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NATURAL ARRANGEMENT
OF THE
FALCONIDÆ.

RIDGWAY

CORNELL UNIVERSITY

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OUTLINES

OF A

NATURAL ARRANGEMENT

OF THE

FALCONIDÆ.

BY

ROBERT RIDGWAY.

[EXTRACTED FROM BULLETIN OF THE UNITED STATES GEOLOGICAL AND
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Presented by Dr Rothrock
to

B. Harry Warden

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WILLIAM DUNLAP SARGENT

1940

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R. Ridgway.

OUTLINES OF A NATURAL ARRANGEMENT OF THE FALCONIDÆ.

BY ROBERT RIDGWAY.

[Read before the Philosophical Society of Washington, April, 1875.]

Until very recently, the Birds of Prey have been classified entirely according to their external characters, the primary division being into three so-called families, as follows: (1) *Vulturidæ*, or vultures, characterized by their naked heads, sluggish habits, and filthy food; (2) *Falconidæ*, or falcons, hawks, eagles, and other diurnal birds of prey, distinguished by their feathered head and predatory nature; and (3) *Strigidæ*, or owls, known from both the preceding by having the eyes directed forward, instead of laterally, and by being nocturnal.

Notwithstanding the fact that occasional genera constituted transitional forms intermediate between two "families,"* the above classification was adopted almost universally until the year 1867, when Professor Huxley clearly demonstrated† that the so-called family *Vulturidæ* had no existence in fact, it being an unnatural association of members of two very distinct families, viz, the *Cathartidæ*, or American vultures, on the one hand, and a group of the *Falconidæ* (the Old-World vultures) on the other. Besides the announcement of the above important discovery, Professor Huxley also proved that the secretary bird (*Serpentarius reptilivorus*), previously included among the *Falconidæ*, was in reality the sole representative of a very distinct family, which he named "*Gypogeranidæ*."

To sum up the important results of Professor Huxley's studies of the osteology of the raptorial birds, they are briefly as follows: (1) The demolition of the old so-called family *Vulturidæ*, the typical members of which were referred to the *Falconidæ*; (2) the recognition of a separate family, *Cathartidæ*, to accommodate the aberrant ones; and (3) the removal of *Serpentarius* from the *Falconidæ* and its establishment as a distinct family, "*Gypogeranidæ*." The families of diurnal Raptores, according to Huxley's views, then were as follows: (1) *Cathartidæ* (American vultures); (2) *Gypætidæ* (= *Falconidæ*, hawks, &c., including the Old-World vultures); and (3) *Gypogeranidæ* (= *Serpentariidæ*, the secretary bird).

After a very careful consideration of all that relates to the principles of a natural classification, I find every reason for adopting, without hesitation, Mr. Huxley's conclusions. ‡

* Examples of these perplexing "intermediate" forms are the genera *Gypætus* and *Polyborus*, among the *Falconidæ*, which combine "vulturine" and "falconine" characteristics of habits and external appearance; while among the *Strigidæ* the genus *Surnia* is strictly diurnal, and its appearance decidedly hawk-like. The falconine genus *Circus*, on the other hand, has a distinct facial ruff and other characteristics belonging chiefly to the owls. These cases were very embarrassing to the followers of the old classification, and by different authors were shifted from one family to the other.

† Proceedings of the Zoological Society of London, 1867, pp. 440, 443, 462, 465.

‡ I cannot follow, however, in substituting the name *Gypætidæ* for the old term *Falconidæ*, which in its former signification is sufficiently comprehensive to justify its continued use as the proper name for this family; the term *Gypogeranidæ* is equally objectionable, since *Gypogeranus* (Illiger, 1811) is antedated by *Serpentarius* (Cuvier, 1798), in consequence of which *Serpentariidæ* (Selys, 1842), as adopted by Gray (Hand List, 1869, p. 38), is preferable.

A fifth family, the *Cariamidae*, or Cariamias, is quite nearly related to those mentioned, and has by some authors been even included among the *Falconidae*; but the degree of its relationship by no means justifies that view of its affinity. The families *Strigidae*, *Falconidae*, *Cathartidae*, *Serpentariidae*, and *Cariamidae* may possibly be eventually combined to form an order; but whether this association would be a natural one is an undecided question, beyond the province of this paper.

Having defined the limits of the family *Falconidae*, it now remains to treat of this alone; the subdivisions of the family being the subject of discussion.

To the present time, the *Falconidae* have been divided into a greater or less number of so-called "subfamilies", the number varying according to the author; those founding their classification on purely external characters finding it necessary to adopt a great many, and those relying upon the anatomical characters carefully avoiding any subdivision at all.*

To review in this connection all the classifications of the family which have been proposed up to the present time would require far more space than the limits of this memoir will allow; each author, while following a generally-recognized plan, having his own peculiar views regarding certain details of arrangement. It will, therefore, suffice for the present to give a mere outline of this generally-adopted plan, and supplement it by the modified systems of our latest and best authorities.

The "subfamilies" usually recognized are the following: (1) "*Falconinae*", (2) "*Milvinae*", (3) "*Accipitrinae*", (4) "*Circinae*", (5) "*Buteoninae*", (6) "*Aquilinae*", and (7) "*Polyborinae*." Some authors add "*Circatinae*" and "*Pandioninae*"; while previous to the important discovery, made by Professor Huxley, regarding the vultures before alluded to, this supposed family was divided into the so-called subfamilies, (1) "*Vulturinae*", (2) "*Gypinae*", (3) "*Neophroninae*", (4) "*Gypaetinae*", and (5) "*Gypohieracinae*",—some authors grouping two or more of these in one, others recognizing all. They are all, of course, typical *Falconidae*, thus making a total of fourteen subfamilies into which this family has been divided, when there are in reality but two.

Mr. George Robert Gray, in his "Hand List of Birds in the British Museum",† divides the *Falconidae* into seven so-called subfamilies, as follows: (1) *Polyborinae*, LAFR., 1839 (= *Polybori* of the subfamily *Falconinae*); (2) "*Buteoninae*", SWAINS., 1837"; (3) "*Aquilinae*", SWAINS., 1837"; (including *Pandion*!); (4) "*Falconinae*", SWAINS., 1837" (including *Harpagus*!); (5) "*Milvinae*", BONAP., 1838"; (6) "*Accipitrinae*", SWAINS., 1837" (including *Herpetotheres* and *Micrastur*, both groups of the subfamily *Falconidae*) and (7) "*Circinae*", BP."

Messrs. Philip Lutley Sclater and Osbert Salvin, in their "*Nomenclator Avium Neotropicalium*",‡ divide the American members of the family into the following "subfamilies": (1) "*Pandioninae*", (2) "*Circinae*", (3) "*Buteoninae*", (4) "*Accipitrinae*", (5) "*Falconinae*", (6) "*Milvinae*", (7) "*Herpetotherinae*", and (8) "*Polyborinae*."

Mr. R. Bowdler Sharpe, in his recently-published great-work upon the diurnal "*Accipitres*",§ employs a singularly inconsistent classification,

*This has, perhaps, been mainly due, not to the difficulty of finding sufficiently good characters, but to the fact that the conclusions arrived at were so opposed to views long established by usage.

†London, 1869, (vol. I).

‡London, 1873, pp. 118-123.

§ Catalogue of the *Accipitres*, or diurnal birds of prey, in the collection of the British Museum. London, July, 1874.

which can only be considered a decided retrograde from, instead of an improvement upon, the better classifications which preceded it. In the first place, the genus *Pandion* is made to form a "suborder"—*Pandiones*! This would not be so bad, all things considered, were it not that the genus *Polioaëtus* is included in this so-called "suborder", the latter being a very near relative, probably a subgenus, of *Haliaëtus*, one of the group *Buteones* of the subfamily *Buteoninae*, and not at all allied to *Pandion* (group *Pandiones* of *Buteoninae*), though it represents that genus in its group; that is, is analogous, but not affined to it. In the next place, *Serpentarius* (= family *Serpentariidae*) and *Cariama* (= family *Cariamidae*) are placed in the "subfamily" *Polyborinae*! The subfamilies which Mr. Sharpe recognizes are the following: (1) *Polyborinae*, (2) *Accipitrinae*, (3) *Buteoninae*, (4) *Aquilinae*, and (5) *Falconinae*.

In this connection, it may be well to call attention to the importance of distinguishing between evidences of affinity and those of mere analogy in the birds of this family. Certain types of teleological modifications are repeated in members of different subfamilies, and in different groups of one subfamily, to such a degree of perfection, that, if we were to follow external appearance only, we would not hesitate to place them near together in a systematic arrangement. This is what has led to such confusion and such utterly unsatisfactory results as have characterized most attempts at a natural classification. Among the more prominent instances of analogy between members of different groups or subfamilies, or even different families, the following may be mentioned: The family *Cathartidae* is reproduced in the vultures of the Old World (vulturine series, group *Buteones*, subfamily *Buteoninae*, family *Falconidae*); the *Gypogeranidae* and *Cariamidae*, in a less degree, by *Polyboroides* and *Geranospizias* (*Buteones*); the *Strigidae*, in a very slight degree, by *Circus* (*Buteones*, *Buteoninae*), *Micrastur* (*Micrastures*, *Falconinae*), and *Pandion* (*Pandiones*, *Buteoninae*)*. The *Falcones* are represented in the *Buteoninae* by *Ictinia* and *Harpagus* (*Buteones*); also by *Baza* (*Pernes*); one of the *Polybori* (*Ibycter*) by *Rostrhamus* (*Buteones*); the *Micrastures* are repeated in the genera *Circus* and *Nisus*† (*Buteones*), and *Herpetotheres* very nearly imitated by *Circaëtus* (*Buteones*). Taking the *Buteoninae* alone, the *Pandiones* are mimicked by certain *Haliaëti* (*Buteones*); Certain *Pernes* (*Elanoides*) by *Milvus* and *Nauclerus* (*Buteones*); and others of the same group (*Baza* and *Aviceda*) by *Harpagus* and *Ictinia*.

In three widely-distinct "series" of genera in the group *Buteones*, we find a very peculiar type of modification, viz, the excessive abbreviation of the outer toe. This occurs only in *Heteropus* (an "aquiline" form, with densely-feathered tarsus), *Polyboroides* (a long-legged terrestrial form, with reticulated tarsus), and *Geranorpozas* (similar to the last, but with scutellate tarsus); these latter two differ from the first in being of terrestrial habits, and in a very remarkable teleological modification of the tibio-tarsal joint, whereby it can be bent with ease in both directions.

The following tabular arrangement expresses the equivalents of the two subfamilies and several groups, adopted in this memoir in the numerous "subfamilies," or "families" of leading authorities, and suc-

* *Circus* resembles the owls merely in the possession of a distinct facial ruff and large ear-aperture; *Micrastur*, in the same respects, and also in decomposed downy edges to the inner webs of the primaries, the rounded, concave wing, as well as in the dimorphic plumage of some of the species ("rufescent" and "gray" "phases"); *Pandion*, in having the outer toe reversible and in lacking after-shafts to the feathers.

† In general form, *Micrastur* exactly repeats the genus *Nisus*, and has, besides, the facial ruff of the genus *Circus*.

ceeding it a series of diagnoses explaining the reasons which justify such a classification :*

Subfamilies—present arrangement.	RIDGWAY. ("Groups.")	SHARPE. ("Subfamilies.")	SCL. & SALV. ("Subfamilies.")	SUNDEVALL. ¹ ("Families.")
Falconinae.	Falcones.	Falconinae.	Falconinae.	Falconinae.
Polybori.	Polybori.	Polyborinae.	Polyborinae.	Polyborinae.
Micrastures.	Micrastures.	Accipitrinae (pt.).	Accipitrinae (pt.).	Circaetinae (pt.).
Herpetotheres.	Herpetotheres.	Aquilinae (pt.).	Herpetotherinae.	Circaetinae (pt.).
Pandiones.	Pandiones.	Pandiones. ²	Pandioninae.	Circaetinae (pt.).
Pernes.	Pernes.	{ Aquilinae (pt.), Falconinae (pt.), Milvinae (pt.).	Milvinae (pt.).	Circaetinae (pt.).
Buteoninae.	Buteones.	{ Accipitrinae (pt.), Buteoninae (pt.), Aquilinae (pt.), Falconinae (pt.), Vulturidae (pt.).	{ Falconinae (pt.), Milvinae (pt.), Circinae, Accipitrinae (pt.).	{ Falconinae (pt.), Circaetinae (pt.), Aquilinae (pt.), Gypaetinae, Vulturinae, Haliaetinae (pt.).

¹ Förnyad anordning av Dagrofvogllarna (Dispositio nova Accipitrum Hemeroharpagorum). Öfersigt af Kongl. Vetenskaps Akademiens Förhandlingar 1874. No. 2. Stockholm.

² "Suborder."

A.—Scapular process of the coracoid produced forward so as to meet the clavicle.† Nasal bones almost completely ossified, the nostril being a small, usually circular, opening, with a conspicuous, usually central, bony tubercle.‡ Inferior surface of the supramaxillary with a prominent median angular ridge. Superciliary process of the lachrymal consisting of a single piece.§ . . . Subfamily *Falconinae*.

B.—Scapular process of the coracoid *not* produced forward, but separated from the clavicle by a wide interval.|| Nasal bones very incompletely ossified, the nostrils large, without bony tubercle, and frequently with an incomplete septum. Inferior surface of the supramaxillary without median ridge.¶ Superciliary process of the lachrymal usually consisting of two pieces, joined by a cartilaginous hinge.** . . . Subfamily *Buteoninae*.

* It is proper to explain here that the key to the leading character was furnished by Professor Huxley in the paper before referred to (p. 464), in the following words: "The scapular process of the coracoid sometimes is * [* *e. g.*, in the Falcons proper, and in *Polyborus*] and sometimes is not produced to the clavicle"—having reference to the family *Falconidae*. Following up this clew by examining the coracoid apparatus of every genus available, I was surprised to find it to be a character which separated trenchantly not only the "Falcons proper" (= *Falcones* and *Polyborus*, but also all the genera related to the latter, besides *Micrastur* and *Herpetotheres*, from all other *Falconidae*.

† See Plate XI, Figs. 1-4.

‡ Except in *Micrastur*. (See Plate XII, Fig. 4.)

§ See Plate XIII, Figs. 1-4.

|| See Plate XI, Figs. 5-11.

¶ In Fig. 6, Plate XII, the tomium of the supramaxillary is so deeply sinuated as to allow the middle portion of the under surface to be seen from the side; but this has no analogy to the raised median ridge of the falconine forms.

** The exceptions are the *Pandiones* (*Pandion*) and *Pernes* (*Elanoides*, *Cymindis*, *Regerhinus*, *Aviceda*, *Baza*, &c.), in which this bone much resembles that of the *Polybori*, as shown in Figs. 6 and 7, Plate XIII.

Subfamily FALCONINÆ.

The term *Falconina* has been restricted in most previous arrangements to the true falcons (= *Falcones* of the present system), but in view of its being a subfamily-name it becomes necessary to make it cover all the forms allied to these by subfamily-characters; hence the wider signification given it here.

The subfamily *Falconina* is composed of four well-defined groups, the *Falcones*, *Polybori*, *Micrastures*, and *Herpetotheres*, which are distinguished as follows:

- A.—Posterior toe abbreviated, very much shorter than the lateral pair; tarsi and toes covered with small hexagonal scales, larger in front.
- a. Nostril a small, round, or oblique opening, with a bony rimmed margin and central tubercle. (Plate XII, Figs. 1-3.)
 1. Superior tomium with a conspicuous tooth, and inferior tomium with a corresponding notch. (Plate XII, Fig. 2, and Plate XV, Fig. 1.) Superciliary process of the lachrymal elongated, narrow, reaching nearly across the orbit. (Pl. XIII, Fig. 2.) Posterior margin of the sternum nearly even, with a pair of large oval foramina. One or two outer primaries with their inner webs emarginated near their tips. (Plate XVII, Figs. 1 and 2.) . . . Group 1, *Falcones*.
 2. Tomia without tooth or notch.*
Superciliary process of the lachrymal abbreviated, reaching only half-way across the orbit. (Plate XIII, Fig. 1.) Posterior margin of the sternum with a pair of deep indentations. Three or more outer primaries with their inner webs sinuated near the middle portion. (Plate XVII, Figs. 3 and 4.) Group 2, *Polybori*.
 - b. Nostril a large opening without bony-rimmed margin or central tubercle. (Plate XII, Fig. 4.)
 3. Superciliary process of the lachrymal elongated, broad, extending nearly across the orbit. (Plate XIII, Fig. 4.) Tomia without tooth or notch. (Plate XII, Fig. 4, and Plate XIV, Fig. 2.) Posterior margin of the sternum as in *Falcones*. Four or more outer primaries with inner webs sinuated near the middle portion . . . Group 3, *Micrastures*.
- B.—Posterior toe elongated, almost equal to the lateral pair. Tarsi and toes covered uniformly with thin, rough, imbricated scales.
4. Tomia without tooth or notch. (Plate XII, Fig. 3, and Plate XIV, Fig. 1.) Nostril as in *Falcones* and *Polybori*. Superciliary process of the lachrymal elongated, very broad, reaching nearly across the orbit. (Plate XIII, Fig. 3.) Posterior margin of the sternum nearly even, entire, and without foramina. Primaries as in *Polybori* and *Micrastures* Group 4, *Herpetotheres*.

The pterylography of the members of this subfamily affords some very important diagnostic characters. From the descriptions given by Nitzsch† (pp. 55-57), the following arrangement may be tabulated,

* Though faint indications of these are observable in some genera (*Milvago* and *Phalco-benas* (see Plate XV, Fig. 2) in the horny sheath, they cannot be detected in the bone of the bill. (See Plate XII, Fig. 1.)

† Nitzsch's Pterylography, translated from the German, edited by Philip Lutley Selater, M. A., Ph. D., F. R. S., secretary to the Zoological Society of London. London: Published for the Ray Society, by Robert Hardwicke, 192 Piccadilly. 1867. pp. 118, ppl. 10.

which, in the main, supports the one founded on the osteological structure.

A.—Dorsal portion of the spinal tract deeply divided, and each branch dilated exteriorly *Falcones*

B.—Dorsal portion of the spinal tract enlarged on all sides, undivided, and sparsely feathered.

a.—Eyelids with distinct lashes; lumbar tract present; dorsal portion of the spinal tract sparsely feathered to the caudal pit, thence diminished and continued as a narrow band along the caudal vertebræ to the oil-gland *Herpetotheres*.

b.—Eyelids without distinct lashes; lumbar tract absent; dorsal portion of the spinal tract in the form of an elongated ellipse, only contracted into a band immediately in front of the oil-gland (but even there still broad), consisting exclusively of scattered feathers, which become stronger posteriorly.

Micrastures.

The only close relationship between any two groups of this subfamily is seen in the generalized forms of the *Falcones* and *Polybori* (*Hieracidea* and *Milvago*), whose specialized forms (*Falco* and *Polyborus*) are so extremely dissimilar in appearance. In the two genera mentioned, the approach is so very close as to almost form a transition between the two groups.* There is a wonderful similarity in the general form and relative proportions of all the parts, the arrangement of the scutellæ of the tarsi and toes, the character of the plumage, and the size of the species. But notwithstanding this apparent correspondence of external characters, they are found to differ in all those osteological characters diagnostic of their respective groups, and, when their external structure is examined closely, agree severally with the other members of the groups to which they belong in an apparently trivial yet really pertinent character, viz, *the cutting of the inner webs of the outer primaries*, which is always essentially different in the two groups. The external diagnostic characters (associated with osteological, indicated on p. 229) are thus reduced to the structure of the primaries, as follows:

FALCONES.—Two, or less, outer primaries with their inner webs cut; this always an abrupt emargination on the first, and situated near its end. Second or third quill longest; first longer than the fifth.

POLYBORI.—Three, or more, outer primaries with their inner webs cut; this an oblique sinuation on the first, and near its middle. Third or fourth quill longest; first shorter than the fifth.

The *Falcones* comprise very few genera in proportion to the number of species, which is very considerable; but it is outside the purpose of this paper to discuss the subject of what the genera of the group are. Suffice it to say that neither *Baza* nor *Harpagus* belong here, as many have supposed, being members of different groups (*Pernes* and *Ictinia*) of the subfamily *Buteoninae*. The genus *Spiziapteryx*, however, which many consider a synonym of *Harpagus*, is a true *Falcon*.

The groups *Micrastures* and *Herpetotheres* have but one genus each, so these are passed by without further notice; but the Polyborine genera are numerous, and, as they have never been satisfactorily defined, the following diagnoses are presented:

* The typical *Hieracidea* will, upon examination, probably be found to have the superciliary process of the lachrymal much shorter than that of the typical *Falcones*, if it does not approach the extreme brevity of this bone which characterizes the Polyborine group.

Genera and subgenera of POLYBORI.

A.—Tarsus $\frac{1}{2}$ – $\frac{2}{3}$ its length longer than the middle toe; outer toe but little longer than the inner; posterior toe very decidedly shorter than the inner; claws slightly curved, blunt. Inner webs of primaries deeply sinuated. Habits chiefly terrestrial.

a. *Nostril linear, obliquely vertical, its tubercle concealed.*

1. **POLYBORUS.** Nostril linear, obliquely vertical, its posterior end the upper one;* situated in the upper anterior corner of the cere. Anterior outline of the cere nearly straight and vertical. Occipital feathers elongated into a depressed crest.

b. *Nostril circular, in the middle of the cere, its tubercle exposed;† anterior outline of the cere doubly curved.*

2. **PHALCOBÆNUS.** Tooth and notch of the tomia of the bill nearly obsolete; lower jaw nearly naked; outer toe not appreciably longer than the inner; posterior toe reaching much beyond the first joint of the middle toe; claws remarkably blunt, slightly curved; posterior face of the tarsus without distinct rows of quadrate scales; upper tail-coverts remarkably developed, covering nearly two-thirds the tail; size large.

a. Frontal feathers (of adult) recurved, very soft, lanceolate; loreal and maxillary regions naked; fore-neck feathered. In the adult, the abdomen, anal region, crissum, upper tail-coverts, and lining of the wing white; secondaries and tail tipped with white; other parts deep black. . . . *Phalcobænus*.

β. Frontal feathers pointed backward (normally), stiff and lanceolate; lower jaw and lores densely covered with strong bristles; fore-neck naked. In the adult, abdomen and anal region ochraceous; crissum and upper tail-coverts black; lining of the wing and tibiae black mixed with ochraceous; breast and nape longitudinally streaked with dingy whitish; secondaries not tipped with white. *Senex*.

3. **MILVAGO.** Tooth and notch of the tomia of the bill distinctly indicated; lower jaw normally feathered; outer toe decidedly longer than the inner; posterior toe not reaching the first joint of the middle toe; claws sharp, strongly curved (as in the *Falcones*); posterior face of the tarsus with two distinct rows of quadrate scales. Upper tail-coverts normal, covering about one-third the tail; size small.

B.—Tarsus scarcely longer than the middle toe; outer toe very much longer than the inner, which is but little longer than the posterior one. Inner webs of primaries shallowly sinuated. Habits strictly arboreal.

4. **IBYCTER.** Nostril circular, near the middle of the cere, its tubercle either concealed or exposed; anterior outline of the cere doubly curved. Tarsus without transverse scutellæ either in front or behind.

a. Size large. Bill slender, the tip much produced; gonys barely convex, nearly horizontal. Bare superciliary region very narrow. (See Plate XVIII, Fig. 1.) . . *Ibycter*.

β. Size small. Bill thick, the tip only slightly produced; gonys strongly convex, decidedly ascending terminally. Bare superciliary region very wide. (See Plate XVIII, Fig. 2.) *Daptrius*.

* This is exactly the reverse of the position of the nostril in all other *Ialconidae*, in which its direction is oblique! †As in the *Falcones*!

PLATE XI.

CORACOID APPARATUS.

(*All natural size.*)

- FIG. 1. *Falco anatum*.
2. *Ibycter americanus*.
3. *Micrastur semitorquatus*.
4. *Herpetotheres cachinnans*.
5. *Pandion carolinensis*.
6. *Elanoides forficatus*.
7. *Elanus leucurus*.
8. *Ictinia mississippiensis*.
9. *Rostrhamus sociabilis*.
10. *Buteo borealis*.
11. *Aquila canadensis*.

[*a.* Anterior process of the coracoid.

b. Basal process of the scapula.

n. Scapular process of the coracoid.]

PLATE XII.

SUPRAMAXILLARY AND NASAL BONES.

(*Natural size.*)

. FIG. 1. *Phalcobænus australis*.

— 2. *Falco anatum*.

3. *Herpetotheres cachinnans*.

4. *Micrastur semitorquatus*.

5. *Pandion carolinensis*.

6. *Ictinia mississippiensis*.

7. *Antenor harrisi*.

8. *Harpagus bidentatus*.

[*a.* Bony tubercle of the nostril.

b. Median ridge of the supramaxillary.]

1

2

3

4

5

6

7

8

PLATE XIII.

SUPERCILIARY PROCESS OF THE LACHRYMAL.

(*Natural size.*)

FIG. 1. *Phalcobænus australis*.

2. *Falco anatum*.

3. *Herpetotheres cachinnans*.

4. *Micrastur semitorquatus*.

5. *Antenor harrisi*.

6. *Pandion carolinensis*.

7. *Elanoides forficatus*.

8. *Harpagus bidentatus*.

[*a.* Superciliary process of the lachrymal.

b. Accessory piece.]

1

2

3

4

5

6

7

8

PLATE XIV.

(Natural size.)

- FIG. 1. *Herpetotheres cachinnans*.
2. *Micrastur semitorquatus*.

1

2

PLATE XV.

(Natural size.)

FIG. 1. *Hieracidea berigora*.

2. *Milvago chimango*.

1

2

PLATE XVI.

(*Natural size.*)

FIG. 1. *Hieracidea berigora*.

2. *Milvago chimango*.

1

2

PLATE XVII.

(*One-half natural size.*)

- FIG. 1. *Falco aurantius*.
2. *Hieracidea berigora*.
3. *Milvago chimango*.
4. *Phalcobæus megalopterus*.

1

2

3

4

PLATE XVIII.

(*Natural size.*)

FIG. 1. *Ibycter americanus*.

2. *Ibycter (Daptrius) ater*.

1

2