

THE PTERYLOSIS OF THE ANDEAN CONDOR

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The opportunity to investigate the pterylosis of the Andean Condor (*Vultur gryphus*) was provided through the courtesy of Mr. William Vogt of Lima, Peru, who shipped an alcoholic specimen to the Museum of Vertebrate Zoology late in September of 1941. Two study skins, a male and a female, were also available. It is especially desirable to study the feather tracts of this species to see whether they conform with the cathartid pattern as defined in previous papers on *Cathartes*, *Gymnogyps*, and *Coragyps*. Then too, it is of interest to compare the tracts in the two largest vultures, *Vultur* and *Gymnogyps*.

No attempt is made to present a complete picture of the pterylosis of the Andean Condor. Only major points of difference and of significant similarity in pattern compared with that of the California Condor as given by Miller and Fisher (Condor, 40, 1938:248-256) will be mentioned. Reference may be made to Compton (Univ. Calif. Publ. Zool., 42, 1938:173-211) for a detailed study of the pterylosis of the Turkey Vulture and to Fisher (Auk, 56, 1939:407-410) for the Black Vulture.

The alcoholic specimen is perhaps a bird in its third year. No birds known to be immatures are available, and no description of the immature plumage has been found. However, a rough estimate of the age may be obtained by comparison with the California Condor. In the latter the pure white does not appear in the wing before the bird molts in its second summer. Thus, if such comparison is valid, the presence of pure white in the specimen of *Vultur* gives evidence that it is over one year of age. The fact that some of these white feathers were being replaced adds at least one year, making the bird over two years of age.

Capital tract.—This region is greatly variable in the different genera. In *Vultur* the head is more completely covered than in any other genus, except possibly *Coragyps*. The various feathered areas are not sharply defined, and the bristle-covered regions are confluent except for small, localized apteria. No plumaceous feathers are present; all the feathers are hair-like bristles set in groups of 1 to 8.

In dorsal view the frontal feathered area on each side may be seen to extend forward almost to the nostril. The bristles are 3 to 5 mm. long and 1 to 2 mm. apart. In the anterior dorsal part of the frontal region is a V-shaped space devoid of feathers. The apex of this space extends posteriorly almost to a transverse line drawn between the anterior corners of the eyes. In the male this part of the frontal area is occupied by the caruncle which is nude except for a few bristles basally along its posterolateral margins. It is interesting that the female also shows this bare area, although it may be less completely nude in the dorsal region just anterior to the eyes. In contrast, the frontal area of *Gymnogyps* is covered by short, close-set, plumaceous feathers and there are feathers anterior to the nares.

The bristles of the coronal area are the shortest (2 to 5 mm.) on the head and are approximately 2 mm. apart. In the anterior half of the occipital region the bristles are longer (4 to 6 mm.) and are spaced at intervals of 1 to 3 mm. However, in the posterior part of the occipital region the bristles begin to shorten and are more widely separated. This trend toward shorter and fewer bristles posteriorly on the dorsal and lateral surfaces of the neck reaches its climax in the dorsal cervical region. Just anterior to the white collar there are few bristles, and these are extremely short. *Gymnogyps* has only two small patches of weak bristles in the coronal area.

In contrast to the other New World vultures studied, *Vultur* has feathers in the loreal region only in its anterodorsal part where a bristle-covered area is confluent with the frontal region. In *Cathartes* and *Gymnogyps* the loreal region is the most heavily feathered, but in *Coragyps* the condition is somewhat similar to that in *Vultur*. The superciliary zone has shorter (1 to 2 mm.) and more closely-set (less than 1 mm.) feathers than in the contiguous frontal region. Upper and lower ocular apteria meet widely posterior to the eye and are continuous anteriorly with the loreal apterium. *Vultur* and *Gymnogyps* lack eyelashes, but *Cathartes* and *Coragyps* agree in having a single incomplete row on the upper lid and two rows on the lower eyelid.

An auricular apterium 2 cm. in diameter surrounds the auditory orifice. On all sides of this apterium, except anteroventrally, the bristles (3 to 6 mm. long) are close-set but are not in definite rows. This is the typical cathartid pattern. In the rest of the auricular and postauricular areas bristles are spaced as in the anterior occipital region but are finer and shorter. There is evident here the decreased covering posteriorly as seen in the dorsal part of the head and neck.

The anterior two-thirds of the interramal and malar regions are bare, but there is no submalar apterium. Interramal and submalar bristles are 8 to 12 mm. long, are semi-plumaceous and are set 2 to 3 mm. apart. Dorsally the feathers gradually decrease in length. Posteriorly they decrease both in length and in numbers. Short, fine bristles may or may not extend down into the anterior one-third of the ventral cervical region. All cathartids studied have interramal apteria. *Vultur* has long, close-set, semi-plumaceous feathers (the longest on the head) in the posterior interramal and submalar areas. Only sparse bristles are to be found in the submalar regions of the other genera.

Spinal tract.—Relatively high on the neck *Vultur* has a band of white, downy feathers on the dorsum that extends ventrally to the junction of the dorsal and ventral cervical areas. No feathers of any type are found between the ventral ends of this collar. The white, downy collar is about 3 cm. in depth and 3 to 5 cm. wide. Dorsally the collar may be extended posteriorly about 8 cm. by black-tipped, but otherwise white, down. Also, black contour feathers posterior to the collar and lateral to the dorsal down area may have extensive, white, downy barbs in their basal thirds.

Posterior to the white collar and extending almost to the shoulders is a black ruff of feathers. They are typical contour feathers, 5 cm. long in the forepart of the ruff and 10 cm. long at the point where the ruff blends with the contour feathers of the shoulder. The feathers project anteriorly and laterally to cover part of the ventral cervical apterium. This ruff probably corresponds to the ruff of *Gymnogyps*, but the feathers are shorter and are not lanceolate. The formation of this group of feathers in *Vultur* is more reminiscent of the vestigial ruff found in *Coragyps* and *Cathartes*. The white, downy collar of *Vultur* apparently represents down feathers that are lost in the other genera.

Laterally just behind the shoulders an apterium 3 to 4 cm. wide separates the spinal tract from the humeral tract and the marginal coverts of the wing. This apterium extends its apex on to the lateral surface of the neck and thus effects a partial separation of the spinal and ventral tracts. There is no other lateral cervical apterium. Placement of feathers in the spinal tract is about the same as in *Gymnogyps*. A narrow, irregular, median apterium starts just posterior to the shoulders but is interrupted in the dorsal region by large feathers set across the midline. Feathers of the dorsal region and the anterior part of the pelvic region are about 4.5 cm. long, semi-plumaceous and irregularly placed. In the pelvic region no feathers are placed as far laterally as they are in *Gymnogyps*. Posteriorly the feathers become more normal and longer. Immediately in front of the oil gland is a group of 7 large feathers, the longest of which measures 11.5 cm. These feathers project back over the completely nude oil gland. Such greatly elongated feathers anterior to the oil gland have been found only in *Vultur*.

Ventral tract.—The ventral apterium is uniformly wider than in other cathartids studied. It is continuous anteriorly with the ventral cervical apterium which extends forward past the anterior edge of the white collar. There is no constriction in width in the cervical region as in *Gymnogyps*. At the anterior end the apterium is 7 to 9 cm. wide; it decreases gradually and is narrowest (2.5 cm.) near the highest crest of the sternal keel. Posteriorly it reaches a maximum width of 5 cm. in the middle of the abdominal region. The sternal apterium is large and, as in *Gymnogyps*, is enclosed laterally by a single row of large feathers.

In the anterior part of the ventral tract the feathers are 10 to 13 cm. long and are for the most part typical feathers. Some are lanceolate, as in the axillar region where they may attain a length of 20 cm. Posterior to the region of the sternal apteria all feathers are lanceolate and elongated. A triple row of feathers on either side of the ventral apterium extends back to within 2 cm. of the cloaca. Immediately in front of the cloaca some lanceolate feathers are 16 cm. long; they project posteriorly beneath the cloaca and to the bases of the major under tail coverts.

In New World vultures the ventral tract is uniform as regards feather placement. The major differences are to be found in the relative development of the sternal apterium, the number of rows of feathers lateral to this apterium and the number of rows of feathers that extend caudally to the anus.

Caudal tract.—In *Vultur* semi-plumaceous, down feathers are more abundant about the anus than in *Gymnogyps*; there are two complete circlets and outside these three additional circlets that are incomplete anteriorly. At the dorsolateral margin of the circlets are three lanceolate feathers, the longest of which measures 11 cm.; these constitute a vestigial postpelvic region. There are only a few down feathers in the postventral tract. *Vultur* and *Gymnogyps* agree in having at least one complete anal circlet; in *Cathartes* and *Coragyps* the circlet is incomplete.

The longest of the six rectrices measures 37 cm. There are six major under tail coverts and three or four minor coverts but no indication of another row as in *Gymnogyps*. A remarkable fact is the

length of the major under coverts; they are 26.5 cm. long and extend two-thirds the length of the rectrices. The longest of the six major upper tail coverts measures 13 cm. There may or may not be a feather representing the outer minor covert of the first row of minor upper tail coverts.

Patagia are absent from the bases of the rectrices in all the cathartids examined.

Humeral tract.—This is identical with that of *Gymnogyps* even to the length of the longest feathers on the posterior row (see Miller and Fisher, *op. cit.*:253).

Alar tract.—The design of placement is the same as in *Gymnogyps*, but there are major increases in the number of tertiaries and secondaries. There are 13 tertiaries as compared to 10 in *Gymnogyps*, and 9 in *Cathartes* and *Coragyps*. The longest measures 20.5 cm. and is in the middle of the series; the shortest is 15 cm. and is most medial. Twenty-five secondaries are present as compared to 22 in *Gymnogyps*, 19 in *Coragyps* and 18 in *Cathartes*. The two medial secondaries are 34 cm. long and are only 3 cm. shorter than the longest; the secondaries are unusually uniform in length. Eleven primaries are found in all cathartids; the lateral or eleventh primary is always vestigial. In the alcoholic specimen of *Vultur* this primary was only 7 cm. long, or about one-half the length of its covert. The longest primary (63 cm.) was in the middle of the series.

Ten greater upper coverts are found on the hand (10 in *Gymnogyps*). There are 8 middle coverts (7 in *Gymnogyps*, 8 in *Cathartes*), beginning distal to greater covert three. Coverts on the humerus are small and are increased in number to correspond with the number of tertiaries. Secondary coverts have also increased. No disruption of pattern has been caused by the greater number of tertiaries and secondaries. There are no claws on the pollex and no carpal remex although there is a carpal covert. The longest of the 4 large alular feathers measures 15 cm.

Dorsally the secondaries and tertiaries with their greater and lesser coverts present an almost universally white appearance. In the distal two-thirds of the outer vane of the lateral secondaries there is a white edging (5 mm. wide) except at the tip which is black in all the secondaries. Medially the white edging becomes wider, and the distal black tip becomes shorter. Midway of the series of secondaries the outer vane is entirely white except for a distal edge of black. The amount of white increases until in the most medial secondaries the only black remaining in either vane is a distal tip 0.5-1.0 cm. wide; even this may be absent in the outer vane.

The black bases of the secondaries are covered by the white tips of the greater coverts which also show an increased amount of white medially. There is a short, white tip on the distal coverts; the proximal coverts are almost pure white. The rows of lesser coverts are white-tipped and cover most of the black of the greater coverts. The tertiaries are white dorsally and gray ventrally.

Femoral tract.—In *Vultur* this tract is similar to that in *Gymnogyps*, *Cathartes* and *Coragyps*. The essential difference is the greater length (18 cm.) of feathers in the posterior part of the tract.

Crural tract.—The pattern is the same in all the vultures examined. However, *Vultur* does not have feathers as far medially as *Gymnogyps*; the apterium between the crural and the sternal tracts is wider. Feathers are somewhat more numerous ventrally; especially is this true of the downy, lanceolate feathers. Semi-plumaceous feathers on the proximal part of the shank are 4 cm. long. They increase in length down the tibia and reach a maximum of 9.5 cm. a few centimeters above the tibial malleoli. From this point they decrease to 2 cm. in length at the tip of the tibia. On the dorsal surface some feathers attain a length of 11 cm.

SUMMARY

The feather tracts of *Vultur* are characterized by the most complete head covering of any cathartid vulture, by a greater number of remiges, and by a remarkable elongation of certain feathers, especially in the subaxillar area, in front of the oil gland, and anterior to the anus. The major under tail coverts are also elongated.

This study of the pterylosis of *Vultur gryphus* has shown that the cathartid pattern as described by Compton applies to this species in most respects. Features of the pterylosis of the Cathartidae which differentiate the New World vultures from other falconiforms are: absence of a submalar apterium, vestigial or absent lateral cervical apterium, wide dorsal cervical region, continuous dorsal and pelvic regions, fused sternal, axillar and subaxillar regions, a row of large feathers in the posterior subaxillar area, a definite sternal apterium, a femoral tract consisting of 5 to 7 longitudinal rows of lanceolate feathers on the posterior margin of the thigh, 4 alular quills, absence of a patagium about the bases of the rectrices, an essentially nude oil gland and a reduced number of lower tail coverts.

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