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More Beetles

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CHAPTER I

THE CETONIÆ

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My hermitage boasts a long, wide lilac-walk. When May is here and the two rows of bushes, bending beneath their load of clustering blooms, form pointed arches overhead, this walk becomes a chapel, in which the loveliest festival of the year is celebrated beneath the kisses of the morning sun: a peaceful festival, with no flags flapping at the windows, no expenditure of gun-powder, no drunken squabbles; a festival of simple creatures disturbed neither by the harsh brass band of the dance nor by the shouts of the crowd acclaiming the amateur who has just won a silk handkerchief at the hop, skip and jump. Vulgar delights of drinks and crackers, how far removed are you from this solemn celebration!

I am one of the worshippers in the chapel of the lilacs. My orison, which cannot be translated into words, is a tender and intimate emotion. Devoutly I make my stations from one column of verdure to another, [2]telling step by step my observer's rosary. My prayer is an "Oh!" of admiration.

To this delicious festival pilgrims have hastened, to gain the Lenten indulgences and to slake their thirst. Here, dipping their tongues by turns into the holy-water stoup of the same flower, are the Anthophora1 and her tyrant the Melecta.2 Robber and victim sip their nectar like good neighbours. There is no ill-feeling: between them. Both attend to their own affairs in peace. They seem not to know each other.

The Osmiæ,3 clad in black-and-red velvet, dust their ventral brushes with pollen and make hoards of meal in the reeds round about. Here are the Eristales,4 noisy, giddy-pated insects, whose wings shimmer in the sun like scales of mica. Drunk with syrup, they withdraw from the festival and sleep off their debauch in the shadow of a leaf. [3]

These others are Wasps, Polistes,5 hot-tempered swashbucklers. When these intolerant creatures are abroad, peaceful insects withdraw and establish themselves elsewhere. Even the Hive-Bee, predominating in numbers and ever ready to unsheathe her sting, makes way for them, busy as she is gathering in the harvest.

These thick-set, richly variegated Moths are Sesiæ, with wings not dusted with scales throughout. The bare zones, like so much transparent gauze, contrast with the covered zones and are an added beauty. The sober sets off the magnificent.

Here is a crazy swarm, eddying, receding, returning, rising and falling. It is the ballet of the common Butterfly-folk, the Cabbage Butterflies,6 all white, with black, eye-shaped dots. They flirt in mid-air, pursuing and pressing their attentions on one another, until, weary of frolic, now one, now another of the dancers alights once more upon the [4]lilacs, quenching her thirst from the amphoræ of the flowers. While the proboscis dives down the narrow throat of the blossom, sucking the nectar at the base, the wings, gently fluttering, are raised above the back, expanding anew and again standing erect.

Almost as numerous but less sudden in flight, because of his wide-spreading wings, is the Machaon, the magnificent Swallow-tail Butterfly, with the orange spots and the blue crescents.

The children have come to join me. They are enraptured by this elegant creature, which always escapes their pouncing hands and flies a little farther to taste the nectar of the flowers while moving its wings after the fashion of the Cabbage Butterfly. If the pump is working quietly in the sunlight, if the syrup is rising easily, this gentle fanning of the wings is in all these Butterflies a sign of satisfaction.

A catch! Anna, the youngest of the whole household, gives up all hope of capturing the Swallow-tails, who never wait for her nimble little hand to seize them. She has found something more to her liking. It is the Cetonia. The handsome insect has [5]not yet recovered from the chill of morning; it lies slumbering all golden on the lilac-blossoms, unconscious of danger, incapable of flight. It is plentiful. Five or six are quickly caught. I intervene, so that the rest may be left in peace. The booty is placed in a box, with a bed of blossoms. Presently, during the heat of the day, the Cetonia, with a long thread tied to one leg, will fly in circles round the little girl’s head.

Childhood is pitiless because it does not understand, for nothing is more cruel than ignorance. None of my madcaps will heed the sufferings of the insect, a melancholy galley-slave chained to a cannon-ball. These artless minds find amusement in torture. I dare not always call them to order, for I admit that I on my side am also guilty, though I am ripened by experience, to some extent civilized and beginning to know a thing or two. They inflict suffering for the sake of amusement and I for the sake of information: is it not really the same thing? Is there a very definite line of demarcation between the experiments of knowledge and the puerilities of childhood? I cannot see it. [6]

Human barbarity in the past employed the rack to force a prisoner to speak. Am I anything but a torturer when I interrogate my insects and put them to the rack to wrest some secret from them? Let Anna get such pleasure as she can out of her prisoners, for I am meditating something worse. The Cetonia has things to reveal to us, things that will interest us, beyond a doubt. Let us try to obtain these revelations. We cannot, of course, do so without serious inconvenience to

the insect. So be it; and now let us proceed: we will silence our kindly scruples for the sake of the story.

Among the guests at the festival of the lilacs the Cetonia deserves to be most honourably mentioned. He is of a good size, which lends itself to observation. Though deficient in elegance with his massive, square-cut build, he has splendour in his favour: the gleam of copper, the flash of gold, or the austere magnificence of bronze as it leaves the brass-founder's burnisher. He is a regular frequenter of my enclosure, a neighbour, and will therefore spare me the trips which are beginning to tell upon me. Lastly—and this is an excellent quality when one wishes to be understood by all [7]one's readers—he is known to everybody, if not by his classic name,7 at least as an object that often meets the eye.

Who has not seen him, like a great emerald lying at the heart of a rose, whose tender blush he enhances by the richness of his jewellery? In this voluptuous bed of stamens and petals he is encrusted, motionless; he remains there night and day, intoxicated by the heady fragrance, drunk with nectar. It needs the stimulus of fierce sunlight to arouse him from his bliss and set him soaring with a buzzing flight.

To watch the idle Beetle in his sybaritic bed, without further information, one would hardly suspect him of gluttony. What nourishment can he find on a rose or a cluster of hawthorn-blossom? At most a tiny drop of sugary exudation, for he does not browse upon the petals, still less upon the foliage. And can this, a mere nothing, satisfy that big body? I hesitate to believe it.

In the first week of August I placed in a cage fifteen Cetoniæ that had just burst their shells in my rearing-jars. Bronze [8]above and violet underneath, they belong to the species *C. metallica*, Fab. I provide them, according to the resources of the day, with pears, plums, melon or grapes.

It is a joy to see them feast. Once at table they do not budge. Not a movement, not even a shifting of the feet. With their heads in the fruit-pulp, often with their bodies completely submerged, they sip and swallow night and day, in the darkness, in the sunlight, without a break. Surfeited with sweets, the guzzlers hold on. Collapsing under the table, that is to say, under the deliquescent fruit, they still lick their lips, in the blissful drowsiness of a child that drops asleep with its slice of bread and jam at its lips.

There is no sportiveness in their orgy, even when the sun shines fiercely into the cage. All activity is suspended; the time is wholly devoted to the joys of the stomach. In this torrid heat it is so pleasant to lie under the greengage, oozing with juice! With such good things at hand, why go flying across the fields where everything is parched? None dreams of such a thing. There is no scaling of the walls of the cage, [9]no sudden unfurling of the wings in an attempt to escape.

This life of junketing has already lasted a fortnight without producing satiety. Such a protracted banquet is not frequent; we do not find it even in the Dung-beetles, who are zealous eaters. When the Sacred Beetle, spinning his little unbroken cord of intestinal refuse, has remained a whole day on a tasty morsel, it is the most that the gormandizer can allow himself.8 But my Cetoniæ have been feasting on the sweets of the plum and pear for a full fortnight; and there is no sign yet that they have had enough. When will the orgy make way for the wedding and the cares of the future?

Well, there will be no wedding and no family-cares this year. These are put off till next year: a singular postponement, quite at variance with the usual custom, which is to be extremely expeditious in these important matters. It is the season of fruits; and the Cetonia, a passionate glutton, means to enjoy these good things without [10]being diverted from them by the worries of egg-laying. The gardens offer the luscious pear and the wrinkled fig, its eye moist with syrup. The greedy creature takes possession of them and becomes oblivious to all else.

However, the dog-days are becoming more and more pitiless. Day after day, another load of brushwood, as our peasants say, is added to the furnace of the sun. Excessive heat, like cold, produces a suspension of life. To kill the time, creatures that are grilled or frozen go to sleep. The Cetoniæ in my breeding-cage bury themselves in the sand, a couple of inches down. The sweetest fruits no longer tempt them: it is too hot.

It takes the moderate temperature of September to wake them from their torpor. At this season they reappear on the surface; they settle down to my bits of melon-rind, or slake their thirst at a small bunch of grapes, but soberly, taking only short draughts. The hunger-fits of early days and the interminable filling of the belly have gone for ever.

Now comes the cold weather. Again my captives disappear underground. Here they pass the winter, protected only by a layer of [11]sand a few inches in depth. Under this slight covering, in their wooden shelter, exposed to all the winds of heaven, they are not endangered by the severe frosts. I thought them susceptible to cold, but I find that they bear the hardships of the winter remarkably well. They have retained the robust constitution of the larvæ, which I used to find, to my astonishment, lying stiff and stark in a block of frozen snow, yet returning to life when carefully thawed.

March is not over before signs of life reappear. My buried Beetles emerge, climb up the wire trellis, wandering about if the sun is kind, going back into the sand if the air grows colder. What am I to give them? There is no fruit. I serve them some honey in a paper dish. They go to it without any marked assiduity. Let us find something more to their taste. I offer them some dates. The exotic fruit, a delicious pulp in a thin skin, suits them very well, despite its novelty: they

could set no greater store by pears or figs. The dates bring us to the end of April, the time of the first cherries.

We have now returned to the regulation diet, the fruits of the country. A very moderate consumption takes place: the hour is [12]past for feats of gastric prowess. Very soon my boarders grow indifferent to food. I surprise them in nuptial embraces, a sign that egg-laying is near at hand. In anticipation of events, I have placed in the cage, level with the soil, a pot full of dead, half-rotten leaves. About the summer solstice I see them enter it, one by one, remaining in it for some little time. Then, having finished their business, they return to the surface. For a week or two longer, they wander about, finally hiding themselves in the sand, at no great depth, and dying.

Their successors are in the pot of rotten leaves. Before the end of June I find, in the tepid mass, plenty of recent eggs and very young larvæ. I now have the explanation of a peculiarity which caused me some confusion at the time of my earlier studies. When rummaging through the big heap of leaf-mould which, in a shady corner of the garden, provides me yearly with a rich colony of Cetoniæ, I used to find, under my trowel, in July and August, intact cocoons which would soon split open under the thrust of the insect inside; I also found the adult Cetonia, who had emerged from her strong-box that very day, and quite close to [13]these I would find very young larvæ, which had only just made their appearance. I had before my eyes the crazy paradox of children born before their parents.

The breeding-cage has cleared up these obscure points completely. It has taught me that the Cetonia, in the adult form, lives through a whole year and the summer of the following year. The cocoon is broken during the summer heats of July and August. The regular thing would be, provided the season were propitious, to think at once of the family, after indulging in a few nuptial frolics. This is the general rule among other insects. For them the present form is an efflorescence of brief duration, which the needs of the future employ as quickly as may.

The Cetonia does not display this haste. She was a gross eater in her days of pot-bellied grubhood; she remains a gross eater beneath the splendour of her adult cuirass. She spends her life, so long as the heat is not too overwhelming, in the jam-factory of the orchard: apricots, pears, peaches, figs and plums. Lingering over her meal, she forgets all else and defers her egg-laying to the following year. [14]

After the torpor of hibernation in some place of shelter, she reappears with the first days of spring. But there is no fruit now; and last year’s glutton, who, for that matter, has become a frugal eater, whether by necessity or by temperament, has no other resource than the niggardly drinking-bar of the flowers. When June has come, she sows her eggs in a heap of vegetable mould,

beside the chrysalids whence the adult insect will emerge a little later. This being so, unless we are in the secret, we behold the mad spectacle of the egg preceding the mother that lays it.

Among the Cetoniæ that make their appearance in the course of the same year we must therefore distinguish two generations. Those of the spring, the inhabitants of the roses, have lived through the winter. They must lay their eggs in June and then die. Those of the autumn, passionate fruit-lovers, have recently left their nymphal dwellings. They will hibernate and will lay their eggs about the middle of the following summer.

We have come to the longest days of the year; this is the moment. In the shadow of the pines, against the wall of the enclosure, stands a heap some cubic yards in volume, [15]formed of all the rubbish of the garden and particularly of dead leaves collected at the time of their fall. This is the compost-factory which supplies the needs of my potted plants. Now this bank of corruption, warmed by the slow decomposition which is working in it, is a paradise for the Cetoniæ in their larval state. The fat grub swarms there, finding abundant provender in the shape of fermented vegetable matter and an agreeable warmth, even in the heart of the winter.

Four species live here, thriving admirably, despite the annoyance which my curiosity causes them. The most numerous is the Metallic Cetonia (*C. metallica*, Fab.). This is the insect that provides me with the greater part of my data. The others are the common Golden Cetonia, or Rose-chafer (*C. aurata*, Linn.), the Dark-brown Cetonia (*C. morio*, Fab.) and lastly the small Funeral-pall Cetonia (*C. stictica*, Linn.).9

Let us inspect the heap about nine or ten o’clock in the morning. We must be diligent and patient, for the advent of the laying mothers is subject to capricious delays [16]and often makes us wait in vain. Chance favours us. Here is a Metallic Cetonia dropping in from some neighbouring spot. In wide circles she flies once or twice over the heap; she inspects the lie of the land from above and selects a point easy of access. Whoosh! She pounces upon it, digs with her head and legs and forthwith makes her way in. Which way will she go?

At first the sense of hearing tells us of the direction followed: we hear a rustling of withered leaves as long as the insect is working through the dry outer layer. Then nothing but silence: the Cetonia has reached the moist centre of the heap. Here and here only must the laying take place, so that the grub emerging from the egg may find soft food at hand without seeking for it. Let us leave the mother to her task and return a couple of hours later.

But first let us reflect upon what has just occurred. A magnificent insect, a living gem of goldsmith’s work, was slumbering just now at the heart of a rose, on the satin of its petals, in the sweetness of its scent. And now this voluptuary in her golden tunic, this sipper of ambrosia, suddenly leaves her flower and

buries herself in corruption; she [17]abandons the sumptuous hammock, fragrant of attar, to burrow in nauseous filth. Whence this sudden depravity?

She knows that her grub will regale itself on what she herself abhors; and overcoming her repugnance, not even giving it a thought, she takes the plunge. Is she actuated by the memory of her larval days? But what memory of food can she have after a year's interval, above all after an absolute remoulding of her organism? To draw the Cetonia hither, to make her come from the rose to this putrid heap, there is something better than the memory of the belly; there is a blind, irresistible impulse, which acts in the most logical manner under cover of a seeming insanity.

Let us now return to the heap of leaf-mould. The rustle of the withered leaves has informed us approximately: we know in what direction to make our search, a minute and hesitating search, for we have to follow the mother's trail. Nevertheless, guided by the materials thrust aside on the insect's passage, we reach our goal. The eggs are found, scattered without order, always singly, with no preparatory measures. It is enough that there should be close at hand [18]soft vegetable matter, suitably fermented.

The egg is an ivory globule, departing only slightly from the spherical form and measuring nearly three millimetres10 in diameter. The hatching takes place twelve days later. The grub is white, bristling with short, sparse hairs. When laid bare and removed from its leaf-mould, it crawls upon its back, that is to say, it possesses the curious method of locomotion characteristic of its race. With its earliest wriggles it proclaims the art of walking on its back, with its legs in the air.

Nothing is easier than to rear this grub. A thin box, which hinders evaporation and keeps the provisions fresh, receives the nursling together with a selection of fermented leaves, gathered from the heap of mould. This is enough: my charge thrives and undergoes its transformation in the following year, provided I take care to renew the victuals from time to time. No entomological rearing gives less trouble than that of the Cetonia-larva, with its robust appetite and its vigorous constitution.

Its growth is rapid. At the beginning of August, four weeks after hatching, the grub [19]has reached half its final size. The idea occurs to me to estimate its consumption of food by means of the stercoral granules which collect in the box from the time of its first mouthful. I find, 11,978 cubic millimetres;11 that is to say, in one month the grub has digested a volume of matter equivalent to several thousand times its own initial bulk.

The Cetonia-grub is a mill that is always grinding dead vegetable substances into meal; it is a crushing-machine of great efficiency, which night and day, almost all the year round, shreds and powders the matter which fermentation has already reduced to tatters. In the rotting heap the fibres and veins of the

leaves would remain intact indefinitely. The grub takes possession of these refractory remnants; with its excellent shears it tears and minces them very small; it dissolves them, reducing them to a paste in the intestines, and adds them, henceforth capable of being used, to the riches of the soil.

In the larval stage, the Cetonia is a most active manufacturer of leaf-mould. When the metamorphosis occurs and I review the results of my insect-rearing for the last time, [20]I am shocked by the amount of eating which my gormandizers have done in the course of their lives; it can be measured by the bowlful.

The Cetonia-larva is worth attention from another point of view. It is a corpulent grub, an inch long, with a convex back and a flat belly. The dorsal surface is wrinkled with thick folds, on which the sparse hairs stand erect like the bristles of a brush; the ventral surface is smooth, covered with a fine skin, through which the ample wallet of ordure shows as a brown patch. The legs are very well-shaped, but are small, feeble and out of proportion to the rest of the body.

The creature is given to coiling itself into a closed ring. This is a posture of repose, or rather of anxiety and defence. At such times the living coil contracts so violently that we fear to see it burst open and void its entrails when we seek to unroll it by force. When no longer molested, the grub unrolls itself, straightens out and makes haste to escape.

Then a surprise awaits us. If placed upon the table, the harassed creature travels on its back with its legs in the air, inactive. [21]This extravagant method, contrary to the accepted usages of locomotion, appears at first sight an accident, a chance manœuvre of the bewildered animal. Not at all: it is a normal manœuvre; and the grub knows no other. You turn it over on its belly, hoping to see it progress in the customary fashion. Your attempts are useless: obstinately it lies down on its back again, obstinately it crawls along in a reversed position. Nothing will persuade it to walk on its legs. Either it will remain motionless, coiled into a circle, or, straightening itself out, it will travel upside down. This is its way of doing things.

Leave it undisturbed on the table. It sets off, longing to bury itself in the soil and escape from its tormentor. Its progress is by no means slow. The dorsal pads, actuated by a powerful layer of muscle, give it a hold even on a smooth surface, thanks to their brush-like tufts of hair. They are ambulacra which, by their multiplicity, exert a vigorous traction.

The moving mechanism is apt to roll from side to side. By reason of the rounded form of the back, the grub sometimes turns turtle. The accident is not serious. With a heave of its loins, the capsized grub at once [22]recovers its balance and resumes its dorsal crawl, accompanied by a gentle swaying to right and left. It also pitches to and fro. The prow of the vessel, the larva’s head, rises

and falls in measured oscillations. The mandibles open and bite at space, apparently trying to seize some support which is lacking.

Let us give it this support: not in the leaf-mould, whose opacity would hide what I want to see, but in a transparent medium. I happen to have what I need, a glass tube of some length, open at both ends and of a gradually diminishing calibre. At the large end the grub enters comfortably; at the other end it finds a very tight fit.

As long as the tube is more than wide enough, the grub moves along on its back. Then it enters a part of the tube whose calibre is equal to that of its body. From this moment the locomotion loses its abnormal character. No matter what its position, whether the belly is uppermost, undermost or to one side, the grub advances. I see the muscular waves of the dorsal pads moving with a beautiful regularity, like the ripples spreading over a calm sheet of water which has been disturbed by the fall of a pebble. [23]I see the bristles bowing and standing up again like corn waving in the wind.

The head oscillates evenly. The tips of the mandibles are used as a crutch which measures the paces in advance and gives stability by obtaining a purchase of the walls. In all the positions, which I vary at will by turning the tube between my fingers, the legs remain inactive even when they touch the supporting surface. Their part in locomotion is almost *nil*. What use, then, can they be? We shall see presently.

The transparent channel in which the larva is worming its way tells us what happens in the heart of the heap of garden-mould. Supported on every side at once, close-sheathed in the substance traversed, the grub progresses in the normal position as often as in the reversed position and even oftener. By virtue of its dorsal waves, which come into contact with the surrounding materials in every direction, it moves back or belly uppermost, indifferently. Here are no longer fantastic exceptions; matters return to their habitual order; if we could see the grub ambling through the heap of rotting leaves, we should not regard it as in any way peculiar. [24]

But, when we expose it on the table, we perceive a glaring anomaly, which disappears upon reflection. Support is lacking on every side save from below. The dorsal pads, the principal ambulacra, take contact with this one surface; and the animal straightway walks upside down. The Cetonia-grub surprises us by the strangeness of its locomotion merely because we are observing it outside its usual environment. It is thus that the other corpulent, short-legged grubs would travel—the grubs of the Cockchafer, the Oryctes12 or the Anoxia-beetle—were it possible to unroll them entirely and to straighten out the crook of their mighty paunches.

In June, which is laying-season, the old larvæ that have lived through the winter make their preparations for the transformation. The nymphal caskets are

contemporary with the ivory globules from which the new generation will emerge. Although rudely made, the Cetonia-cocoons are not without a certain elegance. They are ovoids almost the size of a Pigeon's egg. Those of the Funeral-pall Cetonia, the smallest of the species inhabiting my heap of leaf-mould, [25]are very much smaller, hardly larger than a cherry.

All, however, have the same shape and the same appearance, so much so that, with the exception of the small cocoons of the Funeral-pall Cetonia, I cannot distinguish one from the other. Here the work tells me nothing of the worker; I must wait until the adults come out to name my discoveries correctly. However, as a general rule, subject to many exceptions, the cocoons of the Golden Cetonia have an outside facing of the insect's droppings, set close together without any definite arrangement. Those of the Metallic Cetonia and the Dark-brown Cetonia are covered with remnants of decayed leaves.

We must regard these differences as resulting merely from the materials that surround the grub at the moment when it is building its cocoon and not from a special method of construction. It seems to me that the Golden Cetonia likes building in the midst of its old dejecta, now hard granules, while the other two prefer cleaner spots. Hence, no doubt, the diversity of the outer layer.

In the case of the three larger Cetoniæ, [26]the cocoons are free, that is to say, they do not adhere to a fixed base; they are constructed without a special foundation. The Funeral-pall Cetonia has other methods. If it finds in the leaf-mould a little stone, no larger than a finger-nail, it will by preference build its hut on this; but, if there is no little stone, it can quite well dispense with it and build as the others do, without any firm support.

The inside of the cocoon is smooth as stucco, as is required by the delicate skin first of the grub, then of the nymph. The wall is tough, resisting the pressure of the finger. It consists of a brown, homogeneous material, of a nature which at first is difficult to determine. It must have been a smooth paste which the grub worked in its own fashion, even as the potter works his clay.

Does the ceramic art of the Cetonia likewise employ some sort of fuller's earth? So we should judge from the books, which agree in regarding the cocoons of the Cockchafer, the Oryctes, the Cetonia and other Beetles as earthy structures. The books, which are generally compilations and not collections of facts directly observed, do not [27]inspire me with much confidence. In this instance my doubts are increased, for the Cetonia-larva could not find the necessary clay within a short radius, in the midst of the decayed leaves around it.

I myself, digging this way and that in the heap, should be greatly put to it to collect enough plastic material to fill a thimble. What of the grub, which no longer stirs from its place when the time has come to shut itself up in a cocoon? It can gather only immediately around it. And what does it find? Solely remains

of leaves, humus, a bad mortar that does not set. The conclusion is inevitable: the grub must have other resources.

To divulge these resources will perhaps expose me to the foolish accusation of unblushing realism. Certain ideas shock us though they are quite straightforward and consistent with the sacred simplicity of things. Nature has not our scruples: she makes direct for her goal, heedless of our approval and our dislike. Let us silence a delicacy which seems out of place: we must ourselves become animals to a certain small extent, if we wish to understand the beautiful economy of animal industry. Let us [28]gloss over things as best we can, but let us not shrink from the truth.

The Cetonia-larva is about to build itself a strong-box in which the transformation, the most delicate of tasks, will be accomplished; it is about to erect itself an enclosing wall, I might almost say, to spin itself a cocoon. The caterpillar, to weave its cocoon withal, has silk-tubes and a spinneret. The Cetonia-larva, which cannot make use of outside things, has nothing at all, it would seem. But this is a mistake. Its poverty is only apparent. Like the caterpillar, it has secret reserves of building-materials; it has even a spinneret, but at the other end of its body. Its store of cement is its intestine.

The grub was a mighty evacuator in its active period, as is proved by the brown granules which it has scattered in profusion along its road. As the transformation approached, it became more moderate; it began to save up, amassing a hoard of paste of a most fine and binding quality. Observe the tip of its belly as it withdraws from the world. You will see a wide dark patch. This is the bag of cement showing through its skin. This store, so well provided, tells us plainly in what the artisan specializes: [29]the Cetonia-larva works exclusively in fæcal masonry.

If proofs were needed, here they are. I isolate some larvæ which have attained their full maturity and are ready to build, in small jars, placing one in each. As building needs a support, I provide each jar with some slight contents, which can easily be removed. One receives some cotton-wool, chopped small with the scissors; another some bits of paper, the size of a lentil; a third some parsley-seed; a fourth some radish-seed. I use whatever comes to hand, without preference for this or that.

The larvæ do not hesitate to bury themselves in these surroundings, which their race has never frequented. There is here no earthy matter, such as we should expect to find used in the construction of the cocoons; there is no clay to be collected. Everything is perfectly clean. If the grub builds, it can only do so with mortar from its own factory. But will it build?

To be sure it will and supremely well. In a few days' time I have magnificent cocoons, as strong as those that I extracted from the leaf-mould. They are, moreover, much prettier in appearance. In the flask [30]containing cotton-wool,

they are clad in a fluffy fleece; in that containing bits of paper, they are covered with white tiles, as though they had been snowed upon; in those containing radish or parsley-seed they have the look of nutmegs embellished with an accurate milling. This time the work is really beautiful. When human artifice assists the talent of the stercoral artist, the result is a pretty toy.

The outer wrapper of paper scales, seeds or tufts of cotton-wool adheres fairly well. Beneath it is the real wall, consisting entirely of brown cement. The regularity of the shell gives us at first the idea of an intentional arrangement. The same idea occurs to us if we consider the cocoon of the Golden Cetonia, which is often prettily adorned with a rubble of droppings. It looks as though the grub collected from all around such building-stones as suit its purpose and encrusted them piecemeal in the mortar to give greater strength to the work.

But this is not so at all. There is no mosaic-work. With its round rump the larva presses back the shifting material on every side; it adjusts it, levels it by simple pressure and then fixes it, at one point after another, [31]by means of its mortar. Thus it obtains an egg-shaped cavity which it reinforces at leisure with fresh layers of plaster, until its excremental reserves are exhausted. Everything that is reached by the trickling of the cement sets like concrete and henceforth forms part of the wall, without any further intervention by the builder.

To follow the grub through the whole course of its labours is impracticable: it works under a roof, protected from our indiscretion. But we can at least surprise the essential secret of its method. I select a cocoon whose softness indicates that the work is not yet completed. I make a moderate hole in it. If it were too wide, the breach would discourage the occupant and would make it impossible for the grub to repair its shattered roof, not for lack of materials, but for want of support.

Let us make a cautious incision with the point of a penknife and look. The grub is rolled into a hook which is almost closed. Feeling uneasy, it puts its head to the sky-light which I have opened and investigates what has happened. The accident is soon perceived. Thereupon the hook closes entirely, the opposite poles of the grub come [32]into mutual contact and then and there the builder is in possession of a pellet of cement which the stercoral factory has that moment furnished. To display such prompt obedience the intestine must certainly be peculiarly obliging. That of the Cetonia-larva is very highly so; directly it is called upon to act, it acts.

Now the true function of the legs is revealed. Of no use for walking, they become precious auxiliaries when the time comes for building. They are tiny hands that seize the piece gathered by the mandibles, turn it over and over, and hold it while the mason subdivides it and applies it economically. The pincers of the mandibles serve as a trowel.

They cut bit after bit from the lump, chewing and kneading the material and then spreading it on the edge of the breach. The forehead presses and smooths it as it is laid. When the supply of the moment is exhausted, the grub, coiling itself again into a closed hook, will obtain a further piece from its warehouse, which remains obedient to its orders.

The little that the breach allows us to see—for it is pretty quickly repaired—tells [33]us what goes on under ordinary conditions. Without the aid of sight, we see the grub evacuating at intervals and renewing its store of cement; we can follow it as it gathers the clod with the tips of its mandibles, squeezing it with its legs, dividing it to its liking and spreading it with its mouth and forehead on the weak spots of the wall. A rolling motion of the rump gives it a polish. Without borrowing any extraneous materials, the builder finds within itself the building-stones of its edifice.

A similar stercoral talent is the portion of other big-bellied larvæ, which wear around their abdomen a wide brown sash, the insignia of their craft. With the contents of their intestinal wallet they build the hut in which metamorphosis takes place. All tells us of the high economy which knows the secret of turning the abject into the decent and of producing from a box of ordure the Golden Cetonia, the guest of the roses and the glory of the spring. [34]

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1 One of the wild Bees. Cf. *The Mason-bees*, by J. Henri Fabre, translated by Alexander Teixeira de Mattos: chap. viii; and *Bramble-bees and Others*, by J. Henri Fabre, translated by Alexander Teixeira de Mattos: chaps. ii., iv. and vii.—*Translator's Note.*↑

2 A parasitic Bee. Cf. *The Mason-bees*: chap. viii.—*Translator's Note.*↑

3 For these wild bees, cf. *Bramble-bees and others: passim*.—*Translator's Note.*↑

4 Drone-flies.—*Translator's Note.*↑

5 Cf. *The Hunting Wasps*, by J. Henri Fabre, translated by Alexander Teixeira de Mattos: chap. vii.; and *The Mason-Wasps*, by J. Henri Fabre, translated by Alexander Teixeira de Mattos: chaps. ix and x.—*Translator's Note.*↑

6 Cf. *The Life of the Caterpillar*, by J. Henri Fabre, translated by Alexander Teixeira de Mattos: chap. xiv.—*Translator's Note.*↑

7 The Cetonia is also known as the Rose-chafer (*C. aurata*). Cf. *More Hunting Wasps*, by J. Henri Fabre, translated by Alexander Teixeira de Mattos: *Translator's Note*.↑

8 Cf. *The Sacred Beetle and Others*, by J. Henri Fabre, translated by Alexander Teixeira de Mattos: chaps. i to vii. and in particular chap. iv.—*Translator's Note.*↑

9 This Beetle, also known as *C. Oxythyrea*, Muls., is black and, in the males, covered with white spots, suggesting a pall.—*Translator's Note.*↑

10 .117 inch.—*Translator's Note.*↑

11 732 cubic inches.—*Translator's Note.*↑

12 The Rhinoceros-Beetle.—*Translator's Note.*↑

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CHAPTER II

SAPRINI, DERMESTES AND OTHERS

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Twenty thousand, Réaumur1 tells us, twenty thousand embryos in the body of the Grey Flesh-fly!2 Twenty thousand! What does she want with this formidable family? With offspring that reproduce themselves several times in a year, does she intend to dominate the world? She would be capable of it. Speaking of the Bluebottle,3 who is far less prolific, Linnæus4 already wrote:

"Three Flies consume the carcase of a Horse as quickly as a Lion could do it."

What could not the other accomplish? [35]

Réaumur reassures us:

"Despite such amazing fertility," he says, "these sorts of Flies are not commoner than others which resemble them and in whose ovaries we find only two eggs. The maggots of the former are seemingly destined to feed other insects, which very few of them escape."

Now which are the insects charged with this task of extirpation? The master suspects their existence; he guesses that they are there, without having had the occasion to observe them. My retting-vats provide me with the means of filling up this historical gap; they show me the consumers at their appointed

task of thinning out the obtrusive maggot. Let me record this tragic business.

A larger Adder is liquefying, thanks to the solvent dribbled by the teeming vermin. The earthenware dish becomes a porringer full of cadaveric fluid whence the reptile's backbone emerges spiral-wise. The scaly sheath swells up and throbs in gentle undulations, as though an internal tide were lifting the skin with its ebb and flow. Gangs of workers pass to and fro between skin and muscle, seeking a suitable spot for their activities. A few of them show themselves [36]for a moment between the disjointed scales. Surprised by the light, they dart forth their pointed heads and at once pop in again. Close beside them, in the gaps between the spiral coils, the highly-flavoured broth lies in stagnant channels. Here the greater part are feeding in shoals, motionless, packed together, with their bud-shaped breathing-holes expanded on the surface of the liquid. Their numbers are indefinite and immense, defying computation.

Many strangers take part in the maggots' banquet. The first to hasten to it are the Saprini, lovers of corruption, as their name implies. They arrive at the same time as the Luciliæ,5 before the flesh liquefies. They take up their positions, inspect the body, tease one another in the sunshine, disappear under the corpse. The time has not yet come for a good square meal. They wait.

Despite their habit of dwelling in fetid surroundings, the Saprini are pretty insects. Well-armoured, thickset, moving by fits and starts with short, quick steps, they glisten like beads of jet. On their shoulders are [37]chevron-like stripes which the classifier notes to mark where he stands in the midst of this specific variety; they temper the brilliance of their black wing-cases with stippled spaces which diffuse the light. Some display polished, shimmering patches on a dull-bronze background chased as though with the graver's tool. Sometimes the sombre ebony costume is embellished with brightly-coloured ornaments. The Spotted Saprinus decorates each wing-case with a splendid orange crescent. In short, considered merely from the æsthetic point of view, these little undertakers' assistants are by no means devoid of merit. They cut an excellent figure in the glass cases of our collections.

But one should see them above all at work. The Snake is submerged in the broth of its liquefied flesh. The maggots are legion. With their diadem-like valves gently opening and closing, they lie, spread like a field of flowers on the pool of meat-extract. The hour has come for the Saprini to begin feasting.

Busily bustling to and fro on the parts that are still uncovered, they scale the reefs and promontories formed by the reptile's coils and from these points, protected [38]against the perilous flood, they fish for their favourite titbit. Here is a grub near the bank, one not too large and for that reason all the more

tender. One of the gluttons sees it, cautiously approaches the depths, snaps with his mandibles and pulls, uprooting his prey. The plump little sausage emerges, wriggling. As soon as it is on dry land, the victim is disembowelled and rapturously crunched up. Not a scrap is left. The morsel is often shared, two collaborators tugging in opposite directions, but without a scuffle.

Maggot-fishing is carried on in this way at every point of the shore. The catch is not abundant, for most of the fry are some distance from the mainland, in deep waters where the Saprini do not venture. They never risk wetting their feet. However, the tide withdraws by degrees, absorbed by the sand and evaporated by the sun. The grubs retreat under the corpse; the Saprini follow them. The massacre becomes general. A few days later, we remove the Snake. There are no maggots left. Nor are there any in the sand, making ready for the metamorphosis. The horde has disappeared: it has been eaten. [39]

The extermination is so complete that, to obtain pupæ, I have to resort to rearing them in private, guarding the larvæ against the invasion of the Saprini. The earthenware pans in the open air, though thoroughly searched, never yield me any, however numerous the maggots were at the outset. During my earlier experiments, when as yet I had no suspicion of the massacre, I could not get over my surprise when, after noting an abundance of vermin under this or that piece of carrion a few days before,

I no longer found anything, even in the sand. I should have concluded that the occupants had migrated in a body, had it been permissible to imagine a maggot making a long journey through a waterless world.

The Saprini, those lovers of fat sausages are entrusted with the task of thinning out the Grey Fly, of whose twenty thousand offspring only a few will survive, just enough to maintain the race within proper limits. They flock about the dead Mole or Adder; but, kept at a distance by the too liquid sanies and, for that matter, able to live on a few frugal mouthfuls, they wait until the maggots' work is finished. Then, the liquefaction of the corpse completed, they slaughter [40]the liquidators. To purge the soil swiftly of life's offal, the scavenging maggot multiplies its legions; then, having itself become a peril by reason of its numbers, it disappears, exterminated, when its cleansing task is done.

In my district, I obtain nine species of Saprini, some found under carrion, others under dung. I give their names in a footnote.6 The first four species hasten to my earthenware pans, but the most numerous and most assiduous, those on whom the bulk of the work falls, are *S. subnitidus* and *S. detersus*. They arrive as early as April, at the same time as the Luciliæ, whose offspring they ravage with the same zeal as that of the Grey Fly. Both of them abound in my charnel-pits until the torrid sun of the dog-days puts an end to the invasion of the Flies by

drying up the exposed carrion too quickly. They reappear in September, with the first cool breezes of autumn.

Flesh or fish, fur, feather or reptile, everything suits them because it also attracts the [41]maggot, their favourite meat. While waiting for the vermin to grow, they take a few sips of the sanies; but these are scarcely more than an appetizer in preparation for the great feast, when the wriggling grubs are fattened to a turn.

Seeing them so active, one at first pictures them as occupied with family-cares. So I believed; and I was wrong. Under the carrion in my necrotic laboratory, there is never an egg belonging to them, never a larva. The family must be established elsewhere, in the dung-hills and dust-heaps apparently. I have, in fact, found their nymphs, which are easily recognized, in March, on the floor of a poultry-run saturated with the droppings of the fowls. The adults visit my retting-pans to feast upon the maggot. When their mission is accomplished, in the late autumn, they seem to return to the filth under whose shelter the generation is prepared which, as soon as winter is over, hastens to the dead bodies of animals to moderate the excesses of the Sarcophagæ7 and the Luciliæ.

The labours of the Fly do not satisfy the requirements of hygiene. When the soil [42]has drunk the cadaveric extract elaborated by the grubs, a great deal remains that cannot be liquefied or dried

up by the heat. Other workers are needed, who treat the mummified carcase anew, nibbling at the shrivelled muscles and tendons until the relics are reduced to a heap of bones as clean as ivory.

The Dermestes are charged with this long labour of gnawing. Two species come to my earthenware pans at the same time as the Saprini: *D. undulatus*, Brahm., and *D. Frischii*, Kugel. The first, striped with fine, snow-white, wavy lines on a black ground, has a red corselet speckled with brown spots; the second, the larger of the two, is dull black all over, with the sides of the corselet powdered ashen grey. Both wear white flannel underneath, which forms a violent contrast with the rest of the costume and seems inconsistent with the insect's calling.

The Necrophorus,8 the burier of the dead, has already shown us this propensity for soft stuffs and the clash of discordant colours. He covers his breast with a waistcoat of nankeen [43]flannel, decorates his wing-cases with red stripes and sports an orange club at the tip of his antennæ. The Wavy Dermestes, wearing a leopard-skin cape and a jerkin striped with ermine, could almost, humble though he be, rival the elegance of this mighty undertaker.

Both of them numerous, the two Dermestes come to my earthenware receptacles with a common aim; to dissect the dead body to the bone and to feed on what the maggots have left. If the work of these is not completed, if the lower surface of the corpse is still oozing, they wait, gathered on the edges of the