

April 6, 1886.

Prof. W. H. Flower, LL.D., F.R.S., President, in the Chair.

The Secretary read the following report on the additions to the Society's Menagerie during the month of March 1886 :—

The total number of registered additions to the Society's Menagerie during the month of March was 121. Of these 6 were by birth, 58 by presentation, 11 by purchase, 1 by exchange and 45 were received on deposit. The total number of departures during the same period, by death and removals, was 127.

The most noticeable additions during the month were :—

1. A second specimen of the Rough-billed Pelican of North America (*Pelecanus trachyrhynchus*)<sup>1</sup>, purchased March 2nd.

2. An example of the White-tailed Ichneumon (*Herpestes albicauda*) from Lamoo, East Africa, presented by F. J. Jackson, Esq., F.Z.S., March 4th.

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The Secretary exhibited, on behalf of J. B. Martin, Esq., F.Z.S., a large tusk of the Indian Elephant (*Elephas indicus*) belonging to the executors of the late Charles Reade, of which the length was stated to be 6 feet, and the weight over 100 pounds. The tusk was stated to have belonged to a "rogue Elephant" which had only one tusk, and which had been killed at Goruckpore in 1836, when the late Charles Reade was magistrate there.

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Mr. Sclater exhibited the heads and horns of two species of Antelopes received by Lord Walsingham from Mr. F. J. Jackson, F.Z.S., having been obtained in the vicinity of Lamoo, East Africa. One of these belong to an adult specimen of *Strepsiceros imberbis*, Blyth; the two others to *Damalis senegalensis*, which, so far as Mr. Sclater knew, had not been previously obtained in this district. *Strepsiceros imberbis* had been already met with as far south as the Juba River on this coast<sup>2</sup>.

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Dr. H. Woodward exhibited specimens of animals commensal or parasitic in the shell of *Meleagrina margaritifera*, the Pearl-mussel, from the north coast of Australia, and read the following notes :—

"The Pearl-shell fishery is now a recognized and important branch of the commerce of Western Australia, and also of Queensland and South Australia, which Colonies own the rights of the northern shores of that vast continent.

"Mr. Thomas Harry Haynes has given me much interesting information regarding the pearl-shell fishery carried on by him and

<sup>1</sup> For notice of previous specimen see P. Z. S. 1883, p. 463, plate xlv.

<sup>2</sup> See P. Z. S. 1884, p. 45.

his partners on the N.W. coast of Australia, and has submitted many shells to me which had been attacked by lithodamous *Mollusca*, or by worms and the burrows of *Cliona*.

"Some of these I have now the pleasure to exhibit. I have, moreover, to-day been permitted by Prof. Flower to examine a still more interesting specimen which he has just received from Henry Willett, Esq., F.G.S., of Arnold House, Brighton.

"It is that of a specimen of *Pinnotheres* which has been entombed in a cyst of pearl by a living pearl-mussel, into the shell of which he had ventured to intrude.

"It seems extraordinary and beyond belief that the *Meleagrina* should of all the Conchifera be the one to resent the commensalism of the Pea-crab, which has been known since the days of Cicero, Pliny, Oppian, and Aristotle to inhabit the shell of the *Pinna* and the Oyster, and has been recorded from *Astarte*, *Pectunculus*, and at least some half-dozen other bivalves, with whom it appears to live on the most friendly terms.

"It is the females, however, which constantly reside within the shells of the Conchifera, whilst the males are said to avail themselves of favourable opportunities to visit the females in their retirement.

"Whether or not in this case the unlucky male intruded himself upon *Meleagrina* at an unfavourable period, and finding no female *Pinnotheres*, penetrated so far beneath the mantle of the Pearl-mussel as to be unable to retreat, one thing is quite clear, namely that the *Meleagrina* entombed the intruder in a cyst of pearl from which the clever pearl-button maker alone liberated him.

"There is a large series of *Pinnotheres* in the Museum: the one from Australia is referred to *P. orientalis*, but as these are all females comparison is useless. These are from shells of *Pinna*, *Donax*, and *Pectunculus*. There are others from Broken Bay.

"Prof. Dana, U.S. Expl. Expedition, 1852, part i. text, pp. 380-381, and Atlas, pl. 24. fig. 3, describes a species under the name of *P. obesa* from Fiji Islands. The male, however, is said to be slightly broader than long, and the eyes (which in the adult female are quite hidden beneath the overreaching and protuberant carapace) can be seen in the upper view, and the front of the carapace is emarginated by the orbits. (Size  $4\frac{3}{4}$  lines long, and  $6\frac{1}{2}$  broad.)

"Mr. Willett's specimen is slightly longer than broad, and in size agrees very nearly with the male of *P. pisum*, which was formerly described by Leach as *P. latreillei*."

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The following papers were read :—

1. On some Points in the Anatomy of *Chauna chavaria*. By FRANK E. BEDDARD, M.A., F.R.S.E., F.Z.S., Prosector to the Society.

[Received March 15, 1886.]

Prof. Garrod has contributed to the 'Proceedings' of this Society some notes upon the anatomy, more particularly of the soft parts, of *Chauna derbiana*<sup>1</sup>. The recent death of one of the Society's specimens of *Chauna chavaria* has enabled me to supplement Prof. Garrod's observations by some notes on the structure of the second species of *Chauna*. As might have been expected, there are no great differences between the two species; and with the exception of the colic cæca and the distribution of the tracheal muscles, all the statements made by Garrod apply equally well to the present species; with regard to the visceral anatomy I am not able to institute a detailed comparison between the two species, since certain of the facts which I shall describe in the present paper have not been referred to by Garrod in his account of *Chauna derbiana*. To these facts I have paid particular attention in order to render more complete our knowledge of this interesting bird.

*Air-sacs, &c.*—On opening the body-cavity it was seen to be completely separated into a right and left half by a vertical septum attached above to the sternum and the ventral wall of the abdomen, and below to a horizontal fibrous septum which will be presently described. This vertical septum anteriorly separates the two lobes of the liver and runs as far forward as the pericardium; it corresponds to the umbilical ligament, a structure which has not usually so great an extent in birds; more generally the umbilical ligament only extends as far back as the gizzard and terminates in a semicircular free posterior margin. In *Chauna* this vertical ligament bears a blood-vessel which joins the portal system anteriorly and posteriorly divides into two trunks, one of which passes further back than the other; this vessel is situated near the dorsal attachment of the septum. The horizontal septum is an extremely thick brown-coloured membrane which passes across the abdominal cavity from side to side, and completely covers the coils of the intestine, being attached laterally to the walls of the abdomen. This tough brown membrane corresponds to a structure described by Weldon (P. Z. S. 1883, p. 640) in the Storks, and by myself (P. Z. S. 1885, p. 841) in the Cranes and other birds. This horizontal membrane when it reaches the gizzard splits into two layers which form a complete covering to that organ; between it and the gizzard, on the inferior surface of the latter, are numerous air-spaces which were easily distended by inflating the air-sacs.

The relations of the abdominal viscera are therefore, so far as the presence of this horizontal septum is concerned, indicative of an affinity with the Storks and Cranes, and more particularly with the

<sup>1</sup> 'Collected Papers,' p. 318.

former group, since the lobes of the liver are not shut off by septa from the space which lies between the horizontal membrane and the ventral abdominal walls. In the Cranes, as in the Struthious birds, the lobes of the liver are enclosed in separate compartments distinct from that underlying the horizontal membrane (*cf.* P. Z. S. 1885, p. 836).

There are other points in which *Chauna* approaches the Storks. In the paper already referred to, Weldon has drawn attention to a peculiarity in the air-sacs of the Storks which appears to be characteristic of this group, and is at any rate not to be found in the Ducks. The præbronchial air-sacs (in the Storks and *Phenicopterus*) are divided by a complicated arrangement of transverse septa into smaller chambers.

In *Chauna chavaria* this subdivision of the præbronchial air-sacs is very much more marked, and the subbronchial air-sacs, which in the Storks and many other birds are fused into a single cavity, are in the same way divided up into an immense number of extremely small chambers, so that the whole air-sac presents the appearance of a crowd of air-bubbles closely pressed together of various sizes. It was quite impossible on this account to distinguish the præbronchial from the postbronchial sacs, that is to say at the points where they come into contact.

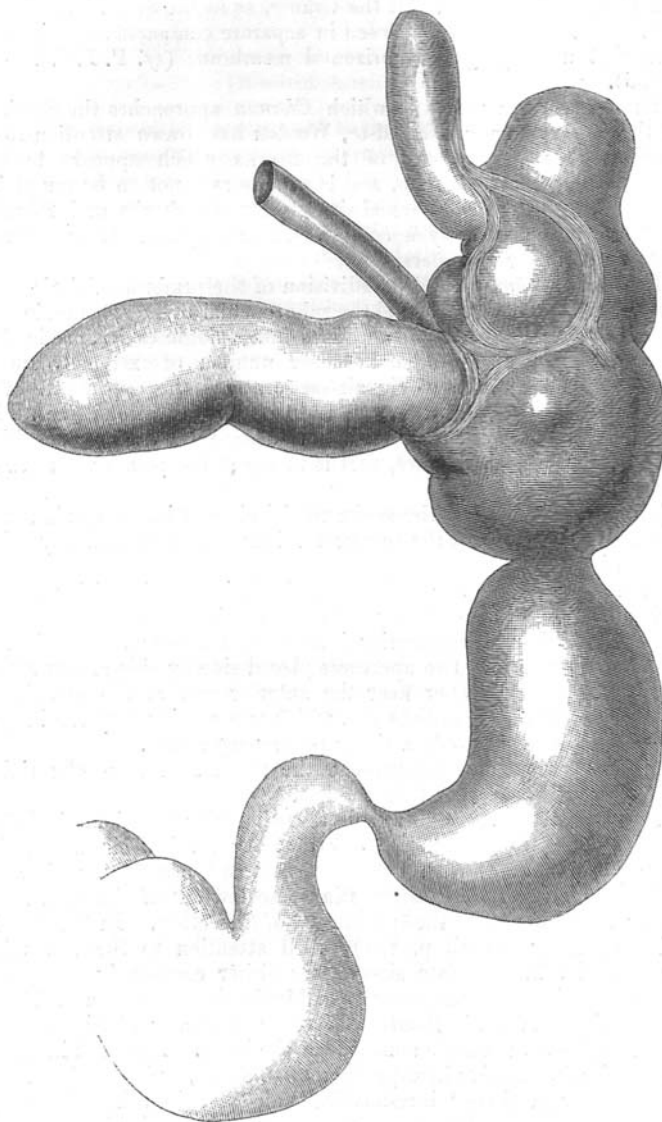
The prolongations of the subbronchial air-sacs into the axilla and into the space between the two pectoral muscles were similarly subdivided by innumerable septa.

There appeared to be nothing remarkable in the disposition of the abdominal air-sacs, and there were no indications of any subdivision of these chambers; the anterior intermediate air-sac communicates with the bronchus by two apertures placed side by side and at some distance from each other near the anterior end of the chamber; in the posterior intermediate sac, which was considerably the larger of the two, there was only a single pulmonary orifice.

The abdominal air-sacs present the usual character—the right being considerably larger than the left.

It appears to be the general rule that the thoracico-abdominal air-sacs are not divided up in the way that the cervical air-sacs are in *Chauna* and in the Storks; but I have met with occasional variations in the structure of their air-sacs in some few out of the numerous birds which I have had the opportunity of dissecting. In *Steatornis* I have already (*suprà*, p. 151) called attention to the fact that the posterior intermediate air-sac was either completely separated into two distinct compartments or had indications of such a division; in a specimen of *Strix flammea* there was a similar division of the posterior air-sac, at least on one side of the body. The third instance is *Platalea leucorodia*; in a specimen of this bird, on both sides of the body there were three “intermediate” air-sacs, the third being very small and interpolated between the anterior and posterior intermediate sacs. This may of course be an abnormality<sup>1</sup>; but the air-sacs of birds differ so little that any fact seems worth recording; and the

<sup>1</sup> A second specimen had the normal number of abdominal air-sacs.



Cæca of *Chauna chavaria*.

fact that the modification of the posterior air-sacs in *Platalea* was carried out on *both* sides of the body perhaps shows it to be a characteristic of the bird.

*Alimentary Canal.*—The cæca of *Chauna chavaria* appear to differ slightly from those of *Chauna derbiana*, the most noticeable difference being that they are not symmetrical in the former species; the right cæcum is slightly longer than the left, and is of a uniform conical shape, tapering slightly to the free extremity; it measured  $3\frac{1}{2}$  inches from the tip to the junction with the ilium; the left cæcum measured as nearly as possible 3 inches. The left cæcum also differs in its shape, as may be seen by an inspection of the accompanying drawing (p. 180); its proximal half is about equal in diameter to that of the right cæcum, but instead of tapering gradually it narrows abruptly into the distal half, which is of about the thickness of the little finger.

In the *liver* the right lobe is larger than the left lobe, and, as in the other species, there is a large gall-bladder the duct of which opens into the duodenum below the hepatic duct; the pancreatic duct is the most anterior of the three.

*Trachea.*—The extrinsic muscles of the syrinx are somewhat differently disposed from those of *Chauna derbiana*; as in that species, there are two pairs; the most anterior spreads out in a fan-like manner upon a tough membrane which connects the coracoid and clavicle; this muscle is therefore attached exactly as is its homologue in *Ch. derbiana*. The posterior pair of muscles are, however, not attached to the costal process of the sternum as in *Ch. derbiana*, but terminate upon the aponeurosis of the lung just behind the exit of the pulmonary vein. The syrinx itself does not appear to me to be worth a special description or figure, as it agrees in every particular with that of *Ch. derbiana*.

2. On a Brachiopod of the Genus *Atretia*, named in MS.  
by the late Dr. T. Davidson. By Miss AGNES CRANE.  
(Communicated by Prof. W. H. Flower, LL.D., F.R.S.)

[Received March 15, 1886.]

In July last the late Dr. Thomas Davidson, F.R.S., received from Mr. John Brazier, of Sydney, a gift of an interesting series of Brachiopoda dredged by him in the waters of Port Stephens and Port Jackson, New South Wales. When, in January 1886, it became my duty to select the remaining specimens from the Davidson collection necessary for the illustration of Parts 2 and 3 of Dr. Davidson's forthcoming Monograph on Recent Brachiopoda, these Australian specimens were not found incorporated with his collection of living species. Possibly it was Dr. Davidson's intention to describe them in a separate paper. In February, when the collection of recent and fossil Brachiopoda (which, in accordance with Dr. Davidson's

desire, were presented to the nation) were removed to the Geological Department of the Natural History Branch of the British Museum at South Kensington, where he wished them to be deposited, Mr. Brazier's series was found apart from the recent specimens with the fossil collection. Each species had been placed in a separate box with a number inside, and this number was found to correspond with Mr. Brazier's list, which Dr. Davidson had copied into his letter-book with his remarks appended. The executor instructed me temporarily to retain the series for examination.

One very interesting new species of the remarkable genus *Atrétia* was discovered. This Dr. Davidson had named after his friend and correspondent Mr. John Brazier, of Sydney, who has dredged so extensively in Australian waters. The name *Atrétia brazieri* was attached in Dr. Davidson's handwriting. The specimens are so excellent that there can be no possibility of generic error on my part, and I have therefore thought it my duty to publish a short description of *Atrétia brazieri*, Dav., n. sp. MS., to secure priority for his last species, which should be figured in Part II. of the Davidson Monograph of Recent Brachiopoda which I am now engaged in editing for the Transactions of the Linnean Society.

*Atrétia*, as its name implies, is an imperforate genus. It may be as well briefly to recapitulate the history of the type species, first published by Dr. Gwyn Jeffreys under the name *Cryptopora gnomon* in 'Nature' for Dec. 1869. In the 'Ann. and Mag. Nat. Hist.' 1876, Jeffreys gave the earliest description of the species, substituting the generic name *Atrétia* for *Cryptopora*; Dr. Davidson gave the first figures in his Supplement to the "Recent and Tertiary British Brachiopoda" (Pal. Soc. 1874), and again illustrated the species in one of the two plates he contributed to Dr. Jeffreys's paper on "The Mollusca (Brachiopoda) of the 'Lightning' and 'Porcupine' Expeditions," published in the Proc. Zool. Soc., April 1878. *Atrétia gnomon* was dredged off the west coast of Ireland in from 1380-1443 fms.; during the 'Valorous' expedition, 1100-1750 fms., in Davis Straits. It was found by Dr. Friele (during the Norwegian Arctic expedition) about 30 miles W. of Tromsø, in 650 fms., "on the slope of the banks cold area." It was dredged off Morocco and the Canaries at depths of 50-65 fms., by the 'Talisman' and French expeditions. In all more than fifty examples of the European representative of this well-marked Rhynchonelloid have been obtained by Jeffreys, Friele, and the Marquis de Folin.

M. Eugène Deslongchamps, in his 'Etudes Critiques sur des Brachiopodes nouveaux ou peu connus,' p. 242 (Caen, 1884), expresses an opinion that *Atrétia gnomon*, Jeffr., is probably only a very young stage of *R. psittacea*, Chemn. But the recent discovery by Mr. Brazier of eleven good specimens of the genus *Atrétia* in the Southern Pacific Ocean, off the coast of New South Wales, tends to invalidate that assumption, the only *Rhynchonella* in the Australian and Novo-Zelandian region being the deeply ribbed or furrowed *Rh. nigricans* and its variety, *R. pyxidata*, Boog-Watson. To these well-characterized forms *Atrétia brazieri*, smooth, flat,

and compressed, bears no resemblance whatever, and exhibits at all ages definite generic characters<sup>1</sup>.

*ATRETIA BRAZIERI*, sp. nov.

*Description*.—This pretty little Brachiopod presents all the well-marked characteristics of the genus, two short curved slender processes, denticulated at their extremities, descend from the small narrow hinge-plate of the smaller dorsal valve, and an elevated wedge-shaped projection rises abruptly from the central mesial septum of the same valve. The presence of this septum is indicated by a dark line visible from the exterior of the shell. The shell is small, generally longer than wide, triangular in shape, especially in the younger specimens. Dorsal valve rounder and not so large as the ventral one, slightly flexuous towards the centre at the margins of the valves. The ventral valve, owing to the prolongation of the beak area, is longer and more triangular than the dorsal one raised towards the beak, which is slightly produced and incurved, with a triangular foramen commencing beneath its pointed extremity. Two elevated ridges extend from the shoulder of the shell nearly to the margins of the valves, and there seems to be a slight elevation corresponding with the well-marked exterior depression and surrounded by muscular scars (?) in the exteriors of the ventral valves of two specimens I have examined under magnifying-powers. The shell is shallow towards the margins, but rounded and deeper near the beak. Shell-substance imperforate; surface smooth, glossy, and gleaming, marked with fine concentric lines of growth; semitransparent. Horn-coloured or light grey.

Length  $2\frac{1}{2}$  lines; width  $1\frac{1}{2}$  line; depth about 1 line. Another specimen measured 2 lines in length by  $2\frac{1}{4}$  in width; this was more flattened and depressed, and the external mesial sinus in the ventral valve was less marked. Other specimens were about 1 line in length.

*Station and Depth*.—Eleven specimens and odd valves were dredged in twenty-five fathoms in sandy mud off Cabbage-Tree Island, Port Stephens, N.S.W., by Mr. John Brazier, who sent five specimens to Dr. Davidson, with the remark that they differed from all other known Brachiopoda from Australian waters.

*Obs*.—Dr. Davidson commemorated Mr. Brazier's discovery by naming the species after him, and I have deemed it my duty to my old and valued friend to describe the species under the name he desired to give it, as well as I am able. In so doing I wish to call the attention of qualified conchologists thereto, and to place on record the wide geographical distribution of the genus *Atretia*, which we now know to range in from 25–1750 fathoms, from nearly 70° N.

<sup>1</sup> NOTE.—I communicated the discovery of the Australian *Atretia* to the Norwegian naturalist, Herr Herman Friele, who replied, April 19th, that my description of the skeleton of *A. brazieri* is quite typical of the genus *Atretia*, which he cannot consider to be the young of *Rhynchonella*. He adds the important fact that he obtained some fifty specimens of the *Atretia gnomon*, Jeffr., during the Norwegian North-Atlantic Expedition, but no *Rhynchonella* occurred on the same station or in corresponding depths.—AGNES CRANE, April 26th.



lat., in the Arctic Ocean to the Canaries in the South Atlantic, and as far as lat. 32° south of the Equator in the Southern Pacific Ocean. The specimens will eventually be placed in the Davidson Collection in the British Museum.

P.S.—Since my paper on *Atretia brazieri* was written, I have submitted with my friend Mr. J. E. Haselwood, F. R. Micr. Soc., all the specimens of *Atretia* to microscopic examination. Under a ten-inch power the beak-area deltidial plates present some immature features similar to those figured by Morse in his ‘Embryology of *Terebratulina*.’ The scaly structure of the shell is very apparent; there are no perforations. We observed two long slender narrow muscular scars, with a diamond-shaped central one in the interior of a ventral valve. The marginal borders of the largest specimen seemed raised or swollen. The most puzzling appearance occurs on some brown patches on the shell, consisting of circular and elongated sac-like aggregations. If these bodies are a feature of the *shell-structure*, it seems strange they should be visible in portions of the surface only<sup>1</sup>. I hope further to investigate the matter.

3. Observations on the Disposition of the Cubital Coverts in Birds. By J. G. GOODCHILD, F.Z.S., F.G.S., H.M. Geological Survey.

[Received March 16, 1886.]

The prominent position occupied by the cubital coverts in most living birds renders their correct delineation a point of so much importance in any figure intended for zoological purposes that it is perhaps hardly necessary to offer any apology for submitting a few observations upon that subject for the consideration of the Fellows of this Society. Both ornithologists and zoological artists have, of course, long been aware of the existence of considerable diversity both in the relative proportions and in the mode of arrangement of these feathers in various groups of birds; but it seems never to have occurred to any one that these variations are of such a nature as to admit of their being reduced to any system of classification. This oversight may be due to the fact that the specimens made use of for scientific purposes have necessarily been either spirit-specimens or else skins flat or mounted. In the case of the skins especially, such specimens cannot, as a rule, be at all depended upon as representing the natural order of the feathers in a living state; and consequently ornithologists have been led to believe that the subject under notice was not worth any serious attention. But a careful

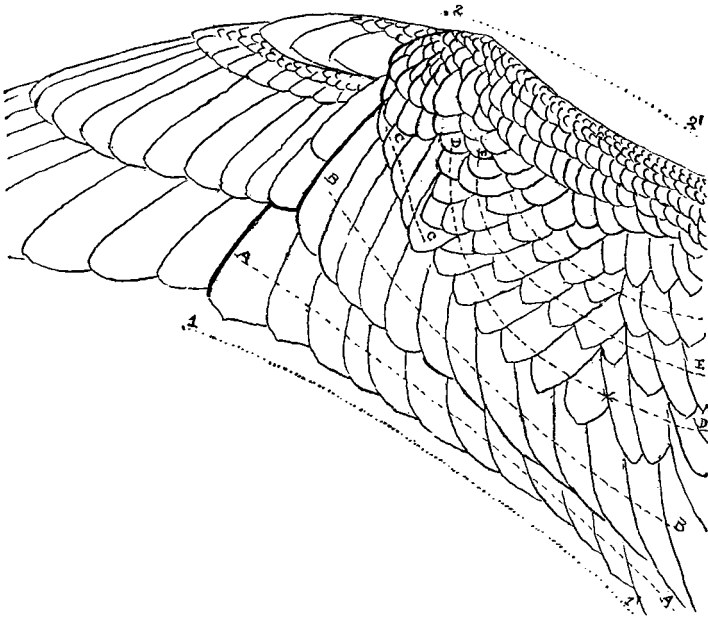
<sup>1</sup> NOTE.—More prolonged examination by daylight with different powers showed these appearances to result from the partial overlapping of the cycloidal scales of the *shell-structure*. The presence of parallel rows of spicular projections was clearly revealed in the interior of the valves; these occur at regular distances from each other, running from the beak towards the margins of the valves.—AGNES CRANE, April 26th.

comparison of the features presented by a large series of living birds, in good health, or of freshly-killed wild birds, leads to a different conclusion. These show that a particular mode of arrangement, or a particular order of overlap, of the median cubital coverts is practically constant for all the individuals of the same species. More extended observations show that the same general mode of disposition is as a rule characteristic of all the species of a genus, and may even be found throughout all the members of groups larger than that.

A reference to the wing of the Golden Plover, a central type, and one that in itself represents all the leading modifications (see fig. 1, p. 186), may help to make the nomenclature herein used more intelligible. [In drawing up this scheme I have availed myself of several suggestions made to me by Prof. Flower, and by my colleague Mr. E. T. Newton, after the paper was read before the Society.] The terms used refer mainly to the relations of various parts of the wing to each other and to the body axis, when the wing is extended and is viewed from the dorsal or upper surface. The wing-surface is primarily divided into the manual (primary) region and the cubital (secondary) region, this last embracing all the feathers that originate from any part of the forearm or cubitus. Of the manual region I have nothing that need now be discussed. In the cubital region the Remiges, and the Greater Coverts that come on next above them, are uniform in disposition in all Carinate birds. In these feathers the overlap is uniformly distal; that is to say, the several feathers are disposed in such a manner that the outer free edges of those nearer the vertebral axis overlap the inner edges of those originating nearer the distal extremity of the wing. The same observation applies also (but with some minor modifications of detail that will not now be taken into consideration) to the Lesser Coverts, or those feathers that mainly originate in the Patagium, and that extend along the anterior border of the wing from the humeral fold to the carpal joint. The remaining feathers, which are generally comprehended under the term Median Coverts, vary considerably in both their direction of imbrication and in the number of rows that run parallel to the greater coverts in each case. The present paper is devoted to a consideration of the nature and the extent of the variation referred to, without regard to morphological details of any other kind soever. Many of the facts have either not been noticed, or else, if they have been noticed, their significance appears to have been missed. For convenience of description the tract occupied by the Median Coverts may be divided into three areas by lines parallel to the main direction of the cubital quills. The area nearest the vertebral axis will be referred to as the Proximal area, the next the Middle area, and the remaining third, up to the distal border next the manual region, the Distal area. The rows of feathers composing the median coverts range, in a general way, parallel with the greater coverts. The number of rows varies from one to six, or even more, in different forms of birds; and the row nearest the greater coverts is the one most subject to variation in the disposition of the feathers composing it.

In dealing with the various modifications, I propose to take the birds as nearly as possible in the order adopted by Dr. Sclater in the Eighth Edition of the 'List of Vertebrated Animals now or lately living in the Gardens of the Zoological Society of London.'

Fig. 1.



Illustrations of the terms used in the following description, as shown by the feathers of the Cubital Region in the Golden Plover.

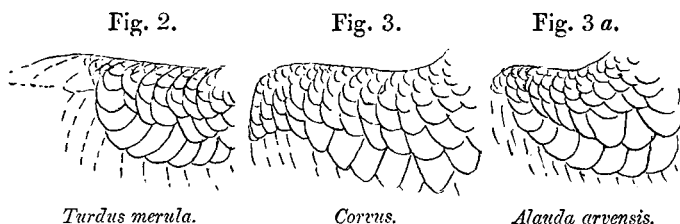
- 1 to 1'. Posterior Border. 2 to 2'. Anterior Border. 2' to 1'. Proximal End. 2 to 1. Distal Edge of the Cubital Region (shown by the thicker line). A. Cubital Remiges. B. Greater Wing-coverts. C. Supplementary row of Median Coverts, or Upper Wing-coverts. D. Posterior row of Median Wing-coverts. E. Second row. F. Third row. The Posterior row of Median Coverts from D, near the Carpal joint, shows Proximal Overlap as far as the point marked with a small cross. Distal Overlap is shown by the mode of imbrication of the Greater Wing-coverts.

The Passerine style of imbrication represents one extreme of the range of modification observable, and is well exemplified by the wing of *Turdus merula* (fig. 2). In this the median coverts consist of a single uninterrupted row of feathers, whose free edges are regularly directed backwards along a curve extending from near the carpal joint towards a point near the elbow. The same figure shows also one of the simplest arrangements of the Lesser Cubital Coverts. Such an arrangement as obtains in the Blackbird may be traced, with modifications of only minor importance, through some thousands of

species of Passerine birds, and will probably, on further examination, be found to characterize the whole of the birds that are correctly referred to that Order.

In the Corvidæ an approach towards a somewhat different mode of arrangement is made (fig. 3): another minor modification is seen in the Alaudidæ (fig. 3a). The Swallows (fig. 5a, p. 188) all appear to follow the normal passerine type. That of the Swifts and the Cotingas appears to me to be essentially different. There is some doubt also in regard to the Bower-birds and the Birds of Paradise in this respect.

Following Dr. Selater's arrangement, the Swifts and the Humming-



birds fall next to be described. Living Humming-birds can very rarely be examined closely; I have therefore been compelled to rely entirely upon the examination of museum specimens. After examining the whole of the Gould Collection, and checking the results by comparing them with those made on a large series of other specimens, I am convinced that one general type of wing-pattern characterizes the whole of these birds; it is of a very simple character, and is represented in figure 4, p. 188. By this it will be seen that the proximal lapping row of median coverts found throughout all the Passeres is absent entirely in this. The Humming-birds might, indeed, be described as possessing no median coverts at all, the place of these being taken up by feathers having the same mode of imbrication as the Lesser Coverts. All the feathers of each series overlap outwards and backwards from the vertebral axis towards the distal end of the wing in these birds.

Observations on the order of overlap in the wing of freshly-killed specimens of *Cypselus apus*, afterwards extended by an examination of the whole series of Swifts in the National Collection, showed that in these, as in the Humming-birds, no one series of feathers overlaps backwards. In fact the wing-pattern in the genera *Cypselus*, *Acanthylis*, *Chætura*, and *Collocalia* seems to me to differ in no essential respect from that found throughout the Trochilidæ. So far as the disposition of the wing-coverts is concerned, the Swifts and Humming-birds agree amongst themselves, and differ from all of the Passeriform birds, with the possible exception of the Birds of Paradise. Fig. 5, p. 188, taken from a freshly-killed specimen of *Cypselus apus*, will serve to make this point clear. A wing of *Hirundo rustica* is figured alongside for comparison (fig. 5a).

Following the normal Macrochires come the Caprimulgidæ. Of these, in the living state, I have examined only *Caprimulgus europæus* and *Podargus cuvieri*. The disposition of the cubital coverts in these is certainly not at all like that seen in the Swifts; but it closely follows the arrangement seen in the Picarian birds. In these at least two series of the feathers next above the Greater Coverts show proximal overlap. An examination of the specimens

Fig. 5 a.

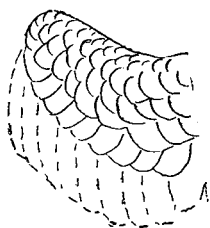
*Hirundo.*

Fig. 5.

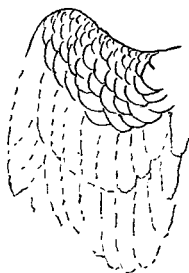
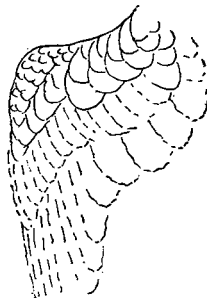
*Cypselus.*

Fig. 4.

*Trochilus.*

of *Podargus*, *Batrachostomus*, *Ægotheles*, and *Caprimulgus* in the National Collection, as well as of specimens of the same family elsewhere, confirms this view. The soft and downy nature of the feathers prevents satisfactory observation upon any feathers above the two lower rows of median coverts; but I have satisfied myself in regard to the point in question. While *Caprimulgus* and its allies seem to agree in this particular with *Podargus*, *Steatornis* (so far as one can judge by the unsatisfactory data furnished by skins) presents yet another type, which seems to follow that of the true Cuckoos rather than that of *Podargus* or its allies. In all the remaining

Fig. 6.

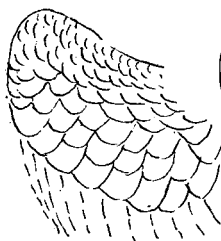
*Chasmorhynchus.*

Fig. 6 a.

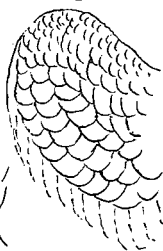
*Dacelo.*

Fig. 6 b.

*Rhampastos.*

Picarian families enumerated in the List (except Cuculidæ, Musophagidæ, and Indicatoridæ), at least the two rows of feathers next

above the greater coverts, and often more, show uniform and uninterrupted proximal overlap. This arrangement can be very conveniently studied in the Toucans (fig. 6*b*), which are nearly always well represented in the Parrot House in the Society's Gardens. The Cuckoos are associated with the Picarian birds in the List; but as their wing-pattern differs in some essential respects from that of the typical forms, they will be referred to in connection with another series.

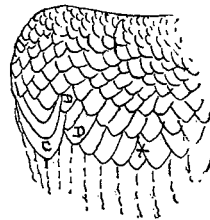
The transition from the Picarian type to the Psittacine is gradual; indeed some of the smaller Parrots, especially *Melopsittacus*, might, so far as the wing-pattern is concerned, well stand within the confines of the Picarian group. The chief difference in the case of *Melopsittacus* lies in the further increase in the number of rows of backward-lapping feathers on the cubital area. Fig. 7 shows this form of wing, which can be easily compared with the living form in the case of so common a cage-bird. In the type of wing-pattern prevailing throughout all, or nearly all, the rest of the Psittacidae, an additional modification may be observed. The row of feathers coming on next above the Greater Coverts, indicated by the letter C in the following diagrams, is seen to consist of a series numbering generally five or six, which are confined to the distal area of the cubital region, and form a distinct and separate series from the feathers that extend across the median area. They correspond in relative position to the Upper Wing-coverts (*tectrices superiores*) in the manual region of the wing; and it might be convenient for the present to refer to those extending over the distal area of the cubital region under the same term, as is done in the specimens illustrative of the structure of birds' wings that Prof. Flower has arranged at the Natural-History Museum. The feathers referred

Fig. 8*a*.*Psittacus.*

Fig. 7.

*Melopsittacus.*

Fig. 8.

*Calopsitta.*

to often form a conspicuous feature on the wing of the living bird, as they are frequently arranged in such a manner that the shafts of three or more of the feathers are in a line. The proximal edges of these feathers are generally as firm as those on the opposite side, and, as a consequence, the whole series slides between the feathers next them on the proximal side in much the same way as the

blade of a lancet closes into its sheath. The feature referred to can be better understood by reference to C, figure 8, taken from a living specimen of *Calopsitta novæ-hollandiæ*, which represents the style prevailing throughout probably the whole of the Psittaci.

Essentially the same pattern as is found in the Psittaci prevails also throughout the whole of the Striges, and also throughout the whole of the Accipitres, with the exception of *Pernis*, *Pandion*, *Gypogeranus*, and the Cathartidæ. These exceptional forms will be referred to again in their proper places. Fig. 9, representing the wing

Fig. 9.

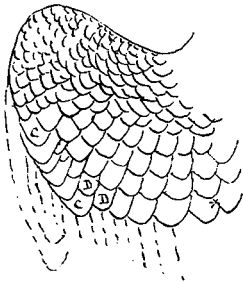
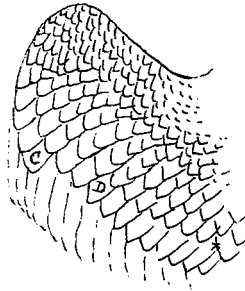
*Falco.*

Fig. 9 a.

*Phalacrocorax.*

of a Merlin, well illustrates the whole of the normal Accipitrine forms. Mr. Wolf's beautiful figures of the Birds of Prey all afford excellent illustrations of the same point, while, from a part of the world where experience has led us to expect minute accuracy of detail, we have the Japanese figure in metal of a species of *Spizaetus*, now amongst the choicest treasures at South Kensington Museum, which affords a correct illustration of the Accipitrine style of cubital coverts. Of the Pelicans, in the present connection, nothing satisfactory can be made out, on account of the lax and drooping condition of their feathers, even in health. But *Phalacrocorax* (fig. 9 a) gives us a style hardly distinguishable in any noticeable respect from that of the Accipitrines. On the other hand, *Fregata*, *Sula*, *Plotus*, and some other forms associated with them are widely removed, pterographically, from the Cormorants.

All the Herons and their immediate allies, *Nycticorax* (fig. 10), *Botaurus*, and, I believe, also *Cancroma*, closely follow the Accipitrine mode of imbrication. The principal difference lies in the reduced prominence of the supplementary row of lancet-like feathers (upper wing-coverts) so characteristic of the Birds of Prey and the Parrots. Healthy Night-Herons in immature plumage exhibit the Ardeine style of median cubital coverts remarkably well.

The Ciconiidae, in regard to the point under notice, will fall to be described in another part of this paper.

The remarks made in connection with the Pelicans apply also to the Odontoglossæ.

Passing over the Palamedæ for the present, the last group whose style of cubital coverts brings them under notice here is the Anseres. Here, again, we have a group with nearly uniform pterographic

Fig. 10.

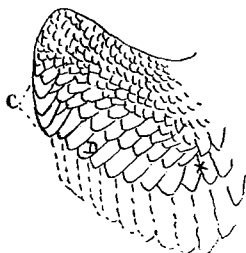
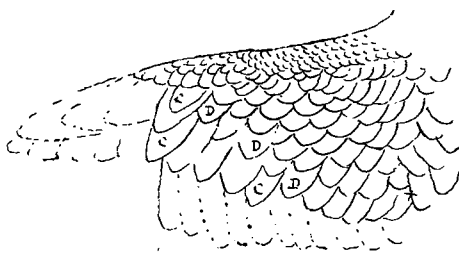
*Nycticorax.*

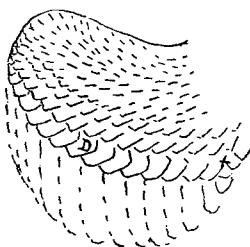
Fig. 11.

*Querquedula.*

characters; these, as will be seen by reference to figure 11, representing *Querquedula crecca*, so closely follow the style seen in the Accipitres and the others mentioned as possessing the accessory row of median coverts, or upper wing-coverts (C), that it is difficult to point to any one character that would serve to distinguish them.

It will be noticed that the birds characterized by possessing more than two rows of median cubital coverts with proximal overlap, together with a single supplementary row of upper wing-coverts also with proximal overlap, are further characterized by the Desmognathous palate, are Homalognate, and possess in addition several other deep-seated points of structure is common.

Fig. 12.

*Meleagris.*

Near to the Accipitrine birds, and perhaps leading away from them somewhere near the Polyborine birds, a kind of transition may be traced in the direction of the Gallinæ. In the case of *Meleagris* (fig. 12) proximal overlap characterizes nearly all the median cubital coverts, as in the Accipitrines, and in this respect these birds stand



alone amongst the Gallinæ; but neither in *Meleagris* nor in any of the Alectoropods do any traces of the upper wing-coverts exist. In some respects the Peristeropod Gallinæ, represented by *Talegalla* (fig. 13 a) and by *Crax* (fig. 13), stand nearest of the Gallinæ to the Accipitres; while *Numida* is hardly more removed.

Fig. 13.

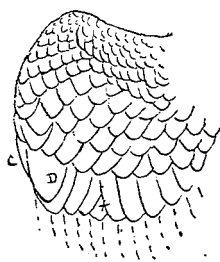
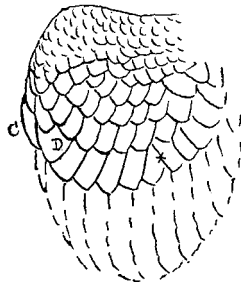
*Crax.*

Fig. 13 a.

*Talegalla.*

In the Peristeropods we find the commencement of a modification that is carried to a much greater length in other Galline birds, as well as in a large number of forms that have yet to be noticed. This consists in the increased prominence of distal overlap in the proximal third of the cubital area. In *Crax* (fig. 13), for instance, it will be noticed that the distal overlap, whose commencement is indicated by the small cross, extends into the middle area in the case of the lowest row. The distal overlap at C is another noteworthy feature, as it has not yet been observed in any of the Gallinæ except the Peristeropods.

Taking the evidence afforded by the mode of imbrication of the wing-coverts alone, it is near to the Peristeropods, and not near to

Fig. 14 a.

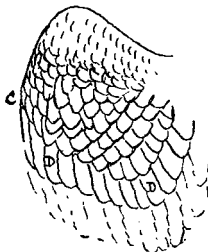
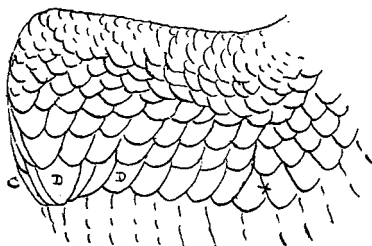
*Columba*

Fig. 14.

*Goura.*

the Pigeons, that *Goura* should be placed. The pattern is shown in fig. 14, which should be compared with *Crax* on the one hand and

with any conspicuously-marked Pigeon of the normal type (*Columba guinea*, for example, fig. 14 *a*) on the other. The difference, to me, appears both striking and significant. Perhaps I may be allowed to remark that the characteristic differences between *Goura* and the normal Pigeons are represented in the very useful series of coloured illustrations now posted up outside the Western Aviary in the Society's Gardens.

In addition to the difference already noted between the true Pigeons and *Goura*, the following points of agreement and of difference between the two groups may be considered:—

In the normal Pigeons an oil-gland is present; but is absent in *Goura*.

In the normal Pigeons the tail-feathers are 12 in number; while there are 16 in *Goura*.

In the normal Pigeons the pterylosis is columbine; and is galline in *Goura*.

In the normal Pigeons cæca are present; but are absent in *Goura*.

In the normal Pigeons a gall-bladder is present: no gall-bladder in *Goura*.

In the normal Pigeons incubation lasts 16 days; but extends to 28 days in *Goura*.

In addition to these peculiarities reference may be made to the bird's pheasant-like habits, to certain peculiarities of the urosacral and of the caudal vertebræ, to the number of the cervical vertebræ, to the absence of pterygoid processes, and to other features referred to by Prof. Huxley (P. Z. S. 1868, p. 302) and by Prof. Parker (T. Z. S. v. p. 151, 1863). Dr. Sclater (*Ibis*, 1880, p. 407) refers to certain peculiarities of the tarsus, in addition to the differences just noted, as evidence in favour of separating *Goura* from the Pigeons.

The main differences that distinguish the wing of the *Peristeropod* Gallinæ from that of the Birds of Prey have already been pointed out. It remains to add that the prominence of distal overlap introduced by *Talegalla*, *Crax* and its allies, becomes more accentuated in *Numida*, and thence, through the *Tetraonidæ* (fig. 15, p. 194), reaches its greatest development amongst the Gallinæ in the typical Pheasants. A progressive increase of distal imbrication can be traced, in the first stages, only in the first, or posterior, row of median coverts, then in the second, and the third, and so on, until in *Polypteron* all the more conspicuous feathers in the closed wing of the living bird seem to lap from the proximal towards the distal side of the wing. Excellent examples of the features referred to may be easily observed in the Society's Pheasant Aviary, where *Lophophorus impeyanus*, *Euplocamus swinhoii*, *Phasianus reevesi*, and *Polypteron chinquis* well display the feature referred to. A reference to the annexed figure of *Euplocamus swinhoii* (fig. 16, p. 194) will serve to make the general disposition clear.

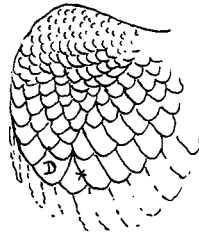
*Pavo* follows a slightly different pattern; and it is a point worth

notice that there seems a constant difference of small amount between the individuals of *P. cristatus* and *P. nigripennis* now living in the collection. In *P. nigripennis* all the feathers of the posterior row of median coverts appear to lap distally. The Common Peacock is

Fig. 15.

*Tetrao.*

Fig. 16.

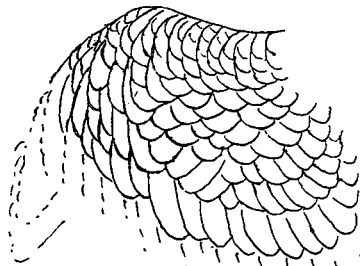
*Euplocamus.*

well represented in the particular feature under notice by one of the fine pieces of Japanese metal-work at South Kensington already referred to under the head of Accipitres.

In the pterographic characters of both the Hemipodii and the Crypturi, I have hitherto failed to discover any marked characteristic connected with the point under consideration that would serve to distinguish these birds from the Gallinæ. In the case of the Tinamous, especially, the structural characteristics of the palate had led me to expect a wing-pattern of a much lower type.

With the exception of *Goura*, already noticed, the pterographic characters of the Columbæ are remarkably uniform throughout. These characters are well displayed in the case of the Domestic

Fig. 17.

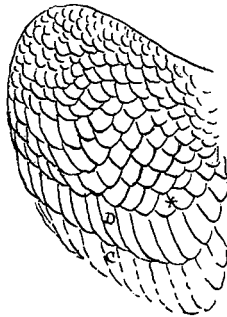
*Columba.*

Pigeon (fig. 17). Here it will be noticed that the proportion of feathers showing distal overlap, at the proximal end of the median coverts, remains much the same as in the Gallinæ; but that in place of the well-marked, uniform, and uninterrupted proximal overlap of

the posterior, 2nd, and 3rd rows of median coverts in the distal area, which is nearly always seen in the Gallinæ, the corresponding features of the Pigeon show a different and much more complex arrangement. In all the birds previously passed under notice (except the Birds of Paradise amongst the Passeres, and the Macrochires) the feathers of both the middle and the distal area of the median coverts maintain a proximal imbrication from near the carpus backwards, various distances according to the zoological position of the bird under notice. In all the remaining birds, inclusive of the Columbæ, the distal area of the median coverts is composed of feathers arranged in the opposite direction. It is somewhat difficult to reduce the facts to anything like an intelligible description; but a study of the figures may help to make the mode of arrangement clear. It will be seen by this that several feathers on the distal area of each row overlap from behind forwards, or from the proximal towards the distal margin of the wing. The feature referred to can be easily studied in the case of Domestic Pigeons; although the general Columbine pattern can, perhaps, best be studied in the case of such conspicuously-marked exotic Pigeons as *Columba guinea*, *Peristera geoffroii*, *Leucosarcia picata*, and others commonly living in the Western Aviary.

*Pterocles arenarius*, now (1885) living in the Western Aviary, shows an arrangement of the wing-feathers somewhat like that of the Pigeons, especially so far as the proximal and the distal areas of

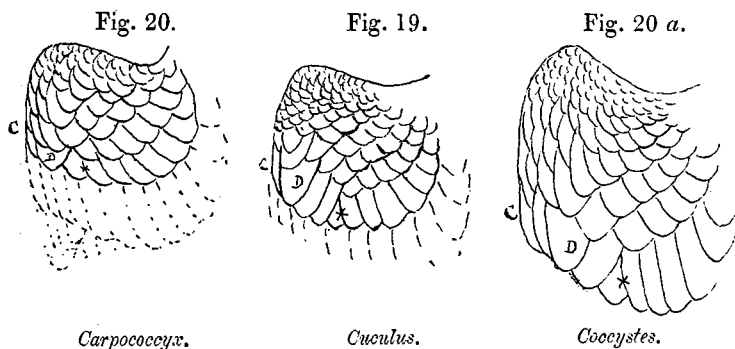
Fig. 18.

*Pterocles.*

the cubital region are concerned. But the distal imbrication of all the feathers next the manual region is, in the Pterocletes, carried to excess. In this respect the Pterocletes stand as far removed from the Pigeons as these are from the Gallinæ. In the stuffed specimens of *Pterocles alchata* in the National Collection this feature is remarkably well displayed (see fig. 18). Another point to be noticed in these birds is that the posterior row of median coverts show distal overlap throughout their entire length—an arrangement of

these feathers that is characteristic of a large number of the birds remaining to be described.

Still following the plan of tracing out the various modifications of wing-pattern without reference to any other characteristics, however important, the place of the *Coccyges* should be somewhere near the confines of the *Columbæ*.



In passing in review a number of species belonging to the *Coccyges*, they seem to be naturally divisible into the Cuckoos proper, well represented by *Cuculus canorus* (fig. 19), and the Centropodinae, represented by *Carpococcyx radiatus* (fig. 20). The Cuckoos proper somewhat resemble the Pigeons, and where they differ from the Pigeons they seem to approach the Picarian birds. The Ground Cuckoos seem to make some approach to the *Peristeropods*; in other respects they remind one of the *Musophagidæ*. Judging from stuffed specimens alone, the wing of *Opisthocomus* closely resembles that of the Cuckoos.

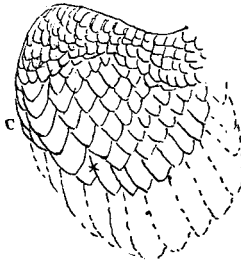
In the living Bustards, so far as I can judge, there seems again to be another variation on the general pattern of the *Columbæ*; but I have hitherto failed to obtain a satisfactory sketch of the wing-pattern in this bird. Of the remaining families of the Order *Alectorides* given in the List, I have also, so far, failed to obtain any good evidence, except in the case of the *Gruidæ*, which will be referred to in more detail presently. It is especially desirable to obtain good observations upon the point specially under notice in the case of the *Cariamas*; but the lax texture of their wing-feathers renders any such observation a matter of considerable difficulty. So far as I can judge at present, the style of coverts in the *Cariamas* agrees with that of the Bustards, and differs from that of *Serpentarius*.

The specimens of *Chauna chavaria* living at the Gardens present a style of imbrication that seems to approach the *Columbine* type very closely. The disposition shown in fig. 21 is practically the same as Wolf has drawn in *Ch. nigricollis* (= *derbiana*), P. Z. S. 1864, pl. xi. Whether the feathers of the distal tract of the cubital region follow exactly the same disposition as do those of the Pigeons

I am at present unable to state definitely, but they appear to do so, judging from stuffed specimens.

The pterographical characters of the Limicolæ, if we start with the Plovers as the representative of the Order, nearly approach those of the Pigeons. The principal difference lies in the fact that the proximal or backward overlap that characterizes the lowest two, or three, rows of median coverts in all the Desmognathæ, and that is so nearly absent in the Pigeons, is again represented more or less perfectly in the majority of the Limicolæ. The distal overlap of all

Fig. 21.



*Chauna.*

the feathers next the manual region of the wing, that serves to distinguish the Pigeons from the Gallinæ, is a well-marked and constant feature in all the Limicolæ. There is one group of feathers, firm on each edge, that extends backwards from the carpal joint down to the greater wing-coverts; on the distal side of this the median coverts all overlap towards the margin of the wings on that side, up to the alula, while on the proximal side of the same firm-edged feathers the median coverts overlap in the opposite direction as far as the point where they are met by that of the proximal area, which, again, lap forward. It is difficult to convey an exact idea of this somewhat complex arrangement except by means of a diagram, such as that of the wing of *Gallinago celestis*, fig. 22, p. 198, which well exemplifies the style current throughout not only all the Limicolæ, but throughout nearly all birds with a Schizognathous palate.

Variations of a minor character occur within the limits of this Order. Even in the case of two birds so closely related as the Common Snipe and the Woodcock (figs. 22, 23), such differences may be detected. The Snipe follows the normal Limicoline style, while that of the Woodcock more resembles aberrant forms such as *Edicnemus*, which comes nearer to the Bustards. I was so much struck with the difference alluded to, that I sought for evidence of a deeper-seated and more reliable nature, with a view to getting further information upon this point. Such differences do exist, notably in the structure of the skull; but I have not yet had an opportunity of following

the subject far enough to speak with confidence in regard to other differences noticed.

Fig. 22.

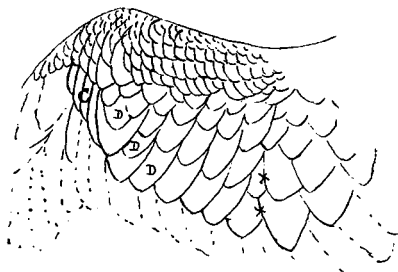
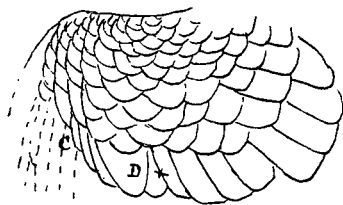
*Gallinago.*

Fig. 23.

*Scolopax.*

From the central forms of the Limicolæ nearly all the modifications of style observable in the Carinatæ could be traced without difficulty; and the forms now remaining to be considered join on naturally enough to such types as that represented by the Plovers. In one direction, and at no remote distance from the Plovers, we come to the Rails, represented in fig. 24. In another direction,

Fig. 24.

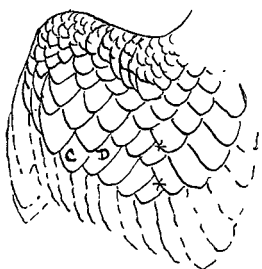
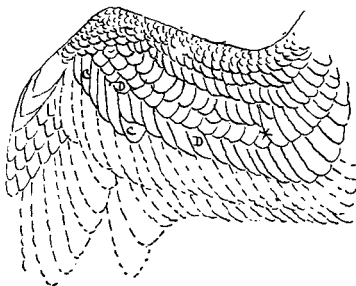
*Rallus.*

Fig. 25.

*Sterna.*

gradations equally gentle conduct us to the Gulls and the Terns (fig. 25). Along another line of modification we arrive at the Cranes. The Storks again stand at no great distance. Each of the forms here mentioned, in turn, leads to others more distantly removed from the central type. Beyond the Gaviæ lie the Pygopods, represented by *Alca* (fig. 26). These in turn graduate easily into the Tubinares, as represented by *Puffinus* and by *Diomedea* (fig. 27). Closely resembling these last in style of wing-coverts follows *Sula* (fig. 28) and *Fregata* (fig. 29), which lead the way to one of the extreme modifications of style observable in this particular, exemplified by *Plotus* (fig. 30). Starting from another point, the

Fig. 26.

*Alca.*

Fig. 27.

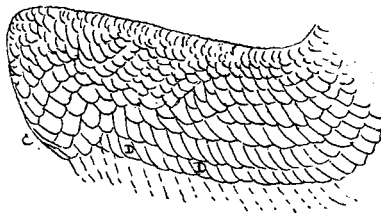
*Diomedea.*

Fig. 28.

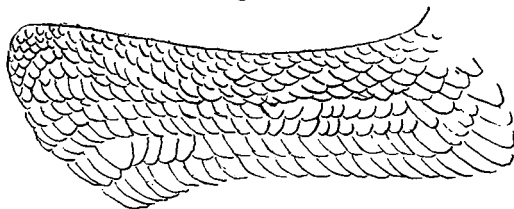
*Sula.*

Fig. 29.

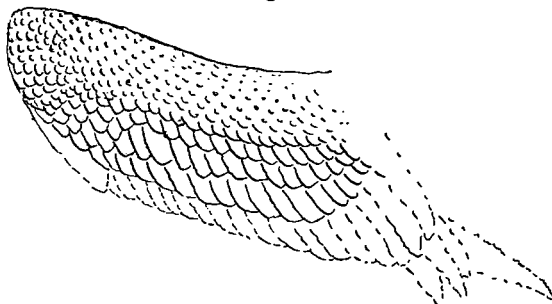
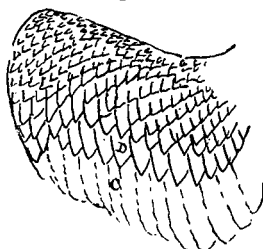
*Fregata.*

Fig. 30.

*Plotus.*



normal Ciconiine pattern, represented by that of *Dissura maguari* (fig. 31), leads the way through *Mycteria* (fig. 32), to *Leptoptilus*

Fig. 31.

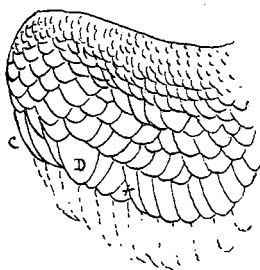
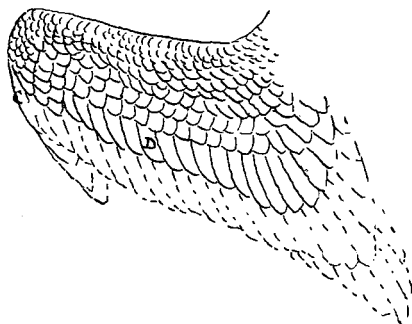
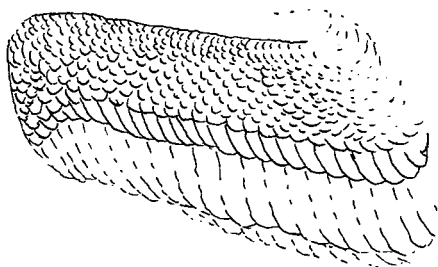
*Dissura.*

Fig. 32.

*Mycteria.*

(fig. 33), which, in respect of the feature under consideration, stands midway between the Ciconiine birds and the Tubinares. Between the style of the median cubital coverts in *Leptoptilus* and that of

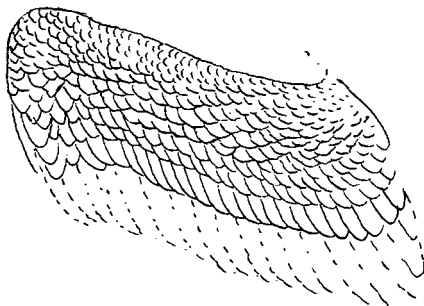
Fig. 33.

*Leptoptilus.*

the Cathartidæ (fig. 34), I have hitherto failed to detect any difference of importance in respect of the feature specially under notice. So far as the imbrication of the wing-coverts is concerned, *Leptoptilus* and the Cathartidæ might even stand in the same family. How far the purely superficial feature at present specially under notice can be regarded as affording data of any value in corroborating the view advocated by Messrs. Garrod and Forbes that there is a close genetic affinity between the Storks and Petrels on the one hand and the Cathartidæ on the other, must be left to competent zoologists to judge. After a careful examination of living specimens of *Diomedea*, *Ossi-fraga*, *Puffinus*, *Fregata*, *Leptoptilus*, *Cathartes*, *Sarcorhamphus*, and

*Gypagus*, I have been so much impressed with the uniform style of wing-coverts prevailing amongst this group, that it seems to me difficult to believe that their genetic relationship amongst themselves is more remote than Forbes regarded it. I cannot, after many years' observation of the facts referred to in this paper, help regarding this similarity of style of wing-coverts in birds so different, both in outward form and in their mode of life, as presenting us

Fig. 34.

*Sarcorhamphus.*

with a certain amount of evidence of the transmitted survival, in an unmodified form, of a mode of imbrication of epidermic structures that at some remote period in the genetic history of the common Sauropsidan ancestors of these birds played some really important part in the economy of the wearer. During the differentiation of such parts of the creature's organization as were directly affected by the struggle for existence, other parts, not so affected, either changed at a slower rate, or else were transmitted from generation to generation hardly modified at all. Habit, or mode of life, as birds now live, can at the most have played but a minor part in bringing about these diversities of style. We have but to compare the Swallows with the Swifts, the Sun-birds with the Humming-birds, and many other parallel cases, and we at once perceive that mode of life has had little or nothing to do with the origin of the features in question. The real cause lies deeper than that, and dates back far into the remote history of the Sauropsida.

Reverting to the normal Ciconiine style of coverts, we find *Platalea*, with *Ibis* and its allied genera, differing but little from each other and from *Ciconia*.

*Tantulus*, in this respect, stands nearer to the Limicolæ.

The Cranes, again (fig. 35, p. 202), present another variation little removed from the central Pluvialine type.

Somewhere near to the Cranes and the Storks, but connected in some way with the Gallinaceous style of coverts, stands the wing of the Secretary Bird (fig. 36, p. 202); it is quite unlike the true Accipitrine type.

Lastly, come two birds whose wings I cannot refer satisfactorily to any one of the groups above described. One is the Osprey

Fig. 35.

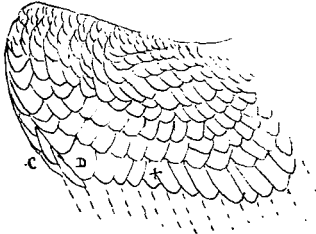
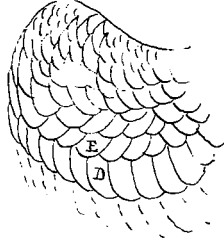
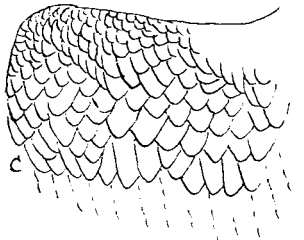
*Grus.*

Fig. 36.

*Gypoggeranus.*

(fig. 37), whose wing seems to occupy an outlying position somewhere between the style of the Pygopodes and that of the Accipitres. The other is represented by *Pernis apivorus*: several stuffed specimens of this bird showed the posterior row of cubital coverts lapping distally, somewhat as in the Ciconiine birds, and there were in addition some minor differences of less importance. Stuffed birds, at the best, afford data of a very untrustworthy character in this

Fig. 37.

*Pandion.*

particular; but on laying my difficulty before Mr. Gurney, who had some Honey-Buzzards alive, he courteously replied by sending me from the Norwich collection a skin that showed the feathers disposed as they were in his own living birds. This agreed exactly with the style observable in the stuffed birds, and differed from all the other Accipitrine birds as herein limited. Perhaps the nearest representative style is that presented by some of the Peristeropods, as, for example, *Crax*.

In regard to any conclusions connected with taxonomy that may be drawn from a study of the facts herein referred to there will probably be much difference of opinion. The facts themselves may be, in general, easily verified by a careful study of healthy living

birds, and most of the views admit, I believe, of no reasonable doubt. There can be little doubt, also, that up to a certain point there is a remarkable correlation of particular styles of imbrication of the cubital coverts with certain structural characteristics—osteological, myological, visceral, and pterographical; so that, within certain limits, the disposition of the cubital coverts may be taken as a kind of index to the presence, or the absence, of deeper-seated characters whose importance in relation to taxonomy is generally recognized. Nevertheless, until the facts here called attention to have been independently considered by other observers, I feel sure that it would be premature to press the importance of the bearing that any of these may seem to me to have upon taxonomic questions: for the present it will probably be generally deemed advisable to lay more stress upon the bearing of the facts upon the correct delineation of birds for zoological purposes, than upon their value as furnishing additional data as subordinate factors in any scheme of classification.

#### 4. Second Note on the Melanotic Variety of the South-African Leopard. By Dr. A. GÜNTHER, F.Z.S.

[Received March 26, 1886.]

By the last South-African mail I have received from Mr. N. Abraham, President of the Graham's-town Natural History Society, a letter with photograph enclosed, which gives more positive information about the variety of the Leopard of the district of Albany, mentioned by Mr. Trimen in *Proc. Zool. Soc.* 1883, p. 535, and described by myself, *ibid.* 1885, p. 243, pl. xvi. The skin in Mr. Abraham's possession leaves hardly any doubt that we have before us a case of incipient melanism, which, if the family in which the melanotic tendency showed itself had been left undisturbed, might have been developed into as complete a condition of melanism as is occasionally found in the Asiatic Leopard. Mr. Abraham writes as follows:—

“Graham's-town, S. A.,  
March 1st, 1886.

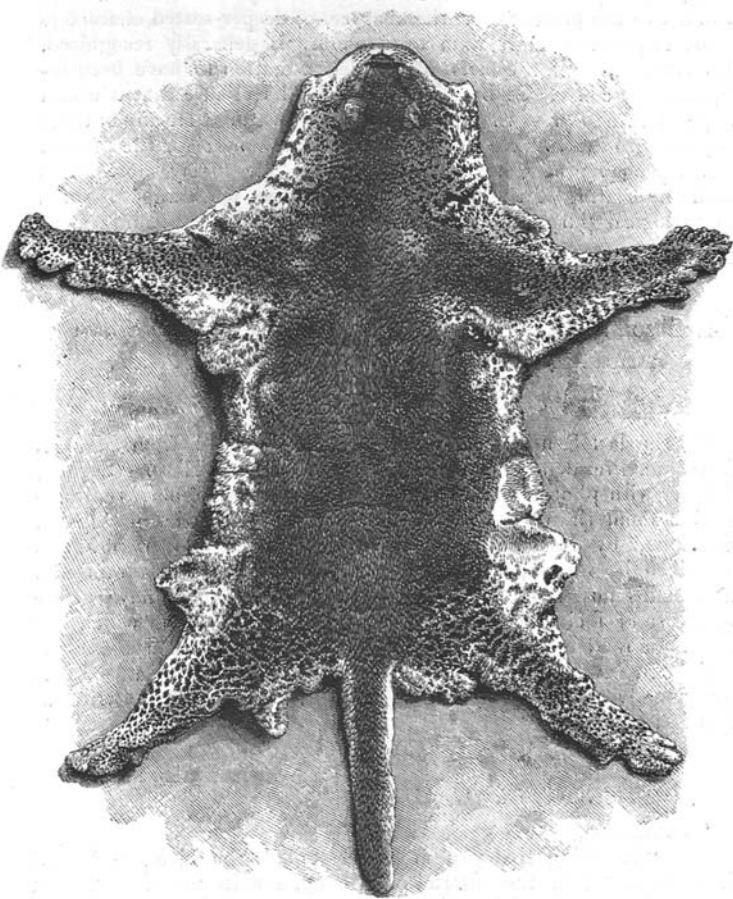
“To Dr. A. Günther, F.Z.S.

“DEAR SIR,

“Knowing that you are interested in the black variety of Leopard found in the district of Albany, I write to tell you of a beautiful skin which I have in my possession and also to send you a photograph of the same. I had the flat skin photographed on purpose that I might send you a copy, as I thought a photo would convey a good description and save many words. It will, however, be necessary for me to say that the blackness of the skin is more dense than appears in the photo. The gloss upon the skin prevented the photographer from giving a true idea of the beautiful black, which is dense in many parts. There are no rosettes or spots at all on the larger portion of the skin; in this the photograph is quite correct.

The spots do not even show through the black as in the black Leopard of Java. The tail has had its point taken off; this accounts for its shortness.

“The measurements of the flat skin are as follows:—Head and



Flat skin of *Felis leopardus*, var. *melanotica*.

body 4 feet 1 inch; portion of tail 1 foot 4 inches; distance from fore toes to central line of back 2 feet 3 inches. On the black portion of the skin the hair is short with a very thick underfur. The tail is not black, but very dark, and has a somewhat remarkable appearance. The markings on the front legs differ very much from the markings on the hind legs, being very tawny with

scarcely any dense black, while the hind legs are slightly tawny with clear markings of black and white. The whole skin is very handsome and remarkable. The specimen was caught by a native in a trap and then shot. The native took the tip of the tail and the claws for trophies. It was caught about twenty miles from Graham's-town. I have made many inquiries respecting this peculiar variety with the hope of forming some good theory explaining this deviation from the ordinary type. I can only trace four specimens, viz. :—The skin in the Graham's-town Museum (this is a good specimen, but not nearly so black as the one in my possession); another was taken to England by Mr. Bowker, and is in the British Museum; a third was sold some time ago at a Church bazaar, but I cannot trace it; and the fourth I have. I do not know of any other for certain. All these have been shot in, or about the same district. The one I have came from Collingham near to Graham's-town. I am told that there are two living specimens still in the district, and there may be more, but these two have been seen, but not captured. I am still on the trail for more information; at present I cannot give any certain or probable account of the origin of this variety, but I write this to you and shall be glad to forward you further information when I have completed my investigation.

“I remain, dear Sir,

Yours sincerely,

(Signed) NENDICK ABRAHAM,  
Pres. Graham's-town Natural History Society.”

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April 20, 1886.

Prof. Flower, LL.D., F.R.S., President, in the Chair.

Mr. O. Salvin, F.R.S., exhibited a living specimen of an exotic Worm—*Bipalium kewense* (Moseley, Ann. & Mag. N. H. ser. 5, vol. i. p. 238), found at Hawksfold, Fernhurst, April 19, 1886, amongst the broken tiles at the bottom of a pot of *Calceolaria*, which had been in a cold frame the whole winter. This fact suggested that the true home of *B. kewense* was some temperate region.

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The following extract was read from a letter addressed by Mr. R. A. Sterndale, F.Z.S., to Sir Victor Brooke, concerning a case of hybridism between *Ovis hodgsoni* and *O. vignei* :—

“In the mountain-range south of the Indus, near Lanskär (the precise locality being for obvious reasons withheld from publication), a herd of *Ovis vignei* were observed for some years to contain a large ram of *Ovis hodgsoni*, who drove out the weaker Shapoo rams and appropriated the ewes of the herd. The ram was ultimately, one winter, killed and eaten by Chankos or Tibetan wolves; but during his stay he produced a family of hybrids possessing greater size of horn and head, with characteristic colouring combining traits