

considered them distinct unless he believed all the small Asiatic spotted cats to be of one species.

Pallas, in the 'Zoographia Russica,' vol. i. p. 29, describes the *Lynxes* found in the Caucasus; but they all have a short tail. The skins of the wild cat from there (p. 27) have four longitudinal black streaks on the forehead, three on the nape, and one dorsal streak.

4. On Sclater's Muntjac and other Species of the Genus *Cervulus*. By Sir VICTOR BROOKE, Bart., F.Z.S.

[Received January 6, 1874.]

(Plates VIII. & IX.)

In a letter accompanying the specimens of *Cervulus sclateri* which are mentioned by Mr. Swinhoe in his description of that species (P. Z. S. 1873, p. 813), he expresses his desire that I should describe the species more fully and exhibit the specimens to the Society. The latter part of Mr. Swinhoe's request I have great pleasure in fulfilling this evening; the former Mr. Swinhoe has rendered very difficult, his description of the species being almost as exhaustive as the materials would admit.

It has, however, occurred to me that this may be a fitting opportunity for putting together in a concise form all that is known concerning the genus *Cervulus*, so as to form a basis for future observation and research.

In the *Prox furcata* from the province of Schlesien (Steinheim), described and figured by Hensel (Zeitschr. d. deutsch. geolog. Gesellsch. 1859, xi. 251-279, T. 10, 11), we have the earliest geological occurrence of this form of Deer. The original specimens described by Hensel consisted of nearly the entire left frontal bone, with pedestal and horn complete, and of part of the superior maxillary. There is in the British Museum a cast of the former, which I have examined carefully; and the close similarity between it and a corresponding portion of the skull of *Cervulus muntjac* has astonished me, so much so that I have no hesitation in saying that, if the Miocene Muntjac's claim to specific distinction depended solely upon the characters afforded by this specimen, its claims would rest upon a very slender foundation. It cannot, however, I think, be doubted that the discovery of other parts of the skeleton of *Prox furcata* would reveal trenchant and interesting differences between this ancient form and the existing Muntjacs.

The distribution of *Cervulus*, as represented by existing species, is, with perhaps the exception of *Cervulus sclateri* (which appears to extend into the north-western Palæarctic Region), confined to and coextensive with the Indian or Middle Palæotropical Region of Sclater.

So far as the materials at my command have enabled me to form an opinion, there are but three definite and persistent modifications

of this form—*Cervulus muntjac*, *Cervulus reevesi*, and *Cervulus sclateri*. Of these *Cervulus muntjac* has the most southern, *Cervulus sclateri* the most northern, and *Cervulus reevesi*, the intermediate range. This being so, analogy would lead us to look for intermediate structural characters in the species of intermediate range; but such is not the case in the present instance, *Cervulus sclateri* being intermediate in size and character to the other two species. In the three species the size of the frontal and suborbital glands increases in inverse ratio to the size of the species; hence the principal differences exhibited by their skulls, that of *Cervulus reevesi* being much more compressed from above downwards, and, if measurement be taken from the most outwardly projecting parts of the maxillæ, much wider in comparison with its length than that of either of the other species. These characters *Cervulus sclateri* exhibits in a degree intermediate between *Cervulus reevesi*, and *Cervulus muntjac*.

Mr. Swinhoe has sent home a young specimen* of *Cervulus*, which he identifies as the young of *Cervulus sclateri*; in the upper part of its back and sides it is dappled with distinct yellowish spots, this specimen is stuffed in the British Museum (1620 c, Gray, Hand-list, p. 165). In the British Museum there is also a specimen of a very young *Cervulus reevesi*, said to have been sent from Amoy by Mr. Swinhoe (1524 d, l.c. p. 165): this specimen shows no sign of spots, the fur being annulated as in the adult. The young of *Cervulus muntjac* is spotted; it would therefore appear that, in the fact of having the young spotted, *Cervulus muntjac* and *Cervulus sclateri* agree together and differ from *Cervulus reevesi*. I must, however, confess that, until an opportunity offers of examining a larger series of the young of all three species, this can hardly be considered satisfactorily established. The skin of a very young specimen of *Cervulus sclateri* sent home by Mr. Swinhoe, the skull of which shows only the first true molar in place, being spotless, leads me to believe that these markings in the Muntjacs are lost at a very early age; it is therefore not impossible that the spotless stuffed specimen of *Cervulus reevesi* in the British Museum may represent that species at an age when the spots are lost.

Correlated, apparently, with the long persistence of this form, I find in the reduction of the number of parts remaining permanently separate in the tarsal joint a more advanced stage of specialization than that exhibited by any Artiodactyle, with the exception of two probably equally ancient forms—namely, the simple horned *Cervus pudu* of Chili, and *Hyomoschus aquaticus*. In the typical tarsus of the Pecora, specialization has proceeded two steps in advance of that shown in the Suinæ; the navicular and cuboid have become united into one bone, as have also the second and third cuneiforms†, the first cuneiform being represented by a small separate bone. Thus the typical adult tarsus of the Pecora (fig. 1 c) presents five separate

* See P. Z. S. 1872, p. 813.

† Professor Flower informs me that Dr. Kowalevsky has shown him convincing proof that the large bone between the cuboid and internal cuneiform in the Pecora represents the second and third cuneiform united.

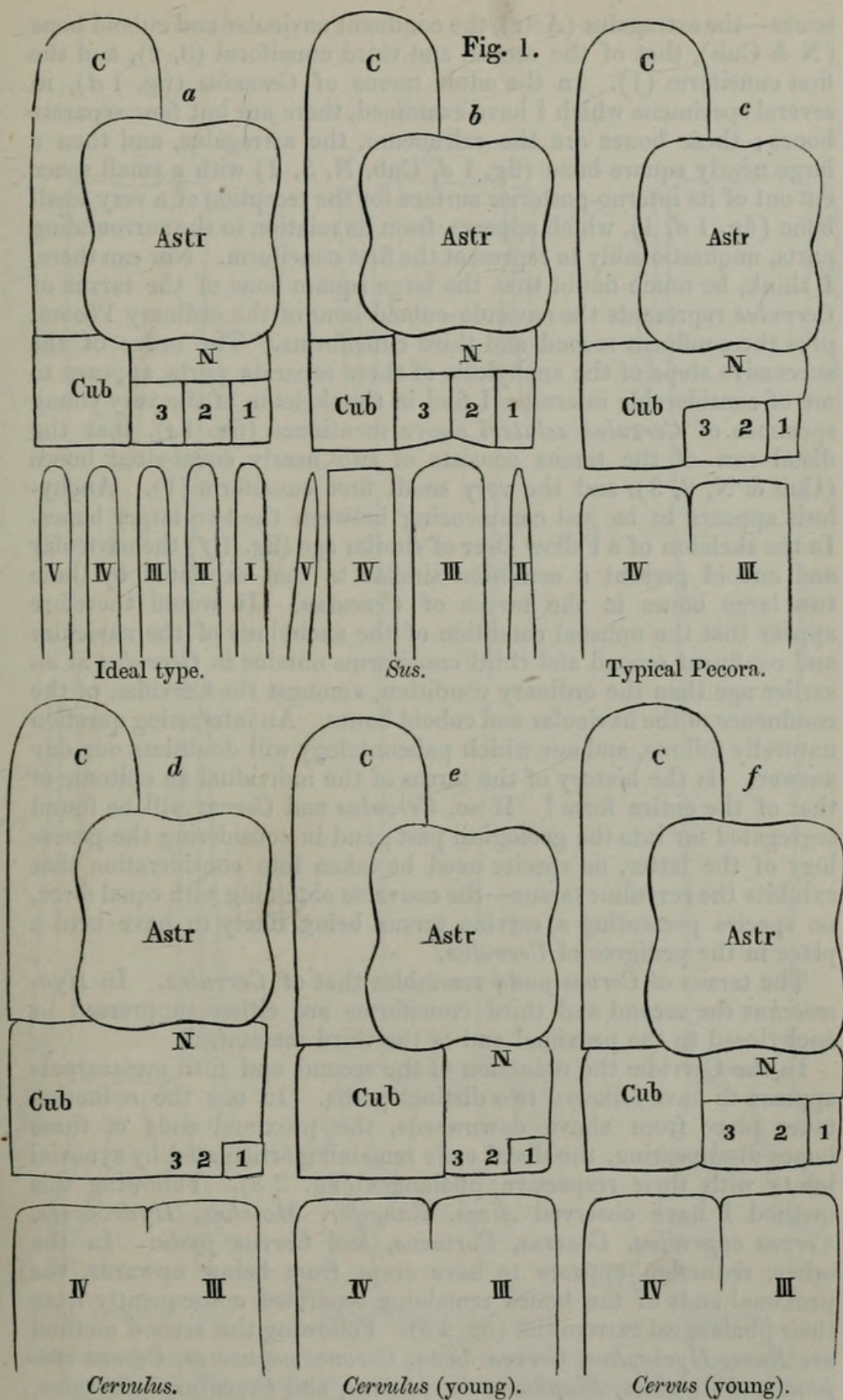


Diagram showing the condition of the tarsus in *Cervulus* as compared with the typical Mammalian tarsus and that of *Sus* and the ordinary Pecora.

C, calcaneum; Astr, astragalus; Cub, cuboides; N, naviculare; 1, 2, 3, cuneiformia; I, II, III, IV, V, metatarsals.

bones—the astragalus (Astr), the confluent navicular and cuboid bone (N & Cub), that of the second and third cuneiform (3, 2), and the first cuneiform (1). In the adult tarsus of *Cervulus* (fig. 1 *d*), in several specimens which I have examined, there are but four separate bones; these bones are the calcaneum, the astragalus, and then a large nearly square bone (fig. 1 *d*, Cub, N, 3, 2) with a small space cut out of its interno-posterior surface for the reception of a very small bone (fig. 1 *d*, 1), which appears, from its relation to the surrounding parts, unquestionably to represent the first cuneiform. Nor can there, I think, be much doubt that the large square bone of the tarsus of *Cervulus* represents the naviculo-cuboid bone of the ordinary Pecora, plus the confluent second and third cuneiforms. The order of the successive steps of the ankylosis of these separate parts appears to me of considerable interest; I find in the skeleton of the very young specimen of *Cervulus sclateri* above mentioned (fig. 1 *e*), that the distal row of the tarsus consists of two nearly equal-sized bones (Cub & N, 2, 3), and the very small first cuneiform (1). Ankylosis appears to be just commencing between the two larger bones. In the skeleton of a Fallow Deer of similar age (fig. 1 *f*) the navicular and cuboid present a condition similar to that exhibited by these two large bones in the tarsus of *Cervulus*. It would therefore appear that the unusual condition of the ankylosis of the navicular and confluent second and third cuneiforms obtains in *Cervulus* at an earlier age than the ordinary condition, amongst the Cervidæ, of the confluence of the navicular and cuboid bones. An interesting question naturally follows, and one which palæontology will doubtless one day answer. Is the history of the tarsus of the individual an epitome of that of the entire form? If so, *Cervulus* and *Cervus* will be found segregated far into the geological past; and in considering the genealogy of the latter, no species need be taken into consideration that exhibits the cervuline tarsus—the converse obtaining with equal force, no species presenting a cervine tarsus being likely to have held a place in the pedigree of *Cervulus*.

The tarsus of *Cervus pudu* resembles that of *Cervulus*. In *Hymoschus* the second and third cuneiforms are either suppressed or ankylosed to the proximal end of the third metatarsal.

In the Cervidæ the reduction of the second and fifth metacarpals appears to have followed two distinct paths. In one the reduction takes place from above downwards, the proximal ends of these bones disappearing, the distal ends remaining articulated by synovial joints with their respective phalanges (fig. 2 *a*). Following this method I have observed *Alces*, *Rangifer*, *Moschus*, *Hydropotes*, *Cervus capreolus*, *Coassus*, *Cariacus*, and *Cervus pudu*. In the other, reduction appears to have crept from below upwards, the proximal ends of the bones remaining separated consequently from their phalangeal extremities (fig. 2 *b*). Following this second method are *Rusa*, *Hyelaphus*, *Cervus dama*, *Cervus magaceros*, *Cervus elaphus* and its allies, *Elaphurus davidianus*, and *Cervulus*. *Cervulus*, however, in this respect (see fig. 2, *c*), as well as in the condition of the tarsus, shows an advance in specialization, all the phalanges of

Fig. 2.

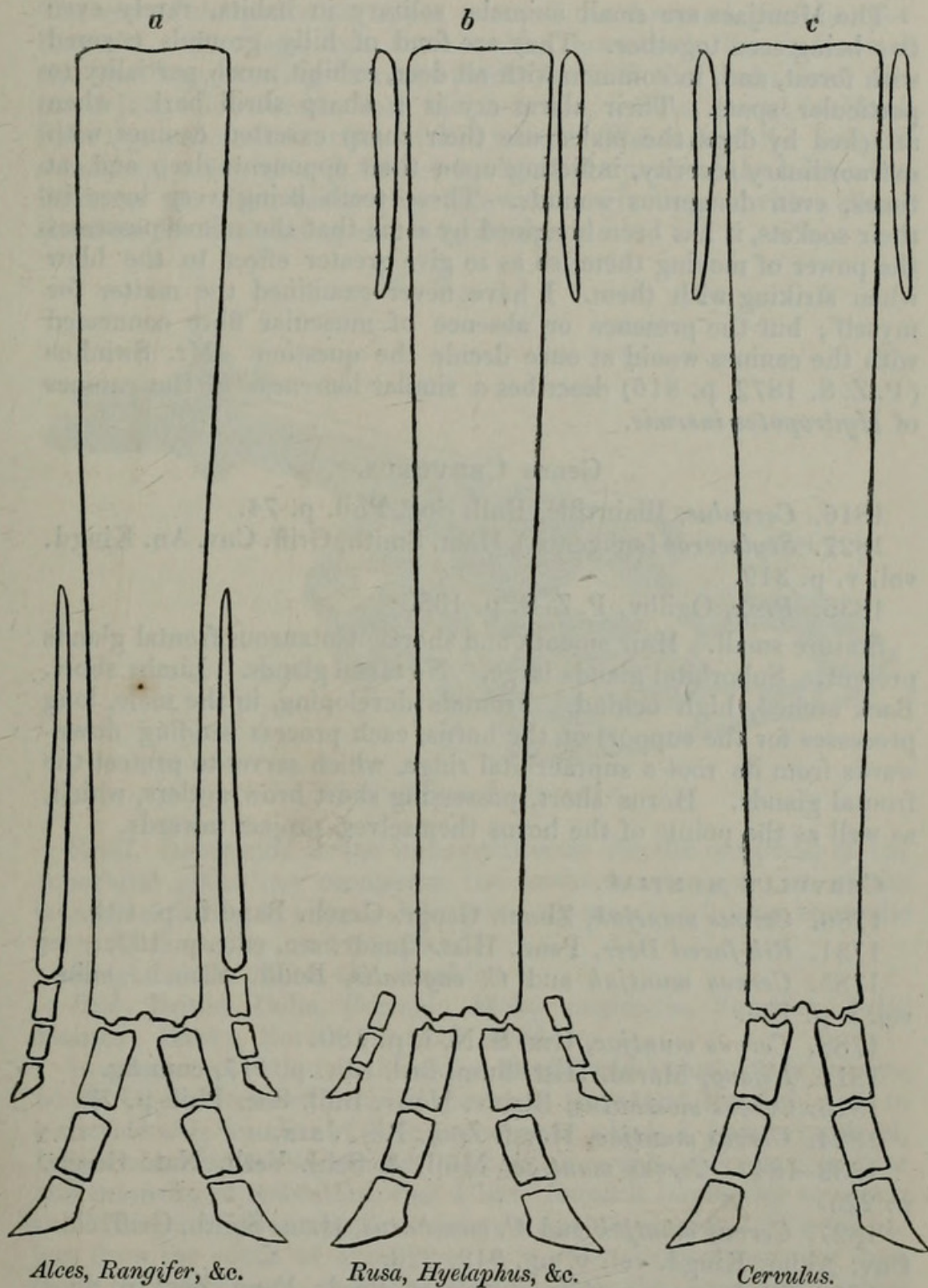


Diagram showing the two paths followed by the *Cervidæ* in the reduction of the second and fifth metacarpals, and the loss of the phalangeal extremities of these digits in *Cervulus*.

the fourth and fifth digits on both fore and hind extremities having, as far at least as the specimens examined by me are concerned, entirely disappeared. In this respect *Cervulus* stands alone amongst the Cervidæ.

The Muntjacs are small animals, solitary in habits, rarely even two being seen together. They are fond of hilly grounds covered with forest, and, in common with all deer, exhibit much partiality to particular spots. Their alarm-cry is a sharp shrill bark; when attacked by dogs the males use their sharp exerted canines with extraordinary severity, inflicting upon their opponents deep and, at times, even dangerous wounds. These teeth being very loose in their sockets, it has been imagined by some that the animal possesses the power of moving them, so as to give greater effect to the blow when striking with them. I have never examined the matter for myself; but the presence or absence of muscular fibre connected with the canines would at once decide the question. Mr. Swinhoe (P. Z. S. 1872, p. 816) describes a similar looseness in the canines of *Hydropotes inermis*.

Genus CERVULUS.

1816. *Cervulus*, Blainville, Bull. Soc. Phil. p. 74.

1827. *Styloceros* (subgenus), Ham. Smith, Griff. Cuv. An. Kingd. vol. v. p. 319.

1836. *Prox*, Ogilby, P. Z. S. p. 135.

Stature small. Hair smooth and short. Cutaneous frontal glands present. Suborbital glands large. No tarsal glands. Limbs short. Back arched, high behind. Frontals developing, in the male, long processes for the support of the horns, each process sending downwards from its root a supraorbital ridge, which serves to protect the frontal glands. Horns short, possessing short brow-antlers, which, as well as the points of the horns themselves, project inwards.

CERVULUS MUNTJAC.

1780. *Cervus muntjak*, Zimm. Geogr. Gesch. Band ii. p. 131.

1781. *Rib-faced Deer*, Penn. Hist. Quadr. sec. edit. p. 107.

1785. *Cervus muntjak* and *C. vaginalis*, Bodd. Elench. anim. vol. i. p. 136.

1788. *Cervus muntjac*, Gm. S. N. i. p. 180.

1811. *Kijang*, Marsd. Hist. Sum. 3rd. edit. p. 117, cum fig.

1816. *Cervus moschatus*, Blainv. Nouv. Bull. Soc. Phil. p. 77.

1824. *Cervus muntjac*, Horsf. Zool. Res. Java.

1839–1844. *Cervus muntjac*, Müll. & Schl. Verh. Nat. Gesch. p. 225.

1827. *Cervus muntjak* and *C. moschatus*, Ham. Smith, Griff. edit. Cuv. Anim. Kingd. vol. v. pp. 319, 320.

1852. *Styloceros muntjacus*, Kelaart, Prodr. Faun. Zeyl. p. 85.

1855. *Cervus muntjac* and *C. styloceros*, Wagn. Säugeth. p. 388.

1867. *Cervulus aureus*, Jerd. Mamm. p. 264.

1869. *Cervulus vaginalis*, Swinhoe, P. Z. S. p. 652.

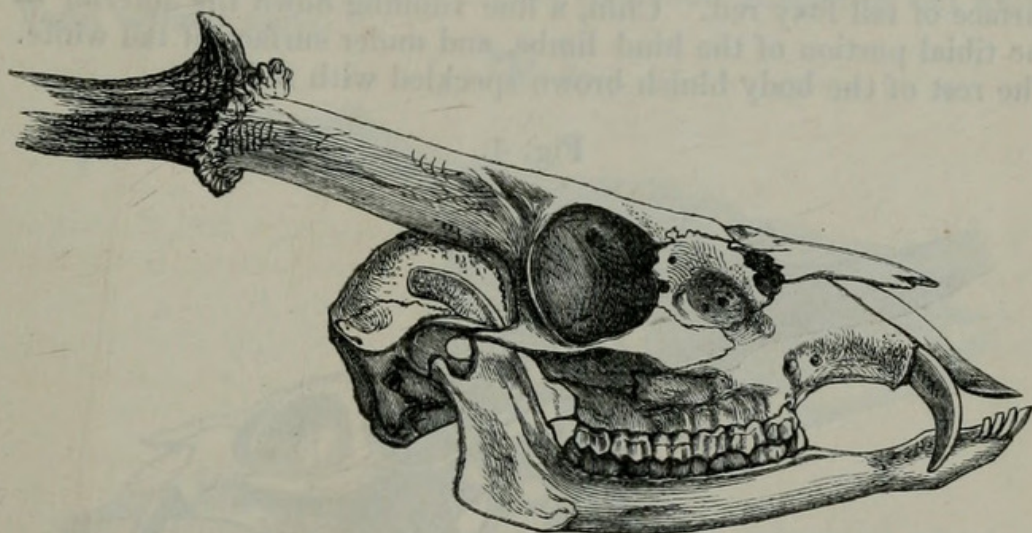
1873. *Cervulus moschatus*, Gray, Hand-list Rum. Mamm. p. 163.

1873. *Cervulus amostylis*, Gray, *ibid.* p. 165.

1873. *Cervulus tamulicus*, Gray, *ibid.*

Anterior parts of the face, from the muzzle to between the eyes, brown, a blackish line running up the inside of each frontal pedestal. The rest of the pedestals, upper parts of the forehead, and occiput foxy red. Fore legs, from the shoulder downwards, line in front of the hind legs, starting from the patella, and all the limbs from the tarsal joints downwards, dark bluish brown. Chin, throat, inside of hind legs and under surface of tail white. The rest of the body of a brilliant yellowish red, darker in the upper parts of the back—the hairs on the sides being grey below, strongly tipped with yellow, those on the back being also ringed with black.

Fig. 3.



Skull of *Cervulus muntjac*.

Skull. Depression in the lachrymal bone for the reception of the suborbital gland not occupying the entire bone, a portion of the lachrymal falling in a vertical direction between the frontal bone, the anteorbital vacuity, and the gland.

Height about 26" at the shoulder.

Hab. British India, Burmah, Malay peninsula, Sumatra, Java, Hainan; Banka, Borneo (*Schl. & Müll.*).

In a large collection of the skins, skulls, and horns of this species, which I have received from all parts of India and Burmah, and in a considerable number of living specimens which I have examined, I have observed amongst adult animals so much difference in size and intensity of coloration, that I have found it impossible to retain the Muntjac of Java and Sumatra as a distinct species. The Muntjacs from the south of India are, as a rule, decidedly smaller than those from the north, as is also the case with the Axis and Indian Antelope. But even this rule is subject to many exceptions; I have received from Northern India perfectly adult and even slightly aged specimens of both Muntjac and Axis inferior in size to the average as presented by these species in Southern India. These small races

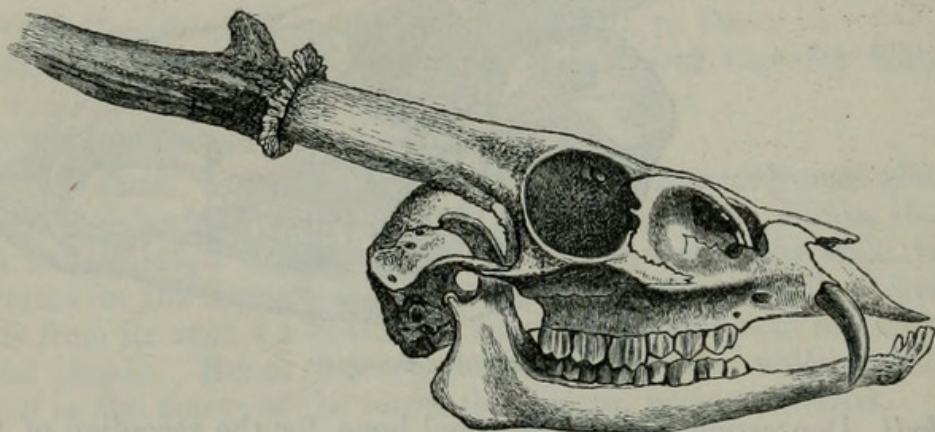
are always connected with particular areas, and are doubtless the result of conditions sufficiently unfavourable to prevent the species reaching the full luxuriance of growth and beauty of which it is capable, though not sufficiently rigorous to prevent its existence.

CERVULUS SCLATERI. (Plate VIII.)

1873. *Cervulus sclateri*, Swinhoe, P. Z. S. p. 813.

♂ *adult*. The entire forehead, occiput, and outside of ear-conchs yellow. The intensity of the yellow varies in different specimens, but is always sufficiently strong to form a very conspicuous character in the appearance of the males of this species. A line running up the inside of the horn-pedestals, starting from the frontal glands, jet-black, this marking contrasting strongly with the yellow of the forehead. Cheeks, anterior of neck and throat, belly, and upper surface of tail foxy red. Chin, a line running down the anterior of the tibial portion of the hind limbs, and under surface of tail white. The rest of the body bluish brown speckled with red.

Fig. 4.



Skull of *Cervulus sclateri*.

Skull. Depression in lachrymal for suborbital gland occupying nearly the entire bone. Nasals more prolonged backwards than in the other species. Parts anterior to the orbits also more prolonged and tapering gradually from the orbits to the præmaxillæ.

Height 19" at the shoulder.

Hab. "Abounding in the hills to the back of Hangchow city" (Swinhoe).

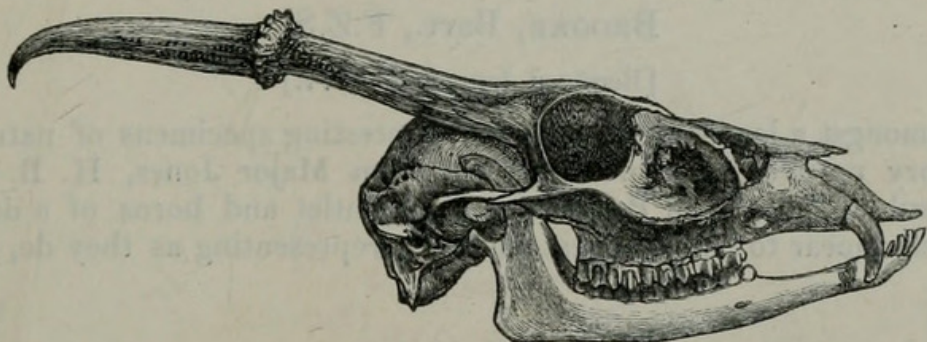
Mr. Swinhoe says, "the female of this species may easily be confounded with the female of *C. reevesi*; but the brighter colour of the latter, and her pure white chin and throat will serve as distinguishing characters for the skin." He describes *C. sclateri* as more porcine in appearance than *C. reevesi*. I am astonished at this, as it is hard to imagine a Deer more pig-like, or, rather, more peccary-like in shape and gestures than *C. reevesi*. The form of the skulls of the two species would lead me to expect the more high-bred and refined appearance in the new species.

CERVULUS REEVESI. (Plate IX.)

1838. *Cervus reevesi*, Ogilby, P. Z. S. p. 105.1862. *Cervulus reevesi*, Swinhoe, P. Z. S. p. 361.1870. *Cervulus reevesi*, Swinhoe, P. Z. S. p. 644.1873. *Cervulus reevesi*, Gray, Hand-list Rum. Mamm. p. 165.

Anterior parts of the face below the eyes brown ; between the eyes the hair becomes more scanty, strong black lines running from each frontal gland up the inside of the horn-pedestals. Upper parts of the forehead become gradually rufous from the mixture of red hairs, the rufous becoming more intense on the occiput and ending in a strongly defined line between the ears. Posterior of neck, back, and sides grizzly rufous, a line running down the centre of the neck and back and forearms bluish brown. Cheeks, throat, belly, and upper surface of tail rufous. Chin and under surface of tail white. Fawn without spots.

Fig. 5.

Skull of *Cervulus reevesi*.

Skull. Depression for the reception of the suborbital gland, of immense size, modifying all the surrounding bones, and giving the parts of the skull anterior to the orbits a compressed appearance from above downwards, the floor of the suborbital fossa being much flattened and pulled out laterally. The pedestals of the frontal bones, in all the specimens examined by me, much more parallel than in the two other species. Frontal supraorbital ridges very strongly developed. Parts anterior to the suborbital gland compressed from side to side and very short,

Height scarcely 13" at the shoulder.

Hab. Southern China, from the latitude of Canton, as far north as Ningpo ; Formosa.

Females hornless. Canines in the males long, pulp-cavity non-persistent. Suborbital fossa deep, anteorbital vacuity small. Tarsus with the navicular, cuboid, external, and middle cuneiform bones united. Phalanges of second and fifth metacarpals and metatarsals absent.

The figure (Plate IX.) is taken from a specimen living in the Society's Gardens since August 1867. See Rev. Cat. Vert. p. 109.

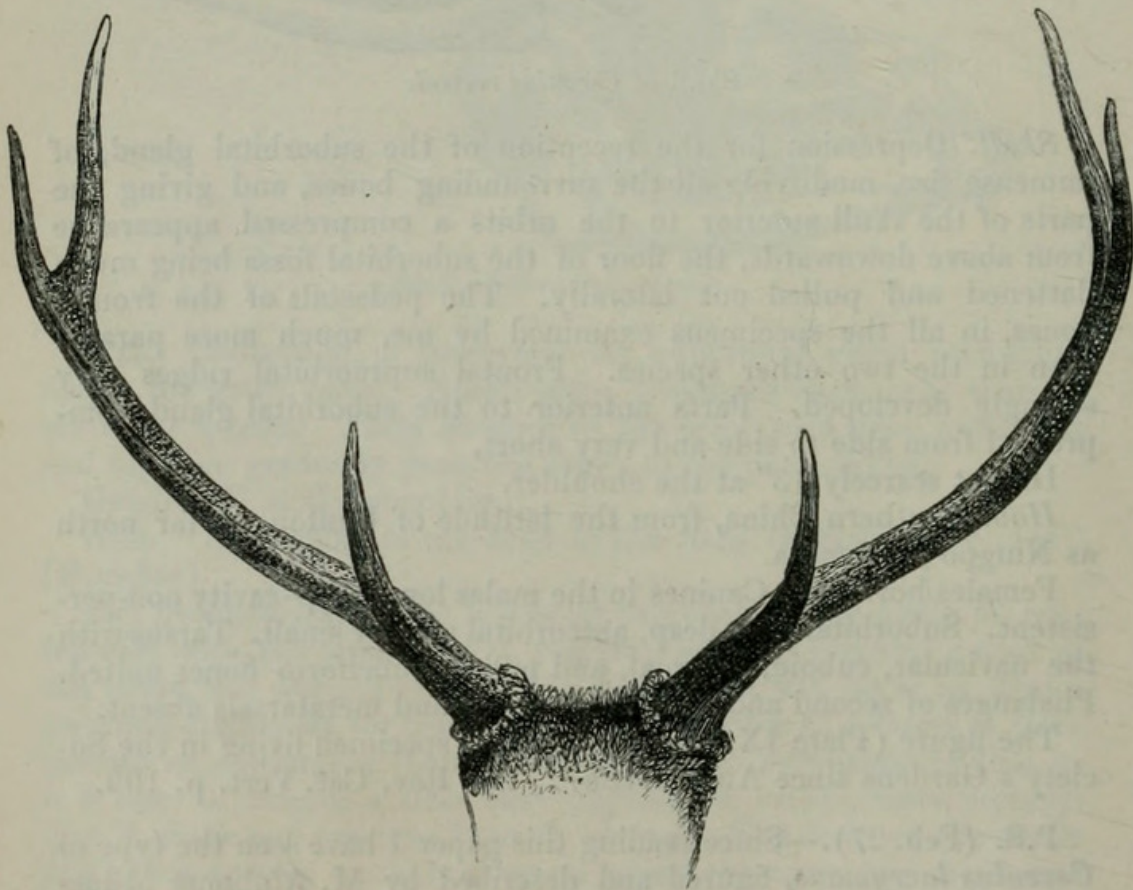
P.S. (Feb. 27).—Since reading this paper I have seen the type of *Cervulus lacrymans*, figured and described by M. Alphonse Milne-Edwards in his 'Recherches pour servir à l'Histoire Naturelle des

Mamm.' (pl. 64), and am nearly convinced that this specimen, which was obtained in Moupin by Père David, is of the same species as *Cervulus sclateri*. If this be so, the former name being the older, must be retained. I may also mention that M. A. Milne-Edwards informs me that, out of a very large number of *Cervulus muntjac* born in the Jardin des Plantes, he has never seen the young spotted; and several specimens preserved in the Museum are without any sign of spots. On the other hand, a very large young Muntjac, obtained in Sumatra, is distinctly spotted. If it were not that there exists in the British Museum a young spotted Muntjac (Hand-list, p. 163, 701 i), sent by Mr. Hodgson from Nepal, I should be inclined to think that after all the *Cervuli* of India, and of Sumatra and Java, may be specifically distinct. The matter requires more investigation, based upon a large number of fresh specimens.

5. On a new Species of Deer from Persia. By Sir VICTOR BROOKE, Bart., F.Z.S.

[Received January 6, 1874.]

Amongst a large number of very interesting specimens of natural history received a short time ago from Major Jones, H. B. M. Consul at Tabreez, in Persia, are the frontlet and horns of a deer, which appear to me of great interest, representing as they do, not



Horns of *Cervus caspicus*.



Brooke, Victor Alexander. 1874. "On Sclater's Muntjac and other Species of the Genus Cervulus." *Proceedings of the Zoological Society of London* 1874, 33-42. <https://doi.org/10.1111/j.1096-3642.1874.tb02448.x>.

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