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# Ornithology

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As, in the descending scale of Nature, Quadrupeds follow after Man, so Birds follow after quadrupeds. As Quadrupeds have a less complex structure than Man, so Birds have a structure more simple yt. quadrupeds. As their anatomical structure is inferior, so are their faculties; — for what great degree of sagacity can be expected from an animal whose eyes are nearly as large as its brain?

If Birds, taken collectively, be inferior in sagacity to the generality of Quadrupeds, they are infinitely superior to them in point of beauty. Their form is elegant, and the plumage of many of them transcendantly beautiful! If to this we add the surprising faculty of ascending into the air with the swiftness of the arrow from the Tartar's bow, we cannot but admire them as the most charming beings in the animal creation! —

The whole structure of a bird is nicely adapted for swiftness of motion, & a life of escape. Their bones are remarkably light, & what is extraordinary, filled with air. If we wish to construct a ship for swift sailing, we, must take the body of a bird of the model; for a bird is a kind of flying ship; the trunk of the body being the hull; the head the prow or bow, the tail the rudder, and the wings the oars

While

While some animals are covered with a hard shell, as the Lobster & Tortoise; others defended by hard scales; others by a thick hide covered with hair; Birds are covered, defended and ornamented with Feathers.

All the world unite in calling the plumage of birds beautiful; but few people have thought it worth their while to examine that curious part of their clothing a single feather; wc. is a distinct body, or organ, very different from the scale of a fish, or the hair of a Quadruped.

"To give" a lecture upon straws," has become prover-bial, and some may think that it would be equally trifling to give a Lecture upon Feathers. We will nevertheless venture it; being conscious, that the mind of youth, at least, may be less profitably employed than in contemplating a production wc. nothing short of omnipo-tence could have formed

We need not, however, apologize for drawing your atten-tion to so light a subject, when we consider that some of the finest feathers are selected to ornament the most beautiful part of our own species; and also to add to the stature and goodly appearance of our military men. We might add too, that a feather is the emblem of honor:—to say that a man has added another feather to his cap, is saying by an elegant figure of speech, that he has acquired a fresh honor. — The nodding plume is as old as Homer. —— The philosopher & the Divine cannot but have a liking for feathers, seeing they cannot commit their thoughts to the eye upon paper

paper, without their assistance. They are therefore full as much attached to their Quill or Feather as the soldier to his — or the fine Lady to her's —

Feathers are of three kinds 1st such as compose the instruments of flight, such as the pen=feathers in the wings & tail of the bird; the one serving as oars; the other as a rudder. These have a large shaft, or fine pellucid tube or quill, with wch we make pens. 2d Feathers that cover the body, wch are denominated the plumage; these have a little shaft or quill & much vane, and are never exerted, or relaxed, unless in anger, fright, or illness. The 3d sort of feather is the downe, wch is dispersed amidst the plumage, over the whole body of the bird. It is very soft, short, unconnected, and the vane part like fine wool, cotton, or raw silk; and is obviously contrived to exclude that air, or water wch might penetrate or escape through the common plumage. In some water fowl, as the Eider=duck, it is remarkably elastic, and as remarkably warm, & is called Eider Downe

If we cut the quill of a goose, in order to make a pen, we shall find it to consist of, at least three lamina, beside a thin membrane or periosteum, wch we commonly scrape off in making a pen, and wch attaches it to the skin of the bird, & by which it doubtless receives part of its nourishment, for the microscope discovers it has vessels.

When the feather is first protruded from the loose skin of the

the wing it is soft, and will bleed if plucked from the animal, w.c suffers pain by it: this shews that it is furnished not only with an artery & veins but a nerve. If we examine the quill, in a proper light, with a mi-
-croscope, & especially that singular body contained in it, called the Pith, we shall be disposed to believe that the vein artery & nerve conceal themselves in this pith, and are only to be discovered previously to the annual illness of the bird, termed "moulting", or chang-
-ing of its feathers. This pith is in fact, a sort of umbilical chord, serving the same purpose; and its vessels are most commonly obliterated, when the feather comes under ordinary inspection. –

Birds shed their feathers every year, by a process called moulting, during which they appear disordered; those most remarkable for their courage then loose their fierceness, and some even die under this natural operation. In this operation the quill shrinks & drops out, and then is observed the rudi-
-ments, or first dawnings of an incipient quill, beginning below; and it comes forward, and shoots out just like a new tooth shooting up in a child's gums to take the place of the old one. The skin, where the new feather is protruded, forms itself into a little bag; and which every day encreases in size, and which is fed from the body of the bird by a vein & artery; w.c extend themselves ~~itself~~ through the pith, and gives life & vigour to the quill & feather, just as the vessels

of a plant

of a plant does to the Leaf; or rather like the nourishment and growth of the hair on our heads; for when we view a living hair with a microscope, it is found to have a bulbous root, like the feather, through which it imbibes nourishment from the skin. So much for the ~~shaft or~~ barrel of the quill —

If we examine the feather part of the Vane, so called from its resemblance to the Vane of a wind mill, we shall find its structure still more curious.

From the barrel or quill rises a long, tapering, and very light, but very strong & elastic shaft; flat on the upper side, and grooved on the under. Into this is attached the numerous leaves, w.c form the vane of the feather, each of which when viewed through a microscope appears to be this large Vane in miniature; and could we detach one of these, & view it a glass of the greatest magnifying powers, it would no doubt appear to be the same sort of body, in a still more diminutive state. Some feathers contain more than 1200 of these leaves; which lie over each other in close conjunction, the under hollow side of one, fitting closely over the rounding part of the other, so as to make one solid web-like fan, that is impervious to air or water, & yet capable of separation, and restoration to their proper places without injury. Were the feather one continued solid membrane, like the fin of a fish, it would be liable to be torn, in their rapid flight, & would endanger the life of the bird in the lofty regions of the air: whereas in their

their present form, they are only liable to be rumpled, and the bird has the art of smoothing them by drawing each feather through his bill, & so lays them neatly in their proper places, & he finishes the whole by oiling them from a gland, or oil bag; w.c Nature has given them for that express purpose. This oil not only makes them shine, but prevents the water of those that swim, from penetrating their plumage & wetting their cloaths.

These leaves in order to lay closely & firmly over each other have an hairy edge, of that peculiar form & stiffness, that they lock & hold each other together; for the hooked beards of one layer always lye next the straight beards of the other; so that when the wing is spread, not a feather misses its impulse on the air, but takes hold of that fluid as firmly as an oar does of the water.

A feather then is composed of many hundreds of these leaves, and each leaf is composed of thousands other leaves of the same shape; for those parts which appear to the naked eye like a flatted hair, are feathers in miniature; each of which, we presume admits an aërial fluid w.c sustains in its flight through the bird in the grosser atmosphere. We know of nothing in Nature, that is so firm, and so strong, and yet so light as a feather.

The wing of a bird possesses more surface, & more strength than any thing we know of in art or nature, of the same weight.

You can judge of the strength of the wing of a bird, when you are told than a Swan has broken a man's leg with a blow of his wing; and an Eagle has been known to ~~lay a~~ strike a man instantly dead; such is the almost incredible force which the larger birds gives to this remarkably light instrument of motion. We can easily conceive that the Condor, wc. is the largest bird that flies, & has wings extending eighteen feet from tip to tip, would be able to strike down an Ox. This surprizing force is given to the wings of birds by what is called the pectoral muscle, wc. is incomparably larger & stronger in birds yn. the pectoral muscle of any other class of animals in creation.

Connected with the wings & feathers of Birds is the singular conformation in their internal structure, wc. fitts them for encreasing their surface, by diminishing their solidity. By this internal structure the bodies of birds, during their flight, are blown up, like a bladder.

The Lungs seem to be an organ of less consequence in birds yn. in Quadrupeds; - they stick fast to their ribs, and are incapable of much dilatation, and certainly have less to do in the respiration of air yn. in the higher order of animals; but then you will observe that the extremity of their Trachea or wind-pipe opens from their Lungs & passes down into their abdomens, and indeed into every part of their bodies,

their brains & eyes excepted. There are air-cells through all the internal parts of the birds body; so that if you blow into its wind-pipe, the air will pass down even to their legs;- their bones instead of being filled with marrow, like the bones of Quadrupeds are filled with air. The external parts of their bodies; & especially the fleshy part of their wings, have, like their internal parts a series of bladders, or air-cells, which they can fill with air by the action of their wings.

When we inspire air, it fills the cells of the Lungs, & oxygenates our blood & is immediately thrown out again by expiration; so that the air penetrates but little lower than the heart; for you all know that there a firm partition called the Diaphragm or Midriff w.c seperates the cavity in which the Lungs & heart are lodged from the bowels; but there is no such seperation in birds; there is but one cavity for the whole, so that the air pervades the whole body, while the Lungs of the bird are in a manner quiescent.* The action of the wings in flying inflates the bird with air; which air may be rendered lighter than the atmospheric air by some process in the vital parts of the bird, and which may pervade even its feathers; otherwise it is difficult to conceive how a large bird as a hawk or Eagle can scale through the air without moving its wings.

Hence you will see that it requires something beside a large pair of wings to enable a man to fly; not only his lungs, but all his internal structure must be changed, before he can raise his lumpish body above the turf on which he treads.

* The Ostrich w.c does not fly, has no such air apparatus; and its body is divided by a midriff into two cavities like the quadruped. The Ostrich is half quadruped & half bird.

He must despair of ever flying by the help of feathered wings. The only chance he has must be with wings like a Bat; which singular creature has no air-cells; and has lungs & breathes as we do. The bat on one side & the Ostrich on the other connects the two classes of birds & Quadrupeds together.

Beside all this Birds have a trachea or wind pipe very different from ours: Some of them take a winding, or spiral course, & penetrate the breast-bone before it enters their Lungs. It is this construction of the wind-pipe that gives that loud, sonorous & various modu-lation observable in the note of some birds. The trachea of some birds resemble a trumpet, while others are con-torted like a horn. The singing of a bird must be on dif-ferent principles from the action of singing in men. — It appears therefore from what has been said that birds have a pneumatic, or aerial system peculiar to them-selves. —

53 The Kite, wc belongs to the tribe of Falcons, is ever upon the wing: he seems to float, or rest himself upon the bosom of the air, and to scale through it, without making the least effort with his wings.

Birds differ in their nutritive & Digestive Systems from man. In the first place a bird has no lips. He has a hard bony mouth, but no teeth to break the firm treble coats which envellope a kernel of corn, and which need to be broken or soaked before an horse can digest it. Let us

Let us see how nature has contrived to obviate the want of teeth. The stomachs of birds that feed on flesh, as the hawk & Eagle, are constructed very much like our own, & digestion is performed in the same way; but in those that feed on grain, it is very different

When we throw corn down to our common barn door fowl, or to pigeons; they pick it up with the greatest expedition and hurry; but they are not eating it; they are only stowing it away, as fast as they can in a bag; so as to carry it off to some secure snug place, there to eat it at their leisure. This bag is placed between the throat & the true stomach, & is commonly called the Crop. Birds of prey that feed on flesh have no such crop. This bag or crop, in birds that feed on grain, is replete with glands that pour forth saliva, which soaks the grain; but even then it is not fit to pass down into their proper stomachs; it must be first ground into meal, which is done by a kind of mill placed at the bottom of the crop, which serves it for a hopper. This animal-mill is denominated the Gizzard; and is composed of two pair of very strong cartilaginous, or grizzly muscles, ridged, & indented like the nut of a coffee mill, and covered on the inside with a bony, or rather stone like coat. You can form some idea of the hardness, as well as of the ~~hardness~~ sensibility of this natural-mill, when you are told that the Abbe Spallanzani put into the gizzard of a Turkey a leaden bullet stuck round with twelve sharp needles, 3/4 of an inch long; and into one of the common fowls another bullet, set round with as many lancets. Eighteen hours after the Abbe killed the fowls, and found

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the needles & lancets all broken off, & ground down, so that there were marks & impressions on the musquet ball itself: -and, what was very remarkable, the coats, or internal parts of the gizzard were perfectly unhurt! — I have known a fowl swallow a lady's silver thimble, which was not only squeezed flat by the action of the gizzard, but worn half through by its friction.

Some may possibly here ask — How comes Nature to adopt so laborious & troublesome a process as this, wc is illy adapted to the impatience of a very hungry bird? — We answer that this is just like all the other works of Nature, wc we understand, exactly as it ought to be. It is a kind provision, for the safety of the weak, mild & helpless part of the feathered race. The rapacious family of birds have no need of such a provision. The eagle e.g. has a formidable beak, strong & sharp claws, and a wing that can kill a man at one blow; thus fortified the eagle eats his meal & picks the bones with the leisure of a gentleman; but not so the Gallinaceous — Columbine, & Passerine order of birds. — The Pheasant, Partridges — Doves — Larks & Swallows, have many enemies & are entirely defenceless: They are therefore obliged to gobble up the grain as fast as they can, wc is merely putting it into a ~~bag to~~ bag to carry away; and when they arrive in a place of safety, they grind the corn to meal in their gizzards, and from thence it

it passes into its proper stomach.

The simple fact in Nat. History of the mechanical power of the gizzard has been strangely misapplied in Medicine. Physicians have directed the gizzards of fowls to be dried, and then powdered & given to patients suffering under indigestion! They might as well have ground up the hopper of a coffee-mill — or have imagined, that pieces of a mill-stone thrown into a bag of corn would convert it into meal. This is not the only instance where plausible inferences from well known facts in brutes have occasioned errors when applied to man. — E.g. We can always fat cattle by giving them ~~their~~ as large a quantity of nutritious food, & keeping them still. — This is not the case with man; for we almost always find, that your thin, raw boned fellows have the keenest appetites, digest the quickest, and of course eat the most. — The stomachs of some birds, as the carrion crow, have the faculty of sweetening putrid flesh ~~taken into their~~ on which they feed, in the course of an hour.

Birds are remarkable for their sharpness of sight. In this they exceed all other animals. A hawk perceives a sparrow, or any other small bird, at a distance, which neither men nor dogs could spy. It has been observed in the East Indies, that a vulture will dart down from an imperceptable height upon a lamb or goat. Nature has formed the eye of a bird with great care

care. In man the brain is more than 20 times the bulk of his eyes; but the eyes of the bird nearly equal its brain in size. (e.g. Eagles) The Owl, and such rapacious birds as commit depredations by night, have eyes of a peculiar structure, by which they are enabled to see objects in the darkness, with extreme precision. e. g.

General Observations —

1st Those birds of prey that have hooked beaks & sharp talons, are solitary & unsociable. Such birds ~~are solitary~~ lead a rapacious, and sort of privateering life; and like the Barbary pirates, they chuse to inhabit high rocks, ruined towers, and dreary unaccessible habitations.

2d Among the birds of prey, the males are a third less wt. the females.* The females are not only of larger size, more beautiful, & lovely for shape & colours, but are stronger, fiercer, and more magnanimous. Goldsmith tells us that it is not till after having been long provoked, by the cries of the rook and magpie, that the generous eagle thinks fit to punish them with death. He will take up with no other prey but that wch he has acquired by his own pursuits: — he disdains to share the plunder of another: he never stoops to feed on carrion. Solitary, like the Lion, the eagle keeps the desert to himself alone; it is as extraordinary to see two pair of Eagles in the same mountain, as two Lions in the same forest; or two independent Kings in

* Male insects are always smaller wt. the Female.

in the same city. From the Natural history of this bird, you see the reason of the epithet Royal Eagle; and why Kings have selected the ~~the~~ Lyon & the Eagle as emblems of their power & dignity. The fiercer the Eagle the more extensive is his range, that is to say his Dominion or Empire. The Lion & the Eagle are formed by nature for war:- both are enemies of all society;- they are alike fierce, proud, & incapable of being tamed. If you think you have tamed an eagle, he often shews that he is a dangerous domestic; for he not unfrequently turns his force against his master. We must despair of ever being able to tame a Royal Tyrant, or a Royal eagle.

The Condor is the largest bird that flies, some of them being 18 feet from tip to tip of their wings. It is peculiar to this Continent of America, and possesses in a higher degree yt. the eagle all the qualities that render it formidable to man & beasts. For these reasons, it ought to be the arms of our Country. A condor reposing on a high limb of the pride & glory of our forests, the Oak, should be the arms of these States, as expressive of the great extent & natural strength of America by land, and her capability, by means of the Oak, of becoming as formidable by sea.

The emigration, or annual flight of Birds, has excited the curiosity of Naturalists in all ages. It is astonishing how these animals, without almanac, or compass will collect all at one time, & steer to their place of rendezvous without error or mistake: they conduct as if they had not only a language, but the gift of reason. The construction of their nests is a standing wonder. Each bird prepares a place, suited to its species, for depositing its eggs, & sheltering its little brood, when hatched. Different genera, & different species set about the task, in a manner suitable to their several natures; yet every individual of the same species collects the very same kind of materials to make their nest with. They put them together in the same form, & choose the same sort of situation for placing their nests. This is not from imitation; for the young bird taken away the moment after it is hatched, & which could never have seen the building of a nest, pursues the same plan in the construction of it, & selects the same materials its parent did. Birds of the same species in remote countries, and in different periods of the world do the same. The magpie builds its nest w.th much art, fortifies it with thorns, & leaves only a small hole for admittance. The hanging-bird lines its nest with the downe of certain seeds,

See Encyclop.

and

fixes it on the pendent branch of some tree, that in some species swings over the water; and this is done to se-
-cure its nest from the depredations of the monkies.
The bird called the Diver has a swimming nest upon the water, among the reeds & rushes.
The web footed fowl build their nest on the cold ground; but then they pull the feathers & down off their own breasts, to secure their eggs from the cold, when they quit them to go in search of food.

There is one curious fact, which affords a good lesson to the most abandoned part of mankind, viz, the Doves, & Pigeons, & all the Columbine order, w. c. pair, or keep with one mate, sit on their eggs by turns, when the female is off, in search of food, the male takes her place; but in the other order of birds, where polygamy prevails, the males take no care at all, of the eggs or of the young ones.

The wings of the Gnat (see Swammerdam) consists partly of pulmonary tubes, & partly of delicate membranes. Upon these pulmonary tubes are fixed a set of beautiful feathers. These are united to the pulmonary tubes; and it is probable that this structure is needful to the action of flying —

Very interesting