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ON THE SENSE OF SMELL IN BIRDS.¹

By M. XAVIER RASPAIL.

Four of the five senses are usually considered to be more or less obtuse in birds. Their sight alone is acknowledged to be more perfect and complicated than that of mammals. In regard to smell, some authors maintain that it is very slightly developed in animals of this class, those which feed on carrion being guided to their prey exclusively by sight. Others go so far as to say that this sense scarcely exists among birds. It is, however, generally admitted that nocturnal birds of prey have a pretty fine sense of smell.

The truth is that it is extremely difficult to observe birds in such a way as to make out precisely what their olfactory capacity is, since their sight and hearing are sufficient of themselves to put them on their guard against anything that may happen anywhere near them; and when they seek their food it is not easy to ascertain that their sight has not informed them of its whereabouts.

But if these circumstances have made it possible to overlook the sense of smell in birds I can not see what can have given rise to the notion that their hearing is imperfect. It is, at any rate, easy enough to convince oneself of the contrary, and so to rectify one at least of the numerous errors of accepted science.

Many a time have I seen a bird fly suddenly away for nothing but the noise of cocking a gun more than 4 rods (20 meters) off, the sportsman being quite invisible behind the peephole in the face of the blind. All gamekeepers know how prudently one has to approach trees where crows are perching, even at night, and this is still more true of ringdoves (ramiers). The smallest twig cracking under foot is enough to send the whole flock away long before the sportsman would have succeeded in finding them had they stayed. And the proof of the fineness of their hearing is that they know whether the cracking of the dead wood has been caused by man, whom they particularly dread, or by a prowling beast. I have observed that the passage of a herd of deer under the trees where crows are passing the night does not disturb them.

¹Translated from a communication to the Zoological Society of France.

Moreover, they hear their note of recall at great distances, and everybody who has observed them at liberty must agree that in their notes, which appear to us so uniform, there are nevertheless differences which escape our ears, and which for them constitute a sort of language to apprise each other of danger.

My observations show that the sense of smell is also highly developed among birds, and that it not only puts them upon their guard against danger, but also directs them in the choice of food which they would be unable to recognize by sight.

The majority of wild mammals take care to snuff the air as they go about, so as to collect any emanations which might reveal the presence of an enemy. Their nostrils are as wide open as their ears. It is easy to show this by experiment whenever one happens to be in the neighborhood of a wood inhabited by rabbits and hares. The most favorable season is in the early part of September, an hour before sunset. This is the time when these animals come out to go to pasture, the hares further from the wood, the rabbits only on its skirts. If at such a time you station yourself as silently as possible in the middle of the length of the border of the wood, well concealed in the thorny ditch that commonly limits it, you will soon be able to judge of the effect your presence has. On the windward side the rabbits will come out without suspecting anything, often to within a few yards of you, while on the leeward side you will not see a single one, and so it will be until you change your place. Every poacher is perfectly aware that, above all, he must beware of the flair of the game, and when he recognizes the passage of a hare or roe he chooses his place so as to have the wind, or, in other words, so that the animal shall come out in the quarter whence the wind blows.

Now this equally applies to pheasants and partridges; that is to say, to birds who spend the day on the ground and only occasionally resort to flight. They are rendered equally distrustful by scent. One can readily convince oneself of this by waiting for them at the hours of the day when the pheasants come out of the wood to feed in the open, and in the evening when the partridges quit the covers, where they have taken refuge from pursuit. Neither the one species nor the other will show themselves on the side where the wind will enable them to scent your presence.

Ringdoves have furnished me with a not less characteristic example. The observation dates from February, 1888, during which month the ground remained covered with a thick layer of snow. The consequence was that these birds, being famished, approached the houses to try to get Brussels sprouts, which are almost their only food in hard winters. A flock of some thirty of them remained about my vegetable garden, where they lighted several times a day on a bed of these Brussels sprout plants. Being tempted to take a few shots at them, I set up a

portable hut within range and installed myself there, calculating upon the prompt return of the doves, which my arrival had driven into the neighboring wood. Accordingly, after a short time I saw them light on an oak close by and then successively descend to the fruit trees of the garden, and one of them even alighted directly on the head of a Brussels sprout cabbage. But instead of pecking at the leaves, as I had always seen them do, while watching them from a window of the house, he kept still with his head up as if disquieted at something unusual. Then all of a sudden he flew away at the very moment when several of his companions were coming to join him. This gave the whole flock notice to depart, and away they all flew, going back to the oak, and directly after leaving altogether. I was much surprised, because the day before I had several times seen these birds when they had been dispersed by the coming of the gardener return as soon as he was gone, so that their present fright must have had some other reason. No bird of prey could have been about, because if there had been any the barnyard cocks would have given the signal. But I noticed that the wind was from the northeast, and I had placed my hut in the best place to hide it, but precisely so that the wind blew from it to the bed of Brussels sprouts. So I concluded that the first dove had scented me and had let the others know it, and that they had taken warning.

That evening I carried my hut over to the west side, where it was much more prominently in sight, but so as to be to the leeward of the bed of Brussels cabbages. The next day, at dawn, in going to my hut, I scared away three doves which had already lit there to feed. Snow had fallen during the night, and the thermometer stood at 14° F. I had not been in my place more than half an hour when the three doves came back and exposed themselves to my fire without the smallest distrust.

No more came till 3 o'clock. Losing patience, I was just leaving the hut, when I saw that a large flock had passed over the garden, and having described a curve, was lighting on the oaks of a wood some hundreds of yards away. I went back in haste, and putting my eye to the loophole, set myself to watching the birds, which I could indistinctly see among the frosty branches. I guessed that they had spied the terminals of the Brussels sprout plants sticking out of the snow, and that that was the reason of their halt; and I was right, for the doves soon came to the nearest trees, and very shortly the whole flock, which was larger than that of the day before, one after another, took their places on the sprouts. The very first comers set to feeding quite calmly, without the smallest symptom of hesitation, and I could soon choose the most compact group to aim at from among fifty or more.

I fear I may have dwelt at too great length upon details more interesting to a hunter than to a scientific man; but they seem to me well

adapted to proving the sense of smell, acting under the same circumstances as among pheasants and partridges.

I come now to observations proving that smell as well as sight serves to direct birds to their food, and I shall limit myself to those in which this inference is least liable to error.

Pheasants go for breeding to the woods of the Plaine-Basse, which continue the forest of the Lys¹ toward Gouvieux. These woods are separated from my place by worked fields about a hundred yards wide. I had never known the setting birds to cross the little plain and come to my place when they left the nest for food, until some years ago, when, having made a little basin where birds could drink in summer, the gardener told me, a few days after, that the pheasants were coming every day to drink at this basin in the interior of the park, nearly 90 yards from the quickset hedge shutting us off from the farm land between us and the woods.

Had they found the water by chance? Possibly; yet it was difficult to imagine that the setting birds, who usually quit the nest only just long enough to take their food, had come so far for nothing. The following year I wished to make sure about the matter and used the following simple plan: When the setting season came, I let the basin drain, and had all the graveled walks around it carefully raked, so that the claws of the birds should leave easily visible traces. For a fortnight no pheasant came.

It was the second week of May. The weather was dry and fine, and the wind was from the north. I had the basin filled with water, and the next day but one I found that a pheasant had come in a direct line to drink, and had returned by the same route. There could be no doubt about its sex, which was shown by the droppings close to the basin in the form that setting birds, especially among the gallinæ, produce so copiously on rising from the nest.

It is incontestible that this pheasant, like all the pheasants, male and female, which I have seen, discover water put in no matter how hidden a place; had perceived its emanations at a distance of at least 200 yards, even supposing her nest were on the very border of the wood.

In order to show that, in the observation which I am now to record, sight could not have played any part, I will begin with describing the place where it was made.

In the midst of a great lawn surrounded by wooded parts which make a thick screen on the side of the tilled fields, there is a thicket of lilacs mixed in with Austrian black pines and with pitch pines (*épicéas*). In the center of this thicket there is a little open place, and it was there that, in the hard winter of 1890-91, I chose a spot, well sheltered by the evergreens from snow squalls, to scatter wheat and other grain, which was at once appreciated by the feathered tribe, who were able

¹ A river of Flanders, rising in Picardy.—TRANSLATOR.

there to fill their crops decently in a season of want and famine. Every afternoon I used to go to renew the provision, when one day I was surprised by the noise of five partridges whom my coming had scared away from the grain. The question which at once puzzled me was how they had ever discovered it.

It was certainly the first time they had come; for I should not have failed to remark their footprints, as I saw them at that moment all about the place where grain had been scattered. Following their traces, plainly marked in the snow, all along their path back to the hedge of the inclosure, I found they had come straight from the tilled fields. They had, therefore, been attracted to this very point, and nothing but its smell could have revealed the presence of this food, which they could not have expected to find at a time when they were reduced to seeking under the crusted snow for leaves of wheat or rye.

Every other hypothesis was excluded; for if chance had brought them to the place, they would not have followed so straight a path. Sight could not have guided them, since in order to see that there was grain they must have flown directly over the little opening, which was closely sheltered by trees; and to fly that way would be to fly straight toward a cluster of houses. Besides, if they had seen the grain in that way, instead of flying back to the field to return to it on foot, they would simply have lit close by. They had, then, scented the grain while they were in the tilled field seeking for possible food.

Tomtits (*Parus major*) are particularly fond of Swiss cheese. Now, in their wild condition they can so seldom find it that most of them can have never tasted it, and consequently it can only be its smell that attracts them to it. I first found this out in a way as unfortunate as it was unexpected.

For a long time I had used Swiss cheese to bait traps intended to destroy marauding cats, as well as those other nocturnal malefactors, the hedgehogs. The latter destroy the ground nests even of the pheasants and partridges—nests not so likely to be found by cats because of their dislike for walking in dewy grass or other crops. Now, I had often found this bait gnawed by some animal—as I supposed, by a field mouse—when, one morning, the trap having snapped, I found under its striking part a crushed titmouse, a victim of imprudent assaults upon the bait of a feather-triggered trap that brings down a load of about 90 pounds. After that, to avoid destroying so valuable an insect eater, I used, especially at the setting season, as it happened then to be, to uncock the trap at dawn and take away the stick with the Swiss cheese.

Last year,¹ contrary to custom, no tomtit nested in my place. From the beginning of spring I had not seen one of these birds. Conse-

¹ See "La diminution des Oiseaux en 1897," in *La Feuille des jeunes naturalistes*, for December, 1897.

quently, my trap, always functioning through the summer, when the safety of the settings makes it the most needed, I had relaxed my precautions a little, so that the trap often remained set until quite late in the morning. But one day I found the trap had gone off, and that without catching a cat or a hedgehog, since there was no room for an animal; and, on lifting it, I was disagreeably surprised to find a female tomtit whose nest was certainly not in that neighborhood. The delicacy of her scent had caused her death.

I am now going to give instances which will remove all doubt, if any remains, of the great power of scent among birds. These observations relate to several kinds of birds which destroy slugs by searching for them in the soil and making way with them, after boring into the earth with their beaks till they come to the villainous larva.

Among these species I may mention the rook (*corbeau franc*), the magpie, and the blackbird (*moine noir*), the only ones which I have actually seen at this work. There are, very likely, others.¹ The services that the two first thus render to agriculture are generally acknowledged. In the case of the magpie they attenuate his misdeeds.

In September, 1898, I used at all hours of the day to surprise several magpies who always flew away from the same point on the lawn. My attention was soon attracted to quantities of holes that they had evidently made in the turf. Some strokes of the spade revealed young larvae of May bugs (*channetons*) several months old, 1898 being the year of the Uranian cycle in the Department of the Oise. I counted up to ten under one turf, and to-day there is an acre or so of the lawn where the grass, eaten at the roots, has rotted and made a horrid spot visible at a great distance.

The magpies had been at work there, as the rooks work in the meadows. Neither of them dig the holes they do with their strong beaks on the mere chance of finding something; they go straight for the larva they want; so that we have to admit that they scent it, notwithstanding the layer of earth that covers it.

I have said that the blackbird does the same thing, a fact which I believe was entirely unknown before 1897. But there always remains an abundance of new facts for the observer of nature to discover.

In the year named, during the month of June, I remarked in a walk bordered on both sides with lilacs, numbers of little heaps of earth that had been taken from holes, at the bottoms of several of which could be seen a print agreeing perfectly in its dimensions with the bodies of larvae of May bugs. At this time of the summer it is not unusual to find these larvae reascending nearly to the surface of the ground before redescending in July to the depth where they are to remain until their nymphal metamorphosis is accomplished.

¹ I have strong reason to believe that the green woodpecker (*? gécine vert*) hunts for slugs in the same way; but I have, as yet, no positive proof of it.

At first sight I thought a magpie, having discovered this mine of slugs, had exploited it to his own profit as well as to the great advantage of the vegetation. But the footprints that a little more attention brought to my notice on the little heaps of freshly stirred earth could only be due to some much smaller bird, such as a blackbird.

The fact was of sufficient interest to engage my further attention, and the next day I posted myself so as to get a sight of the avenue, and it was not long before I heard a blackbird and recognized the presence in the bushes of young ones just out of the nest. Soon after I saw the mother come out from under the lilacs and hop into the avenue here and there and then suddenly stop and fall to picking at the ground with her beak while she shoveled away the loosened earth with her claws. She very soon took out of the hole she had dug a slug with which she hastened to go back under the lilacs to give it to her young. The depth of the hole from the surface to the bottom of the box which the larvae occupied was about two inches (5 centimeters).

Unless we are to attribute to this bird's eyesight a sensibility to Roentgen rays, we must admit that it discovered the subterranean presence of the larvae by smell.

I shall close these observations by recalling how the turtledove abandons its eggs at every stage of incubation as soon as the hand of man has touched them, although having been absent at the time it could not discover the fact otherwise than by scent, which enables it to perceive the infinitesimal odoriferous smear left by the finger on the eggshell.

Birds are, then, endowed with a sense of smell to a degree at least equal to that of the dog, to cite but one universally known example, and it is a great error of scientific literature to represent these animals, though provided with an exceedingly complete olfactory apparatus, as unable to discover their food otherwise than by sight.