

XXIII. *On a new Species of Wild Swan, taken in England, and hitherto confounded with the Hooper. By William Yarrell, Esq. F.L.S.*

Read January 19, 1830.

IT is now about six years since I prepared and preserved the trachea and part of the bones of a young Wild Swan, shot in this country, which, possessing peculiarities I had never observed in the bones of the Hooper at any age, induced me to believe it would prove to belong to a distinct species.

At the sale of part of the valuable Museum of Joshua Brookes, Esq., I became possessed of the sternum and trachea of a Wild Swan which had been prepared by Dr. Leach, and presented by that distinguished naturalist to Mr. Brookes; this also, from its anatomical structure, appeared to be distinct from that of the Hooper, and is now ascertained to belong to an adult bird of the same species as the bones of the young one just mentioned.

I was presented in December last, by I. B. Baker, Esq., with the sternum and trachea of a third example of this new species, shot at Yarmouth during the winter of 1827-28, and of which I had an opportunity of examining the skin while under preparation for mounting for that gentleman's collection at Hardwicke Court.

In age and consequent developement of structure, this third example was intermediate between the two I at that time possessed, and proved a valuable addition.

During the late severe weather, Wild Swans were unusually numerous.

numerous. More than fifty were counted in one flock at Witlesey-mere. Among a considerable number which have been forwarded to the London markets for sale, I have been most unexpectedly fortunate in securing five examples of this new species, of different ages ; and possessing thus a series of gradations in structure, which it is the object of this memoir to describe, I have no doubt of proving them to belong to a species entirely distinct, though hitherto confounded with our more common winter visitor the Hooper ; ornithologists having as yet admitted but one species of Wild Swan in their systematic catalogues of European Birds.

In size the new species is one-third smaller than the Hooper at the same age. The plumage is first grey, afterwards white, tinged with rust-colour over the head and on the under surface of the belly, and ultimately pure white. The beak is black at the point, and orange-yellow at the base ; this last colour appears first on the sides of the upper mandible, and afterwards covers the upper surface in front of the forehead, to the extent of three quarters of an inch, receding from thence by a convex line to the lower edge of the mandible at the gape ; the nostrils are oblong and open ; the irides orange-yellow ; the wings have the second and third primaries the longest and equal, the first and fourth half an inch shorter than the second and third, and also equal ; the tail consists of eighteen feathers, graduated, cuneiform ; the legs, toes, and claws, black.

In anatomical structure the new species differs much more decidedly from the Hooper than in its external characters. The principal difference is in the trachea, which forms one of the best distinctions in the separation of nearly allied species throughout this numerous family.

The tube of the wind-pipe is of equal diameter throughout, and descending in front of the neck enters the keel of the sternum, which is hollow as in the Hooper, traversing its whole length.

length. Having arrived at the end of the keel, the tube then gradually inclining upwards and outwards passes into a cavity in the sternum destined to receive it, caused by the separation of the parallel horizontal plates of bone forming the posterior flattened portion of the breast bone, and producing a convex protuberance on the inner surface. The tube also changing its position from vertical to horizontal, and reaching within half an inch of the posterior edge, is reflected back after making a considerable curve, till it once more reaches the keel (TAB. XXV. Fig. 3.), again traversing which, in a line immediately over the first portion of the tube, it passes out under the arch of the *os furcatorium*; where turning upwards and afterwards backwards, it enters the body of the bird to be attached to the lungs in the usual manner (TAB. XXIV. Fig. 1.). This is the state of development in the most perfect bird I have yet met with. The degree next in order below, differs in having the horizontal loop of the trachea confined to one side only of the cavity of the sternum, both sides of which cavity are at this time formed, but the loop of the tube is not yet sufficiently elongated to occupy the whole space (TAB. XXV. Fig. 2.); and the third in order, being that of a still younger bird, possesses only the vertical insertion of the fold of the trachea (TAB. XXV. Fig. 1.); yet even in this specimen the cavity in the posterior portion of the sternum already exists to a considerable extent, and will be observed to be more capacious on that side to which, judging by the preceding example, the loop of the trachea is first to be determined.

These are the peculiarities of structure which belong to the tube and sternum. The bronchiæ are very short; but the flexible part intervening between the bone of divarication and the bronchial rings is considerable, producing an effect to be hereafter noticed. This elongated, flexible, and delicate portion,

being defended on each outer side by a distinct membrane, attached to the whole edge of the bone of divarication; and posteriorly to a slender semicircular bone on each side, by which it is supported. The muscles of voice with which this bird is provided, pass down, as usual, one on each side of the trachea till the tube is about to enter the cavity in the keel, they then quit that part of the tube to be attached to the ascending portion of the curve, which they follow, ultimately branching off a little short of the bone of divarication to be inserted upon each side of the sternum (TAB. XXIV. Fig. 1. & 2. Letters *d. d. d*).

The stomach, a true gizzard, is only half as large as the same part in the Mute Swan, and one-third less than that of the Hooper; the intestinal canal is uniform in calibre, coiled up in seven oblong folds, measuring from the pylorus to the end of the rectum ten feet two inches, with two cæca of ten inches each.

In their general external appearance, the Hooper and this new species are similar; and that they have been so long confounded together is probably owing to the circumstance that the Hooper, when first gaining its white plumage, is but little larger than the adult bird of the new one. The head of the new species is however shorter, and the elevation of the cranium greater, in proportion to the size of the head; the beak narrow at the middle, and dilated towards the point. The wings when closed do not extend quite so far beyond the roots of the tail feathers; the tail itself is somewhat more cuneiform; and the toes appear shorter in proportion to the length of the tarsi. In the Hooper, the sides of the beak are parallel, the bright yellow colour at the base of the upper mandible extends along each outside edge even beyond the line of the nostrils, and occupies a much larger space comparatively than in the new species. But the following relative measurements of
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the oldest and most perfect specimen of each sort I have been able to procure during the present winter, exhibit the real distinctions in a manner not to be easily mistaken.

| | <i>New species.</i> | | <i>Hooper.</i> | |
|--|-----------------------|------------------|----------------|------------------|
| Weight | 13 $\frac{3}{4}$ lbs. | | 24 lbs. | |
| | Ft. | Inch. | Ft. | Inch. |
| Point of the beak to the end of the tail | 3 | 9 | 5 | 0 |
| Width with wings extended | 6 | 1 | 7 | 10 |
| Point of beak to the edge of the forehead | 0 | 3 $\frac{1}{2}$ | 0 | 4 $\frac{3}{8}$ |
| ———— eye | 0 | 4 $\frac{3}{8}$ | 0 | 5 $\frac{1}{4}$ |
| ———— occiput | 0 | 6 $\frac{1}{4}$ | 0 | 7 $\frac{1}{4}$ |
| Carpus to the end of the primaries | 0 | 20 $\frac{1}{2}$ | 0 | 25 $\frac{1}{2}$ |
| Tail feathers in number | 18 | | 20 | |
| Length of tarsus | 0 | 3 $\frac{3}{4}$ | 0 | 4 |
| ———— middle toe | 0 | 5 $\frac{1}{4}$ | 0 | 6 $\frac{1}{2}$ |
| ———— intestines | 10 | 2 | 12 | 0 |
| ———— cæca | 0 | 10 | 0 | 11 |
| ———— breast bone | 0 | 6 $\frac{3}{8}$ | 0 | 8 $\frac{1}{2}$ |
| Depth of insertion of the trachea within | 0 | 5 $\frac{3}{4}$ | 0 | 3 |
| Length of bronchial tubes | 0 | 1 $\frac{1}{2}$ | 0 | 3 $\frac{1}{2}$ |

The anatomy of the Hooper is too well known to require further notice, except on some points of comparison. The fold of the trachea confined within the keel, never departs from the vertical position in this species at any age; nor have I ever seen, in the oldest examples, the slightest appearance of excavation in the sternum itself. In the new species, on the contrary, the trachea will always be found to have assumed the horizontal direction in old birds; and even when young, the sternum is excavated to a greater depth ready to receive the fold of the trachea, to be developed at a subsequent period. The depth of the insertion of the fold of the trachea in the old

Hooper is but 3 inches in a breast bone of $8\frac{1}{2}$ inches in length ; while the depth of insertion in the new species is $5\frac{3}{4}$ inches in a breast-bone of only $6\frac{3}{8}$ inches. The bone of divarication, placed perpendicular to the base of the sternum, is in the adult birds of both these species of the same height, that is, $1\frac{1}{8}$ of an inch from top to bottom, and is therefore much larger in proportion in the new species ; in this bird also it is considerably convex on each outside. The bone of divarication in the Hooper is compressed, and the membrane connecting this bone with the bronchial rings is not provided with the semicircular bone and membrane which so remarkably assists in sustaining and protecting the same delicate structure in the new one.

The bronchial tubes in the Hooper are invariably long ; those of the new bird are as invariably short ; but the arrangement of the muscles of voice, and the beautiful manner in which the inner ascending curve of the trachea is supported by a tendinous fascia (as shown at TAB. XXIV. Fig. 2.), are the same in both birds.

By a paper in the *Philosophical Transactions*, vol. 56. p. 204. it appears, that a wild Swan of this new species, brought alive from Philadelphia, but which died soon after, had been dissected by Dr. Parsons, but without considering it to be distinct from the Hooper.

Hearne met with both species of our Wild Swans at Hudson's Bay, and the following two short extracts from the published account of his "Journey to the Northern Ocean" refer particularly to this subject.

"Swans.—There are two species of this bird that visit Hudson's Bay in summer ; and only differ in size, as the plumage of both are perfectly white, with black bill and legs. The smaller sort are more frequent near the coast, but by no means plentiful, and are most frequently seen in pairs, but sometimes single,
probably

probably owing to their mates having been killed on their passage north."

"The windpipes of both these species are found to be exactly alike, though their note is quite different. In serene evenings, after sun-set, I have heard them make a noise not very unlike that of a French-horn, but entirely divested of every note that constituted melody. The voice of the larger is much harsher and louder than that of the smaller."

If we consider these Swans to be identical with our birds, of which there can be but little doubt, it is difficult to account for the statement here made, that the windpipes of the two species were found to be exactly alike; except by supposing, either, that the object of the Indians in obtaining these Swans being a lucrative traffic in the feathers and skins, only external examination of the denuded bodies of the birds took place, when the tracheæ of both would be seen to enter the hollow keel in the same manner; or, as the birds of the new species attain their white plumage before the trachea assumes the horizontal direction and insertion, and as old birds are known to be most difficult of approach by the hunter, such Swans only of the rarer sort were examined, as exhibited when the breast-bone was cut into, merely the vertical insertion of the trachea common to the Hooper.

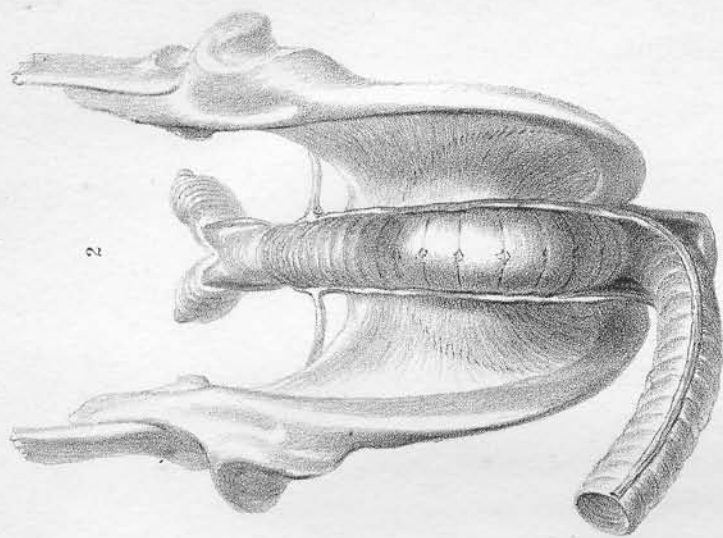
The difference in the voices of the two species will be accounted for on the principles assumed in the description of the organs of voice in birds. The large and irregular calibre of the tube in the Hooper produces the loud and harsh sound; the superior quality of tone, and increased power of modulation in the new species, are owing to the smaller and more uniform tube, and greater flexibility of the bronchiæ. The new bird appears to frequent all the localities common to the Hooper.

From an article on the Hooper in the Supplement to the
Ornithological

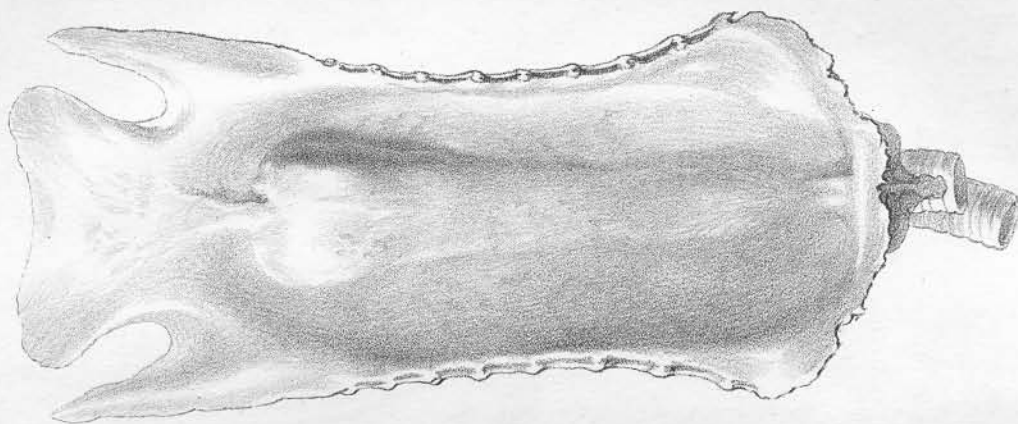
Ornithological Dictionary, it appears Mr. Montagu considered the structure of the trachea in the new species, which he has accurately described, as the sexual distinction of the male Hooper, and the figure in Dr. Latham's paper, as representing the form common to the female; but this assuredly is not the case. Dr. Latham, M. Temminck, and others who have described the tracheal structure of the Hooper, have stated it as common to both sexes of that bird, and my own multiplied observations confirm the fact. I have examined males and females of both species.

Several examples of this new species are now ascertained to be in British collections. The Museum of the Cambridge Philosophical Society contains one. There is one in the possession of Edward Lombe, Esq. of Great Melton, who has an excellent collection of British birds. A third was shot in the winter of 1827-28 by Colonel Hawker. These three were preserved by Mr. Leadbeater. A specimen was also killed in February 1829 near Haydon Bridge, upon which bird some remarks have been lately made before the Natural History Society of Newcastle, by Mr. Richard Wingate of that town. I have also had the pleasure of presenting three specimens, which furnished part of the materials for this paper, to the collections of the British Museum and the Linnean and Zoological Societies.

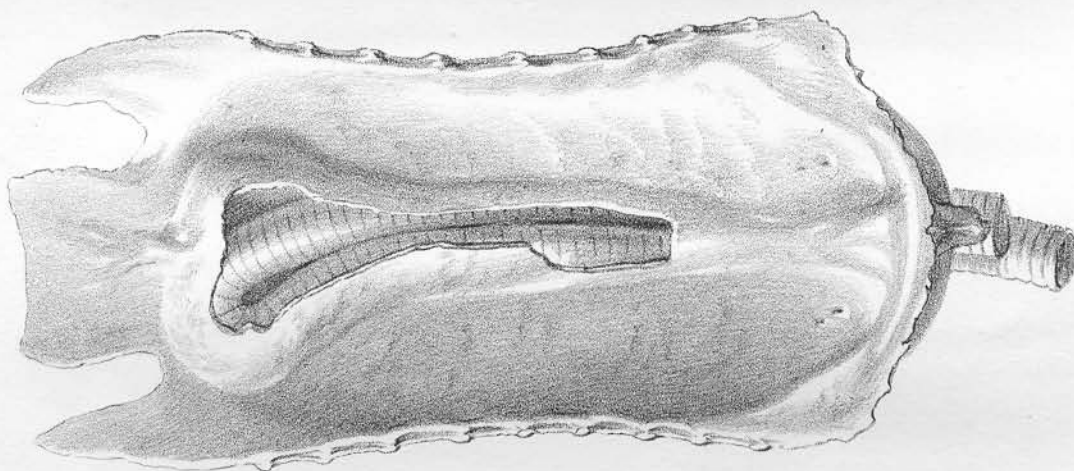
It is my intention, and on this occasion I anticipate the accordance of every British naturalist, to devote this species, which, I trust, I have proved to be distinct and unnamed before, to the memory of our late unrivalled engraver on wood, the justly celebrated Bewick. The instruction and gratification which thousands have derived from the beautiful and animated delineations of this most faithful illustrator of Nature, in all her varied scenes and objects, entitle him to this tribute; and I rejoice in the opportunity this new species affords me of attaching



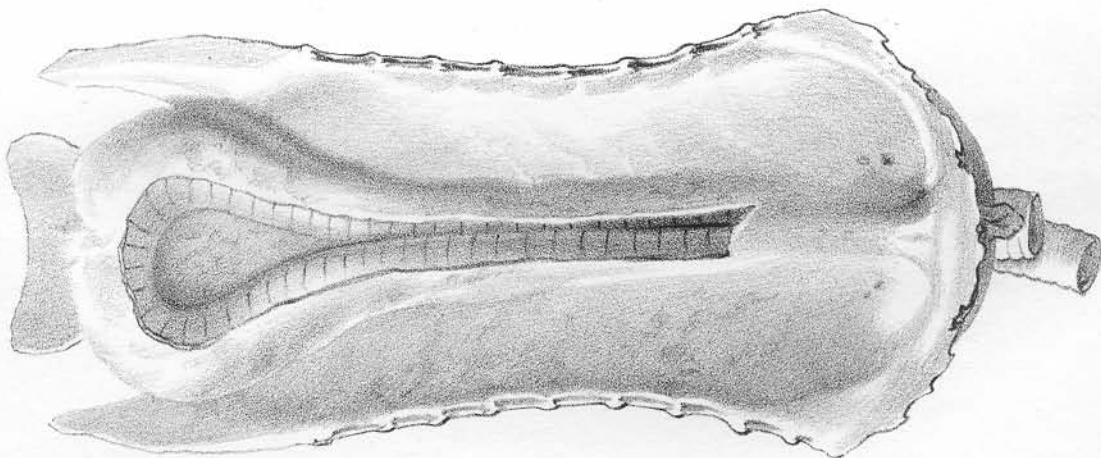
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ing his imperishable name to so valuable and interesting an example among his own most admired and favourite subjects.

Ordo. NATATORES. *Illiger.*

Fam. ANATIDÆ. *Leach.*

Genus. CYGNUS. *Meyer.*

Bewickii. C. rostro semicylindrico atro, basi aurantiacâ, corpore albo, caudâ rectricibus 18, pedibus nigris.

And the better to distinguish the *Anas Cygnus (ferus)* of Linnæus, I venture to propose the following specific character :

—— *ferus.* C. rostro semicylindrico atro, basi lateribusque (his ultra nares) flavis, corpore albo, caudâ rectricibus 20, pedibus nigris.

EXPLANATION OF THE PLATES.

TAB. XXIV.

Fig. 1. Side view of the sternum and trachea of Bewick's Swan.

a. The keel ; *b.* sternum ; *c, c.* trachea ; *d, d.* muscles of voice ; *e.* bone of divarication ; *f.* bronchiæ.

2. Front view of the same part, the anterior portion of the trachea turned aside to show the inner ascending part of it, the muscles of voice, and the tendinous fascia by which both are supported.

TAB. XXV.

Fig. 1. Upper surface of the sternum of a young bird.

Fig. 2.

Fig. 2. Upper surface of the sternum of an older bird, showing the loop of the trachea occupying one side of the cavity only. Part of the slender plate of bone being cut away.

3. Upper surface of the sternum of an adult bird, the cavity wholly occupied by the loop of the trachea. Part of the plate of bone being also cut away.

All the representations are one-fourth less than the natural size.