With the evidence now before us there is no longer [1] any reason to doubt that the skeleton described by Gervais really belongs to *Trichys*. He gives as the numbers of vertebræ :—D. 16, L. 5, S. 4, C. 21, whilst I find in our skeleton D. 16, L. 6, S. 3, C. 24. The caudal vertebral column bears four compressed, hatchet-shaped chevron-bones between the fourth and eight caudal vertebræ. The eighth vertebra marks the boundary between the proximal and distal portions of the caudal series, differing much in shape from the seventh as well as the ninth, and having the transverse process dilated into a broad lamina extending along the whole length of the centrum. The seven vertebræ preceding it are provided with strong and long lamelliform transverse processes, whilst the apophyses rapidly disappear from the ninth vertebra backwards.

P.S.—Through the kindness of Dr. Jentink I have been able to examine one of the specimens described by Waterhouse as *Atherura fasciculata*, and find that I was right in supposing that they are identical with *Trichys*. I have to add that Dr. Jentink adopts now Waterhouse's identification, an opinion which, for reasons stated, I do not share. Dr. Jentink also informs me that the specimens in the Leyden Museum come from Malacca, not from Siam.—*March* 11*th*.

6. On certain Points in the Anatomy of the Accipitres, with reference to the Affinities of *Polyboroides*. By Frank E. Beddard, M.A., Prosector to the Society.

[Received February 19, 1889.]

I have recently had the opportunity of dissecting a specimen of *Polyboroides* which died in the Society's Gardens; the specimen was deposited by Lord Lilford, who expressed a wish that the skin should go to the British Museum; after the bird was skinned it was still possible to examine into the arrangement of certain of the muscles and of other organs, which examination has, in my opinion, thrown some light upon the affinities of the bird. For this reason I think it worth while to publish the notes of my dissection, although this paper is necessarily very far from containing a complete account of the anatomy of *Polyboroides*.

I have not attempted to give any description of its osteology, which has been lately worked out in detail by Prof. Milne-Edwards[2], but in a different species, *P. radiatus*. This account shows that the supposed resemblances of *Polyboroides* to *Serpentarius* are purely superficial, and that in reality it comes nearest to the Buzzards. The position assigned to the genus by Sharpe[3] (in the subfamily Accipi-

[1] Proc. Zool. Soc. 1876, p. 712.

[2] Milne-Edwards and Grandidier, Hist. phys. nat. et polit. de Madagascar: Oiseaux, tom. i. p. 50.

[3] B. M. Catalogue of Birds, vol. i. p. 47.

trinæ of the family Falconidæ), and by G. R. Gray[1], is, as Milne-Edwards acknowledges, in the main justified by the osteological characters; Milne-Edwards, however, considers that its peculiarities necessitate the creation of a separate subfamily for its reception. This view is accepted by J. H. Gurney[2].

The Accipitres have been divided by Prof. Huxley[3] into three groups—(1) Cathartidæ, (2) Gypaetidæ, (3) Gypogeranidæ—on the characters of the skeleton. Prof. Garrod's investigations[4] emphasized the naturalness of this grouping; he showed that these three divisions could be defined by the presence or absence of certain muscles in the leg.

In the Cathartidæ the ambiens, semitendinosus and accessory semitendinosus, and femoro-caudal are present, the formula being on Garrod's system AXY+.

In the Gypaetidæ (termed Falconidæ) the muscles present can be indicated by the formula A+.

In the Gypogeranidæ (*Serpentarius*) the formula is BXY+.

These muscular divergences led Prof. Garrod to remove *Serpentarius* and the Cathartidæ from the Accipitres and to associate them with other birds. Without following Prof. Garrod in this latter alteration of existing arrangements, it must certainly be admitted that his results entirely justify the breaking up of the Accipitres into the three groups already indicated.

I do not, however, find myself able to agree with Prof. Garrod in believing that the absence of the semitendinosus muscle is absolutely distinctive of *all* the Gypaetidæ.

I have found this muscle in *Falco subbuteo*, where it was rather feeble and apparently fused at its origin with the semimembranosus, but it ended in a separate and perfectly distinct tendon and was present on both legs; in the Merlin (*Falco æsalon*), where it was a little better developed; and finally in *Circus maurus*.

Apart from these exceptions, which do not affect the classification of the group, the formula of Gypaetidæ is, as stated by Garrod, A +.

Polyboroides typicus possesses the ambiens and femoro-caudal alone of the leg-muscles, upon the variations of which Garrod's system was based; it therefore agrees with *Accipiter*, *Circus*, &c., and should be referred to the Gypaetidæ and *not* to the Gypogeranidæ.

In examining the muscles of the wing I have compared *Polyboroides* with *Serpentarius*, *Cathartes*, and with *Gypohierax* as a type of the Falconidæ.

The *tensor patagii brevis*[5] of each wing is a stoutish muscle which divides into two tendons, inserted as shown in fig. 1 (p. 79); each tendon is slight and thin and of equal diameter throughout.

[1] Hand-list, i. p. 38.

[2] 'A List of the Diurnal Birds of Prey,' &c. (London, Van Voorst), p. 18.

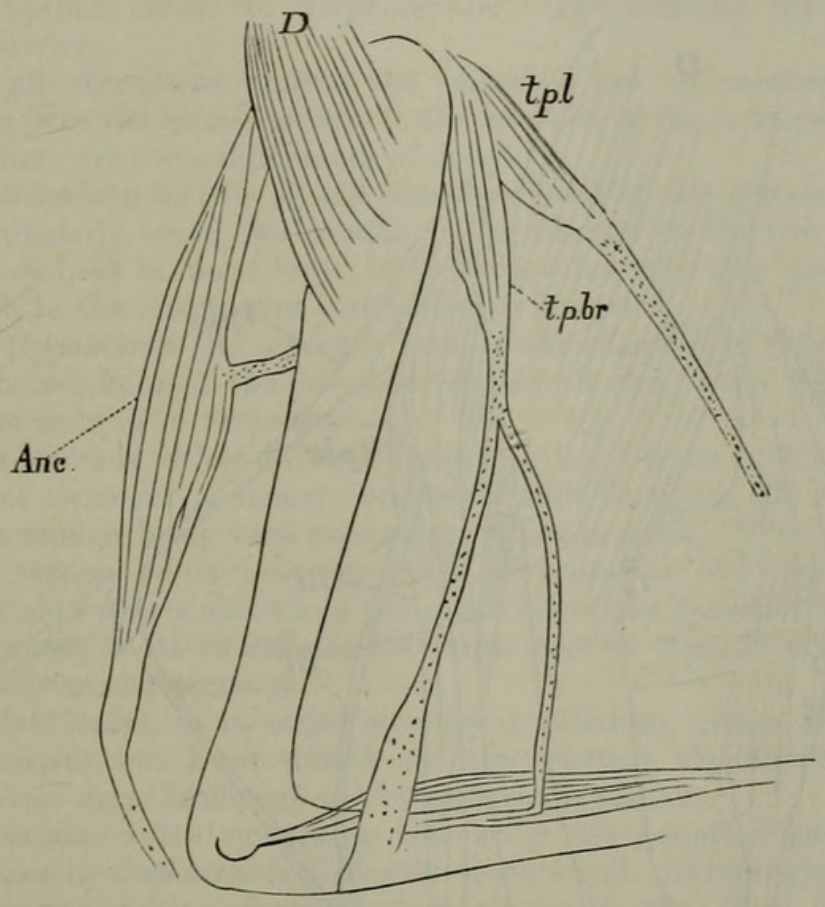
[3] "On the Classification of Birds," P. Z. S. 1867, p. 462.

[4] "On certain Muscles in the Thigh of Birds, and on their Value in Classification," P. Z. S. 1873, p. 634.

[5] These muscles were dissected in another specimen.

I find an identical arrangement of these tendons in *Circus maurus*, and they appear to be exactly the same (judging from a MS. sketch by Forbes) in *Spizaetus occipitalis* and *Aquila imperialis*. In *Milvago chimachima* and in *Haliaetus albicilla* and *Astur approximans* (Forbes, MS.) the tendon is single, but there is a trace of the second tendon in a short fibrous slip which, arising from near the

Fig. 1.



Tensores patagii and other muscles of *Polyboroides typicus*.

t.p.l, tensor patagii longus; *t.p.br*, tensor patagii brevis; *Anc*, anconeus; *D*, deltoid.

(The dotted parts represent tendons in this and the following figure.)

insertion on to the forearm of the *tensor patagii* tendon, ends upon the patagium. This tendinous band may, however, perhaps be considered as the equivalent of the tendon which in other Accipitres (v. *infrà*) unites the tendon of the *tensor patagii longus* with that of the *tensor patagii brevis* at the insertion of the latter on to the forearm.

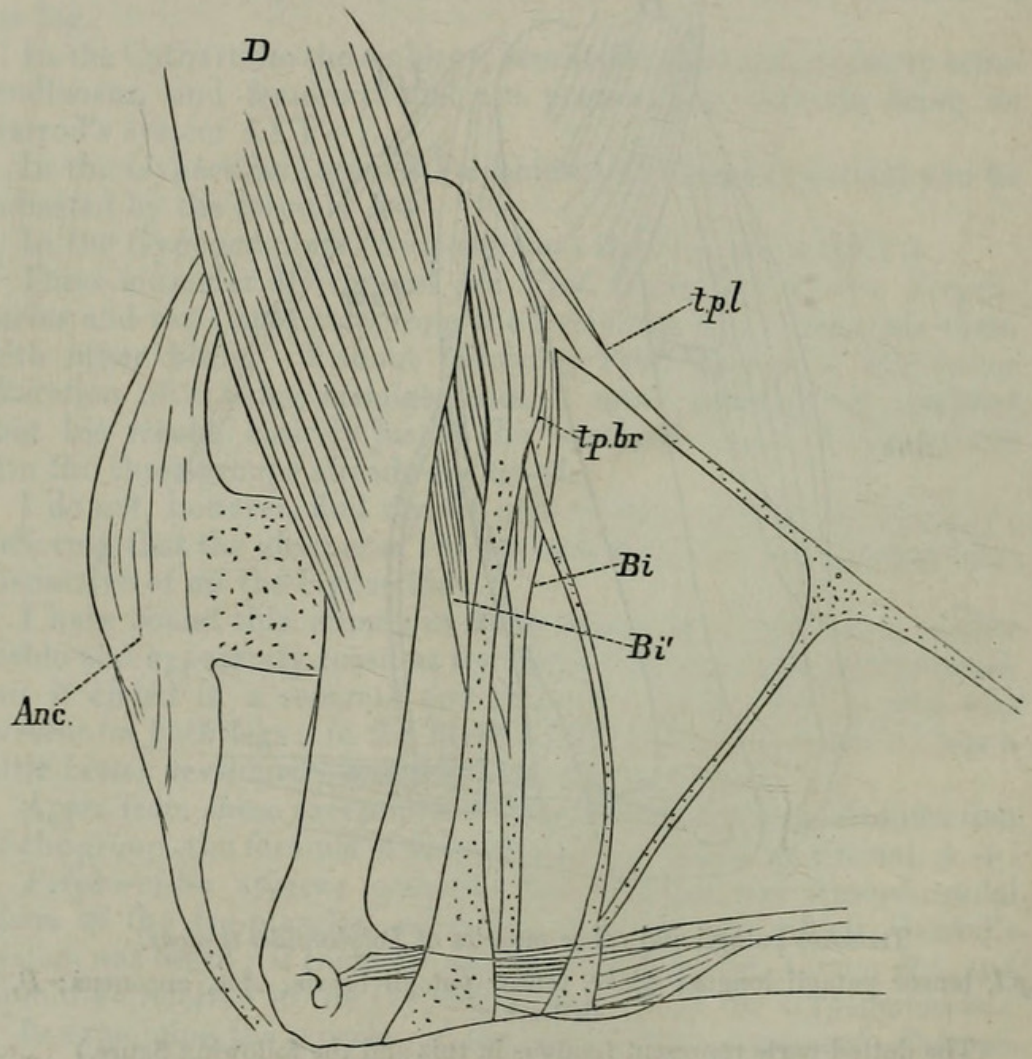
In *Gypohierax*[1] the *tensor patagii brevis* resembles that of *Polyboroides* except that the outermost of the two tendons near to the

[1] Fürbringer, Untersuchungen z. Morph. und Syst. d. Vögel, pl. xxii. fig. 9.

muscles is united by a fibrous band with the tendon of the *tensor patagii longus*; so also in *Gypaetus barbatus*[1], which in the attachment of the band resembles *Cathartes*.

In *Serpentarius*, in *Cathartes*[2], and in *Gypagus papa* (Garrod, MS.) the tendon of the *tensor patagii brevis* divides into two; the inner branch (see fig. 2) is very broad and diffuse, while the outer

Fig. 2.



Tensores patagii and other muscles of *Serpentarius*.
Bi, biceps; *Bi*[1], accessory biceps. Other lettering as in fig. 1.

is a thin even tendon; the latter at its point of insertion on to the forearm is connected by a tendinous band with the tendon of the *tensor patagii longus*. These three types present, therefore, a disposition of the patagial tendons which differs from that found in

[1] Figured by Fürbringer, *loc. cit.*
[2] Figured by Nitzsch and copied by Fürbringer, *loc. cit.* pl. xxii. fig. 8.

the Falconidæ. *Polyboroides* is in these particulars near to the Falconidæ. *Cathartes* is described and figured by Fürbringer [1]. *Serpentarius* is neither figured nor described in Fürbringer's work.

The line of attachment of the *deltoid* to the humerus and, in consequence, the size of that muscle vary in the three types of Accipitres. It is largest in *Serpentarius* and smallest in *Cathartes*; in the former bird the length of the attachment of the muscle to the humerus is about half the entire length of the bone. In *Cathartes* the proportion is (roughly) as 1 : 4. *Gypohierax* is intermediate but nearer to *Serpentarius*. *Polyboroides* agrees with *Gypohierax*.

In all Accipitres diurnæ the *anconeus* has an accessory head arising from the humerus close to the insertion of the *latissimus dorsi*. But there are some differences of detail.

In *Serpentarius* (fig. 2) the accessory head of the *anconeus* forms a particularly broad flat tendon. The anterior of the two *latissimi dorsi* end, as in most birds, in a narrow tendon; this gives off a branch to the integument just before its insertion.

In *Gypohierax* the accessory head of the *anconeus* is very narrow, but the relations of the *latissimus dorsi* to it and to the integument are precisely as in *Serpentarius*.

Cathartes is rather different from both these types; the accessory head of *anconeus* is almost completely split into two, the thickness of the tendon being very unequal in different parts. The *latissimus dorsi* tendon splits into two as in *Serpentarius* and *Gypohierax*; one tendon passes above and the other below the posterior *latissimus dorsi* close to its insertion; the uppermost of these is attached to the belly of the *anconeus*.

Polyboroides, as in other myological relations, comes nearest to *Gypohierax*, but I am unable to state whether the branch of the *latissimus dorsi* tendon to the integument is present.

It is also worth remarking that while the scapular head of the *anconeus* in *Cathartes* is distinctly double and entirely tendinous—one tendon arising from the scapula itself, the other from the *supinator* muscle—this muscle originates in all the remaining types (including *Polyboroides*) from the scapula alone and by a single head, which is chiefly fleshy though partly tendinous.

The size of the second pectoral muscle offers characters by which the affinities of *Polyboroides* can be to some extent determined. In *Cathartes aura* the attachment of that muscle reaches nearly to the end of the carina sterni. In *Gypohierax angolensis* the muscle reaches only for a very short distance along the carina sterni; this is also the case with *Serpentarius* and *Polyboroides*.

The proportions between the total length of the carina sterni and the breadth of the second pectoral muscle where it is attached close to the base of the carina sterni are indicated in the following table:—

[1] *Loc. cit.* pl. xxii. fig. 7.

	Length of carina sterni.	Length of attachment of 2nd pectoral along the carina.
Cathartes aura	82	72
Serpentarius reptilivorus	115	40
Gypohierax angolensis	84	34
Polyboroides typicus	56	24

The structure of the syrinx is not clearly indicative of the affinities of *Polyboroides*, but I propose to defer for the present the description of this organ in the Accipitres.

The conclusion to which these facts lead is that *Polyboroides* is not even an aberrant type of the Falconidæ; its muscular anatomy lends no support to the view that it should be regarded as the representative of a special subfamily.

7. On a Species of Crested Penguin (*Eudyptes sclateri*) from the Auckland Islands. By Sir Walter Buller, K.C.M.G., F.R.S., C.M.Z.S.

[Received February 19, 1889.]

(Plate IX.)

A recent study of the various species of *Eudyptes* inhabiting New Zealand and the neighbouring islands has satisfied me that three very distinct species of Crested Penguin have been hitherto confounded by ornithologists under the name of *Eudyptes chrysocome*. I have endeavoured to make this clear in the concluding part of my 'Birds of New Zealand' (2nd ed. pp. 287–293); but I gladly avail myself of the Secretary's invitation to exhibit specimens this evening and to offer a few observations on the subject.

The common New-Zealand bird, hitherto treated by most authors as being identical with *Eudyptes chrysocome* of the Falkland Islands, is undoubtedly a different species, and I have accordingly restored to it Mr. Gray's name of *pachyrhynchus*. It is distinguishable from the latter by its thicker bill and by the character of its lateral crests, which are merely an extension of the golden superciliary streak, seldom reaching more than an inch beyond the crown, and never more than two inches. *Eudyptes chrysocome*, on the other hand, exhibits on each side of the head an abundant crest of drooping plumes, from three to five inches in length, besides presenting other minor differences.

Eudyptes filholi, Hutton, from Campbell Island, does not appear to be separable from *E. saltator*, Stephens, and this again (as already pointed out by Messrs. Sclater and Salvin) is certainly referable to the true *Eudyptes chrysocome*, Forster, although Mr. Sharpe, in his Zoology of Kerguelen Island (Phil. Trans. R. S. vol. 168. p. 158), has kept the two latter forms distinct.