

weir. I have seen them, just at night, come within about 300 feet of the weir, and stay there, not coming nearer that night; their line would be, in some places, straight, and others, crooked, just as our weir's were shaped, though there were from 6 to 8 feet water over the weirs.

I do not think I have anything more that would be of service to you.

I remain, Dear Sir, Yours,

BENJAMIN HARDY.

Smith's Cove, November 26, 1861.

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ART. II.—*Nocturnal life of animals in the Forest.* By Capt. C. C. HARDY, Royal Artillery.

[Read Feb. 2, 1863.]

IN one of the most attractive of the works of HUMBOLDT, entitled "*Views of Nature*"—a collection of thoughts and personal observations in connection with some of the noblest objects of nature in different parts of the world visited by the great naturalist—appears an interesting fragment called "The nocturnal life of animals in the primeval forest," suggesting to me comparative remarks on animal life in our own sombre woodlands.

The great writer in the commencement of this chapter describes the scene of his observations, coupled with some decisive remarks of his own, on the nature of a primeval forest, which I think it well to introduce here. It is the boundless forest district which, in the torrid zone of South America, connects the river basins of the Orinoco and the Amazon. "This region," says HUMBOLDT, "deserves, in the strictest sense of the term, to be called a primeval forest—a term that in recent times has been so frequently misapplied. Primeval (or primitive) as applied to a forest, a nation, or a period of time, is a word of rather indefinite signification and generally but of relative import. If every wild forest, densely covered with trees, on which man has never laid his destroying hand is to be regarded as a primitive forest, then the phenomenon is common to many parts, both of the temperate and the frigid zones; if, however, this character consists in impenetrability, through which it is impossible to clear with the axe between trees measuring from 8 to 12 feet in diameter a path of any length, primitive forests belong exclusively to tropical regions. This impenetrability is by no means, as is often erroneously supposed in Europe, *always* occasioned by the interlaced climbing 'lianes' or creeping plants, for these often constitute but a very small



portion of the underwood. The chief obstacles are the shrub-like plants which fill up every space between the trees in a zone where all vegetable forms have a tendency to become arborescent."

Now our North American fir forests—especially in districts where woods predominate and the growth of timber is large—have so frequently—generally—been termed "primeval," that we are bound to enquire into the justice of HUMBOLDT'S very decisive statement of his own views of the etymology of the word. He claims the title for the South American forest from its impenetrability; had he done so from the enormous diameter and consequent age of its trees, and could have proved that they were in general the original individuals planted in the present geological epoch, we should be compelled to cede the title as not applicable to our own woods—for from the natural life of our timber trees—even the giant "*Pinus strobus*," rarely attaining more than 1000 annular rings, though an instance is recorded of 1500 having been counted—the present generation cannot look back with those ancient trees which by some have been placed as coeval with the builders of the pyramids. Still, as it is evident that in the heart of the great fir forests of the North, even in many wooded portions of this Province, the hand of man has never stirred to remove the existing giants, whilst the bones of their ancestors lie mouldering and moss-covered beneath, I cannot see why they do not merit the term primeval—not in the VON HUMBOLDT'S acceptance, but according to the ordinary recognition of its meaning, and as—"original, such as was at first," says Johnson.

Before leaving HUMBOLDT'S beautiful description of the night life of creatures on the Orinoco, and for the sake of comparison, I will quote a few passages exemplifying the excitement and confusion of sounds in these strange tropical forests as compared with the calm silence of our sombre woods:

"We passed the night as usual in the open air, on a sandy flat, on the bank of the Apure, skirted by the impenetrable forest. We had some difficulty in finding dry wood to kindle the fires, with which it is here customary to surround the bivouac as a safe-guard against the attack of the Jaguar. The air was bland and soft and the moon shone brightly. Several crocodiles approached the bank; and I have observed that fire attracts these creatures as it does our crabs and many other aquatic animals. The oars of our boat were fixed upright in the ground, to support the hammocks. Deep stillness prevailed, only broken at intervals by the blowing of the freshwater dolphins which are peculiar to the river net work of the Orinoco; they followed each other in long tracks.



“ After eleven o’clock, such a noise began in the contiguous forest, that for the remainder of the night all sleep was impossible. The wild cries of animals rung through the woods. Among the many voices which resounded together, the Indians could only recognize those which, after short pauses, were heard singly. There was the monotonous, plaintive cry of the Aluates, ‘howling monkeys,’ the whining flute-like notes of the small sapajous, the grunting murmur of the striped nocturnal ape, (which I was the first to describe), the fitful roar of the great tiger, the cuguar or maneless American lion, the peccary, the sloth, and a host of parrots, parraquas, (Ortalides), and other pheasant-like birds. Whenever the tigers approached the edge of the forest, our dog who had before barked incessantly, came howling to seek protection under the hammocks. Sometimes the cry of the tiger resounded from the branches of a tree, and was then accompanied always by the plaintive piping tones of the apes who were endeavoring to escape from the unwonted pursuit. If one asks the Indians why such a continuous noise is heard on certain nights, they answer, with a smile, that the animals are rejoicing in the beautiful moonlight, and celebrating the return of the full moon. To me, the scene appeared rather to be owing to an accidental, long-continued, and gradually increasing conflict among the animals. Thus, for instance, the jaguar will pursue the peccaries and tapirs, which densely crowded together, burst through the barrier of tree-like shrubs which opposes their flight. Terrified at the confusion, the monkeys on the tops of the trees join their cries with those of the larger animals. This arouses the tribes of birds who build their nests in communities, and suddenly the whole animal world is in a state of commotion. Further experience taught us that it was by no means always the festival of moonlight that disturbed the stillness of the forest; for we observed that the voices were loudest during violent storms of rain, or when the thunder echoed, and the lightning flashed through the depths of the woods. The good-natured Franciscan monk who (notwithstanding the fever from which he had been suffering for many months) accompanied us through the cataracts of Atures and Mapures to the Brazilian coast, used to say, when apprehensive of a storm at night, ‘May Heaven grant a quiet night both to us and to the wild beasts of the forest!’ ”

Such is a glimpse at animal existence in a region apparently forever dedicated to nature, assuming her most wondrous and luxuriant forms and plumage, and given up to the strife and dominion of the fiercer wild animals. What a contrast presents itself on entering the solitudes of the pine forests of North America—sombre, but yet most attractive to the



lover of nature, in the perfect harmony of its mysterious gloom and silence with the life of its animal tenants, their retiring and lonely habits, and their often plaintive and mournful voices! Our perceptions of the harmonies of nature as inseparably connect the mournful hooting of the great owl with the glooms of the black spruce swamp, as we can the tangled wildness and tropical vegetation of the South American forest, with the discordant notes of its gaudy parrots and the screams of its monkeys. Although almost all of our mammalia are nocturnal in their habits, and many of them beasts of prey, their nightly wanderings and strife with their victims, are conducted in the most orderly manner, compared with the scenes we have referred to. Quiet, noiseless stealth is the characteristic feature of all animal life in the forest; mutual distrust of the same species, and ever-present tendency to alarm predominates even in the wildest districts, where the sight of man is unknown, or unremembered at least. At the slightest sound the ruminants and rodents cease feeding—remaining motionless either from fear or instinct; the rabbit or hare thus frequently avoiding detection, whilst the moose can so silently withdraw if suspecting an enemy, that I have on more than one occasion, remained hours together on the stillest night believing the animal to be standing within a few yards in a neighboring thicket to which he had advanced in answer to the call, and found at length that he had suspiciously retreated. The great creature had retired, worming his huge bulk and sonorous antlers through the entangled swamp, without detection of the straining ear to which the nibbling of a porcupine at the back of a tree in the same grove was plainly audible.

The habits and sounds of animals at night are especially familiar to the hunter when calling the moose in the clear moonlight nights of September and October,—the season when this animal, forgetting his usual caution and taciturnity, finds a voice to answer the plaintive call of his mate, and often advances to sure destruction, within a few yards of his concealed foe. As the sun lowers beneath the horizon, and twilight is giving place to the uncertain light of the moon, we listen between the intervals of the Indian's calls (about twenty minutes is generally allowed) to the sounds indicating the movements of nocturnal animals and birds. The squirrels which have raced around us and angrily chirruped defiance from the surrounding trees, all through the twilight, at last have scuttled, one and all, into their holes and fastnesses, and the small birds drop, one by one—the latest being the common robin, who is loth to leave his rich pickings of ripe berries on the upland barren, on which he so revels ere taking his annual departure—into the bushes. No longer annoyed by the mul-



titudinous hum and bustle of diurnal animal life, the ear is now relieved and anxiously criticises the nocturnal sounds which now take their place. A little pattering and cracking of small sticks, often magnified into the movements of moose, accompanied by a low grunting whine, not dissimilar from the cry of a guinea-pig, attests the presence abroad of the porcupine, come forth from rocky cavern or hollow tree to revel on the rind of young trees, berries and nuts. Lucky fellow, he fears not the talons of the whooping owl or the spring of the wild cat; he is a perfect "monitor" in his way, and woe to the peace of mind and comfort of body of his adventurous assailant. Even the moose is lamed—if not for life—for a tedious time, by accidentally treading on the back of the "Maduis."

The porcupine is essentially nocturnal in its habits, retiring at break of day, (when I have often surprised them and chased them to their dens) to a long sleep and good digestion. An answer perhaps has at length been evoked from a distant moose—if from far off, resembling the noise of the chopping of an axe—when nearer—partaking of a more guttural sound, most unmistakeably imitated by the word "quoto," when uttered through a cone of birch bark; but many a time is the too sanguine hunter doomed to disappointment; the animals appreciation and perception of his own language too frequently prove the Indian, even, to be but a sorry imitator, whilst the moose at length stands still to listen—maintaining this attitude for sometimes a couple of hours without a movement—and when the impatient hunter once more ventures to allure him by another call, he is off in silent, though hasty, retreat.

As an instance, however, of departure from their usual course of caution and quiet comportment at night, on the part of the moose, I will quote what I heard in a very wild, and then almost unhunted portion of the eastern forests, from one of my former narratives:

"Though it was very cold, and my damped limbs were stiffening under me from crouching so long in the same posture, I could not but enjoy the calmness and beauty of the night. The moon was very low, but the columns of a magnificent aurora, shooting up to the zenith, threw a mellow light on the barren, which, covered by mist as by a sheet, appeared like a moonlit lake, and the numerous little clusters of dwarfish spruce as islands. We had not heard a moose answer to our call for nearly an hour, and were preparing to move, when the distant sound of a falling tree struck our ears. It appeared to come from the dim outline of forest which skirted the barren on our left, and at a great distance.

"Down we all drop again in our deeply impressed couches to listen. The sounds indicate that moose are travelling through the woods and close to the edge of the barren. Presently the foremost moose is abreast of our position, and gives vent to a wild and discordant cry. This is the signal



for a general uproar amongst the procession of moose, for a whole troop of them are following at long and cautious intervals.

“The timber is crashing loudly opposite to our position, and distant reports shew that more are still coming on from the same direction. A chorus of bellowings respond to the plaintive wail of the cow. The branches are broken more fiercely, and horns are rapidly drawn across stems as if to whet them for the combat. Momentarily I expect to hear the crashing of rival antlers. One by one the bulls pass our position, and I long to get up and dash into the dark line of forest, and with a chance shot scatter the procession; but to do so would entail wanton disturbance of the country; so we patiently wait till the last moose has passed.

“Never before had I heard the calmness of the night in the Nova Scotia forest so disturbed; they had passed as a storm, and now the barren and the surrounding country were once more enveloped in the calm repose of an autumnal night, unbroken, save by the chirrup of the snake in the swamp.”

The family of Strigidæ are now very busy hunting mice, shrews, and even hares, through the darkest swamps and occasionally uttering their melancholy hootings. That of the cat owl, horned, or eagle owl, is one of the most impressive sounds of the forest at night. Coming on the ear of the sojourner in the woods most frequently just before daybreak, and emanating from the darkest recesses, the voice of this bird is eminently suggestive of most melancholy solitude and ghostliness, and one instinctively awakens the dying embers of the fire. I believe there is nothing of its own size that this powerful fierce bird will not venture to attack under cover of the night. The poor hare constantly falls a prey to it—the settler frequently loses his poultry—even geese—through its nocturnal visits. An Indian, of my acquaintance, nearly lost a small woolly dog last fall by the attack of a cat owl; and there is one confined in a separate cell at Downs’ gardens who actually committed the crime of fratricide a short time since. This bird is not so exclusively nocturnal as some of the other species. I have frequently started them sitting exposed to open daylight, and perfectly well able to find their way to another hiding place—particularly by the wooded banks of the Shubenacadie and its tributaries.

Of all premonitors of the approach of a storm the night voices of the barred owl and the loon are the surest. “The coogogues is noisy again; more rain coming,” says the Indian, and whether we hear the unwonted chorus of wild hootings soon after sundown or at daybreak, the storm will come within the twelve hours. Such is the case when we hear in summer the frequent screams of the great northern diver answering each other from lake to lake. The barred owl seems the most impatient of daylight



of the whole family; the white owl least so, but none of them are so incapable of finding their way in broad daylight as the common barn owl of England, inhabiting ruined buildings and towers, or the wood-owl disturbed from his dark ivy-covered cavity in the hollow tree. The little Acadian owl commonly called the "saw-whet," is not uncommon in our woods—uttering, morning and evening, its peculiar and (until known) mysterious tinkling sound from the thickest groves of spruces. In one of these I once captured one just about sundown when going to a barren to call moose. The Indian made a noose on the top of a long stick, and after a little manœuvring, during which the bird kept hovering round us, hissing and setting up its wings and feathers in great anger, he got it over its neck and secured it without injury. This little owl weighing but two ounces and a copper, will actually kill a rat.

Wherever there is mystery there lies a charm. Mr. Gosse, an eminent naturalist, in describing his feelings on hearing this bird, speaks thus:

"In the forests of Lower Canada and the New England States, I have often heard in Spring, a mysterious sound, of which, to this day, I do not know the author. Soon after night sets in, a metallic sound is heard from the most sombre forest swamps, where the spruce and the hemlock give a peculiar density to the woods, known as the black growth. The sound comes up clear and regular, like the measured tinkle of a cow-bell, or gentle strokes on a piece of metal, or the action of a file upon a saw. It goes on with intervals of interruption, throughout the hours of darkness. People attribute it to a bird which they call the whetsaw; but nobody pretends to have seen it, so that this can only be considered conjecture, though a highly probable one. The monotony and pertinacity of this note had a strange charm for me, increased doubtless by the uncertainty of its origin. Night after night it would be heard in the same spot, invariably, the most sombre and gloomy recesses of the black-timbered woods. I occasionally watched for it, resorting to the woods before sunset and waiting till darkness; but, strange to say, it refused to perform under such conditions. The shy and recluse bird, if bird it was, was doubtless aware of the intrusion and on its guard.

"Once I heard it under peculiarly wild circumstances. I was riding late at night, and, just at midnight, came to a very lonely part of the road, where the black-forest rose on either side. Everything was profoundly still, and the measured tramp of my horse's feet on the frozen road, was felt as a relief to the deep and oppressive silence; when suddenly, from the sombre woods, rose the clear, metallic tinkle of the whetsaw. The sound, all unexpected as it was, was very striking, and though it was bitterly cold, I drew up for some time to listen to it. In the darkness and silence of the hour, that regularly measured sound, proceeding, too, from so gloomy a spot, had an effect on my mind, solemn and unearthly, yet not unmingled with pleasure."



There is a bird, that long after sundown, and when the moose-caller begins to feel chilled by long watching on the frosty barren, will rush past him with such velocity as to leave no time to catch a certain view of its size or form. It passes close to the ground and with the whizzing sound of an arrow. Almost every night, whilst thus watching, I have noticed this bird; can it be the night hawk? But October is late for so tender a bird; the latest day in which I have observed it in Nova Scotia, was the 28th September.

Another mysterious sound which many of the Indian hunters connect with superstition, and attribute to spirits of the Orpheonist description, is that curious, rushing sound of music—an indescribable melodious rustling in the calm atmosphere of a still October night, with which the ear of the moose-hunter becomes so well acquainted. Most probably the cause exists in the tension of the nerves of that organ.

The fierce yell of the lucifée, and the short sharp bark of the fox, often are heard in wild parts of the country: they are both in pursuit of the unfortunate hare which falls a frequent prey to so many of the carnivora and raptors. I once heard the startling cry of the former close to my head, whilst reposing in the open, after a night's moose-calling away from camp. Its bounds upon its prey, having stealthily crept to within sight, are prodigious. I have measured them as over twenty feet in the snow.

I have always noticed that in the small hours of the morning there appears to be a general cessation of movement of every living creature in the woods. Often as I have strolled from camp into the moonlight at this time, I never could detect the slightest sound—even the busy owls seemed to have retired. The approach of dawn, however, seems to call forth fresh exertions of the nocturnal animals in quest of food, and all the cries and calls are renewed—continuing till the first signs of Aurora send the owls flitting back into the thick tops of the spruces, and calling forth the busy squirrels and small birds to their daily occupation.

Once and only once did I hear the little red squirrel utter his wrathful chirrup at night—a bad sign, say the Indians; they firmly believe that it prognosticates the death of one of their friends. Neither does the chip-munk or little striped ground-squirrel come out at night; the only member of the family of nocturnal habits is the flying squirrel, a rare but most beautiful little creature. Lying in an open camp, I once saw its form sail in a curved line from tree to tree in the moonlight.

Of night songsters amongst our small birds we have few examples. The whip-poor-will is our only systematic nightingale, if we may call him



so. Arriving in June, and choosing the pleasantest retreats in copses, by picturesque intervalles, and generally preferring the neighborhood of man, the plaintive song of this bird is strongly associated with the pleasantness of a summer's evening in the country. Occasionally, however, the white throated sparrow, or the common peabiddy bird, (*F. Pennsylvanica*) strikes up his piping note at various times of the night, and is often heard when the surrounding woods are suddenly lighted up by the application of fresh fuel to the camp fire. Still, as a general rule, the pleasing notes of song birds are foreign to the solitudes of the large fir forest whose gloom is appropriately increased by the wilder voices of predatory birds and animals. With these imperfect remarks, I close the present sketch of the night life of animals in the woods.

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ART. III.—*Some recent movements of the earth's surface.* By THOS. BELT.

(Read before the Institute, Feb. 2, 1863.)

I have thought it well, in the first geological paper read before our Institute, to take a subject of general interest and to treat it in a less technical manner than is usual before scientific societies. To address rather my non-geological hearers, who must in a young society like ours, form the large majority; and to ask the indulgence of my more scientific friends.

I well recollect the interest with which I first saw sea shells encased in hard rocks, hundreds of feet above the sea, and how that interest was increased, when proof upon proof showed that nearly every sandstone had been a sea beach—nearly every limestone had been deposited in the deep ocean,—and yet, there they were, hundreds of feet above that ocean, beneath which they had all been accumulated, and where the various animals whose remains were now imbedded in their hard casing had lived and died. It was easy to understand how corals could build up, in the course of time, great masses of limestone, and how the hard casings of shell fish might be imbedded and preserved in sediments at the bottom of the sea. The difficulty was to account for the breaking up of these ancient sea bottoms and for their upheaval.

Further examination shewed that a simple or a single upheaval would not account for the phenomena. That there must have been oscillations