

2. On a supposed Instance of Hybridization between a Cat and Lynx. By W. J. HOFFMAN, M.D.

[Received April 7, 1880.]

The following statement was made to me a short time since by a medical gentleman, late of the U.S. Army, as having occurred during his residence at Camp Apache, Arizona Territory, about six years ago. The doctor had received orders to report at that isolated station, and took a pet Cat with him, partly on account of his admiration for the animal, also for the purpose of ridding the quarters of annoying rodents.

Upon the arrival of spring the Cat began to show symptoms of restlessness, with occasional fits of irritability, which would at times be replaced by evidences of more than ordinary affection and playfulness. Suspecting that the chief cause of these demonstrations was sexual excitement, and knowing that there was no other cat within eighty or a hundred miles of the station—the intervening country being badly broken and very desolate, the result was watched with interest.

One day the Cat disappeared and remained away for over a week, when she as mysteriously made her reappearance with an apparent sense of contentment and a desire to remain about the building. In due time she gave birth to four kittens, three of which resembled the mother, but the fourth had a tail of but half the normal length, and was also of a greyish tawny colour, in time also growing much larger than the rest. As it grew up it became very tame, following its master around the buildings like a dog, showing various characteristic traits of the Lynx, such as the gait, quickness of motion, climbing trees, etc.

As a Lynx (*Felis rufa*) is exceedingly common in the dense woods surrounding the Post, it is but reasonable to attribute the paternity of the kittens to the above-named species, especially so when we consider the general resemblances above stated.

Washington, March 25, 1880.

3. Contributions to the Anatomy of Passerine Birds.—Part II. On the Syrinx and other Points in the Anatomy of the *Eurylæmidæ*¹. By W. A. FORBES, B.A., F.L.S., F.G.S., Scholar of St. John's College, Cambridge, Prosector to the Society.

[Received April 5, 1880.]

The true position of the Broadbills or *Eurylæmidæ* in the series of birds, and particularly the question as to their passerine or non-passerine affinities, has long been in question amongst systematic

¹ Part i. *suprà*, p. 143.

ornithologists¹. That more intimate knowledge of their structure from which alone any true answer to this question could be given, has been likewise gradually accumulating for many years.

Nitzsch, in his great work on Pterylography, published posthumously in 1840, showed that the species examined by him possessed a characteristically Passerine pterylosis². Johannes Müller, in 1846, in his classical memoir on the vocal organs of Passeres³, remarked that in *Corydon sumatranus*, the only species of this group examined by him, there were "no muscular fibres on the larynx." Blanchard, in 1859⁴, showed that *Eurylæmus javanicus* agreed in its sternal characters with other Passeres, and particularly compared it with the Swallows in this respect.

Mr. Selater⁵, in 1872, figured the sternum of *Cymbirhynchus macrorhynchus* (under the name of *Eurylæmus javanicus*; cf. Lord Walden, *l. c.* p. 370), and stated that in his opinion these birds were truly Passerine.

Prof. Garrod⁶, in 1877, was enabled, by an examination of dry skins of *Cymbirhynchus*, *Calyptomena*, and *Eurylæmus ochromelas*, to show that these species differed singularly from all other Passeres yet examined in that in them the tendon of the *flexor longus hallucis* sends a strong vinculum to the tendon of the *flexor digitorum profundus*, as in nearly all other non-passerine birds in which a hallux is developed. He also showed at the same time that in these species the palate was truly Passerine, and proposed to divide the order Passeres "into two sections to start with, those with the hallux not free (the *Eurylæmidæ*), and those with the hallux independently movable." The following year he was able to add to this account some facts in the anatomy of two other species, *Psarisomus dalhousiae* and *Serilophus rubropygius*. These facts included the typical Passerine arrangement of the tendon of the *tensor patagii brevis* (P. Z. S. 1876, p. 508), the presence of the left carotid only, the

¹ For a succinct resumé of the opinions of ornithologists on this point, see Mr. Selater's paper in the 'Ibis,' quoted below.

² Ray Soc. ed., pp. 76, 77. These were *Corydon sumatranus*, *Calyptomena viridis*, *Eurylæmus javanicus* and *E. ochromelas*, and *Cymbirhynchus macrorhynchus*. In the three last named Nitzsch describes nine of the remiges as situated "on the hand;" in all the specimens of this group I have examined, I find there are ten primaries (cf. also Wallace, *Ibis*, 1874, p. 406, and Sundevall, *Tentamen*, p. 61). An examination of the pterylosis in my spirit-specimens has also convinced me of the partial inaccuracy of Nitzsch's figure of that of *Cymbirhynchus* (pl. iii. fig. 15). The lumbar saddle is here represented as too angular, and the inclosed space, as well as the antero-lateral tracts bounding it, too broad. The postero-lateral tracts also are represented as consisting of but a single row of feathers. In reality, in this species there is a large ephippial space, of an elongated oval shape, the whole shape of the saddle being more like that represented by Nitzsch in *Cephalopterus* (*l. c.* fig. 10.) The tracts behind are two feathers broad. In *Calyptomena*, judging from skins, there is an acutely-angled rhombic saddle, whilst in *Eurylæmus* the condition is intermediate.

I may add that in *E. ochromelas* and *Cymbirhynchus* the neck-feathering of the lower surface is uninterrupted till behind the middle, and that the throat is entirely feather-clad, with no naked symphysial space.

³ Garrod's edition, p. 27.

⁴ Ann. Sci. Nat. (4) Zool. vol. xi. p. 92.

⁵ *Ibis* 1872, p. 177, &c.

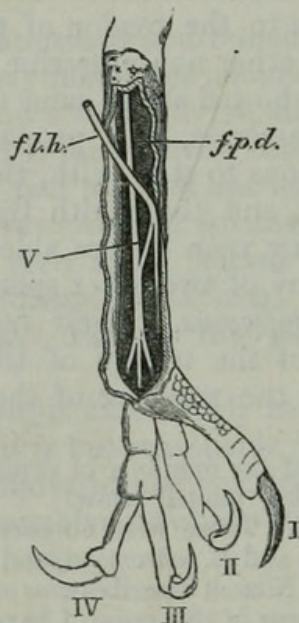
⁶ P. Z. S. 1877, p. 447.

normal disposition of the vessels of the thigh, the presence of the femoro-caudal, semitendinosus and accessory semitendinosus, and the absence of the ambiens and accessory femoro-caudal muscles. He also called attention to the unforked condition of the sternum in *Psarisomus*, this feature resembling that figured previously by Mr. Sclater in *Cymbirhynchus*.

Having lately, through the kindness of Mr. Edward Gerrard, jun., become the possessor of a specimen each of *Cymbirhynchus macrorhynchus* and *Eurylæmus ochromelas* from Sarawak, excellently preserved in spirits, I am in the position to supplement the above mentioned facts in our knowledge of the anatomy of the *Eurylæmidæ* by describing the syrinx and alimentary canal, previously hardly at all known at all in this group, in these two species, as well as of confirming or modifying previously published statements.

As regards osteology, the only point I wish to record is the unforked condition of the *manubrium sterni* in both species. In this respect they resemble the condition present in *Psarisomus*, as already

Fig. 1.



Left foot of *Cymbirhynchus macrorhynchus*, viewed from behind, to show the deep plantar tendons, and the vinculum (v.), which the *flexor longus hallucis* (f. l. h.) sends to the tendon of the *flexor profundus digitorum*. The skin has been turned aside, and the superficial flexors removed; the *flexor longus hallucis* has been cut short above and displaced.

noticed by Prof. Garrod. As this feature appears equally in Mr. Sclater's figure of *Cymbirhynchus* above alluded to, as well as in a specimen of the sternum of that bird in the College of Surgeons, and in Mr. Eyton's figure of *Corydon sumatranus* (Osteol. Av. pl. 8. fig. 5), it seems probable that it is a regular character of this family of Passeres, though in other families of that group it seems to be an individual or specific characteristic.

Both the species under discussion agree entirely with *Psarisomus* and *Serilophus* in the points already noted by Prof. Garrod. I may add that the *pectoralis primus* is large, as is also the *pectoralis secundus*, this muscle extending to the end of the sternum, or thereabouts. As in other Passeres, the *biceps*-slip to the patagium and the *expansor secundariorum* are absent. The *semimembranosus* is slender, but muscular. The *gluteus primus* is large, covering the *biceps*; and the *obturator internus* is elongatedly oval. As will be seen in fig. 1, in *Cymbirhynchus* the vinculum in the deep plantar tendons is strong, and has the character of a firm round tendon, instead of being composed of more or less transversely-directed fibres running between the two tendons, as in many birds where this structure obtains. In *Eurylæmus ochromelas* it is apparently double, there being a second additional slip given off lower down from the hallux-tendon, which joins the tendon of the digital flexor at the point where the latter, splitting up into three, receives the main vinculum.

As regards the alimentary canal of these birds, there is nothing unusual in its conformation. The tongue is elongatedly cordate, and slightly bifid at the tip. Both it and the palate generally are smooth; along its posterior sides, it is provided, as is frequently the case, with about eighteen small, backwardly directed, spiny processes, that at the angle being much larger than the others. There is no crop developed; and the *proventriculus* is zonary: in *Cymbirhynchus* it is $\frac{3}{8}$, in *E. ochromelas* $\frac{1}{4}$ inch in vertical depth. The stomach has the character of a not very muscular gizzard, and is lined with hardened brown epithelium; the left lobe of the liver is the smallest (considerably). The cæca are present, as might have been predicted from the *nude* oil-gland¹, and are truly Passerine in nature, being mere nipples $\frac{1}{8}$, or, in the smaller species, $\frac{1}{10}$ inch long. The following are the intestinal measurements:—

<i>Cymbirhynchus</i> .	Small intestine	$7\frac{3}{4}$ in.,	large intestine	$1\frac{1}{4}$,	total	9 in.
<i>E. ochromelas</i> .	„	$5\frac{3}{4}$ „	„	$\frac{3}{4}$,	„	$6\frac{1}{2}$ in.

The nature of the *syrinx* was the most interesting question to be examined in these specimens, Müller's short allusion to that of *Corydon*, quoted above, being all that was known as regards its structure.

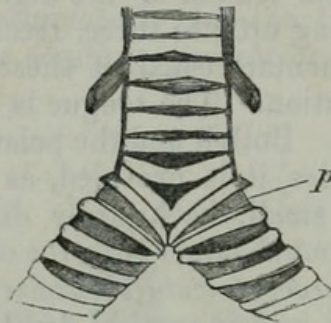
In *Eurylæmus ochromelas* the *syrinx* is less specialized, as regards its cartilaginous constituents, than in *Cymbirhynchus*, and will therefore here be described first.

The tracheal rings have their usual complete form, being notched before and behind to varying extents, and separated only by narrow intervals. The strong *sterno-tracheales*, the only extrinsic syringeal muscles, are inserted on the last ring but five. Only the last two tracheal rings are modified. The penultimate ring is narrowed and slightly produced downwards in front; the last is also narrow, and closely apposed to the penultimate, the membranous interval between the two being very much reduced, except in the middle line in front,

¹ Cf. Garrod, P. Z. S. 1874, p. 119.

where it is well developed, the last ring being here notched above. Behind, the ultimate and penultimate rings are united by a vertically disposed median bar. The last ring forms a three-way piece, there being a forwardly-directed narrow *pessulus* developed from its hinder margin below. The *pessulus* is apparently membranous, in this specimen at least, except at its base. The first bronchial semirings are still narrower than the last tracheal one and strongly arched, being concave downwards. They are separated by a very slight interval indeed from the last tracheal ring (three-way piece), and are nearly in contact with each other in front in the middle line; behind they are intumed and somewhat thickened. To the *middle of each ring*, or a little posteriorly to this point, is attached the lateral tracheal muscle,

Fig. 2.



Syrinx of *Eurylæmus ochromelas*, $\times 5$, viewed from in front.
p, the "pseudo-ring."

which is extremely slender and hardly visible when dry. The second bronchial semirings are shorter than either the first or third; they are slightly deeper than the first pair, but are narrowed behind. Being only slightly concave downwards, a considerable membrane-covered fenestra is left between them and the first pair. What at first looks like a bronchial semiring is interposed between what are here described as the first and second of that category. This pseudo-ring is most evident in front (*vide* fig. 2), but is also visible when dry behind; it is apparently due to the accumulation of tissue inside, forming the outer boundary of each glottis. The third and fourth rings are slightly concave upwards: they are deeper, especially behind, thinning away towards the front, than those that preceded them. The fifth and other succeeding rings are typical, unmodified bronchial rings, which more and more encroach upon the *membrana tympaniformis*, and eventually almost overlap behind. The second and succeeding semirings are more or less incompletely ossified at their ends.

In *Cymbirhynchus macrorhynchus* (figs. 3-5), the syrx is constructed on essentially the same plan, with some modifications. The trachea, below the insertion of the extrinsic muscles (on the last ring but six), appears to be somewhat laterally compressed and diminished in size. In the specimen before me the last few tracheal rings are somewhat irregular in their disposition,

which may or may not be due to individual variation. The antepenultimate ring is apparently incomplete on the right side, or is at least exceedingly reduced (*vide* fig. 5). The penultimate ring is narrowed, and is closely apposed to the terminal ring throughout except in front, where there is a well-marked subtriangular fenestra. The last tracheal ring is produced downwards in front, but is ap-

Fig. 3.

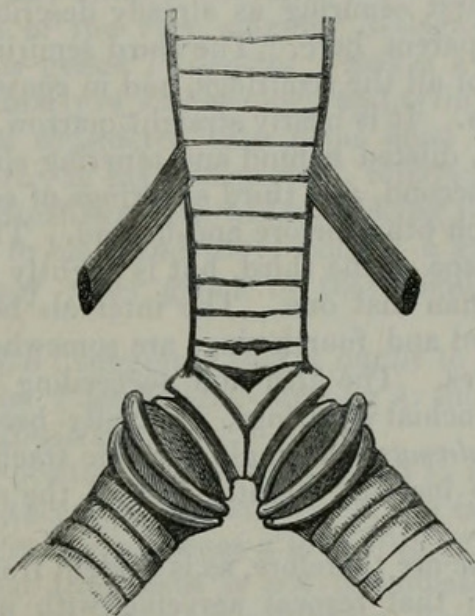
Syrinx of *Cymbirhynchus*, viewed from in front, $\times 5$.

Fig. 4.

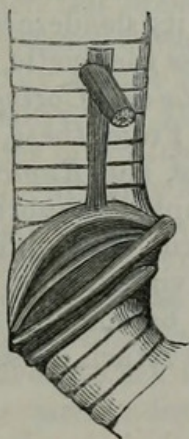


Fig. 5.

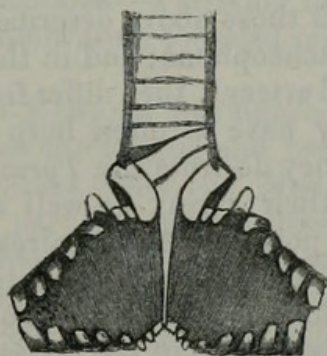


Fig. 4. The same, $\times 5$, from the side, to show the insertion of the intrinsic syringeal muscle into the *middle* of the first bronchial semiring. The *sternotrachealis* is cut short.

Fig. 5. The same, $\times 5$, from behind, to show the pessulus.

parently incomplete on the left side in front; so that there the penultimate ring is next to the first semiring, in consequence of this disposition. The *pessulus* is a well-marked, forwardly-directed

linear process, formed only by the right half of the last tracheal ring, which is thus like the antepenultimate, incomplete for a part of its course. The first bronchial semirings are much thickened and strongly arched: they are nearly in contact in front in the middle line, and are separated by but a narrow space from the last tracheal ring; behind they become incurved and thickened. The second bronchial semiring is the slenderest of all; it is shorter than the first or third, and slightly concave downwards. There is the same pseudo-ring formed, apparently by accumulation of tissue inside, between it and the first semiring as already described in *Eurylæmus*, but it is not so apparent here. The third semiring is much longer, being the longest of all the semirings, and in consequence projecting at both extremities. It is nearly straight, narrow, but not so narrow as the second ring, dilated behind and tapering slightly towards the front. The first, second, and third semirings of each side are nearly in contact with each other before and behind. The fourth ring has much the same shape as the third, but is slightly shorter, and more concave upwards than that one. The intervals between the second and third and third and fourth rings are somewhat deeper than are the rings themselves. The fifth and succeeding rings take on the usual form of bronchial semirings, gradually becoming more complete. As in *Eurylæmus*, the single intrinsic tracheal muscle, which is very slender, is inserted slightly behind the middle of the first bronchial semiring.

The *Eurylæmidæ* are therefore, as is evident from this description, Mesomyodian¹, in that respect agreeing with most of the other "Formicarioid" Passeres of Wallace (*Ibis*, 1874, p. 406). It is probable that the existence of an intrinsic muscle in the syrinx of *Corydon sumatranus* escaped the notice of Johannes Müller—always supposing that in that species the same essential form of syrinx occurs as in those above described—owing to its slenderness. They are *not* Tracheophone; and in that they possess the sciatic, instead of the femoral artery², they differ from the *Pipridæ* and *Cotingidæ*, with which they have so often been associated. From these, too, they differ, as they do from the *Tyrannidæ*, *Pittidæ*, and *Rupicola*, in the details of their syrinx as well as in the simple manubrium sterni and other points. As has already been stated, they differ from all the other Passeres in the retention of a vinculum in the deep flexor tendons of the foot. To the general bearing of these facts on the classification of the Passeres, I hope to return on some future occasion.

¹ Garrod, P. Z. S. 1876, p. 517.

² Cf. Garrod, P. Z. S. 1876, p. 516.



Forbes, W. A. 1880. "Contributions to the Anatomy of Passerine Birds.-Part II. On the Syrinx and other Points in the Anatomy of the Eurylœmidæ1." *Proceedings of the Zoological Society of London* 1880, 380–386.
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