

From this examination, it will now be more probable that the luminousness of the eyes of human beings, as well as of beasts, depends on the want of the pigment, and so much the more from being observed only in the albino. With this view of the matter, the two cases already quoted of Sachs and Michaelis are indeed at variance. I must confess that I have read and considered these cases with some degree of interest. Are they really fictions? When we read of the shape of fiery coruscations, or balls in the eyes, of their rolling round, of their frequently darting forth rays an inch long, our suspicions are surely pardonable.

As to the different colours of the light in the eyes of dogs, it is owing to the different colouring of the place where the pigment is wanting in the choroid,—a fact of which anatomical experiments on the eye of these animals has convinced me; and hence the varied colour of the light of one and the same eye may be owing more to the motion of that part where the rays of light are reflected upon different coloured portions of the choroid, than to the quantity of the incident rays of light.

Finally, there is no question but the light observed in the eyes of some beasts of prey, as well as in those of birds, has the origin above ascribed to it; and its nature is neither phosphoric nor electrical, nor has it any psychological relation.

Account of the Habits of the Turkey Buzzard (Vultur aura), particularly with the view of exploding the opinion generally entertained of its extraordinary power of Smelling. In a letter to Professor JAMESON, by JOHN J. AUDUBON, a Citizen of the United States.*

AS soon as, like me, you shall have seen the Turkey Buzzard follow, with arduous closeness of investigation, the skirts of the forests, the meanders of creeks and rivers, sweeping over the whole of extensive plains, glancing his quick eye in all directions, with as much intentness as ever did the noblest of falcons, to discover where below him lies the suitable prey;—when, like

* This communication was originally intended to be sent to a friend unacquainted with the habits of birds.—J. J. A.

me, you have repeatedly seen that bird pass over objects calculated to glut his voracious appetite unnoticed, because unseen; and when you have also observed the greedy vulture propelled by hunger, if not famine, moving like the wind suddenly round his course as the carrion attracts his eye,—then will you abandon the deeply-rooted notion that this bird possesses the faculty of discovering, by his sense of smell, his prey at an immense distance.

This power of smelling so acutely I adopted as a fact from my youth. I had read of this when a child; and many of the theorists to whom I subsequently spoke of it, repeated the same with enthusiasm, the more particularly as they considered it an extraordinary gift of nature. But I had already observed, that Nature, although wonderfully bountiful, had not granted more to any one individual than was necessary, and that no one was possessed of any two of the senses in a very high state of perfection; that if it had a good scent, it needed not so much acuteness of sight, and *vice versa*. When I visited the Southern States, and had lived, as it were, amongst these vultures for several years, and discovered thousands of times that they did not smell me when I approached them covered by a tree, until within a few feet, and that when so near, or at a greater distance, I shewed myself to them, they instantly flew away much frightened, the idea evaporated, and I assiduously engaged in a series of experiments to prove, to *myself* at least, how far this acuteness of smell existed, or if it existed at all.

I sit down to communicate to you the results of those experiments, and leave for *you* to conclude how far, and how long, the world has been imposed on by the mere assertions of men who had never seen more than the skins of our vultures, or heard the accounts from men caring little about observing nature closely.

My first experiment was as follows:

I procured a skin of our common deer, entire to the hoofs, and stuffed it carefully with dried grass until filled rather above the natural size,—suffered the whole to become perfectly dry, and as hard as leather,—took it to the middle of a large open field,—laid it down on its back with the legs up and apart, as if the animal

was dead and putrid. I then retired about a few hundred yards, and, in the lapse of some minutes, a vulture, coursing round the field, tolerably high, espied the skin, sailed directly towards it, and alighted within a few yards of it. I ran immediately, covered by a large tree, until within about forty yards, and from that place could spy the bird with ease. He approached the skin,—looked at it without apparent suspicion,—jumped on it,—raised his tail, and voided itself freely (as, you well know, all birds of prey in a wild state generally do before feeding),—then approaching the eyes, that were here solid globes of hard dried and painted clay, attacked first one and then the other, with, however, no further advantage than that of disarranging them. This part was abandoned; the bird walked to the other extremity of the pretended animal, and there, with much exertion, tore the stitches apart, until much fodder and hay was pulled out, but no flesh could the bird find, or smell; he was intent on discovering some where none existed, and, after reiterated efforts, all useless, he took flight, coursed about the field, when, suddenly rounding and falling, I saw him kill a small *garter snake*, and swallow it in an instant. The vulture rose again, sailed about, and passed several times quite low over my stuffed deer skin, as if loath to abandon so good-looking a prey.

Judge of my feelings when I plainly saw that the vulture which could not discover, through its *extraordinary sense of smell*; that no flesh, either fresh or putrid, existed about that skin, could, at a glance, see a snake scarcely as large as a man's finger, alive and destitute of odour, hundreds of yards distant. I concluded that, at all events, his ocular powers were much better than his sense of smell.

Second Experiment.—I had a large dead hog hauled some distance from the house, and put into a ravine, about twenty feet deeper than the surface of the earth around it, narrow and winding, much filled with briars and high cane. In this I made the negroes conceal the hog, by binding cane over it, until I thought it would puzzle either buzzards, carrion crows, or any other birds, to see it, and left it for two days. This was early in the month of July, when in this latitude a dead body

becomes putrid and extremely fetid in a short time. I saw, from time to time, many vultures in search of food sail over the field and ravine in all directions, but none discovered the carcass, although, during this time, several dogs had visited it, and fed plentifully on it. I tried to go near it, but the smell was so insufferable when within thirty yards, that I abandoned it, and the remnants were entirely destroyed at last through natural decay.

I then took a young pig, put a knife through its neck, and made it bleed on the earth and grass about the same place, and having covered it closely with leaves, also watched the result. The vultures saw the fresh blood, alighted about it, followed it down into the ravine, discovered by the blood the pig, and devoured it, when yet quite fresh, within my sight.

Not contented with these experiments, which I already thought fully conclusive, having found two young vultures, about the size of pullets, covered yet with down, and looking more like quadrupeds than birds, I had them brought home and put into a large coop in the yard, in the view of every body, and attended to their feeding myself. I gave them a great number of red-headed woodpeckers and parakeets, birds then easy to procure, as they were feeding daily on the mulberry trees in the immediate neighbourhood of my orphans.

These the young vultures could tear to pieces by putting both feet on the body, and applying the bill with great force. So accustomed to my going towards them were they in a few days, that, when I approached the cage with hands filled with game for them, they immediately began hissing and gesticulating very much like young pigeons, and putting their bills towards each other, as if expecting to be fed mutually, as their parent had done. Two weeks elapsed; black feathers made their appearance, and the down diminished. I remarked an extraordinary increase of their legs and bill; and thinking them fit for trial, I closed three sides of the cage with plank, leaving the front only with bars for them to see through;—had the cage cleaned, washed, and sanded, to remove any filth attached to it from the putrid flesh that had been in it, and turned its front immediately from the course I usually took towards it with food for them.

I approached it often bare-footed, and soon perceived that if I did not accidentally make a noise, the young birds remained in their silent upright attitudes, until I shewed myself to them by turning to the front of their prison. I frequently fastened a dead squirrel or rabbit, cut open, with all the entrails hanging loosely to a long pole, and in this situation would put it to the back part of the cage; but no hissing, no movement was made: when, on the contrary, I presented the end of the pole, thus covered, over the cage, no sooner would it appear beyond the edge, than my hungry birds would jump against the bars, hiss furiously, and attempt all in their power to reach the food. This was repeatedly done with fresh and putrid substances, all very congenial to their taste.

Satisfied within myself, I dropped these trials, but fed them until full grown, and then turned them out into the yard of the kitchen, for the purpose of picking up whatever substances might be thrown to them. Their voracity, however, soon caused their death: young pigs were not safe if within their reach; and young ducks, turkeys or chickens, were such a constant temptation, that the cook, unable to watch them, killed them both, to put an end to their depredations.

Whilst I had these two young vultures in confinement, an extraordinary occurrence took place respecting an old bird of the same kind, which I cannot help relating to you. This bird sailing over the yard, whilst I was experimenting with the pole and squirrels, saw the food, and alighted on the roof of one of the outhouses; then alighted on the ground, walked directly to the cage, and attempted to reach the food within. I approached it carefully, and it hopped off a short distance; as I retired, it returned, when always the appearances of the strongest congratulations would take place from the young towards this new comer. I directed several young negroes to drive it gently towards the stable, and to try to make it go in there. This would not do; but, after a short time, I helped to drive it into that part of the gin-house where the cotton-seeds are deposited, and there caught it. I easily discovered that the bird was so emaciated, that to this state of poverty only I owed my success. I put it in with the young, who both at once jumped about him, making most extraordinary gestures of welcome; whilst the old

bird, quite discomfited at his confinement, lashed both with great violence with his bill. Fearing the death of the young, I took them out, and fed plentifully the old bird; his appetite had become so great through fasting, that he ate too much, and died of suffocation.

I could enumerate many more instances, indicating that the power of smelling in these birds has been grossly exaggerated, and that, if they can smell objects at any distance, they can see the same objects much farther. I would ask any observer of the habits of birds, Why, if vultures could smell at a great distance their prey, they should spend the greater portion of their lives hunting for it, when they are naturally so lazy, that, if fed in one place, they never will leave it, and merely make such a change as is absolutely necessary to enable them to reach it? But I will now enter on their habits, and you will easily discover how this far-famed power has originated.

Vultures are gregarious, and often associate in flocks of twenty, forty, or more;—hunting thus together, they fly in sight of each other, and thus cover an immense extent of country. A flock of twenty may easily survey an area of two miles, as they go turning in large circles, often intersecting each other in their lines, as if forming a vast chain of rounded links;—some are high, whilst others are low;—not a spot is passed unseen, and, consequently, the moment that a prey is discovered, the favoured bird rounds to, and by the impetuosity of its movements, gives notice to its nearest companion, who immediately follows him, and is successively attended by all the rest. Thus, the farthest from the discoverer being at a considerable distance, sails in a direct line toward the spot indicated to him by the flight of the others, who all have gone in a straight course before him, with the appearance of being impelled by this extraordinary power of smelling, so erroneously granted them. If the object discovered is large, lately dead, and covered with a skin too tough to be ate and torn asunder, and afford free scope to their appetite, they remain about it, and in the neighbourhood. Perched on high, dead limbs, in such conspicuous positions, are easily seen by other vultures, who, through habit, know the meaning of such stoppages, and join the first flock, going also directly,

and affording further evidence to those persons who are satisfied with appearances only. In this manner I have seen several hundreds of vultures and carrion-crows assembled near a dead ox, at the dusk of evening, that had only two or three in the morning; when some of the latter comers had probably travelled hundreds of miles searching diligently themselves for food, and probably would have had to go much farther, had they not espied this association.

Around the spot both species remain; some of them from time to time examining the dead body, giving it a tug in those parts most accessible, until putridity ensues. The accumulated number then fall to work, exhibiting a most disgusting picture of famished cannibals; the strongest driving the weakest, and this latter harassing the former with all the power that a disappointed hungry stomach can produce. They are seen jumping off the carcase, reattacking it, entering it, and wrestling for portions partly swallowed by two or more of them, hissing at a furious rate, and clearing every moment their nostrils from the filth that enters there, and stops their breathing. No doubt remains on my mind, that the great outward dimensions of these nostrils were allotted them for that especial and necessary purpose.

The animal is soon reduced to a mere skeleton, no portion of it being now too hard not to be torn apart and swallowed, leaving merely the bare bones. Soon all these bloody feeders are seen standing gorged, and scarcely able to take wing. At such times the observer may approach very near the group, whilst engaged in feeding, and see the vultures in contact with the dogs, who really by smelling have found the prey. Whenever this happens, it is with the greatest reluctance that the birds suffer themselves to be driven off, although frequently the sudden scowl or growl of the dogs will cause nearly all the vultures to rise a few yards in the air. I have several times seen the buzzards feeding at one extremity of the carcase, whilst the dogs were tearing the other; but if a single wolf approached, or a pair of white-headed eagles, driven by extreme hunger, then the place is abandoned to them until their wants are supplied.

The repast finished, each bird gradually rises to the highest branches of the nearest trees, and remains there until the full

digestion of all the food they have swallowed is completed; from time to time opening their wings to the breeze or to the sun, either to cool or warm themselves. The traveller may then pass under them unnoticed, or, if noticed, a mere sham of flying off is made. The bird slowly recloses its wings, looks at the person as he passes, and remains there until hunger again urges him onwards. This takes oftentimes more than a day, when gradually, and very often singly, each vulture is seen to depart.

They now rise to an immense height, cutting, with great elegance and ease many circles through the air; now and then gently closing their wings, they launch themselves obliquely with great swiftness for several hundred yards, check and resume their portly movements, ascending until, like mites in the distance, they are seen all together to leave that neighbourhood, to seek further the needed means of subsistence.

Having heard it said, no doubt with the desire to prove that buzzards smell their prey, that these birds usually fly against the breeze, I may state that, in my opinion, this action is simply used, because it is easier for birds to maintain themselves on the wing encountering a moderate portion of wind, than when flying before it; but I have so often witnessed these birds bearing away under the influence of a strong breeze, as if enjoying it, that I consider either case as a mere incident connected with their pleasures or their wants.

Here, my dear Sir, let me relate one of those facts, curious in itself, and attributed to mere *instinct*, but which I cannot admit under that appellation, and which, in my opinion, so borders on *reason*, that, were I to call it by that name, I hope you will not look on my judgment as erroneous, without your further investigating the subjects in a more general point of view.

During one of those heavy gusts that so often take place in Louisiana in the early part of summer, I saw a flock of these birds, which had undoubtedly discovered that the current of air that was tearing all over them was a mere sheet, raise themselves obliquely against it with great force, slide through its impetuous current, and reassume *above it* their elegant movements.

The power given to them by nature of discerning the approaching death of a wounded animal, is truly remarkable. They will watch each movement of any individual thus assailed

by misfortune, and follow it with keen perseverance, until the loss of life has rendered it their prey. A poor old emaciated horse or ox, the deer mired on the margin of the lake, where the timid animal has resorted to escape flies and mosquitoes so fatiguing in summer, is seen in distress with exultation by the buzzard. He immediately alights, and if the animal does not extricate itself, waits and gorges in peace on as much of the flesh as the nature of the spot will allow. They do more, they often watch the young kid, the lamb, and the pig issuing from the mother's womb, and attack it with direful success; yet, notwithstanding this, they frequently pass over a healthy horse, hog, or other animal, lying, as if dead, basking in the sunshine, without even altering their course in the least. Judge then, my dear Sir, how well they must see.

Opportunities of devouring young living animals are so very frequent around large plantations in this country, that to deny them would be ridiculous, although I have heard it attempted by European writers.

During the terrifying inundations of the Mississippi, I have very frequently seen many of those birds alight on the dead floating bodies of animals, drowned by the water in the low lands, and washed by the current, gorging themselves at the expence of the Squatter, who often loses the greater portion of his wandering flocks on such occasions.

Dastardly with all, and such cowards are they, that our smaller hawks can drive them off any place; the little king bird proves, indeed, a tyrant whenever he espies the large marauder sailing about the spot where his dearest mate is all intent on incubation; and the eagle, if hungry, will chase him, force him to disgorge his food in a moment, and to leave it at his disposal.

Many of those birds accustomed, by the privileges granted them by law, of remaining about the cities and villages in our southern states, seldom leave them, and might almost be called a second set, differing widely in habits from those that reside constantly at a distance from these places. Accustomed to be fed, they are still more lazy; their appearance exhibits all the non-chalance belonging to the garrisoned half paid soldier. To move is for them a hardship, and nothing but extreme hunger will

make them fly down from the roof of the kitchen into the yard, or follow the vehicles employed in clearing the streets from disagreeable substances, except where (at Natchez for instance) the number of these expecting parasites is so great, that all the refuse of the town, within their reach, is insufficient; then they are seen following the scavengers' carts, hopping, flying and alighting all about it, amongst grunting hogs and snarling dogs, until the contents, having reached a place of destination outside the suburbs, are emptied and swallowed by them.

Whilst taking a view of that city from her lower ancient fort, I have for several days seen exhibitions of this kind.

I do not think that the vultures thus attached to the cities are so much inclined to multiply as those more constantly resident in the forests, perceiving no diminution of number during the breeding season, and having remarked that many individuals, known to me by particular marks made on them, and a *special cast of countenance*, were positively constantly residents of the town. The Vultur aura is by no means so numerous as the *attratus*. I have seldom seen more than twenty-five or thirty together; where, on the contrary, the latter are frequently associated to the number of an hundred.

The Vultur aura is a more retired bird in habits, and more inclined to feed on dead game, snakes, lizards, frogs, and the dead fish that frequently are found about the sand-flats of rivers and borders of the sea-shore; is more cleanly in its appearance, and, as you will see by the difference in the drawings of both species, a neater and better formed bird. Its flight is also vastly superior in swiftness and elegance, needing but a few flaps of its large wings to raise itself from the ground; after which it will sail for miles, by merely turning either on one side or the other, and using his tail so slowly, to alter his course, that a person looking at him, whilst elevated and sailing, would be inclined to compare it to a machine fit to perform just a certain description of evolutions. The noise made by the vultures through the air as they glide obliquely towards the earth, is often as great as that of our largest hawks when falling on their prey; but they never reach the ground in this manner, always checking when about 100 yards high, and *going several rounds, to examine well the spot they are about to alight on.* The Vultur aura

cannot bear cold weather well; the few who, during the heat of the summer, extend their excursions to the middle or northern States, generally all return at the approach of winter; and I believe also, that very few of these birds breed eastward of the Pine Swamps of West Jersey. They are much attached to particular roosting trees, and I know will come to them every night from a great distance: on alighting on these, each of them, anxious for a choice of place, creates always a general disturbance, and often, when quite dark, their hissing noise is heard in token of this inclination for supremacy. These roosting trees of the buzzards are generally in deep swamps, and mostly high dead cypresses; frequently, however, they roost with the carrion-crows (*Vultur atratus*), and then it is on the largest dead timber of our fields, not unfrequently close to the houses. Sometimes also this bird will roost close to the body of a thick-leaved tree; in such position I have killed several, when hunting wild turkeys by moonlight nights, and mistaking them for these latter birds.

In Mississippi, Louisiana, Georgia and Carolina, they prepare to breed early in the month of February, in common with almost all the genus *Falco*. The most remarkable habit attached to their life is now to be seen; they assemble in parties of eight or ten, sometimes more, on large fallen logs, males and females exhibiting the strongest desire to please mutually, and forming attachments by the choice of a mate by each male, that, after many caresses, leads her off on the wing from the group, neither to mix or associate with any more, until their offspring are well able to follow them in the air; after that, and until incubation takes place (about two weeks), they are seen sailing side by side the whole day.

These birds form no nest, yet are very choice respecting the place of deposit for their *two* eggs. Deep in the swamps, but always above the line of overflowing water mark, a large hollowed tree is sought, either standing or fallen, and the eggs are dropped on the mouldy particles inside. Sometimes immediately near the entrance: at other times as much as twenty feet in. Both birds incubate alternately; and both feed each other whilst sitting, by disgorging the contents of the stomach, or part of them, immediately close before the bird that is sitting. Thirty-

two days are needed to bring forth the young from the shell,—a thick down covers them completely,—the parents at that early period, and indeed for nearly two weeks, feed them, by gorging food considerably digested in their bill, in the manner of the common pigeons;—the down acquires length; becomes thinner, and of a deeper tint as the bird grows older. The young vultures at three weeks are large for their age, weighing then upwards of a pound, but extremely clumsy and inactive; unable to keep up their wings, then partly covered by large pen feathers, drag them almost to the ground, bearing their whole weight on the full length of their legs and feet.

If approached at that time by a stranger or enemy, they hiss with a noise resembling that made by a strangling cat or fox, swell themselves, and hop side-ways as fast as in their power.

The parents whilst sitting, and equally disturbed, act in the same manner—fly only a very short distance, waiting there the departure of the offender to reassume their duty. As the young grows larger, the parents throw their food merely before them, and, with all their exertions, seldom bring their offspring fat to the field. Their nests become so fetid before the final departure of the young birds, that a person forced to remain there half an hour must almost be suffocated.

I have been frequently told that the same pair will not abandon their first nests or place of deposit, unless broken up during incubation. This would attach to the vulture a constancy of affection that I cannot believe exists, as I do not believe that pairing in the manner described is of any longer duration than the necessitous call of nature for the one season; and, again, were they so inclined, they would never congregate in the manner they do, but would go in single pairs all their lives like eagles.

Vultures do not possess in any degree the power of bearing off their prey as falcons do, unless it be slender portions of entrails hanging by the bill. When chased by others from a carcass, it even renders them very awkward in their flight, and forces them to the earth again almost immediately.

Many persons in *Europe* believe that buzzards prefer putrid flesh to any other. This is a mistake. Any flesh that they can at once tear with their very powerful bill in pieces, is swallowed,

no matter how fresh. What I have said of their killing and devouring young animals, are sufficient proofs of this; but it frequently happens that these birds are *forced* to wait until the hide of their prey will give way to the bill. I have seen a large dead alligator, surrounded by vultures and carrion crows, of which nearly the whole of the flesh was so completely decomposed before these birds could perforate the tough skin of the monster, that, when at last it took place, their disappointment was apparent, and the matter, in an almost fluid state, abandoned by the vultures.

It was my intention to give you further details respecting this bird in the present letter, particularly of the anatomical structure of its head and stomach, wherein I have had the pleasure of meeting corroborating evidence, through the observations made on the same by a learned anatomist of this city, Dr Knox. My time, however, is at present quite limited; but I will very soon resume the subject with great pleasure.

EDINBURGH, }

Dec. 7. 1826. }

List of Rare Plants which have Flowered in the Royal Botanic Garden, Edinburgh, during the last three months; with Descriptions of several New Plants. Communicated by
Dr GRAHAM.

10th December 1826.

Aralia spinosa.

This plant has stood on the open wall three winters, protected partially with broom twigs, but never flowered till the beginning of November last, having nearly reached the top of a wall fourteen feet high.

Asplenium flabellifolium.

Aster pulcherrimus.

Banksia integrifolia.

Begonia undulata.

B. undulata; fruticosa; foliis inæqualiter cordatis, undulatis, integerrimis, glabris, nitidis; capsulæ alis rotundatis æqualibus.

DESCRIPTION.—*Stem* erect, turgid below, tapering upwards, annular; when young slightly hispid, green, and having numerous small, oblong white spots; when older smooth, and of a reddish-grey colour; branched, branches axillary and alternate. *Leaves* petioled, alternate, distichous, unequally cordate, smooth and shining, undulate, acuminate, full green on the upper surface, paler and minutely dotted below, 3 inches long; edges occasionally reddish, especially when young, callous, quite entire, but having a dot, like an obsolete tooth, at the termination of each vein;