

THE
INSECT WORLD:

BEING

A Popular Account of the Orders of Insects,

TOGETHER WITH

A DESCRIPTION OF THE HABITS AND ECONOMY OF
SOME OF THE MOST INTERESTING SPECIES.

BY

LOUIS FIGUIER.

A New Edition,

REVISED AND CORRECTED BY P. MARTIN DUNCAN, F.R.S.

WITH 579 ILLUSTRATIONS.

CASSELL & COMPANY, LIMITED:

LONDON, PARIS, NEW YORK & MELBOURNE.

to a certain extent become unbent by means of the elongated haunches which fix them to the body, and clutch firm hold of their prey with the strong claws which terminate the tarsi."

HOMOPTERA.

We come now to the second group of the order Hemiptera, namely, Homoptera.

The insects which compose this division are numerous. They may be arranged into three great families, of the most remarkable members of which we shall give some account. These are the *Cicada*, the *Aphidæ* or Plant Lice, and the *Coccidæ*.

The Cicada is the type of the first of these families. It has a deafening and monotonous song; as Bilboquet says, in the "Saltimbanques," "those who like that note have enough of it for their money." Virgil pronounced a just criticism on the song of the Cicada: he saw in it nothing better than a hoarse and disagreeable sound:—

"At mecum raucis, tua dum vestigia lustrò,
Sole sub ardenti resonant arbusta cicadis,"

says the Latin poet in his "Eclogues," and repeats the same opinion in a verse in his "Georgics:"—

"Et cantu querulæ rumpent arbusta cicadæ."

The song of the Cicada, so sharp, so discordant, was, however, the delight of the Greeks.

Listen to Plato in the first lines of "Phædo:—" "By Hera," cries the philosopher-poet, "what a charming place for repose! . . . It might well be consecrated to some nymphs and to the river Achelöu, to judge by these figures and statues. Taste a little the good air one breathes. How charming, how sweet! One hears as a summer noise an harmonious murmur accompanying the chorus of the Cicada."

The Greeks, then, had quite a peculiar taste for the song of the Cicada. They liked to hear its screeching notes, sharp as a point of steel. To enjoy it quite at their ease they shut them up in open wicker-work cages, pretty much in the same way as children shut up the cricket, so as to hear its joyous *cri-cri*. They carried their love for this insect with the screaming voice so far as to make it the symbol of music. We see, in drawings emblematical of the musical art, a Cicada resting on strings of a cythera. A Grecian legend

relates that one day two cythera players, Eunomos and Aristo, contending on this sonorous instrument, one of the strings of the former's cythera having broken, a Cicada settled on it, and sang so well in place of the broken cord, that Eunomos gained the victory, thanks to this unexpected assistant. Anacreon composed an ode in honour of the Cicada. "Happy Cicada, that on the highest branches of the trees, having drank a little dew, singest like a queen! Thy realm is all thou seest in the fields, all which grows in the forests. Thou art beloved by the labourer; no one harms thee; the mortals respect thee as the sweet harbinger of summer. Thou art cherished by the muses, cherished by Phœbus himself, who has given thee thy harmonious song. Old age does not oppress thee. O good little animal, sprung from the bosom of the earth, loving song, free from suffering, that hast neither blood nor flesh, what is there prevents thee from being a god?"

It was in virtue of the false ideas of the Greeks on natural history in general, and on the Cicada in particular, that this little animal symbolised, among the Athenians, nobility of race. They imagined that the Cicada was formed at the expense of the earth, and in its bosom, on which account those who pretended to an ancient and high origin, wore in their hair a golden Cicada. The Locrians had on their coins the image of a Cicada. This is the origin which fable assigns to the custom:—

The bank of the river upon which Locris was built was covered with screeching legions of Cicadas; whereas they were never heard (so says the legend) on the opposite bank, on which stood the town Rhegium. In explanation of this circumstance, they pretend that Hercules, wishing one day to sleep on this bank, was so tormented by the "sweet eloquence" of the Cicadas, that, furious at their concert, he asked of the gods that they should never sing there for evermore, and his prayer was immediately granted! This is why the Locrians adopted the Cicada as the arms of their city.

The Greeks did not only delight, as poets and musicians, in the song of the Cicada; they were not content with addressing to it poems, with adoring it, and striking medals bearing its image; obedient to their grosser appetites, they ate it. They thus satisfied at the same time both the mind, the spirit, and the body.

The Cicadas are easily to be recognised by their heavy, very robust, and rather thick-set bodies, by their broad head, unprolonged, having very large and prominent *ocelli*, or simple eyes, three in number, arranged in a triangle on the top of the forehead, and short antennæ. The immature anterior and posterior wings have the

shape of a sheath, or case, enveloping the body when the insect is at rest; these are transparent and destitute of colour, or sometimes adorned with bright and varied hues. The legs are not in the least suited for jumping. The female is provided with an auger, with which she makes holes in the bark of trees in which to lay her eggs. The male (Fig. 78) is provided with an organ, not of song, but of stridulation or screeching, which is very rudimentary in the female. We will stop a moment to consider the apparatus for producing the song, or rather the noise, of the male Cicada, and the structure of the female's auger. We are indebted to Réaumur for the discovery of the mechanism by the aid of which the Cicada produces the sharp noise which announces its whereabouts from afar. We will give a summary of the celebrated Memoir in which the French naturalist has so admirably described the musical apparatus of the Cicada.*

It is not in the throat that the Cicada's organ of sound is placed, but on the abdomen. On examining the abdomen of the male of a large species of Cicada, one remarks on it two horny plates, of pretty good size, which are not found on the females. Each plate has one side straight; the rest of its outline is rounded. It is by the side which is rectilinear that the plate is fixed immediately underneath the third pair of legs. It can be slightly raised, with an effort, by two spine-like processes, each of which presses upon one of the plates, and when it is raised, prevents it from being raised too much, and causes it to fall back again immediately.

If the two plates are removed and turned over on the thorax, and the parts which they hide laid bare, one is struck by the appearance which is presented. "One cannot doubt that all one sees has been made to enable the Cicada to sing," says Réaumur. "When one compares the parts which have been arranged so that it may be able to sing, as we may say, from its belly, with the organs of our throat, one finds that ours have not been made with more care than those by means of which the Cicada gives forth sounds which are not always agreeable."

We here perceive a cavity in the anterior portion of the abdomen and which is divided into two principal cells by a horny triangle.

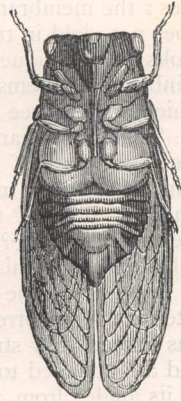


Fig. 78.—Cicada (Male).

* "Mémoires," tome v. 4to.

“The bottom of each cell offers to children who catch the Cicada a spectacle which amuses them, and which may be admired by men who know how to make the best use of their reason. The children think they see a little mirror of the thinnest and most transparent glass, or that a little blade of the most beautiful talc is set in the bottom of each of these little cells. That which one might see if this were the case would in no way differ from what one actually sees; the membrane which is stretched out at the bottom of the cells does not yield in transparency either to glass or to talc; and if one looks at it obliquely, one sees in it all the beautiful colours of the rainbow. It seems as if the Cicada has two glazed windows through which one can see into the interior of its body.”

The horny triangle of which we spoke above only separates in two the lower part of the cavity. The upper part is filled by a white, thin, but strong membrane. This membrane is only drawn tight when the body of the Cicada is raised. But with all this, where is the organ of song? What parts produce the sound? Réaumur will enlighten us on this point.

He opened the back of a Cicada, and laid bare the portion of the interior which corresponds with the cavity where the mirrors are, and was immediately struck with the size of the two muscles which meet and are attached to the back of the horny triangle, and to that one of its angles from which start the sides which form the cavities in which are both the mirrors.

“Muscles of such strength, placed in the belly of the Cicada, and in that part of the belly in which they are found, seem to be only so placed in order that they may move quickly backwards and forwards those parts which, being set in motion, produce the noise or song. And indeed, whilst I was examining one of these muscles, in moving it about gently with a pin, slightly displacing it, and then letting it return to its proper place, it so happened that I made a Cicada that had been dead for many months sing. The song, as might be expected, was not loud; but it was strong enough to lead me on to the discovery of the part to which it was due. I had only to follow the muscle I had been moving, to search for the part on which it abutted.”

In the large cavity, in which are the mirrors and the other parts mentioned above, there are besides two equal and similar compartments, two cells, in which are placed the instrument of sound. This is a membrane in the shape of a kettledrum, not smooth, but, on the contrary, crumpled and full of wrinkles (Fig. 79). When it is touched it is more sonorous than the driest parchment. If the furrows on its

convex surface are rubbed with a small body, such as a piece of rolled-up paper, incapable of piercing or tearing it, it is easily made to sound; and the sound is occasioned by the portions of the kettledrum which are depressed by the friction of the small body, returning to their former position as soon as it has ceased to act upon them. It is here that the two strong muscles act whose existence and use were discovered by Réaumur.

"It is clear," says this naturalist, "that when the muscle is alternately contracted and expanded with rapidity, one convex portion of the kettledrum will be rendered concave, and will then resume its convex form by the force of its own spring. Then this noise will be made, this song of which we have been so long seeking an explanation, because we wished to find out all the parts by means of which He, who never makes anything without its use, willed that it should be produced."

Let us add, to complete what we have already said on this subject, that if the kettledrums are the essential organs of the insect's song, the mirrors, the white and wrinkled membranes, and the exterior shutters which cover in the whole apparatus, contribute largely, as Réaumur pointed out, to modify and strengthen the sound.

We have said above that the female Cicada does not sing; and so her singing organs are quite rudimentary. This fact, moreover, has been known for ages. Xenarchus, a poet of Rhodes, says, with little gallantry:—

"Happy Cicadas! thy females are deprived of voice!"

Nature has indemnified the female Cicada for this privation, by giving her an instrument less noisy indeed, but more useful. This is a sort of auger, destined to penetrate the bark of the branches of trees, and lodged in the last segment of the abdomen, which, for this purpose, is hollowed out groove-wise. By the aid of a system of muscles the auger can be protruded or retracted at pleasure. It is furnished with three implements. In the middle there is a piercer, or bodkin, which when run into a branch supports the insect, and two *stylets*, whose upper edges, having teeth like a saw, resting back to back, on the middle implement, move up and down it. With this admirable instrument the female Cicada incises obliquely the bark and wood until she has almost reached the pith (Fig. 80). The

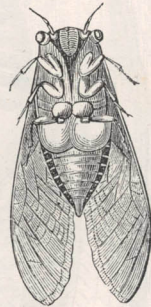


Fig. 79.
Musical Apparatus of the
Male Cicada.

male sings while she is at work. When the cell is sufficiently deep and properly prepared, the female lays at the bottom of it from five to eight eggs.

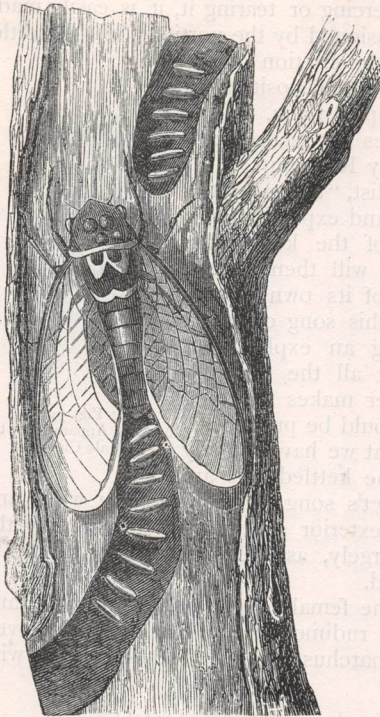


Fig. 80.—Female Cicada laying her eggs in the groove she has bored in the branch of a tree.

From these eggs come very small white grubs (Fig. 81), which leave their nest, descend by the trunk, and bury themselves in the ground, where they devour the roots of the tree. They then become pupæ, and hollowing out the earth with their front legs, which are very much developed, continue to live at the expense of the roots. At the end of spring these pupæ (Fig. 82) come out of the earth, hook themselves on to the trunks of trees, and strip themselves one fine evening of their skin, which remains whole and dried. Very weak at first, these metamorphosed insects drag themselves along with difficulty. But next day, warmed by the first rays of the sun, having had, no doubt, time to reflect on their new social position, and less astonished than they were on the preceding evening, they agitate their wings, they

fly, and the males send forth into the air the first notes of their screeching concert. The Cicadas remain on trees, whose sap they suck by means of their sharp-pointed beak. It is difficult enough to catch them, for owing to their large, highly-developed wings, they fly rapidly away on the slightest noise.

They inhabit the south of Europe, the whole of Africa from north to south, America in the same latitudes as Europe, the whole of the centre and south of Asia, New Holland, and the islands of Oceania. The Cicada, which in hot climates always exposes itself to the ardour of the most scorching sun, is not found in temperate or cold regions.

The consequence is that the southern nations know it very well, whilst in the north the large grasshopper, which is so common in those regions, and whose song closely resembles that of the Cicada, is commonly taken for it. There was to be seen at the Exhibition of Fine Arts in 1866 a picture by M. Aussandon, "La Cigale et la Fourmi," which showed, under an allegorical shape, the subject of La Fontaine's fable. The painter here represented the Cigale, or Cicada, under the form of a magnificent apple-green grasshopper. The artist



Fig. 81.—Larva of the Cicada.

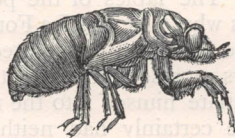


Fig. 82.—Pupa of the Cicada.

materialised here, as we may say, the common mistake of the inhabitants of the north, which makes them confound the Cicada with the great green grasshopper.

For the rest, we may, by-the-by, say that La Fontaine's fable of "La Cigale et la Fourmi" is full of errors in natural history. Nothing is easier than to prove the truth of this assertion. From the very first verses, the author shows that he has never observed the animal of which he speaks.

"La Cigale ayant chanté
Tout l'été."

No Cicada could sing "tout l'été," since it lives at the utmost for a few weeks only.

"Se trouva fort dépourvue
Quand la bise fut venue."

"Quand la bise fut venue" means without doubt the month of November or December. But at this season of the year the Cicada has a long time since passed from life to death. When one wanders along the outskirts of woods as early as the month of October, in the south of France, one finds the soil covered with dead Cicadas. La Fontaine's *Cigale* then could not have found itself "fort dépourvue," for the simple reason that it was already dead.

"Elle alla crier famine
Chez la Fourmi, sa voisine,
La priant de lui prêter
Quelque grain pour subsister."

The ant is carnivorous, and although it likes honey, it has nothing to do with grains of wheat, nor with any other grain, of which, according to the fabulist, it had laid up a stock. On the other hand, the Cicada, which he blames for having

“ Pas un seul petit morceau
De mouche ou de vermisseau,”

never dreamt of such victuals, for it lives entirely on the sap of large vegetables. The fables of the poet, who is called in France, one never knows why, “Le bon La Fontaine,” teem with errors of the same kind as those we have just pointed out. The habits of animals are nearly always represented as exactly the contrary to what they really are. To initiate himself into the mysteries of the habits of animals, La Fontaine certainly had neither the works of Buffon nor the memoirs of Réaumur, which had not then been written; but had he not the book of Nature?

But it is time to mention the principal species of the Cicada. We will describe two: that of the Ash, which lives on those trees in the south of France; and that of the Manna Ash, which is very common in the south-east of France. It is particularly plentiful in the forests of pines which abound between Bayonne and Bordeaux. It is on these two species of Cicada that Réaumur made the beautiful observations of which we gave a summary above.

The *Cicada plebeia* or *Tettigonia fraxini*, very common in Provence, is found, though rarely, in the forest of Fontainebleau, occasionally in La Brie. It is of a grey yellow below, black above; the head and thorax are marked or striped with black.

M. Solier, in a Memoir inserted in the “Annales de la Société Entomologique de France,” says that its song, very loud and very piercing, seems to consist of one single note, repeated with rapidity, which insensibly grows weaker after a certain time, and terminates in a kind of whistle, which can be partly imitated by pronouncing the two consonants *sz*, and which resembles the noise of the air coming out of a little opening in a compressed bladder. When the Cicada sings, it moves its abdomen violently, in such a manner as alternately to move it away from, and to bring it near to, the little covers of the sonorous cavities; to this movement is added a slight trembling of the mesothorax.

The same entomologist relates a very interesting observation made on this species of Cicada by his friend, M. Boyer, a chemist at Aix, and which he himself verified. The Cicadas, in general, are very timid, and fly away at the least noise. However, when a

Cicada is singing, one can approach it, whistling the while in a quavering manner, and imitating as nearly as possible, its cry, but in such a manner as to predominate over it. The insect then descends a small space down the tree, as if to approach the whistler; then it stops. But if one presents a stick to it, continuing to whistle, the Cicada settles on it and begins again to descend backwards. From time to time it stops, as if to listen. At last, attracted, and, as it were, fascinated by the harmony of the whistle, it comes to the observer himself.

M. Boyer managed thus to make a Cicada, which continued to sing as long as he whistled in harmony with it, settle on his nose. Charmed by this concert, the insect seemed to have lost its natural timidity.

The *Cicada orni* is of a greenish yellow, spotted with black. The abdomen is encircled by the same colours. The elytra and the wings are hyaline, or glassy, and their veins alternately yellow and brown. The legs are yellow throughout. The song of this species is hoarse, and cannot be heard at any great distance.

M. Solier, in the work we quoted just now, says that the song of this Cicada is of a deeper intonation, but that it is quick and is sooner over. It does not terminate in the manner which characterises that of the other species.

Next the genus *Cicada* comes *Fulgora*, whose type is the *Fulgora lanternaria*, or Lantern Fly (Fig. 83).

Belonging to South America, these insects are above all remarkable and easy to recognise, by their very large elongated head, which nearly equals three-quarters of the rest of the body. This prolongation is horizontal, vesiculous, enlarged to about the same breadth as the head, and presents above a very great gibbosity. The antennæ are short, with a globular second articulation, and a small terminal hair. The species represented in Fig. 83 is yellow varied with black. The elytra are of a greenish yellow, sprinkled with black; the wings, of the same colour, have at the extremity a large spot resembling an eye, which is surrounded by a brown circle very broad in front. It inhabits Guyana. This remarkable insect enjoys a great renown with the vulgar, by a peculiarity which might be called its speciality—the property of shining by night or in the dark. Hence its name of *Fulgora lanternaria*.

The knowledge of the *Fulgora lanternaria* has been spread and popularised in Europe by a celebrated book, which has for its title, "Métamorphoses des Insectes de Surinam." This book, which contains the result of patient study of the natural history of Dutch