

the Fortieth Parallel, under Clarence King, the Vermillion Creek series, and by Hayden the Wasatch group. The known localities are in Utah, Wyoming and New Mexico. Among the associate mammals are the equine *Eohippus*, and the suilline *Helohyus*, showing clearly that we must look to Cretaceous strata at least for the parent form of the Ungulates.

Yale College, June 12th, 1877.

ART. XII.—*Characters of the Odontornithes, with Notice of a new allied Genus*; by Professor O. C. MARSH. With plate V.

THE Cretaceous birds with teeth, (*Odontornithes*), described by the writer, prove on careful investigation to possess some important characters in addition to those already published.* This is especially true of *Hesperornis*, which is now represented in the Yale College Museum by so large a number of specimens that almost every part of the skeleton is known, and all the more important points in its structure have been determined.

The most marked features in this genus already announced, are: the teeth in grooves; sternum without keel, and rudimentary wings; and posterior limbs closely resembling those of modern diving birds. The last character, which seemed at first sight to indicate the near affinity of *Hesperornis* with the *Colymbidae*, proves to be only an adaptation; while the skull, scapular arch, and other important portions show unmistakably that the nearest existing allies of the genus are the *Ratitae*, or Ostrich group, the most reptilian of modern birds. The characters that show this affinity are nearly identical with those laid down to distinguish the *Ratitae* by Huxley in his important memoir on the Classification of Birds.† They may be briefly stated as follows:

1. The sternum is devoid of a crest.
2. The long axes of the adjacent parts of the scapula and coracoid are parallel, or identical.
3. The posterior ends of the palatines, and the anterior ends of the pterygoid are very imperfectly, or not at all, articulated with the basisphenoid rostrum.
4. Strong "basipterygoid" processes, arising from the body of the basisphenoid, and not from the rostrum, articulate with facets which are situated nearer the posterior than the anterior ends of the inner edges of the pterygoid bones.
5. The upper, or proximal, articular head of the quadrate bone is not divided into two distinct facets.

* This Journal. vol. x, p. 403, Nov., 1875.

† Proceedings Zoological Society, 1867, p. 448.

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The vomers are separate, as in lizards and a few modern birds. In the pelvic arch, the ilium, ischium and pubis are free at their distal ends, as in the Emu, and the acetabulum is perforated only by a moderate foramen.

The scapular arch of *Hesperornis* is represented in plate V, figure 1. Its position in the skeleton is shown in the restoration, figure 2.

The scapula is long and slender, and has no acromial process. The clavicles are separate, but meet on the median line, as in some very young existing birds. The coracoids are short, and much expanded where they join the sternum. The latter has no distinct manubrium, and is entirely without a keel. The wings were represented by the humerus only, which is long and slender, and without any trace of articulation at its distal end. Its position was close to the ribs, and it was probably nearly or quite concealed beneath the integuments, as in *Apteryx*. This rendered the rudimentary wings of no possible service in flight or swimming.

Baptornis advenus, gen. et sp. nov.

The existence of a small swimming bird cotemporary with *Hesperornis* is indicated by a nearly perfect tarso-metatarsal bone from the same geological horizon. This specimen, although pertaining to a bird not fully adult, is in excellent preservation, and is so characteristic that it may be readily distinguished from any forms already described.

In general shape and proportions, this bone most nearly resembles the corresponding part in *Hesperornis*, but differs from it decidedly in the outer metatarsal, which at its lower end scarcely equals the adjoining one in size and length. In *Hesperornis*, on the contrary, the outer metatarsal is more than double the size of the third. In the present specimen, the three trochlear articulations of the distal ends are nearly equal. The existence of a hallux is indicated by a small elongated depression on the inner metatarsal, a short distance above the articulation. As in *Hesperornis*, there are no canals or grooves for tendons on the posterior face of the proximal end.

The principal dimensions of this tarso-metatarsal are as follows:—

Entire length.....	76· ^{mm}
Transverse diameter of proximal end.....	17·
Antero-posterior diameter.....	8·
Length of second metatarsal.....	64·5
Length of third metatarsal.....	72·
Length of fourth metatarsal.....	72·
Antero-posterior diameter of distal articulation of second metatarsal.....	8·5

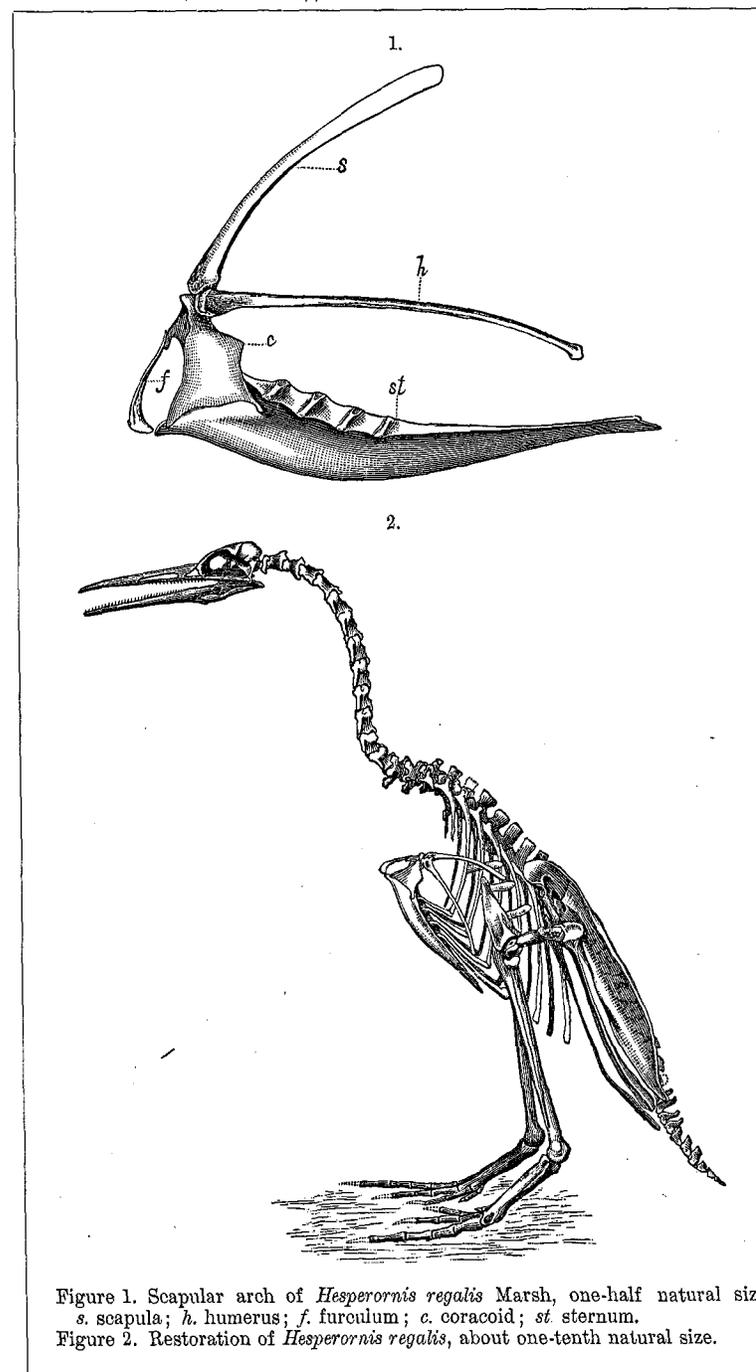


Figure 1. Scapular arch of *Hesperornis regalis* Marsh, one-half natural size.
s. scapula; *h.* humerus; *f.* furculum; *c.* coracoid; *st.* sternum.
 Figure 2. Restoration of *Hesperornis regalis*, about one-tenth natural size.

Transverse diameter	5·mm
Antero-posterior diameter of distal articulation of third metatarsal	9·2
Transverse diameter	6·
Antero-posterior diameter of distal articulation of fourth metatarsal	9·
Transverse diameter	5·5

This specimen indicates a bird about as large as a loon, and apparently of similar habits. The locality of the only remains at present known is in Western Kansas, in the same Cretaceous beds that contain the *Odontornithes* and *Pteranodontia*.

ART. XIII.—Notice of a new and Gigantic Dinosaur; by
Professor O. C. MARSH.

THE Museum of Yale College has recently received from the Cretaceous deposits of Colorado a collection of reptilian remains of much interest. Among these specimens are portions of an enormous Dinosaur, which surpassed in magnitude any land animal hitherto discovered. The most characteristic bones preserved are portions of the sacrum, and posterior limbs. The former is represented by the last two vertebræ with their transverse processes, nearly complete, and by other fragments. The last sacral vertebra has its centrum moderately concave below on each side of the median line, but only near its anterior end can indications of a keel be observed. The next sacral vertebra has its inferior lateral surface so deeply concave as to materially lessen its bulk. This is also true of the next anterior centrum, and may be considered a distinctive character of these vertebræ. A more important character of the same centra is a very large cavity in each side, connected with the outer surface by an elongated foramen, below the base of the neural arch. The inner surface of this cavity indicates that it was not filled by cartilage, and it probably was a pneumatic opening, designed to lessen the weight of the enormous sacral mass. The transverse processes of these vertebræ are very stout, and of moderate length. Their distal ends are firmly coössi-fied, forming a powerful support for the ilium. Between these processes are large oval openings.

The following measurements give the more important dimensions of these interesting fossils:

Length of centrum of last sacral vertebra	300·mm
Transverse diameter of distal end	270·
Vertical diameter of distal end	250·
Distance between extremities of transverse processes ...	850·