

dreaded bees. I have now an opportunity for explaining what is meant by Mimetic Analogy, and Selection of the Fittest. And this explanation will open the way for future lessons in school of which I shall presently speak.

Or, standing by the stove for a few spare minutes with a group of children, on a winter's day, I notice that a piece of cord-wood brought in to feed the fire is scored and perforated by the larvæ of the Horn-tail, *Tremex Columba*. I take the opportunity of giving the history of the insect. Thus

The *Tremex* belongs to the order HYMENOPTERA or Membraneous-winged Insects. The female of *T. Columba* is a large and handsome insect, having a peculiar ovipositor, the horny sheath of which projects from the under part of the body. The instinct of the female *Tremex* leads her to a damaged tree, a tree about to die, as a fit receptacle for her eggs. I suppose that a flourishing tree would be too moist and a dead tree too dry for food for her young. A tree in which the sap flows imperfectly, or has just ceased to flow, seems to be best suited to them. The insect bores through the bark, and lays her eggs in the white wood, so deep that in many a case she is unable to withdraw her ovipositor, and so becomes a fixture and perishes. Numbers of the dead insects thus fastened may sometimes be seen. And we can fancy a farmer lamenting the decay of a favourite maple and exclaiming bitterly in his ignorance, "They have stung it to death!" The eggs of the *Tremex* are oblong, pointed at each end, and less than the twentieth of an inch in length. As soon as the grubs are hatched they begin to tunnel their way into the tree. By the end of the year they have attained the size of small thread-worms. At the end of the second year they have grown to be $1\frac{1}{2}$ in. long, and have worked their way back towards the surface—a thin covering of bark alone shutting them from the outer world. They now assume the pupa state. In the third year the insect bursts forth from its dark prison as an imago, or perfect insect. Numbers of the grubs of *T. Columba* are destroyed by the pretty Red-headed Woodpecker (*Picus Erythrocephalus*). But more dreadful foes for the *Tremex* than woodpeckers are the ichneumonflies, *Pimpla atrata* and *P. Lunator*. These terrible insects thrust their ovipositors which are 3 or 4 inches long into the passage in which the grub is mining-poke about until they find their prey—lay an egg inside him—an egg which in due time produces a grub—a grub, mind you, inside the other grub. And the grub so produced proceeds at once to reverse the state of things in which he finds himself, and to put the outside grub into his inside—making him, as the boys would say "grub" indeed.

On the banks of the Yamaska River across the road from the Missisquoi High School is a growth of poplars. Projecting from these trees broken pupa-cases, brown and scaly, may often be seen in July and August. They are the chrysalis cases of the moth *Cossus Populi*. The caterpillars of this insect, wiser than the grubs of the *Tremex Columba* having bored their way upwards and outward till a thin film of bark alone secures them from the outer air, retire beyond the reach of the woodpeckers and ichneumons to assume the pupa or chrysalis state. But how can the footless chrysalis work its way back to the surface, that the perfect insect may in due time be set free? Nature has provided the means. Around every segment of the chrysalis is a ring of projecting teeth. By the hold which these afford, the creature can not only work its way back, but thrust itself, also, about one-third of its length out of its tunnel. The covering or case of the part thus protruded bursts; and the moth crawls out from the ruptured envelope.

The finding of the empty pupa-skin of the Cicada or of the Dragon-fly affords me an opportunity for a discourse on the Metamorphoses of Insects.

I made the acquaintance of *Cicada Canicularis* the Dog-day Harvest Bug, 16 years ago on Mount Royal. I was passing a stately elm-tree, when I noticed a seedy-looking individual of the Insect Order, who had evidently just come out from the dirt, digging his claws (and he was well provided with claws!) into the bark of the tree. I sat down and watched his manœuvres. Having obtained a good hold he began to wriggle, as if he were possessed by an insane idea of shaking the tree down, or had been suddenly seized with a violent internal disorder. All this commotion must end in something strange I thought to myself. And sure enough, in a few minutes the skin of his back burst open, and the fellow began to crawl out from his own skin, drawing out his legs as if he were drawing them out of boots. After he had shaken himself he presented the appearance you see before you; and I quietly put him, and his skin into a box which I happened to have in my pocket.

The male Cicada is furnished with musical instruments with which he, like a gallant troubadour, entertains his mistress. These are side drums—the skin of which is made to vibrate by muscular action; and no drummer-boy in the British army can beat so regular a tattoo as can the Cicada.

The female also is supplied with a remarkable arrangement, one feature of which resembles a double key-hole saw. With this she cuts into the bark of trees, and forms receptacles for her eggs. These eggs she carefully deposits. After a while they hatch; and the larvæ which emerge from them soon find their way to the roots of the tree, into which they thrust their beaks, and then commence a work of suction which is continued for a length of time. Their only nourishment being the juices of the tree. One species of Cicada (*C. Septemdecim*) is said to spend 17 years at this employment. Which is as if a man were to lie in a dark cellar for a life-time sucking beer through a straw from a vat. When however the larvæ has changed into the pupa, and the pupa has arrived at perfection the insect feels a desire to rise in the world. It climbs into the daylight, casts off its old skin and its grovelling habits, and flies off to sound its drum, or listen to the drum of its mate, and to spend a brief but merry existence in the upper air.

The *Libellula* spends its early days in the water, and a very odd appearance it presents there with its big eyes and long body. Then it has a strange mode of capturing its prey. Let us suppose the case of a sportive Water Beetle meandering amongst the plants at the bottom of a pond. Suddenly he comes face to face with a *Libellula* nymph. He pauses at what he considers a safe and respectful distance to contemplate the grim object before him, holding all his paddles in readiness for instant flight. But, alas, he has formed a wrong estimate both of his own powers and of those of his opponent. From under the jaws of the nymph, where it has lain snugly folded up, is suddenly thrust a long jointed arm, terminated with a thumb and finger which seize the beetle before he can set himself in motion, and teach him

"Never to come there no more".

The *Libellula* nymph when the time for its change has come climbs the stem of some water plant and, as in the case of the Cicada, the perfect insect creeps out from its own skin through a rent in the back.