which breed of horses in which dapple-grey individuals crop up approaches

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pigment which formerly produced stripes . . . has in recent times been as it were left uncontrolled, with the result that it frequently gives rise to ever-varying and quite meaningless dappling, or to large equally meaningless blotches" ('Pencuick Experiments,' pp. 123-124, 1899). Yet pigment which adheres so persistently to the dappled pattern can scarcely be described as uncontrolled.

\* Pocock, *Ann. & Mag. Nat. Hist.* (7) xx. p. 436 (1907).

† 'Studies in the Evolution of Animals,' p. 61 (1895). This work, although the reverse of orthodox in many of its conclusions, is well worth careful reading for its recorded facts.



nearest to the hypothetical wild type that was so coloured. Whether he was tall in stature or a pony, heavily or lightly built, long- or short-headed, must be left, at all events for the present, undecided. It is, in my opinion, almost certain that crossing of different breeds, whether intentionally selective or not, together with changed conditions of life, have so altered domestic horses, that no existing grey resembles, except in colour, and perhaps not exactly in that, the hypothetical wild prototype. Welsh and Airedale terriers have reverted nearly to the coloration of jackals without in themselves resembling jackals in structure.

According to Prof. Ridgeway\* there is justification for the conclusion "that grey horses are not an original stock . . . but are the result of crossing Libyan and Asiatic blood." I presume from this that Prof. Ridgeway holds that dapple-greys with the mane, tails, and lower legs mostly black are hybrids or mongrels or "sports" in the sense that chestnuts are sports, a view which may be perfectly correct †. Nevertheless I do not think it follows that dapple-grey was not a primitive colour because it comes out in the progeny when the parents belong to distinct stocks, whether they be breeds, subspecies, or species; for, as Darwin pointed out, the offspring of distinct breeds may revert to the coloration of remote ancestors. Hence, if "dapple-grey" results from crossing bay Libyan with dun Asiatic horses, the fact may be cited as an item of evidence in favour of the possibly primitive nature of that pattern. This, at all events, is a suggested explanation of what is otherwise, if true, a remarkable phenomenon in inheritance.

But the dapple-grey pattern is interesting from another point of view. As already said, a horse so coloured may be described with perfect accuracy either as a dark horse with white spots or as a white horse with dark reticulations, just as zebras may be described as black animals with white or fawn stripes or as white or fawn animals with black stripes. Up to the present time it has been almost universally admitted that in the Equidæ the black markings constitute the stripes and the white or fawn the ground-colour to which the stripes have been superadded, as in the case of the *Æluroid Carnivora*. Sir Harry Johnston ‡, however, thinks this view

\* 'Origin and Influence of the Thoroughbred Horse,' p. 261 (1905).

† Compare, however, Hamilton Smith, who said "albinism would produce white or flea-bitten or sorrel horses, but does not afford the round dapples and black legs" ("Horses" in the 'Naturalist's Library,' *Mammalia*, vol. xii. p. 211, 1841).

‡ 'The Woburn Library: British Mammals,' pp. 276 277 (1903).

is entirely wrong, and holds that the white marks in zebras are the true stripes and the black the ground-colour. Although this hypothesis appears at first sight to be improbable, especially when brought into contact with the coloration of such species of Equidæ as Prjevalsky's horse or the Nubian wild ass, it seems to me to be worthy of careful consideration and not hastily dismissible as without foundation.

In its favour its author adduces the following facts. In several groups of Ungulates there is a pattern of white spots, which are either transitory and confined to the young or are persistent through life to old age. The deer furnish familiar instances of both these phenomena, and no one probably doubts that white spots tending to run into longitudinal lines formed the pattern of primitive members of the Cervidæ. Antelopes of the subfamily Tragelaphinæ also commonly exhibit white markings usually in the form of transverse stripes, but sometimes, as in *Tragelaphus*, of longitudinal white stripes and spots often coexistent with the transverse stripes, which have probably been derived from them. Giraffes, too, although commonly described as spotted with brown on a whitish ground, may be equally well regarded as brown animals with a network of white. This is especially evident in the Somaliland race of the North-African giraffe (*Giraffa camelopardalis reticulata*); and in view of what has already been said of the prevalence of a pattern of white in some other ruminant Ungulates, the view that giraffes are fundamentally brown animals marked with white must be regarded as highly plausible. Even outside the limits of the Ruminantia pale longitudinal bands occur in Artiodactyle Ungulates, as in the young of some species of pigs (*Sus*). Artiodactyle Ungulates, however, are by no means nearly related to Equidæ, and cannot in themselves be considered as supplying very valuable evidence on the nature of zebra-patterns. Much more to the point, indeed in the highest degree pertinent to the question at issue, is the fact that the young of tapirs, the most primitive (as horses are the most specialized) of existing Perissodactyle Ungulates, are thickly covered with white stripes and spots forming longitudinal bands on a dark ground.

These are the facts, amplified in detail, upon which Johnston based his conclusion. Let us see if his argument can be further elaborated by a comparison between the markings of young tapirs and existing Equidæ, especially zebras.

In tapirs the only white spots which persist to maturity\* are those on the rim of the ears, and on the fetlocks in some specimens. In all zebras the tips of the ears are also white; but some young tapirs, at all events, also show white spots on the back of the ear behind, and the back of the ears in all zebras has a varying amount of white. All zebras, too, have a varying amount of white on the fetlocks. In four young tapirs mounted in the Natural History Museum, and referred to the four species *T. terrestris*, *T. roulini*, *T. bairdi*, and *T. indicus*, there is a broad dark brown spinal area, defined on each side by a white stripe, sometimes more or less broken up into spots, and extending from the base of the neck on to the hind-quarters. In one of them, *T. terrestris*, this area is itself spotted with white in the middle line. In the young of *T. bairdi*, which apparently shows the white pattern in an evanescent stage, the dorsal white stripes are only just visible; but they are there nevertheless. Gray also noticed these dorsal white stripes in the young specimens he described†. In all zebras, all Asiatic asses, the typical African ass, Prjevalsky's horse, and many domestic horses there is a dark spinal line, narrower or broader according to the species. This dark spinal line is defined by a pale line as far forwards as the withers in some races of Asiatic asses, and at least as far as the middle of the back in some zebras, e. g. *E. grevyi*; and the pale line is represented on the neck of many horses and asses, both African and Asiatic, by the outer pale portion of the mane, the middle of which is always black like the spinal line‡. If it be just to regard as genetically related the dark spinal area set off by a pair of white stripes in young tapirs and in existing Equidæ, it follows that the pale dorsal longitudinal lines in the horses are the stripes and the dark spinal area part of the ground-colour. The mane of zebras fully bears this out, for it is perfectly evident that the white marks, which, be it noted, are continuous with those of the neck, are the stripes. They merely form superficial tufts on the black mane.

Now and again the white marks on young tapirs, especially across the sacral region, form short transversely set stripes,

\* In the adult Malayan tapir the whole of the posterior half of the body is white. Presumably this white area results from the extension and fusion of the white pattern on this area in the young.

† P. Z. S. 1872, pp. 483-492.

‡ Unless my memory is at fault, Prof. Cossar Ewart told me some time ago in conversation that he considered the definition of the dark spinal line by two light lines to be a primitive feature in the Equidæ.

like those on the body of zebras; but for the most part the lines are decidedly longitudinal. The stripes are also longitudinal across the thighs up to the root of the tail in all zebras; and this arrangement may be a primitive feature. In young tapirs, where the legs are spotted, the spots often form abbreviated stripes at right angles to the axis of the limbs, and the spots are present on the inside as well as on the outside of the limbs. In all zebras in which the legs are fully marked the stripes are present both on the inside and the outside, and their direction is always at right angles to the long axis of the limbs. But in some young tapirs the legs below the "knees" and "hocks" are unspotted, and thus recall the black "points" of many horses. On the head in young tapirs the spots frequently tend to run into longitudinal lines. In zebras also the white marks form longitudinal lines at least on the area in front of the eyes.

In the young of *T. roulini* the belly is brown; in that of *T. terrestris* it is white; but in that of *T. indicus* it is distinctly spotted with white like the rest of the body. In fully marked zebras the belly is striped like the rest of the body, and in those in which the belly is white the whiteness has evidently been acquired by the suppression of the dark bands. Finally, in all the young tapirs\* exhibited in the Museum the nose is dark and unspotted. In all zebras the muzzle is mostly or wholly black or ashy grey, and never marked with white.

It is needless to insist upon the importance of these resemblances, since Johnston's hypothesis supplies an explanation of them.

The greatest apparent difficulty in the way of accepting this author's view is presented, not by the zebras, but by the Asiatic and African donkeys, by Prjevalsky's horse, and by certain domestic breeds like the dun. Now if these animals exhibited a primitive style of coloration, showing dark stripes in an incipient stage of development, the fact would be practically destructive of Johnston's hypothesis. But this is not so. All the evidence goes to prove that the coloration of these species is highly specialized and derivable from a type resembling that of zebras in a general

\* The nose of the example of *T. indicus* is denuded of hair. But a figure of the young of this species in J. G. Wood's 'Illustrated Natural History,' vol. i. p. 744, shows this part to be dark and unspotted. There is also an excellent photograph of the young of this species published by Dr. Mitchell in P. Z. S. 1908, p. 786, which shows, I believe, the same feature, the pale patch on the snout being merely reflected light.

way, the dark marks they may exhibit being vestigial. According to the accepted theory, the dark stripes of the zebroid prototype have, apart from these vestiges, vanished, leaving the dun, reddish-fawn, or tan ground-colour unmarked. According to Johnston, the pale stripes have increased in extent until they have enveloped nearly the whole body, fusing together and swamping the dark interspaces representing the ground-colour, the sole remnants of which are the spinal stripe and the stripes, when present, on the legs, shoulders, or elsewhere.

Johnston seems to think also that the uniformity in colour may have been attained by a rather different process as well, namely, by the fading of the dark interspaces and the darkening of the light stripes until they were both of the same brown or dun hue.

There seems to me to be nothing extravagant in the view of a pattern developing so as to overrun the ground-colour. An instance of this is seen in the black leopards of Grahams-town, where the spots have become broken up and multiplied until there is scarcely a trace of the original yellow interspaces left; and, to cite an instance which is peculiarly apposite, I may mention that of the quagga in the Vienna Museum, the type of *E. quagga lorenzi*, in which the dark markings, hitherto quoted by myself and others as stripes, have expanded and spread to such an extent that the head, neck, and fore-quarters of the animal are dark brown, relieved by thin pale lines. If these dark marks, as has been assumed, are stripes that have spread so as almost to crowd out the pale interspaces, no reason can be alleged why white stripes should not similarly spread and obliterate dark interspaces.

It seems to me indeed that we need not look beyond the subspecies of *Equus quagga* itself for justification of Johnston's belief. In these may be seen the passage from thickly striped legs to white legs by the thinning of the black marks, or, stating the same fact another way, by widening of the white marks. It is quite obvious, too, that the dark marks become not only reduced in width and length, but also toned in intensity of colour until they fade away and are replaced by white. This process goes on up to the shoulder and nearly to the root of the tail, and also takes place on the belly. Existing races only go to this stage, which is exhibited in Burchell's quagga (*E. quagga burchelli*). But in extinct races the suppression of the dark marks at the expense of the light marks was carried still further, as is shown in the original quagga depicted by Edwards, in which the black

marks over the quarters break up into spots. In another race, Grey's quagga (*E. quagga greyi*), there are no very definite markings over the hind-quarters and posterior area of the flanks, owing apparently to the toning down of the dark marks and the deepening of the pale marks to a nearly uniform brown; the marks on the head and neck, however, retain respectively their normal width, the dark marks nevertheless being deep brown and the pale marks creamy brown. In yet another form, Daniell's quagga (*E. q. danielli*), of which there are extant three coloured plates drawn by different artists from different living models, the extension of the light marks, which are chestnut in hue, is still further carried, the dark markings being represented principally by narrow lines on the head, neck, and shoulders. Finally, in Lorenz's quagga, as already stated, the dark markings on the head, neck, and fore-parts have encroached upon the light marks, reducing them to pale narrow streaks\*.

Thus the quaggas supply evidence of a progressive evolution of the black and white zebroid pattern towards, though never quite achieving, uniformity of colour of a brown or chestnut hue. This approximation to uniformity has been brought about by four distinct processes:—(1) by the lightening of the dark marks and the darkening of the light marks to practically the same tint; (2) by the lightening of the dark marks and their extension across the intervening pale marks; (3) by the darkening of the light marks and their extension across the intervening dark marks; (4) by the fading away of the dark marks, especially after reduction in length and width has taken place.

Thus there appear to me to be very good reasons for thinking that Johnston's view of the coloration of the Equidæ is correct, namely, that they are descended from dark-coloured animals patterned with white spots, running into longitudinal lines originally, and at a late stage in evolution becoming arranged in transverse bars over the neck and body. It is this view of the question which, in my opinion, gives special interest to the coloration of dapple-grey horses; for if, as it is obvious to suggest, the white spots of these horses represent phylogenetically the white spots of a tapiroid progenitor, we see in this dappled pattern a stage in the evolution of equine coloration antecedent to the vertically banded zebroid pattern hitherto regarded as the most primitive pattern extant in the Equidæ.

\* Pocock, Ann. & Mag. Nat. Hist. (7) xiv. pp. 313-328 (1904).