

ART. XXIX.—On *Harpagornis* (third paper).

By PROFESSOR JULIUS VON HAAST, Ph.D., F.R.S.

[Read before the Philosophical Institute of Canterbury, 1st July, 1880.]

Plate IX.

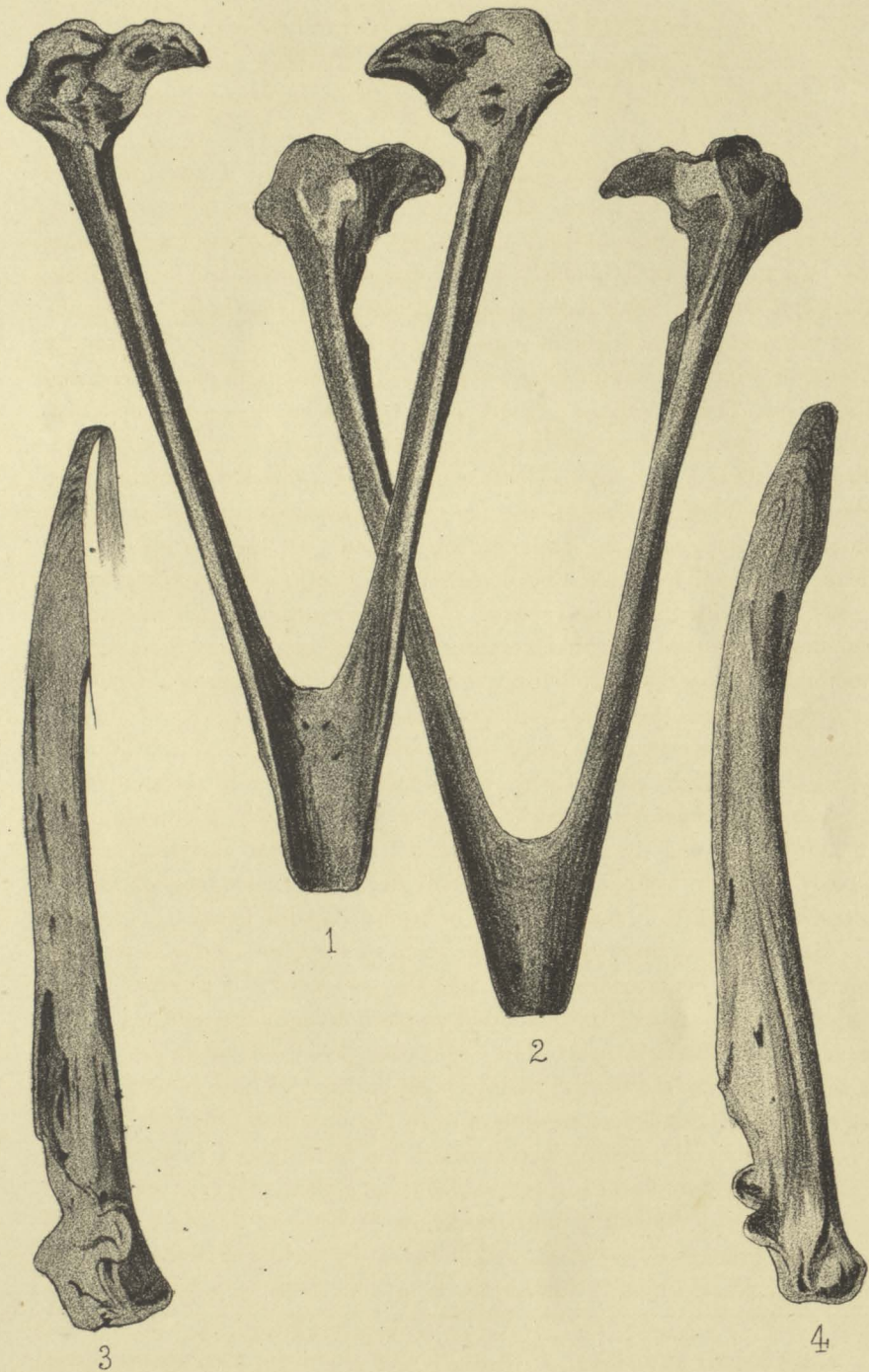
IN two former papers published in the Transactions,* I have described those portions of the bones of a large diurnal bird of prey, *contemporaneous with the Dinornithidæ*, named by me *Harpagornis*, which were obtained from the turbary and loess deposits of Glenmark and from a rock-shelter of Otago. Since then Mr. B. S. Booth, of Hyde (Otago), has made very interesting excavations in some turbary beds situated at Hamilton, in Otago, of which he has given us an exhaustive account in Vols. VII.† and IX. of our Transactions. A great quantity of moa bones was obtained, belonging to half a dozen different species, and to birds of all ages. In addition to these bones, a considerable number of *Cnemidornis* remains were discovered, of which the turbary deposits of Glenmark did not contain a single specimen, and a few bones of *Harpagornis*. Of the two latter I was fortunate enough to obtain a portion from Mr. Booth, which are now in the Canterbury Museum. The bones of *Harpagornis*, although few in number, are nevertheless of considerable interest, containing amongst them the mandible, or lower jaw-bone, hitherto unknown to us, and which doubtless, as I shall show in the sequel, belonged to the tibia, the smaller of the two ulnas, and the metacarpus, found with it in the same locality. The bird to which the mandible belonged was, as the measurements will show, of somewhat smaller dimensions than *Harpagornis assimilis*, from Glenmark. Although designating the latter by a specific name, I am inclined, as previously observed, to think that it was only the smaller male form of *Harpagornis moorei*, which in that case may be regarded as the female.

Prof. R. Owen, upon receiving the casts of the *Harpagornis* bones from Glenmark, has confirmed my views, that they belonged to a gigantic extinct harrier, and a study of the mandible in question has strengthened to my mind this hypothesis considerably. However, before offering a description of these bones under review, I wish to point out that we have proof that two specimens of *H. assimilis* were imbedded in the Hamilton peat beds.

If we admit Mr. Booth's theory about the formation of these deposits, viz., that they were formed in lagoons, obtaining their supply of water from springs only, it is difficult to understand how the bones of the two birds could have been brought there, unless we admit that by feeding upon the carcasses of those moas perishing in the springs from some cause or other, they were

* "Trans. N.Z. Inst.," Vol. IV., p. 192, and Vol. VI., p. 62.

† And not Vol. VIII., p. 12, as stated in a foot note to Mr. Booth's article in Vol. IX., p. 365.



MANDIBLE OF *HARPAGORNIS ASSIMILIS*, von Haast.

killed or drowned during that operation, because we know from experience that all birds, if possible, retire to most inaccessible or hidden spots to die.

This mode may also account for the extreme rarity of the remains of *Harpagornis*, which I am sure flourished in considerable numbers during the Moa Age.

Mandible of HARPAGORNIS ASSIMILIS.

Total length measured from point of symphysis along the ramus to posterior end of articular process 4.75 inches, greatest distance between articular processes, measured from the outward sides, 3 inches.

From a comparison of the general form of this mandible with that of the New Zealand harrier (*Circus assimilis*) it will be seen that it is somewhat narrower in proportion than that of the latter. In this respect it resembles the mandible of the condor (*Sarcorhamphus gryphus*) and griffin vulture (*Gyps fulvus*). However, as several others of the vultures have a broad mandible, this character is not of any generic value. But when comparing the shape and size of the articular portion of *Harpagornis* with that of *Circus*, the striking resemblance between both becomes at once manifest. The articular part of the mandible in both is well excavated for the mandibular end of the tympanic bone.

The articular process has the same form in both. A pneumatic canal perforates the surface of this articular process at its base. The articular depressions for the insertion of the pterygoid muscles and for the two strong ligaments uniting the tympanic and squamosal with the articular part of the mandible are well excavated. The three portions of which the ramus consists when extending forward from the articular end are well cemented together, having a long and well defined articular surface for the insertion of the temporal muscle in the central portion.

The dentary portion is so well united on the right ramus that its junction with the posterior portion is not well visible, whilst on the left side the separation can be easily traced. From here the dentary curves gradually down to the symphysis, which is well channelled, measuring .68 inch across the upper portion. Total length of symphysis, .98 inch. A number of nervo-vascular tracts are seen on the anterior part of the symphysis, together with a series of canals on the lower side.

Right tibia.

This bone evidently belonged to a full-grown bird, although not aged. The intermuscular ridges, as well as the fibular ridge, are well developed, and all the characters described in my former paper, as observed on the tibia of *H. assimilis* of Glenmark, are well exhibited.

Although somewhat shorter than the latter, both the proximal and distal extremities are a little larger.

TABLE OF MEASUREMENTS.

				Hamilton	Corresponding bone of
				Specimen.	<i>H. assimilis</i> from
				Inches.	Glenmark.
Right tibia, length	..	..	..	8.30	8.92
Circumference of shaft where thinnest	..			1.90	1.91
Circumference of proximal end	..	..	..	4.10	4.06
" " distal end	..	..	..	3.85	3.80

Ulna.

There are two ulnas, both of the right wing, of which No. 1 doubtless belongs to the tibia whose measurements are given above.

			Hamilton	Corresponding Bone of	
			Specimen.	Glenmark.	
			No. 1.	No. 2.	
Total length	..	..	9.30	9.60	9.35
Circumference at proximal end			2.90	..	3.00
" " distal end	..	..	2.24	..	2.32
Shaft where thinnest	..	..	1.50	1.62	1.48

No. 1.—This bone is also somewhat more slender in its proportions than the corresponding bone obtained at Glenmark, but it has at the same time the characteristic features of the bones belonging to a full-grown bird.

No. 2.—This evidently belonged to a larger specimen of the *H. assimilis* size. It is a shade stouter than the corresponding Glenmark bone. Both extremities are partly broken off.

Metacarpus.

Among the bones from Hamilton is also a right metacarpus, agreeing in all its proportions with the tibia and ulna No. 1.

Total length, 4.27 inches, or .21 inch less than the corresponding bone from Glenmark, the total length of which is 4.48 inches. The latter is also a *little* stouter in all its proportions. Amongst the smaller bones there are a few ribs and some phalanges, all of which are similar to the corresponding bones of Glenmark, with the exception that they are all a little smaller. The last specimen to which I wish to draw your attention is the distal end of a femur (right leg) of *Harpagornis moorei*, obtained, according to Mr. Booth, in a gully a mile away from the turbary deposits of Hamilton. It was evidently extracted from a loess bed. It accords so closely in size and other distinctive features with the femur of *H. moorei* from Glenmark, that I need not offer a description of it.

DESCRIPTION OF PLATE IX.

1. Upper view of mandible of *Harpagornis assimilis*, von Haast.
2. Lower " " " "
3. Outside " " " "
4. Inside " " " "

All natural size.