

## CORRESPONDENCE.

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The Osteology of *Habia melanocephala*, with Comparative Notes upon the Skeletons of certain other Conirostral Birds and of Tanagers.

TO THE EDITORS OF THE AUK:—

Dear Sirs:—To none others better than yourselves is the fact well known, that whosoever has undertaken to compare the skulls of several of the more nearly allied genera of our fringilline birds, with the view of discovering distinctive characters among them, how next to hopeless that person has found such a task to be. Among a large series of skeletons before me I find such species represented as *Zonotrichia coronata*, *Chondestes grammacus*, *Habia melanocephala*, *Pipilo m. megalonyx*, *Pipilo chlorurus*, *Piranga ludoviciana*, *Calamospiza melanocorys*, *Icteria v. longicauda*, *Calcarius lapponicus*, besides a host of other Passeres, including the majority of the Crows, Jays, Orioles and their allies, Sparrows, Finches, and others, and it is truly wonderful to note the manner in which the cranial characters, indeed the skull as a whole, in these numerous genera, morphologically shades from one series of the more intimately related forms into the group next most nearly allied, and so on, along different lines, diverging as they do, from any well-defined genus we may elect as our primary one for initial comparison. True as this is, however, I find it none the less true that if we critically compare the skeleton of some Finch, for instance, at one extremity of such a series, with the skeleton of another conirostral species chosen from the other, important differential characters may not infrequently be detected, which characters are constant for the species, and of great value to the taxonomist of this, in many cases, puzzling group of birds. It is my object in the present connection to point out some of the more available characters, such as I refer to, and which I have met with in my osteological studies of this extensive group. In *Habia melanocephala* the skull as a whole bears a very striking, though superficial, resemblance to that part of the skeleton in certain Parrots, and when compared with the skull in such a form as *Pipilo m. megalonyx*, for example (Figs. 1 and 2), presents us with some excellent differential characters. Chief among them we find in the Grosbeak to which I have invited attention that, in addition to its far more massive osseous superior mandible, it possesses a complete bony *septum nasi*; the infero-external angle of a *pars plana* meets the jugal bar beneath it, and is produced backwards to no inconsiderable extent; the tympanic bullæ are inconspicuous; the frontal region between the margins of the orbits on the superior aspect of the skull is unusually broad; the antero-external angles of the vomer are commonly produced, and fuse

with the maxillary and premaxillary on either side (there may be exceptions to this, but it never happens in *Pipilo*); the postero-external angle of either palatine is distinctly bifurcated; the palatine, on either side, develops a *secondary palatine process* (*sp.p.*, Fig. 1), extending backwards from a point to the outer side of where the anterior palatine limb fuses with the premaxillary;\* and finally, the interorbital septum is perforated entirely in bone, though the foramina for the exit of the first pair from the cranium merge, and the vacuity is of some considerable size.

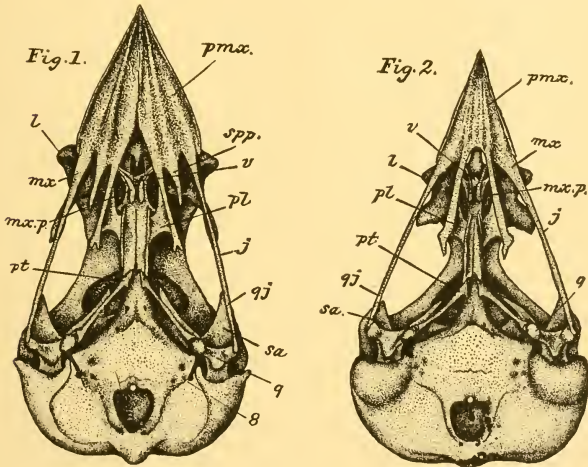


Fig. 1. Basal view of the skull of *Habia melanocephala*, adult ♂,  $\times 2$ , and mandible removed.

Fig. 2. Basal view of the skull of *Pipilo m. megalonyx*, adult ♂,  $\times 2$ , and mandible removed. *pmx.*, premaxillary; *l*, lacrymal; *mx*, maxillary; *mx.p.*, maxillo-palatine; *pt*, pterygoid; *spp.*, secondary palatine process; *v*, vomer; *pl*, palatine; *j*, jugal; *sa*, squamosal process; *q*, quadrate;  $\delta$ , foramen for glossopharangeal and vagus nerves; *qj*, quadrato-jugal.

\*These processes are well shown in Figure 1, and as I have never met with a former description, I have designated them by the above-given name. Not having examined the young of *H. melanocephala*, it is just possible that these interesting projections may be developed on the part of the premaxillary, but the adult skull does not seem to so indicate. The name I have bestowed upon them will answer very well in either event. They are absent in such a form as *Coccothraustes vulgaris* (See Huxley, P.Z. S., 1867, p. 452, fig. 33), and very likely in our *C. vespertina*, though I have not examined the skeleton of that species.

Now in the skull of the *Pipilo*, which I have chosen for comparison, each and all of these characters are just the reverse. There we find not even a vestige of an osseous nasal septum; nor does the *pars plana* so much as reach the jugal bar; nor are the postero-external angles of the palatines bifurcated, but are on the other hand distinctly truncated from without inwards and backwards; while in addition we find in this species very conspicuous tympanic bullæ, a large vacuity in the interorbital septum, a narrow frontal region, and the secondary palatine processes absent (Fig. 2). Both of these birds possess an elliptical vacuity in the ramus of the mandible, on either side, but in *Habia* this bone is far stronger with much deeper sides than we find it in *Pipilo*, and withal is not a little different in shape. In both of these Finches, too, the squamosal processes are very large (*sa*); while I may add that thus far it is only in *Habia melanocephala*, of all our Conirostres that I have detected the secondary palatine processes. The characters of the skull in *Pipilo m. megalonyx* are almost exactly repeated in the skulls of *Pipilo chlorurus* and *Zonotrichia coronata*, though the skull in the first-named species is considerably larger, and has the tympanic bullæ markedly more prominent; while in the case of the two species last named, both in point of size and in all other details, it lies next to an impossibility to distinguish them. All North American Fringillidæ have an extraordinarily minute occipital condyle, as compared with the size of the skull (see figs. 1 and 2).

By the easiest sort of intergradation the skull of *Zonotrichia* shades into the skull of *Chondestes*, and an attempt to define the differences between them would simply result in an enumeration of insignificant details. As we pass to such a skull, however, as we find in *Calcarius lapponicus*, a specimen of which species I collected in Wyoming in 1880, and now have its skeleton before me, a few of the modifications in characters so faintly forecast in *Zonotrichia*, are here completed and stereotyped. The delicate, mesial ends of the maxillo-palatines are now enlarged and paddle-shaped; the antero-external angles of the vomer are curled upwards and inwards; the palatines are well separated from each other the entire length of the rostrum of the sphenoid, and their postero-external angles each terminate in a needle-like point; and lastly, the tympanic bullæ cease to be a striking feature of the skull. And for conirostral birds, the gap indicated by the characters of this part of the skeleton, between such a type as *Calcarius* and *Habia*, is now of no inconsiderable extent; I was almost about to say of family distinction.

To see the typified fringilline skull, however, we can turn to no better example than exists in *Calamospiza melanocorys*,—a true Bunting, if there ever was one. Compact to a fault, and with all the bones stouter and thicker than in any of the foregoing species, the skull of *Calamospiza* is easily distinguished from the skull either of *Pipilo* or of any of the true Sparrows. In it the external nasal aperture upon either side, is circular rather than elliptical, as it is in the Towhees and *Zonotrichia*. Compared with its allies its characters are of excellent generic rank, if we may be

permitted to judge from the skull alone; there is nothing especial though in this part of the skeleton in *Calamospiza* that at all reminds one of the skull in *Habia melanocephala*.

Elsewhere I have shown that *Molothrus ater* was by its skeleton a Finch, though the most icterine of all our Fringillidæ, with the exception perhaps of *Dolichonyx*, a form which I have not yet osteologically examined, but judging from what I found in *Molothrus*, I am strongly inclined to believe that it too belongs on the fringilline side of the line. Barring the broad frontal region in the first-named species, its skull approaches in its general *facies* the skull in the Towhees and their more immediate allies, and from them it shades beautifully into the Icteridæ.

Passing for a moment to the skull in another family, the Tanagridæ, we meet with the extreme modification of the conirostral type in another direction, so profound a change, indeed, that I am not familiar with the skull of any true fringilline, that the skull of such a species, for instance, as *Piranga ludoviciana* could be confused with, or would in its entirety resemble. In the Tanager to which I refer the nostrils are large and elliptical; there is a total absence of an osseous nasal septum; as compared with an average Finch the skull is elongated, and the brain-case relatively smaller; its palatines are of the most marvelously delicate construction, and their postero-external angles drawn out into long hair-like spiculæ; the pterygoids are markedly slender; and finally, the presence of *secondary palatine processes* plainly points to its affinity with such a Grosbeak as *Habia melanocephala* among the Fringillidæ. So far as the skull goes, the Tanagers are remotely linked with the Mniotiltidæ through *Icteria*, and in *Icteria virens longicauda* the skull presents some few striking differences from that part of the skeleton in *Piranga ludoviciana*, for not only does it seem to exceed it in frailty and delicacy of construction with respect to the bones composing it, but in the skull of the Chat to which I refer we find that the secondary palatine processes are absent; the postero-external angles of the palatines are produced as blunt apophyses, and the anterior projecting limbs of these bones are conspicuously slender and widely separated; the ramal vacuity of the mandible is large, elongated, and elliptical in outline, while the sides of this bone are shallow, and its entire make impresses us with its weakness. Omitting, however, the mandible, the palatines, the acuteness of the superior osseous mandible, we should have remaining in the rest of the skull of *Icteria* a structure that without the slightest violence could be appropriated by any true Pirangine avian type.

Turning again to the skeleton of *Habia melanocephala*, we find that it possesses nineteen vertebræ between the cranium and the pelvis, all freely movable upon each other; of these the ultimate *five* connect with the sternum through costal ribs, while just anterior to them are two vertebræ which support free ribs (the anterior pair being very minute), and finally, there is a pair of sacral ribs, the hæmapophyses to which fail to connect with the sternum. This arrangement of the ribs and vertebræ also obtains in *Pipilo*, *Zonotrichia*, *Icteria*, and other forms, and is undoubtedly the

typical plan for the vast majority of average Passeres. A difference is met with though in the tail vertebræ, for in the specimens at my hand *Habia* possesses *seven* free caudals and the pygostyle, while *Pipilo* has but *six* and the terminal piece. In *Piranga*, too, we find but six caudal vertebræ, and the pygostyle, while this also seems to be the number in *Icteria*, and in a former memoir I recorded the same in *Molothrus ater*.

With barely an apology of a structural difference between them upon which to base a substantial distinction, the *pelvis* in *Habia* sees almost its exact counterpart in the corresponding bone in the skeleton of *Pipilo m. megalonyx*. Both are typically passerine, and so well known is the passerine pelvis in such genera as these, that to enter upon its description is by no means necessary. *Pipilo chlorurus* has a pelvis which differs from the pelvis in *P. m. megalonyx*, as well as from the pelvis in *Zonotrichia coronata*, in that in it is the fourth sacral vertebra, counting from the last forward, that extends its diapophysial braces opposite the acetabula, instead of the third as in the excepted species, and a difference of arrangement also exists in that an additional vertebra, anteriorly, extends its lateral processes to meet the ilium upon either side, there being three each in *P. m. megalonyx* and *Zonotrichia*, and four in *P. chlorurus*. I should like to examine more material before pronouncing upon the significance of this departure, and more especially skeletons of *Embernagra rufivirgata*. *Piranga ludoviciana* and *Icteria* have pelves almost identically alike, it being in each case the fifth from the last sacral vertebra that throws out the long strut-like apophysial arms to act as braces opposite the acetabula. *Calamospiza* possesses the same arrangement of the vertebræ in its pelvis, but here the bone is apparently not as wide for its length as it is in *Habia*, though no satisfactory differences exist between several of these pelves, upon which to base strong family, or even generic lines.

Few differences again are to be found in the *sternum* of the species we have under consideration; the common pattern of the bone as seen among the smaller average passerine birds of this country is well shown in my figures of it in *Otocoris* (Osteology of *E. alpestris*, figs. 22, 24, 27, and 38); in *Habia* the anterior carinal angle is pointed and the keel itself is but of moderate depth, while among the *Pipilos*, and in *Zonotrichia*, the anterior carinal angle is rounded, and the keel much shallower, markedly so in the ground-loving species of the first-named genus. I am strongly inclined, however, to attribute this last character to physiological adaptation rather than to an evidence of affinity. These Towhees spend much of their time hopping about beneath the shrubbery of their places of resort, and by no means use their wings in flight so often as other fringilline species, and consequently develop less their pectoral muscles, which are attached, in part, as we know, to the sternal carina. True Tanagers, as I have elsewhere pointed out, have an osseous bridge extending across the top of the manubrium to the anterior margin of the body of the sternum, and if it be constant, it is an excellent character for this family. It is absent in such a genus as *Icteria*, and in all the Fringillidæ now at my hand.

My plate of the osteology of *Otocoris*, cited above also presents good figures of the bones of the *shoulder girdle*, and when we come to compare them among these smaller passerine types it is truly wonderful how well they agree with each other. We have examined them in many species representing a host of different genera, and yet who has been enabled to base a single, *constant*, differential character upon the elements of this arch? Slenderer here, a little shorter there, a somewhat longer and more quadrilateral hypocleidium in this form than in that, still in all essential particulars, coracoid, scapular, and *os furcula* in *Piranga* are the same as we find them in *Habia*, or in *Pipilo*, or in *Molothrus*. *Progne*, *Lanius* (I have elsewhere figured it for this genus), *Merula*, in short a perfect phalanx of other forms among our smaller Passeres.

What I have just said in reference to the shoulder girdle applies with equal force and truth to the skeleton of the *pectoral* and *pelvic limbs* of these birds, which parts have been likewise figured in my memoirs upon *Otocoris* and *Lanius*. One may go carefully over, with lens in hand, for hours, studying the limb bones of these particular genera of passerine birds, and yet signally fail to select a reliable set of characters in any genus that can be depended upon to distinguish it from another. Differences, of course, yes, constant differences, *do* exist, but they are not of the kind which can be powerfully brought into play by the taxonomist, who in searching for differential skeletal characters in these several groups must rely almost entirely upon what he finds in the skull, the vertebral column, and occasionally in the pelvis and sternum. Still, minor differences, which are sometimes presented, may, by the careful classifier, be mentally added to the more salient distinguishing features, and thus be allowed their weight in his final decisions, where they might not be of sufficient importance to warrant a published description or special record. This has been the writer's habit when dealing with such characters. To the practised eye, and an unbiased and mature judgment, the general *facies* presented by the skeleton of the wing or leg of a small passerine bird will sometimes assist, and properly so, in one's forming a final opinion, when these facts are being compared with similar parts in a different species, and where affinities are being searched after.

In conclusion, I would remark that having carefully gone over and thoroughly studied and weighed the characters of the species now under consideration, and many others not enumerated above, I am prepared to say that, in so far as the skeletons seem to indicate, the following deductions can be drawn. First, *Habia melanocephala* possesses characters in its skeleton not shared by any other fringilline bird known to me, outside the Grosbeaks, which characters are of family rather than generic rank. Essentially coriostiral, and a seed-eater with a big beak, but for all that with an *ossified nasal septum*, with *secondary palatine processes*, and a *vomer generally fused with the surrounding bones, anteriorly*,—all of which characters are disreputably unfinch-like, and entitle their owner fully as much to family distinction as any set of skeletal characters we might array chosen from *Sturnus* does that form; and how about *Molothrus* and *Dolichonyx*?

As for *Pipilo chlorurus*, its skeleton is quite the counterpart of the skeleton in *Zonotrichia coronata*, and is readily distinguished from the skeleton of *Pipilo m. megalonyx*, which is by no means an easy task in the case of the first-mentioned species. I believe, from my studies of the anatomy of this form, that it has more Zonotrichine stock in its economy than it has Towhee kinship to boast of, and it sees its nearest affinity in the family among the 'Crown Sparrows.'

Osteologically, *Calcarius*, *Spinus*, and *Acanthis* are more or less closely affined genera, nor does the genus *Plectrophenax* stand between them as at present represented in our Check-List. *Calamospiza*, as I have already remarked, is a true 'Bunting,' but not especially related to the Grosbeaks by any skeletal affinity, and it characterizes a strong genus with well-defined osteological features. Judging from such a form as *Piranga ludoviciana*, I would say that osteologically the Tanagers form a good family, and through certain Grosbeaks are linked with the Fringillidæ, more, though only a little more, remotely through *Icteria* with the 'Wood-Warblers.'

These groups and their kin will bear far more extended anatomical study, which some day I hope to bestow upon them. In closing, it gives me pleasure to thank Mr. C. A. Allen, of Nicasio, California, for his kindness in collecting and sending me the specimen of *Zonotrichia coronata*; it was received in April, 1881, seven years ago.

Very respectfully yours,

R. W. SHUFELDT.

Fort Wingate, New Mexico, July 14, 1888.

#### How far West has *Anas obscura* been found?

TO THE EDITORS OF THE AUK:—

Sirs:—In my Revised Catalogue of the Birds of Kansas I said "*Anas obscura* Gml. Black Duck. Entered in first catalogue as 'migratory; rare'; but since, on comparing the specimens captured in the State, that I have seen, with Eastern ones, they prove to be the 'Florida Duck.' Other writers claim that the birds have been taken in the State, also in Texas, and west to Utah, and I am inclined to think that further investigation will prove it to be the case. With this explanation I let the bird stand as first entered."

I now desire to say that further examination tends to convince me that the birds do not come as far west as this, and leads me to think it probable that all specimens taken west of the Mississippi River, will prove upon comparison to be the Florida Duck. A set of eight eggs collected near Corpus Christi, Texas, May 27, 1882, and reported to me as of this species, are in dimensions altogether too small, viz.,—2.08 × 1.62, 2.12 × 1.62, 2.10 × 1.58, 2.12 × 1.60, 2.12 × 1.59, 2.08 × 1.62, 2.10 × 1.60, 2.08 × 1.59 inches. In color they are cream or pale buff white.

Any information that will aid in determining their western limits will be gratefully received.

N. S. Goss.

Topeka, Kansas.