NOTES ON THE ANATOMY AND AFFINITIES OF THE COEREBIDÆ AND OTHER AMERICAN BIRDS.

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Some five or six years ago I planned a paper on the Coerebidae which, for lack of time and material, has lain at a standstill until the present time. It is brought forward now, not because the necessary amount of material has been obtained, but because it seems probable that if delayed until the needed specimens are secured it will never be written, and also in the hope that these notes and figures may be of some service to other students and save the trouble of again going over the entire ground. It may, to some extent, be considered as a brief supplement to Dr. Gadow's paper on the Structure of certain Hawaiian birds, as comparisons are made with some of the species therein described.

One in search of the relatives of any passerine bird has before him, if not exactly a thankless task, something very nearly akin to it, and one in which even comparatively small results can be reached only by the expenditure of much time and labor. The birds which perch at the top of the avian tree are so many in number and so exasperatingly interrelated that any attempt at sorting them out is fraught with much difficulty, or, as Dr. Gadow puts it, "the examination of a small twig of the passerine branch of the Avine tree shakes and disturbs the whole branch, if not the whole top, of the famous ideal tree." So it has been in the present case. Representatives of the Mniotiltidae, Meliphagidae, Drepanididae, Tanagridae, and Fringillidae, have been examined in the hope that the affinities of the Coerebidae might be made apparent; and I am compelled to confess that, on the whole, the result has been unsatisfactory, and that the examination of a considerable number of specimens has rather lessened my hopes that anatomical, and especially osteological, characters may be relied upon to show relationship among the passerines.

Of course one trouble lies in the fact that the so-called families of passerines, at least very many of them, are not families at all, or not the equivalents of the families of other groups of vertebrates. It is my belief that any group of vertebrates to be of family rank should be capable


299
of skeletal diagnosis, and this test applied to the passerines reduces them to a family or two, as has been done by Huxley and Fürbinger.

It would almost seem that, aside from purely negative results, the skeleton can be relied upon to show but two things, very general and very close affinities, for the variation of parts is so infinite that between any 10 given birds we may find every intermediate stage and establish relationships in all directions.

Then, too, characters which would be of much importance among mammals appear, from their instability, to be of but little value in birds. An example of this is found in the condition of the presacral vertebrae. In a large number of Passerines there are 4 presacra, the third and fourth being fused and having a common transverse process; in others there are 5 presacra, the fourth and fifth being fused. Such characters as these would seem to be of some importance, and yet Himantone parva has the third and fourth presacra fused, while H. sanguinea has the fourth and fifth united. And these birds are undeniably closely related.

The same thing occurs again and again in other closely related species, such, for example, as Merula migratoria and Turdus musicus, while the instability of the character is well shown by the fact that it is by no means uncommon to find sacra in which, on one side, the third and fourth vertebrae are fused and on the other the fourth and fifth.

The degree of value to be assigned the pterylosis is yet unsettled, and this can only be done by accumulating and comparing the facts in the case. It would be a great service if some one with ample time and unlimited patience would plot the pterylosis, or even the configuration of the dorsal tract, in as many small birds as could be obtained, for it would then be possible to ascertain what correlation, if any, there is between tract pattern and other characters.

Between the continuous dorsal tract of a thrush and the inverted Y of a swallow there is a great difference, and this difference should have some definite meaning, exactly what meaning, is to my mind, not yet evident.

All the birds examined during the preparation of this paper have an uninterrupted dorsal tract whose shape appears to be specifically subject to great variation, but these variations are so slight and so innumerable that, except for general purposes, the pattern appears to be of little service.

The convolutions of the intestine are in every much the same case as the pterylosis for, judging by Dr. Gadow’s figures and my own limited number of dissections, they are subject to great specific variation. There is certainly a decided difference between the alimentary canal (including the stomach) of birds so nearly alike as Cereba cyanea and C. cerulea, and the genera of tanagers vary widely.

The indications are, as might not unnaturally have been expected, that such parts as the tongue and alimentary canal are subject to great
variation, so that the skeleton would seem to offer the most stable characters for classification, although, as has so often been said, it is by the resultant of characters that we must be guided.

The members of the Corvidae herein discussed are Careba cyanea, C. caerulea, Certhiola caboti, C. bahamensis, and Glossoptila campestris. The palatal regions of the skulls of these genera are figured, and reference to them will be better than any detailed description.

The crania agree in the following particulars: the prepalatine bar is slender, the postpalatine portion produced backward and overhanging the anterior ends of the pterygoids. The anterior, interpalatine angle is small, almost abortive; the transpalatine process slender and spine-like. The more noticeable differences are as follows: In Careba the prepalatine is carried forward beneath the premaxillary; in Certhiola and Glossoptila it abuts upon and interlocks with the posterior, ventral part of the premaxillary. In Careba the palatine and pterygoid are completely fused; in Certhiola and Glossoptila they are separate. The pterygoids are anteriorly in contact, or very nearly so, in Careba and Certhiola; in Glossoptila they are separated by the sphenoid.

Certhiola and Glossoptila have septomaxillary splints united with the vomer. Dr. Parker figures them in Chlorophanes atricilla, and they are present in Careba caerulea, although I failed to find them in C. cyanea.

The tendinal perforations of the upper end of the tarsus, while arranged on the same general plan in those passerine birds examined, show a number of variations in the executions of details, some of which

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* Also crania of C. tricolor and C. portoricensis. This last has the angle of jaw most produced of any species of Certhiola examined.
are shown in the figures. Their arrangement in the Coerebidæ is very much that shown by Myadestes, except that in Certhiola 4 and 5 are merged in one.

Fig. 2.—Hypotarsi of (1) Phoebis obscura; (2) Merula migratoria; (3) Myadestes solitarius; (4) Hemignathus olivaceus; all very much enlarged. The numbers in (2) refer as follows: [1] Foramen for tendon of flexor longus hallucis; [2] flexor perforatus digitus IV and slip to base of first phalanx of digit III; [3] flexor perforatus digitus III; [4] flexor perforans digitorum profundus; [5] flexor perforans et perforatus digitii II, and flexor perforatus digitii I.

The tongue is forked in Cæreba and Certhiola, brushy in Certhiola, laciniated or feathered in Cæreba. There is a decided difference between the tongues of Cæreba cœrulea and C. cyanea, as is shown by the figures.

Cæreba cœrulea comes near having a tubular tongue, but although the edges approach one another they do not meet except at the laciniated tip. In Certhiola the tongue is simply grooved down the center.*

Glossoptila is noteworthy, from the fact that it has a trifid tongue, a thin, flat, pointed strip being produced between the laciniated branches.

* It makes a decided difference whether the tongue is examined in a moist or dry condition, for in drying the outer edges curl upwards and render the tongue more tubular, or gutter-like, than in its natural state. The specimens from which the figures in this paper were made were all kept wet while they were being drawn.
Certhiola has no crop, Cœreba has a well-marked crop-like dilatation of the oesophagus, and Glossoptila has a good-sized crop. The stomach is small in Certhiola, a little larger in Glossoptila, and largest in Cœreba coerulae. In all, the intestine is long and slender. There are many convolutions in Certhiola, comparatively few in Cœreba, while Glossoptila is somewhat intermediate between the two. In C. cyanæa the intestine is 0.900 mm. long, in C. coerulae 1.25 mm.; both have two small ceca a short distance above the anal opening. The food of Certhiola, as indicated by the stomach contents, consists of small insects and spiders, that of Cœreba and Glossoptila consists of small berries, containing numerous small seeds.

![Diagram](image)

The feather tracts and apteria are, with trifling variations, as shown in the figure of Certhiola caboti. The pattern of the dorsal tract varies slightly according to the species, and the lengths of the median apteria, especially that on the under side of the neck, vary according to the length of the neck.

Glossoptila is different from the other Cœrebidae in having a narrower dorsal tract, and much longer and looser feathers.

Professor Baird, in his "Review of North American Birds," considered the Cœrebidae as nearly related to the Mniotiltidae, being apparently largely influenced by the slender beaks of this last group, and by the peculiar tongue of Deidroica tigrina.

Dr. Gadow, in the "Birds of the Sandwich Islands," considers the Cœrebidae as the nearest allies of the Sandwich Island Drepanididae, this family being formed to accommodate the slender-billed brush-tongued birds peculiar to those islands.

Dr. Sclater* places the Cœrebidae just before the tanagers, remarking that it is difficult to separate them from the tanagers on the one hand and the Mniotiltidae on the other, and this position is that generally accepted.

* British Museum Catalogue of Birds.
In considering the relationships of the group, the pterylosis may be left out of the question, as it will not help us any. The figure showing the pterylosis of Certhiola might, with trivial alterations, do duty for Careba, Dendroica, Geothlypis, Acanthorynchus, and some of the Fringillidae, and since the same pattern is found in so many genera, including those but distantly related, it may be considered as very generalized.

The palate of the Mniotiltidae differs from that of the Cerebidae in having the interpalatine process well developed, the transpalatine short and bluntly angular, and the palatines not produced backward over the pterygoids.

In the general pattern of the palate, the shape and development of the interpalatine and transpalatine spurs, and in the amount of exposure of the sphenoid between the palatines, some of the tanagers agree very well with the Cerebidae. Others of the tanagers differ considerably in their palate from the Cerebidae, and there seems to be in the Tanagridae more of an approach towards the union of the palatines beneath the sphenoid.

The Drepanididae, as represented by Vestiaria, Oreomyza, Hemignathus, and Himatone, agree with the Cerebidae in the character of the transpalatine and interpalatine processes, and exceed them in the depth and production of the postpalatine. This feature is carried to its extreme in the Drepanididae, and the same is true of the compression of the palatines, the free ventral edges of these bones approaching one another very closely, being in Himatone sanguinea almost in contact. The Drepanididae have the sphenoid covered by the palatine, a feature which is not found in the Cerebidae, but occurs in some, although by no means all, or even in a large majority, of the Fringillidae.* Among the skulls examined, those of Certhiola and Himatone bear the closest general resemblance to one another. Careba and Glossoptila have a small palato-maxillary, and so do some of the Mniotiltidae. On the other hand, Certhiola and some species of Dendroica do not have this little bone.† It is wanting in Dendroica discolor, coronata, pennsylvanica, Melospiza fasciata, melodia, Locia curvirostra, Zonotrichia albicollis, Pipilo erythrophthalmus, Leucosticte griseonucha, Ammodramus and Parula americana. Its exact value remains to be shown, for it appears in forms which are not related, at least closely, and drops out in some that

* That is, in the species which have come under my observation.
† The following species have a palato-maxillary: Dendroica maculosa, vigorsii, astrol, Cardinalis virginianus, Habia ludoricaniana, Plectrophenax nivalis, Calcarius tapponeus.
are nearly allied. It is present in the Swallows, but not in the Flycatchers or Thrushes; is well developed in such stont-billed Finches as *Caria*
*nalis* and *Habia*, missing in *Coccothraustes*. It appears as a slender splint in *Plectrophanes* and *Calcarius*, and reaches a considerable size in *Rhamphocelus* and *Pyranga*, while it is lacking in *Phoenicophilus*. None of the Drepanididae and Meliphagidae examined have a palatomaxillary.

None of the Mniotiltidae or Tanagridae have the angle of the jaw produced, nor do the genera *Coereba* and *Glossoptila*. In *Certhiola*, however, the angle of the jaw is slightly produced, and this occurs in *Oreomyza, Vestaria, Himatium*, and to a less extent in *Hemignathus*. The production of the angle is marked in *Acrulocercus*, and reaches a maximum in *Anthocephura carunculata*. *Acanthorhyncus* and *Tropidoro*

rhynchus* do not have the angle of the jaw produced, although they are “tenuirostral” birds, and the character is one that seems to have no correlation with length of bill. Like many other points in the anatomy of the Passeres, more observations are needed regarding the occurrence of this character, although it would seem that it should be of some importance. It does not occur in many birds, but is found in some of the Icteridae.

The tongue in the Mniotiltidae is of moderate length, with very slightly upturned margins, cleft a little at the tip, and slightly brushy. *Dendroica maenosa* and *D. tigrina* represent the extremes so far as speci-

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**Fig. 6.—Tongues of Dendroica tigrina; (2) Dendroica coronata; (3) Glossoptila canencris; (4) Acanthorhyncus tenuirostris; (5, 6) Coereba cyanca; (7) Coereba corulea; all enlarged.**
mens have been examined. The tongue shown in fig. 5, page 163, "Review of North American Birds," is unfortunately not the tongue of *Dendroica tigrina*. There has evidently been a transposition of specimens, and fig. 4, which is said to be that of *Daevis*, is probably that of *D. tigrina*. As the shape of the tongue was the principal character of the genus *Perisoglossa*, the genus would for this reason, if for no other, be untenable; but even had the tongue been as figured, it would hardly seem a character of sufficient importance for the establishment of a genus.

The tongue of the Tanagridæ may be slightly bifid as in *Pyranga*, *Tanagra*, and *Rhamphocælus*, or thick, fleshy, and fringed, as in *Saltator atriceps*, but so far I have found no species in which the tongue bore any resemblance to that of *Coræba*.

Among the Drepanidæ, *Himatione*, *Hemignathus*, and *Vestiaria* have very perfect tubular tongues, the upturned edges meeting or even lapping over one another slightly, being so firmly apposed that it is often a difficult matter to force them apart. A few filaments at the end, and here and there along the edge, constitutes the entire feathering of the tongue.

*Oreomyza* has the commencement of a tubular tongue, but, owing to its shortness, the tubular structure is not carried out. None of these tongues are deeply cleft or widely feathered at the tip, as in the Cærebidæ, and none approach the peculiar condition found in *Certhiola*, which has a two-branched tongue, with a twisted brush on either branch, and a shallow groove down the center of middle third of the tongue.

The general pattern of this tongue is very much like that of the Australian *Meliormis* while the nearest approach to such a tongue as that of *Coræba corulea* is found in the Australian *Acanthorhynchus tenuirostris*, and in this bird the cærebine pattern is carried to the extreme, the tongue being extremely long, slender, bifid, feathered at the tip, and tubular for a part of its length.

The alimentary canal of the Mniotiltidæ is, as a rule, comparatively simple, but in *Dendroica coronata* the convolutions of the intestine are almost exactly the same as in *Coræba*. The stomachs of all Mniotiltidæ examined contained insects. There is no crop in this group and the stomach is large and somewhat pyriform in shape.

The tanagers are fruit-eaters, are devoid of a crop, and have the largest intestine and simplest convolutions of any birds examined.

In the complexity of the alimentary canal there is a parallel
between Certhiola and the Drepanididae, and the convolutions of Hemignathus olivaceus very nearly coincide with those of C. cabotii.*

But in both groups there is varying complexity of convolution among the different species, and in neither is there any adherence to a given pattern. Among the Sandwich Islands birds there is, in the majority

![Intestinal convolutions diagram]

Fig. 8.—Intestinal convolutions of (1) Glossoptila campestris; (2) Coerba cyanea; (3) Dendroica coronata; (4) Certhiola caboti; (4a) Certhiola caboti, central portion; (5) Coerba coerula; (6) Hemignathus olivaceus; (6a) Hemignathus olivaceus, with coil opened out to show convolutions; (7) Acanthorhynchus tenuirostris.

of specimens figured, a slight peculiarity in the manner in which the intestine begins to uncoil from the center. When looking from below at the right side of the viscera, the intestine is seen, roughly speaking, to start from the stomach and in a decreasing spiral or series of loops

* There is at first sight an apparent discrepancy between Dr. Gadow's figure and that shown in fig. 8 (6), of this paper, but this is due to the fact that Dr. Gadow's specimen has a longer and more closely twisted intestine, so that the point of reversion is different in the two.
coil into a knot or short loop, whence it uncoils or unfolds in an increasing spiral. In *Loxioides, Psittacrostrro, Himatione, Vestiarla, and Hemignathus* the first turn of the intestine from the center is to the left, while in the American species figured it is to the right. The point is one of little or no value, but among the species figured the difference exists.

My only specimen of *Acanthorhynchus* was doubly unfortunate; first in being neatly shot through the palate, completely destroying that region, and, secondly, in having the intestine in so tender a state that it was difficult to trace its convolutions. Hence I do not feel quite positive that the figure is entirely correct, although it is very nearly so, and if there is any error it lies in the portion beyond the central knot and consists in the omission of some convolutions. It is much simpler than in *Certhiola*, but not unlike *Carcena*, while a little more complexity beyond the central knot would make the general pattern of the intestine very much like that of *Glossoptila*.

To sum up: In the character of their palate the Cerебidae differ from the Mniotiltidæ and resemble in some points the Drepanididæ and some of the Tanagra ita.

The Drepanididæ differ from all the above-mentioned groups except *Certhiola* in the production of the angle of the jaw.

In their tongue the Cerебidae are markedly different from the Mniotiltidæ, but it is largely a difference of degree rather than of kind. They differ *in toto* from the Tanagra ita, are quite distinct from the Drepanididæ, and find their nearest homologue in *Acanthorhynchus*.

As regards the Drepanididæ, it may be thought that this distinction is very much a matter of opinion, but to me the two patterns of tongue seem quite different, though both derivable from such a tongue as that of *Dendroica*.

It would, perhaps, require less modification to derive the tongue of the Drepanididæ from such an one as that of *Icterus icterus*, as this is considerably upcurved along the edges, is not greatly feathered, and is, considering its size, less fleshy at the basal portion than that of *Dendroica*.

It must be borne in mind, too, that there are three distinct types of tongue among the Cerебidae and that no comparison can be made with them in this particular as a group.

In complexity of alimentary canal they much exceed the Mniotiltidæ (except *Cerrea cyanea*, noted previously), bear no resemblance at all to the Tanagra ita, and are approached by the Drepanididæ.
As groups of birds are constituted the Cerebidae are certainly sufficiently distinct to stand apart, and the gap between them and the Mniotilidae seems widest, although this may be due to a tendency on my part to place considerable weight on the general pattern of the palate.

The relationship with the tanagers is not very close, although such short-billed forms as Chlorophanes and Dacnis, which unfortunately were not available, might bring the two groups a little closer.

In size, form, pterylosis, structure of tongue, and pattern of convolutions of alimentary canal, there is a strong resemblance between Cereba and Acanthorhynchus, and so far the two forms exhibit a most interesting case of parallelism. The palate, too, on superficial examination, looks not unlike that of Glossoptila, but as Dr. Parker points out in the second part of his memoir on the Skull of Egithognathous Birds, there is a striking dissimilarity in the fact that in Acanthorhynchus the palatines run outside the palatal process of the premaxillary instead of along the inner side, as in passerine birds generally.

Finally, it must be said that the members of the Cerebidae do not form a homogeneous group, for the family contains at least three well-marked types, Cereba, Certhiola, and Glossoptila, and these types differ from one another in a very marked degree. While Dacnis and Chlorophanes have not been examined by me, the figures of skulls and tongues of these genera indicate that they belong near Cereba. These genera form a well-marked group containing those species nearest to the Mniotilidae and characterized by a long, cleft, feathered, but not sectorial tongue, small crop-like dilatation of the oesophagus and simply convoluted intestine.

Certhiola has a bifid, brushy tongue, no crop, extremely complicated intestine, and produced angle to the mandible. The tongue resembles that of some of the Meliphagidae; the other characters are like some found in the Drepanididae. Glossoptila, with its loose ptiloclisis, decided crop and unique, trifid tongue, is equally well characterized and certainly should stand apart, seeming to hold with respect to Cereba much the same position that Chamea does with the wrens.

The Anatomy and Affinities of Certhidia.

At the suggestion of Mr. Ridgway I have examined three specimens of Certhidia salvini, kindly provided by Dr. G. Baur, with a view of ascertaining whether or not the suggestion of Cerebine affinities presented by its external appearance was borne out by its anatomy.

The pterylosis is of the orthodox passerine pattern and the dorsal tract has a diamond-shaped outline, similar to that found in Dendroica and many other small birds. The testimony of the skull is unmistakable, for it has the short, subangular, transpalatine processes, and well
developed interpalatines characteristic of the Mniotilidae, and well shown by the common warbler of this Galapagos group, *Dendroica aureola*.

The Cærebine skull, on the other hand, is characterized by the fining down of the palatal region, the transpalatines being reduced to mere spikes, while the interpalatine spur is abortive or small. The cranium of *Certhidia* is a trifle shorter than that of the majority of the Mniotilidae examined and has a little more material in the palatines. The hypotarsus is also like that of *Dendroica* in its configuration, slight but perceptible differences existing between it and the corresponding region of any of the Cærebidae. There is apparently nothing specially characteristic in the shoulder muscles, their arrangement being practically similar in *Certhidia, Dendroica, Cæreba*, and many other small birds.

The tongue is warbler-like in shape and character, being moderate in length and slightly cleft and bifid. It is a trifle thicker and more fleshy than in such a bird as *Dendroica aureola* and not at all gutter-shaped. All this is in direct contrast to the elongate, feathered, hollowed-out tongue of *Cæreba*, and not at all like the cleft, brushy tongue of *Certhiola*, although all three forms agree in one respect: long or short, plain or feathered, the tongue is not sectorial, for even in long-billed *Cæreba* the hyoid stops low down on the base of the skull and lacks the elaborate arrangement of muscles found in truly sectorial birds. The intestinal convolutions are quite simple, much as in *Cæreba* and *Dendroica coronata* and *aureola*, but not exactly like either, although, curiously enough, precisely similar to the convolutions of *Cinnyris bifasciata*. There is, however, no crop-like dilatation of the oesophagus as in *Cæreba*. The coca are moderate, and in the best specimen examined the *bursa fabricii* was very large.

All in all, the anatomy of *Certhidia* points to a very near relationship with *Dendroica*, and indicates that the genus surely belongs among the Mniotilidae.

**Remarks on the Affinities of Myadestes and Phœornis.**

The skull of *Myadestes* is rather short, and on its superior aspect bears a considerable resemblance to that of *Ampelis*. The maxillary process of the nasal is short, not expanded distally, and abuts upon, but does not fuse with the maxillary. In the thrushes this process is wider and continued for a little distance along the maxillary, but does not unite with it. *Phœornis* resembles the thrushes in these particulars. In *Tyrannus* the descending process of the nasal is narrowest near its origin, expands distally, and ankyloses with the maxillary.

The prepalatine bar of *Myadestes* is narrow, as in *Ampelis*, the transpalatine angle much like that of *Phœornis*. The interpalatine angle is blunter in *Myadestes* than in *Ampelis*, in this respect resembling that of *Phœornis* and the thrushes.
Tyrannus differs from the genera mentioned above in the early and complete fusion of the prepalatines with the premaxillaries. Ampelis is peculiar in the large symmetrical ossifications of the anterior trabeculae which articulate with the vomer.

*Myadestes*, like *Tyrannus*, has a flat non-pneumatic maxillo palatine, although that of *Myadestes* is the less hooklike and more expanded of the two. *Phaornis* has a maxillo palatine like that of a thrush.

The manubrium of *Myadestes* is rather wide and low, similar to that of *Phaornis*, these birds in this particular departing from the thrushes as well as from *Ampelis*.

The oesophagus is large and there is no crop. The stomach is large, with strong walls. The intestine is very short, measuring but 0.145 m. in length. The stomach was full of small berries mingled with a few remains of insects.

The dorsal tract is almost straight in *Myadestes*, slightly different from what occurs in *Turdus pallasii*.

*Myadestes* was placed by Gray with the Ampelidae, but is included among the thrushes by Dr. Stejneger.

While the bird has some leanings toward the Ampelidae it seems to have more decided affinities with the thrushes,
although it is by no means a typical thrush. It certainly has no near relationship with the Tyrannidae.

Neither Myadestes nor Phaornis have any trace of a metapterygoid, but while this little process is quite generally present in thrushes, it varies greatly in the amount of development. It is best developed in Merula aurantia and M. migratoria, is small in Turdus mustelinus and pallasi, rudimentary or even wanting in swainsoni and fuscescens. When the metapterygoid is small it is occasionally difficult to decide whether a minute process is present, or merely a prolongation of the sphenoid foot.

The turdine resemblances of Phaornis have already been pointed out by Dr. Gadow, although he seems to have had doubts about positively placing the birds together. Working over the question anew my own observations corroborate those of Dr. Gadow, but I would go a step farther and until it was shown to be otherwise definitely place Phaornis with the Turdidae. Certainly if Myadestes is to be considered a thrush Phaornis is doubly one.

Remarks on the Affinities of Phainopepla Nitens.

Phainopepla was placed by Gray near Ampelis, and here is where it undoubtedly belongs. The skulls of the two are very much like, particularly in the palatal region, and both possess a large, free, swollen lachrymal, this last being a point of much importance, since such a lachrymal is of rare occurrence among birds. The quadrates of Ampelis and Phainopepla agree with each other in minute as well as general characters, as do also the pneumatic maxillo-palatines.

The characters which separate Myadestes from Ampelis separate it also from Phainopepla.

The very marked resemblances between the skulls of Phainopepla and Ampelis render it, in this instance, unnecessary to go into further details, but it may also be said that the general contour of the dorsal tracts in the two species agree very well also, although the outer angles of the tract are a little more rounded in Phainopepla than in Ampelis.