

stoned by whole armies of locusts, by the mere act of mastication alone, when incalculable millions of powerful jaws are in action at the same time, has been likened to the crackling of a flame of fire driven before the wind.

The Canadian student will be well repaid, by collecting all the varieties of the locusts and grass-hoppers, which abound on the Island of Montreal.

As belonging to the same family as the locusts and grass-hoppers, may be mentioned the Canadian crickets, the males of which make a chirping noise, produced as in many of the grass-hoppers by rubbing the inner part of the wing-covers like a talc-like mirror, against each other with rapidity, and sometimes by a similar alternate motion of the hind thighs against the wings and wing covers, the thighs acting as part of the bow of a violin. The last I suspect is the common practice with crickets, whose song is heard with so much regularity in the night time. The number of chirps uttered I have counted with my watch, and find it to be 76 per minute, the standard of the healthy pulse, but if any noise be made, the chirps increase to 100, very seldom more. The field cricket *Gryllus campestris*, is of a black colour and may be heard in the fields at all periods of the day, where they may be found of all sizes hopping about. The song of the house cricket, *G. Domesticus*, is to be heard in every well regulated Canadian hearth in the evening or twilight, and although it is said not to be so soft as the song of the mole cricket, which I have never met with in Canada, it is by no means disagreeable, although I must confess it is sometimes rather harsh. Opinion varies on the "vulgarly called song of these animals," for I find Milne Edwards, of whom I had expected better things, calls it a sharp and disagreeable sound, which explains the origin of their vulgar name of *cri-cri*. The author of the "Backwoods of Canada," is also evidently no admirer of the *Gryllus*, for she says—"The very crickets, that used to distract us with their chirping from morning till night, have forsaken their old haunts." But this is excusable, for a sad inroad was made by these insects into the fair author's clothes and woollens. To study the habits and song of the Canadian cricket, a good plan would be to keep a number in cages, as practised by the Spanish peasantry, who delight in its querulous chirping. (1) Among many people the chirp of the domestic cricket is considered a good omen, and its absence from a French Canadian heart produces some anxiety. Although not influenced by anything of this kind, I do entertain a partiality for the cricket's chirp, which I have been accustomed to hear with satisfaction from childhood.

All the known species of the *Mantis* are proper to America, but by the species of *Phasma* (2) which I have captured on the slopes and base of the Montreal mountain, I have not noticed that any sound was produced, notwithstanding that some species, as the *Praying Mantis*, are said "to carol forth a fine canticle."

I have observed that many beetles, particularly the large drab with long antennæ (*Mohammus*), emitted a distinct but slight sharp sound, which is attributed to the friction of the peduncle of the base of the abdomen against the inner recess of the thorax, when they alternately enter and withdraw it. The rubbing of different parts of their dense integument against each other, is however, the general explanation of these sounds in beetles. This may be the case in many of them, but I think there are, in some, true respiratory sounds, that is to say, while at rest sounds are emitted from some of the spiracles which answer the purpose of the larynx in higher animals, when the insect is motionless. In the cock chafer, which soon makes its presence known in the evening, by the noise it makes in flying about a room, the sounds are likely due to currents of air directed to some of the spiracles which exist at the interspace between every two segments of its body, as in common with the other coleoptera.

Least it might be thought that I had overlooked the sound produced by the *Anobium*, a small beetle that burrows in old timber, I will merely give it the passing notice, that its tick, which has procured for it the name of the *death-watch*, is totally unconnected with the respiratory system, and is produced by rapping its head against the wood work, and if the signal be answered, it is continually repeated. Its noise resembles a moderate tap with the nail upon the table, and this imitation will be answered by the insect, as if the real sound of its own kind. When I first heard the *death-watch*, I was told it was a very bad sign, and that it por-

(1) My readers will doubtless remember the quarrel between two boys respecting a cage full of crickets, which gave Don Quixote so much annoyance, but which was ended by the worthy squire making a purchase of the chirping brood for four farthings.

(2) *Spectrum fenoratum?*—Eds.)

tended the dissolution of some relative! The superstitious notions which prevail regarding this harmless beetle, are proposterous, but at the same time have done much mischief. The reader (especially the superstitious one) is referred to the description of the *death-watch* in Maunder's Treasury of Natural History.

Among the Lepidoptera—the butterflies of which those common to Canada have been so ably illustrated in the pages of this Journal, I have heard a stridulous sound emitted by many species of the sphinx or hawkmoth tribe, captured generally in the evening twilight. This sound is something like the squeaking of a mouse or a bat, and was strikingly pronounced in a beautiful and rare specimen of humble-bee hawkmoth, the *Sesia Pelasgus* with reddish brown wings and hyaline disks, taken in the gardens of Mr. James E. Campbell, at the foot of the Current St. Mary. This squeaking noise continued as long as the creature remained alive, and was much louder than in any other of the numerous sphinges it was my good fortune to capture. It is a well-known fact that when the *death's-head sphinx*, *Sphinx Atropos*, (1) common to England, is in the least irritated or disturbed, it emits a similar sound, and it is related that from this circumstance, together with the presence of a very large patch, exactly resembling the usual figure of a skull or *death's-head* on the top of the thorax, it is held in much dread by the vulgar in several parts of Europe, its appearance being regarded an ill omen, or harbinger of approaching fate. With the *Death's-head moth*, this sound is given out when confined or taken into the hand, and is likened to the cry of a mouse, but is said to be more plaintive and even lamentive.

The humming noise of many, if not of most of the Canadian sphinges, some good specimens of which were in my collection, is distinctly heard during their rapid flight, but it is again different from the stridulous and plaintive note emitted by them when stationary. The mode in which this sound is produced has not as yet been correctly ascertained. It has been supposed by Reaumur to be caused by rubbing the palpi against each other, and by Lorey to be owing to the rapid escape of the air from the two ventral cavities. On carefully considering the matter, there cannot be any doubt that the sound is connected with the respiratory organs, but in what manner it is produced, will probably never be ascertained. I have no doubt if attention is paid to this point, that one or more of the Canadian species may be found to emit the sound before quitting the pupa-case, as Mr. Raddon found with the *Death's-head moth*.

Although it is not always easy to detect the mode of production of the sounds generated by different tribes, we have no difficulty in rightly attributing the buzzing and humming noises heard during the flight of the dipterous and hymenopterous insects, to the forcible expulsion of the air as it streams through the respiratory spiracles. The experiments of Burmeister on bees and flies show that the noises are not so much produced by the simple motion of the wings, to which it is commonly attributed, as by the vibrations of a little membranous plate, situated in each of the posterior spiracles of the thorax; for if the apertures of these be stopped, no sound is heard, even though the wings remain in movement. These are the true vocal organs, although the full-toned buzz is increased by the action of the wings; yet many of the species, as the wasp-fly for instance will buzz when at rest.

The buzzing of the gad-fly *Tabanus* is familiar to horses and cows, (2) which are sometimes covered with blood from its attacks. The shrill trumpet of the mosquito gives us warning of the proximity of that insect, which pursues us in many parts of Canada, thirsting for our blood. The buzzing of numerous flies, including countless blue-bottles; the humming of bees, the shrill buzzing of wasps, and the creaking sound of the sawyers, are, I presume too well known to need description. The last of these is the *Tenthredo cerasi* so destructive to many of the fruit trees of North America, and the sound produced by its sawing efforts is entirely mechanical. So also is that of the timber-louse, *Atropus pulsatorius*, which in this respect resembles the *death-watch*, but belongs to the Neuroptera, and reminds me that the same family includes the celebrated *Termes* or White ants. Ants belonging to the Hymenoptera are well known as domestic pests, from their ravages some times in the well-stored cupboard; and when a swarm of them is dispersed, the only sound emitted for so unceremoniously driving them away, is a distinct and audible kind of a hiss.

I trust this slight sketch of the generation of sounds of insects:

(1) A very perfect specimen is in the Museum of the Natural History Society, presented by the writer.

(2) The horse gad-fly *Gastrophilus equi*, whilst that affecting sheep is called *Oestrus oris*, or the sheep gad-fly.