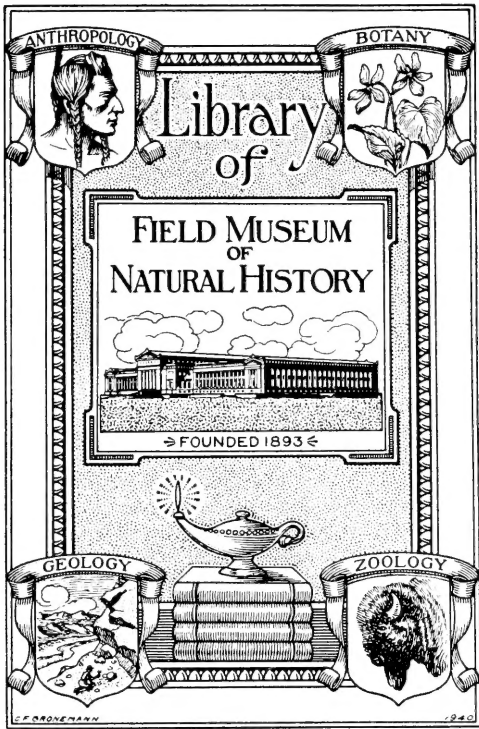
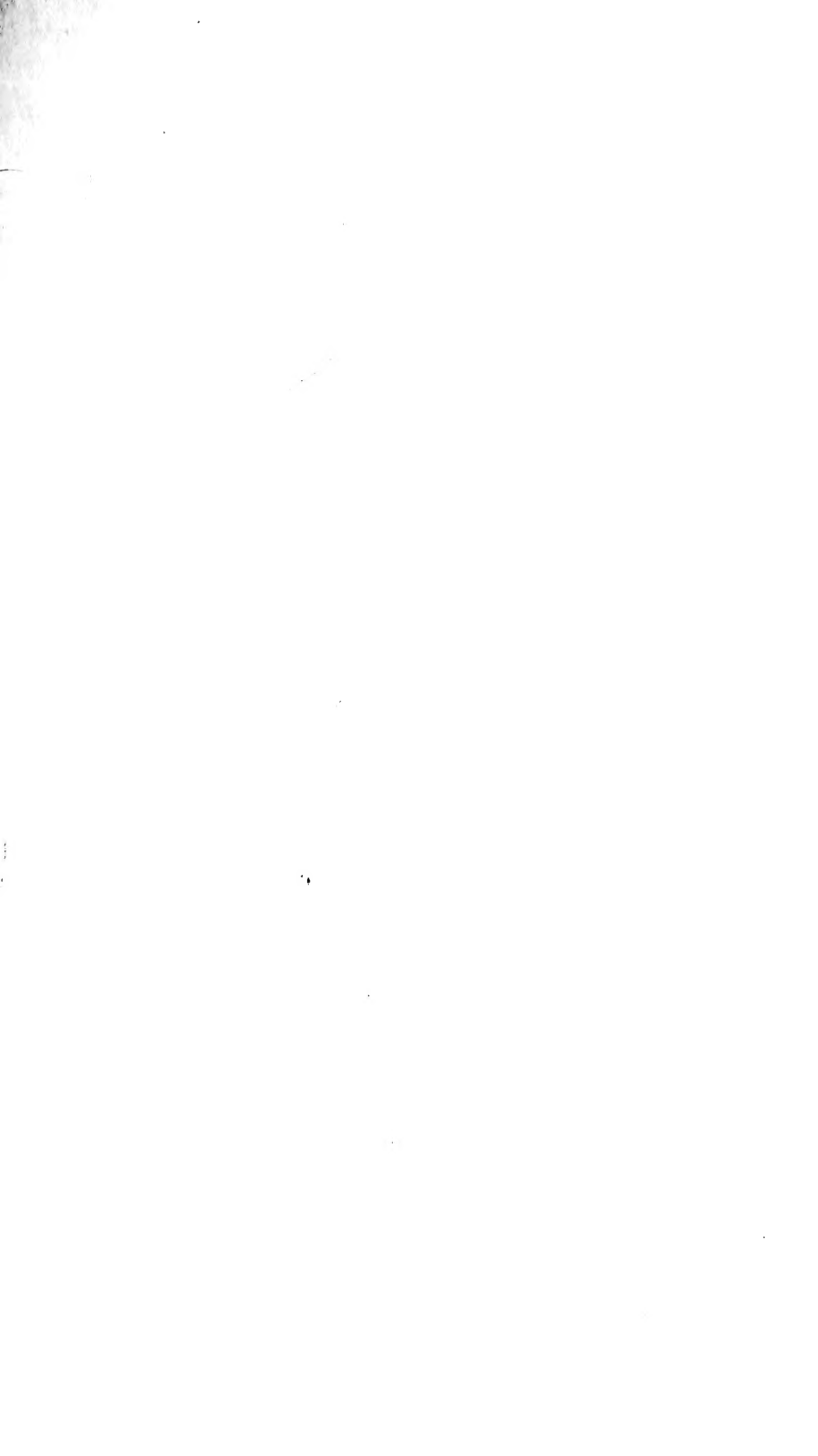


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SCIENTIFIC TRACTS.

VOL. II.....NO. XV.

THE BEE.

THE Bee tribe of insects is very large, embracing a vast variety of species. The general characteristics of the genus are four membranaceous wings, and the female being armed with a sting. This genus is called by naturalists *apes*, and there are no other genera of insects which comprehend a greater number or variety. In this article our attention will be directed to but one species, the common honey or domesticated bee.

Almost from time immemorial this useful little insect has attracted the attention and the admiration of man. Treatises respecting its habits, and the mode of its cultivation, are frequently found from the pens of the ancient classic writers. And their poetry is interspersed with images and illustrations drawn from their domestic economy. The bee is found in almost every country, and sips honey alike from the flower which blooms in the city and the wilderness.

In the warmer latitudes where a meridian sun adorns the landscape with almost perpetual bloom, this little insect finds its most congenial home. It revels amid the luxuriant vegetation of the tropics with but little care from the hand of culture, and the abundant produce of its industry affords one of the richest luxuries.

The skill, the industry, and the wonderful order preserved by these little animals, have excited much astonishment, and their history is replete with interest and instruction. The sagacity which they manifest is perhaps surpassed by that of no other animal. Their little empire is gov-

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erned by laws more unvaried than those of the Medes and Persians, and even the most industrious of our species may learn a lesson from the persevering diligence of this little insect. The skill in workmanship, which the arrangement and construction of their cells exhibit, is truly wonderful. And the amount of honey which they collect in one season, shows with what unwearied diligence they pursue their toils. 'When the day is fine and the sun shining brightly, the habitation of these marvellous little creatures exhibits the aspect of a populous and busy city. The gates are crowded with hundreds of industrious workers — some on the wing in search of sustenance; others returning from the field laden with food — some earnestly engaged in building — some in tending the young — others employed in cleansing their habitation — while four or five may be seen dragging out the corpse of a companion, and, as it would appear, scrupulously paying the last honors to the dead. At one moment the entrances of the little city are comparatively free; at another, crowds of its inhabitants may be seen struggling at the gates, making the best of their way to escape from the rain, which by some peculiar sensation they have discovered to be at hand. It can therefore excite no wonder that the habits of these interesting insects should have attracted the attention of some of the best observers of ancient and of modern times.' Probably honey was long used before bees were domesticated. Innumerable swarms were continually depositing their precious stores in the groves of Palestine, so that the land was said to flow with milk and honey. History does not inform us when these industrious little insects were brought from their native grove to labor for man. But now in all parts of the civilized world the cheerful hum of the bee is heard in the farm yard. Long and careful examination of their habits has swept away fabulous stories engendered by imagination, and has brought to light the real history of the bee, replete with interest and wonder.

THE STRUCTURE OF THE BEE.

In every hive or swarm of bees there are three classes.
1. A female, or queen bee. 2. Males, or drones, which

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do no work. 3. The common working bees, which are supposed to be of no sex. These three classes are so different from each other that they are very easily distinguished. There is but one queen bee in each swarm and she is the prolific mother of many thousands. She is larger in every respect than the common working bee, and longer, though not so large in the trunk as the male. The queen bee is distinguished from the working bee simply by the size. There is a little difference in color but this is so small that it is not easily distinguished. The belly of the queen bee is of a lighter color than that of the working bee, but that is a part of the body which is not often exposed. When a hive is killed, by spreading the bees upon white paper, the queen by her size and color may be easily found. The queen has a sting similar to the working bee. The male bee is larger than the laborers, and is considerably thicker than the queen. His proboscis appears not to be formed for collecting honey for it is much shorter than that of the working bee. He is never found abroad on flowers, and is not provided with a sting. There are but few males in the hive, some state the number to be four or five hundred; others suppose it to be much less.

The class of laboring bees, is the largest in number, there being in a common hive seven or eight thousand. Their organization demands a more minute description.

‘In examining the structure of the common working bee, the first remarkable part that offers is the trunk, which serves to extract the honey from flowers. It is not formed like that of other flies, in the manner of a tube, by which the fluid is to be sucked up, but like a brush broom to sweep, or a tongue to lick it away. The animal is furnished also with teeth which serve it in making wax. This substance is gathered from flowers. Like honey it consists of that dust, or farina, which contributes to the fecundation of plants, and is moulded into wax by the little animal at leisure. Every bee when it leaves the hive to collect this precious store, enters into the cup of the flower, particularly such as seem charged with the greatest quantities of this yellow farina. As the animal’s body is covered over with hair, it rolls itself within the flower, and

soon becomes quite covered with the dust, which it soon after brushes off, with its two hind legs, and kneads into two little balls. In the thighs of the hind legs there are two cavities edged with hair, and into these as into a basket the animal sticks its pellets. Thus employed the bee flies from flower to flower, increasing its store and adding to its stock of wax, until the ball upon each thigh becomes as big as a grain of pepper. By this time, having got a sufficient load, it returns, making the best of its way to the hive.

The belly of the bee is divided into six rings which sometimes shorten the body by slipping one over the other. It contains within it, beside the intestines, the honey bag, the venom bag, and the sting. The honey bag is as transparent as crystal, containing the honey that the bee has drawn from the flowers, of which the greater part is carried to the hive, and poured into the cells of the honey comb, while the remainder serves for the bee's own nourishment; for during summer it never touches what has been laid up for the winter. The sting which serves to defend this little animal from its enemies, is composed of three parts; the sheath and two darts which are extremely small and penetrating. Both of the darts have several small parts or barbs like those of a fish-hook, which render the sting more painful and make the darts rankle in the wound; still however this instrument would be very slight did not the bee poison the wound. The sheath which has a sharp point, makes the first impression which is followed by that of the darts, and then the venomous liquor is poured in. The sheath sometimes sticks so fast in the wound that the animal is obliged to leave it behind, by which the bee soon after dies, and the wound is considerably inflamed. It might at first appear well for mankind if the bee were without its sting; but upon recollection it will be found that the little animal would then have too many rivals in sharing its labor. A hundred other lazy animals, fond of honey and hating labor, would intrude upon the sweets of the hive, and the treasure would be carried off for want of armed guardians to protect it. The concentric rings which compose the belly of the bee are of a hard horny substance and im-

pervious to the sting. Thus encased in coat of mail, they often engage for a long time in bloodless battles. The intervals however between the rings of the belly are vulnerable. In this point their attention is directed to their battles. And the bee which succeeds in thrusting its sting between these rings, lays his antagonist in an instant lifeless at his feet.

GENERATION.

‘How numerous soever the multitude of bees may appear in one swarm, yet they all owe their origin to a single parent, which is called the queen bee. It is indeed surprising that a single insect should in one summer give birth to above twenty thousand young. But upon opening her body the wonder will cease, as the number of eggs appearing at one time amounts to five thousand. This animal whose existence is of such importance to her subjects, may easily be distinguished from the rest, by her size, and the shape of her body. On her safety depends the whole welfare of the commonwealth, and the attentions paid her by all the rest of the swarm evidently show the dependence her subjects have upon her security. If this insect be carefully observed she will be seen at times attended with a numerous retinue, marching from cell to cell, plunging the extremity of her body into many of them and leaving a small egg in each.

When the queen bee has deposited the number of eggs necessary, in the cells, the working bees undertake the care of the rising posterity. They are seen to leave off their usual employments, to construct proper receptacles for eggs, or to complete those already formed. They purposely build little cells extremely solid, for the young, in which they employ a great deal of wax. Those designed for lodging the males, as was already observed, are larger than the rest, and those for queen bees, largest of all. There is usually but one egg deposited in every cell. When the fecundity of the queen is such that it exceeds the number of cells, already prepared, there are sometimes three or four eggs crowded together in the same apartment. But this is an inconvenience which

the working bees will by no means suffer. They seem sensible that two young ones, stuffed up in the same cell, when they grew larger would but embarrass and at last destroy each other. They therefore take care to leave a cell to every egg, and remove or destroy the rest.

The single egg that is left remaining, is fixed to the bottom of the cell, and touches it but in a single point. A day or two after it is deposited, the worm is excluded from the shell of the egg, having the appearance of a maggot rolled up in a ring, and lying softly on a bed of whitish colored jelly, upon which also the little animal begins to feed. In the meantime, the instant it appears, the working bees attend it with the most anxious and paternal tenderness. They furnish it every hour with a supply of this white substance, on which it feeds and lies, and watch the cell with unremitting care. They are nurses that have greater affection for the offspring of others, than many parents have for their own children. They are constant in visiting each cell, and seeing that nothing is wanting; preparing the white mixture, which is nothing but a composition of honey and wax, in their own bowels, with which they feed them, thus attended and plentifully fed, the worm in less than six days' time comes to its full growth, and no longer accepts the food offered it. When the bees perceive that it has no further occasion for feeding, they perform the last offices of tenderness, shut the little animal up in the cell, walling up the mouth of its apartment with wax; there they leave the worm to itself having secured it from every external injury.

The worm is no sooner left enclosed but from a state of inaction it begins to labor, extending and shortening its body and by this means lining the walls of its apartment with a silken tapestry which it spins in the manner of caterpillars before they undergo their last transformation.

When their cell is thus prepared, the animal is soon after transformed into an aurelia: but differing from that of the common caterpillar, as it exhibits not only the legs, but the wings of the future bee, in its present state of inactivity. Thus, in about twenty or one and twenty days after the egg was laid, the bee is completely formed, and

fitted to undergo the fatigues of its state. When all its parts have acquired their proper strength and consistence, the young animal opens its prison, by piercing with its teeth the waxen door that confines it. When just freed from its cell, it is as yet moist, and incommoded with the spoils of its former situation : but the officious bees are soon seen to flock round it, and to lick it clean on all sides with their trunks ; while another band with equal assiduity, are observed to feed it with honey ; others again begin immediately to cleanse the cell that has just been left, to carry the ordures out of the hive, and to fit the place for a new inhabitant. The young bee soon repays their care by its industry ; for as soon as ever its external parts become dry it discovers its natural appetites for labor, and industriously begins the task, which it pursues unremittingly through life. The toil of man is irksome to him, and he earns his substance with pain ; but this little animal seems happy in its pursuits, and finds delight in all its employments.

When just freed from the cell, and properly equipped by its fellow bees for duty, it at once issues from the hive, and instructed only by nature, goes in quest of flowers, chooses only those that yield it a supply, rejects such as are barren of honey, or have been already drained by other adventurers ; and when loaded, is never at a loss to find its way back to the common habitation. After this first sally, it begins to gather the mealy powder that lies on every flower, which is afterwards converted into wax ; and with this the very first day it returns with two large balls stuck to its thighs.'

The fertility of the queen mother is prodigious. It is said that during one season a single female will lay from 70,000, to 100,000 eggs. Two or three distinct colonies are often formed in one summer. It appears from repeated experiments, that the love of offspring is the great motive which spurs them on to labor. Take away from a hive the queen bee, and you put all effectual stop to industry. Not a single cell is constructed ; not a particle of honey is stored up. Reaumur* tried this experiment

* A celebrated French philosopher born at Rochelle, in 1683. He wrote largely upon insects, and his works upon philosophy and

in various ways. He divided a swarm, leaving the queen bee, with one part, and leaving the other part without a female. Both parts were placed in commodious hives, but those without a queen appeared to surrender themselves to indolence and despair. The brightest day could lure but few of them to the fields. Those who went, returned with no stores to the hive; their only object appeared to be, to satisfy the immediate cravings of hunger. Inaction and famine spread fatal diseases through their desolate dwelling, and every morning found the bottom of the hive covered with the lifeless remains of those who had fallen during the night. Daily their numbers diminished, and at the close of three weeks scarcely one thousand were left alive, and the whole of these were one morning found dead in the bottom of the hive. There is something truly tragical in their mournful history.

That part of the swarm however with whom the queen bee was left, immediately commenced persevering and vigorous efforts in the construction of cells for the young and for depositing honey. The laborers were continually returning with their little thighs laden with the rich treasure, and the whole hive assumed the aspect of cheerfulness and of thriving industry. The prospect of offspring appeared to animate all. From repeated experiments of this nature Reaumur concludes, that 'we are only sure of one principle of action among bees — the love for their queen, or rather the numerous posterity to which she is to give birth. Each bee is actuated either by a sensation which has in view the welfare of all, or by the love of posterity. Whether they construct cells or most carefully polish them, or labor to gather a harvest of honey, it is never directly for themselves. This may appear somewhat paradoxical to those who have remarked that at the end of the winter, the bees consume the honey they had stored up in the spring and summer. But the experiments just detailed show, that the moment they lose the hope of a numerous progeny, they cease to gather the food which is necessary for their own preservation;

physics, have given him a high rank among the literati of the world. He died 1757.

life seems to them of no value, when unsupported by this hope, and so they choose to die. The love of offspring appears to be therefore the all moving principle.' The same experiment has been tried by others and always with similar results.

After the egg of the common working bee is deposited, three days elapses before it assumes the vermicular state. After remaining in this state five days the cell is closed up with a covering of wax. When thus covered and protected, the embryo insect is not idle, but labors diligently at the distaff, spinning the cocoon. This is a labor of thirtysix hours. In three days it changes to a nymph and passes six days in this form. And it is not until the twentieth day from the time the egg was laid, that it attains the fly state. The progress of the royal worm through the various stages of its infancy is rather more rapid. In sixteen days from the time that the egg was deposited on its princely couch, the perfect state of queen is attained. The male worm or drone is metamorphosed into a fly on the twentyfourth day after the egg is laid. 'One of the most astonishing facts connected with the economy of bees, is the manner in which, when deprived of their queen, they proceed to repair their loss; for this purpose they construct several of these royal cells, and taking a common worker worm out of the common cells, they put it into a royal one, feed the insect with royal food, which is more pungent than that destined for worker grubs, and in a few days instead of a worker they have a queen. This extraordinary discovery made by Shiruch, has been confirmed by Huber, and is now admitted by all naturalists. In many parts of Germany, and more especially in Sasatia and Saxony, the peasants availing themselves of this discovery, are enabled to multiply their swarms of bees at pleasure; they shut up a few hundred working bees, with a piece of honey comb, containing common grubs, three or four days old; the worker bees immediately set about destroying some of the common cells; construct royal cells in their state; deposit the grubs in those cells and administer to them food proper for grubs destined to become queens. This experiment is constantly repeated and

never found to fail. In the proper time a number of young queens is produced, The supernumeraries are destroyed; and at length only one survives to govern the hive. Thus wonderfully does nature provide for the preservation of the species — the life of thousands of these insects depending on that of a queen. In order to guard against the possibility of extermination, she has taught the bee the miracle of converting the whole of the instincts and organization of one kind into those of another, by the simple means of providing a different and a more pungent kind of food for the subject of its marvellous experiment. There seems, however, to be a natural provision for this change; for it is found that all the workers are imperfect females, whose organs are not developed; the food simply furthers this development. But whether we look to the design or the means used, or the circumstances under which it is affected, it is one of the most striking facts in the whole range of natural history.

CONSTRUCTION OF CELLS.

The skill in architecture which these little insects display, even surpasses what would be anticipated from previous manifestation of sagacity. One would suppose that their native instinct would guide them to a uniform mode of constructing their cells. But they are not thus restricted. Governed by circumstances, they appear to take into consideration the form and size of the hive and to arrange and construct their cells in a manner most suitable to the existing case. Indeed no man in the plan of his own commodious house, can give more decisive evidence of study and design than is exhibited in the interior arrangements of the dwellings of the bees. Their little city is laid out into numerous convenient streets and lanes, and their blocks of buildings are never permitted to project into the high-way, or to run in zig-zag lines, obstructing the throngs of laborers who are continually passing and repassing in the performance of their appropriate duties. What is called the honey comb, is composed of two layers of six sided cells, united by

their bases. The combs are longer or shorter as best suits their convenience. 'Reaumur suspected from the hexagonal form of the cells, and the uniform inclination of the base, that this was the most economical form which could be adopted with respect to the quantity of wax necessary. Without intimating his object, he presented for solution the following problem to Koenig, a celebrated analyst, "among all the hexagonal tubes with pyramidal bases, composed of three similar and equal rhombs, to determine that which can be constructed with the least possible quantity of matter." 'Koenig worked out the problem, and replied that if three rhombs were so inclined to each other that the great angles measured $109^{\circ} 26'$ and the little angles $70^{\circ} 34'$, this construction would require the least quantity of matter. Reaumur found by accurate measurement, that the great angles gave $109^{\circ} 28'$ and the little one $70^{\circ} 32'$! How surprisingly is the wisdom of God manifested in endowing these insects with a wisdom surpassing that of many of even the wisest of the human family.

It is stated by Huber, that the principle of a division of labor is adopted very extensively in all the operations of the hive. In constructing cells, different parts of the labor are performed by different bees. Some appear to be highly accomplished architects, who plan and build the edifice. They are also the nurses and protectors of the young. Others seem to labor in more humble employments, and merely bring the raw material.

The wax is not a simple substance which the bees collect ready formed, but it is a secretion from their own bodies. The wax workers having fed plentifully upon the delicious nectar which they find in the cups of almost every flower, remain in a state of repose for about twentyfour hours, during which time the wax is formed and secreted in layers or scales beneath the belly. These scales they take hold of with the little pincers with which their legs are furnished, and peel off. The bee then kneads the detached scale with its tongue and deposits it in the proper place for the formation of the cells. Another and another does the same. A little block of wax being thus collected, an architect takes the work under his own

care, and with his tongue for a trowel, he moulds his materials into the proper form, and with unwearied diligence smooths and polishes his beautiful edifice. Though the labor, for these little insects, is immense, yet the work progresses with great expedition, for all are diligent in contributing their mite. One wax worker after another deposits his tiny burden, and there are many busy laborers on the alert fashioning the raw material into the proper form. The hive of the bee affords a most beautiful illustration of what may be accomplished by persevering industry.

Goldsmith, who has given fascination to every subject his pen has touched, thus vividly describes this interesting department of the bee's labor.

'If we examine their cells they will be found formed in the exactest proportion. It was said by Pappus, an ancient geometrician, that of all other figures hexagons were the most convenient, for when placed touching each other the most convenient room would be given and the smallest lost. The cells of the bees are perfect hexagons. These, in every honey-comb, are double, opening on either side, closed at the bottom. The bottoms are composed of little triangular panes, which when united together terminate in a point and lie exactly upon the extremities of other panes of the same shape in opposite cells. These lodgings have spaces like streets between them large enough to give the bees a free passage in and out, and yet narrow enough to preserve the necessary heat. The mouth of every cell is defended by a border, which makes the door a little less than the inside of the cell. It serves to strengthen the whole. These cells serve for different purposes: for laying up their young; for their wax, which in winter becomes a part of their food; and for their honey, which makes their principal subsistence.

Their teeth are the instruments by which they model and fashion their various buildings and give them such symmetry and perfection. They begin at the top of the hive and several of them work at a time at the cells, which have two faces. If they are stinted with regard to

time they give the new cells but half the depth, which they ought to have, leaving them imperfect till they have sketched out the number of cells necessary for the present occasion. The construction of their combs costs them a great deal of labor. They are made by insensible additions, and not cast at once in a mould as some are apt to imagine. There seems no end to their shaping, finishing and turning them neatly up. The cells for their young are most carefully formed. Those designed for lodging the drones are lower than the rest, and that for the queen bee the largest of all. The cells in which the young brood are lodged, serve at different times for containing honey; and this proceeds from an obvious cause: every worm before it is transformed into an aurelia, hangs its old skin on the partition of its cell, and thus while it strengthens the wall diminishes the capacity of its late apartment. The same cell in a single summer is often tenanted by three or four worms in succession, and the next season by three or four more. Each worm takes particular care to fortify the pannel of its cell by hanging up its spoils there. Thus the partitions being lined six or eight deep, become at last too narrow for a new brood, and are converted into store-houses for honey. Those cells, where nothing but honey is deposited, are much deeper than the rest. When the harvest of honey is so plentiful that they have not sufficient room for it, they either lengthen their combs or build more, which are much larger than the former. Sometimes they work at three combs at a time, for when there are three work-houses, more bees may be thus employed without embarrassing each other.

SWARMING OF BEES.

The departure of a colony from the parent hive to seek their fortunes and a home for themselves, is a most singular and interesting phenomena. Different opinions have been expressed upon this subject by naturalists, who have paid much attention in investigating the habits of the bee. Early in the spring the front of the hive is often seen for several days, perfectly covered with bees,

as though the interior was too narrow for the thronging population. They appear moving about as in a state of indecision, till finally on some pleasant morning, a queen Bee followed by seven or eight thousand subjects, emerges from the hive, and after fluttering about for a few moments, as though bidding their home a lingering adieu, or waiting for any stragglers who may be disposed to join their party, they take a high and rapid flight in a direct line in search of a new abode. It has generally been supposed that the young swarm, headed by the youthful queen, compose this colony. But it is now pretty well established that it is a promiscuous assemblage of old and young bees, headed by the old queen, and that she leaves the sceptre of the hive to her youthful daughter, who at the moment of her birth becomes her enemy and rival.

There is a most deadly animosity subsisting between the female bees. Sometimes there are as many as twenty royal cells in a hive, in each of which the queen deposits an egg, which does not differ in appearance from those placed in the other cells. In size it is a little larger. The instinctive animosity of the queen mother does not however manifest itself against her female progeny, till the worm is transformed into a nymph. Still the working bees appear to be conscious of the danger to which their young females are exposed from maternal malice, and a strong body guard is continually stationed at each royal cell. The sight of these cells appears to give the queen mother the excitement of delirium. She rushes with infuriated haste to the yet unopened cradles of her children, her submissive subjects retiring before her, and unchecked she barbarously murders her offspring. But her impetuosity is too great to be long continued. Having torn away from two or three of the cells the thick coating of wax, which protects the infant queens, she becomes exhausted, and is unable to proceed any farther, in her inhuman employment. The excitement, however, which she has manifested, is communicated to others and soon spreads through the hive. All seem to be in uproar and confusion, and the old queen driven away by jealousy or fear, and followed by a large portion of her sub-

jects, rushes from the hive, and leaves her empire to the undisputed possession of her hated daughters. It is said that in every instance it is the old queen which leads the first swarm.

The multiplication of bees is so immense that it is absolutely a matter of necessity that large parties should continually emigrate. It is said that the young ones remain at home as long as the hive is sufficiently large, to accommodate them. The provision of nature to accomplish this end is singular. To see passion and cruelty raging through all the brute creation, is one of those mysteries which remain as yet unfolded. We should have anticipated an affectionate, or at least a peaceful and a good natured departure. But it is the hatred of the mother for her daughters which drives the queen from her hive, and she goes imbrued with the blood of her children. We can see the wisdom of the *object to be attained* but the *means*, by which God has seen fit to have this object accomplished, are to us dark and mysterious. The cruelty which is raging through the animal creation, is one of the unfathomable mysteries of earth.

For several days before the young ones swarm, it is not unusual to see them hanging in thick and black clusters about the hive, as if there were not sufficient room for them within. This is undoubtedly the case, yet in wet weather they contrive to stow themselves away, though the lanes and alleys of their little city must be greatly crowded, by this immense population.

About six or seven thousand compose the average number of a swarm. In this number there is but one female, the queen bee, several males or drones, who do not work, and the common laboring bees. Before leaving the hive they supply themselves liberally with food as though preparing for a long journey. They usually set off from the hive about the middle of the day, and often immediately after a shower. In what manner they communicate their ideas so as to move simultaneously, it is difficult to imagine, but they are clearly actuated by some common principle. They hover a few moments about the hive as though waiting for any tardy straggler, and then with rapid wing turn from home, the wide world before them.

They take their flight high in the air, and sometimes proceed to a great distance. Often every effort of the owner of the hive to stop the swarm is unavailing, and they depart never to be seen again. More frequently however they light upon the limb of a tree or some other such object at no great distance from the hive. It is said that any noise which will drown the hum of their leader, will so confuse them that they are compelled immediately to alight. Hence you often perceive a swarm of bees pursued with all the noises which shovels and tongs, tin pans, &c, can produce. If they are not induced to alight, and collect into a new hive, they seek out some hollow tree, and there commence the formation of comb. If the orifice is too large, they build a thick coating of comb until it is made of suitable dimensions. As soon as they have selected their habitation they immediately begin to make their combs, for they carry the materials for this purpose from their parent hive. Having repaired their new habitation without delay, they commence their industrious labors. Every department of business thrives under their harmonious and well organized efforts. In warm weather one strong hive has been known to send off four swarms in eighteen days.

DOMESTIC HABITS.

• Bees generally perform their labors in a peaceful manner without interfering with each other's rights. But sometimes they prefer to obtain their honey by stealth rather than by honest labor. Occasionally the inhabitants of two hives, will wage against each other most implacable war. The whole summer is passed in cruel and deadly contest, and the ground in front of the hives may be seen covered with the bodies of the slain. I have watched these furious battles with amazement. Two bees would meet with all the spite and fury imaginable in such little creatures. With mouth and sting they would make most vigorous efforts. Apparently unmindful of everything else, they would mount high into the air, in the contest, or roll over in the dust in deadly embrace. Their stings might be seen glancing from the coat of

mail, with which their bodies are encased, till one succeeds in suffocating the other by pressing its chest, or adroitly thrusts its sting between the scales of its body and thus instantly deprives it of life. In this insect commonwealth, generally so well governed, murder passes unpunished, and their private disputes are immediately settled by an appeal to arms. 'On those fine spring days in which the sun is beautiful and warm, duels may often be seen to take place between two inhabitants of the same hive, the offspring of the same mother. The causes which bring division into so united a society have not been hitherto ascertained. In some cases the quarrel appears to have begun within, and the combatants may be seen coming out of the gates eager 'for blows.' Sometimes a bee peaceably settled on the outside of the hive, or walking about, is rudely jostled by another, and then the attack commences, each endeavoring to obtain the most advantageous position: They turn, pirouette, throttle each other; and such is their bitter earnestness that Reaumur has been enabled to come near enough to observe them with a lens, without causing a separation. After rolling about in the dust, the victor, watching the time when its enemy uncovers his body, by elongating it in the attempt to sting, thrusts its weapon between the scales, and the next instant its antagonist stretches out its quivering limbs and expires. A bee cannot be killed so suddenly, except by crushing, as by the sting of another bee. Sometimes the stronger insect produces the death of the vanquished by squeezing its chest. After this feat has been done, the victorious bee constantly remains, says Reaumur near his victim, standing on his four front legs and rubbing the two posterior ones together. Sometimes the enemy is killed in the hive; then the victor always carries the corpse out of the city and leaves it. These combats are strictly duels, not more than two being concerned in them; and this is even the case when armies of bees meet in combat.'

Highly as we may applaud the industry of the bee, its honesty after all, is rather questionable. In moral in-

tegrity it must be confessed they are at times very lax. Like piratic coasters, these relentless insects, will sometimes overtake a rich merchantman of a humblebee, and they will not let him depart till they have relieved him of his rich stores. It is indeed amusing, — though you cannot help compassionating the poor humblebee, — to see four or five of these nimble highway robbers, mauling and pommelling their awkward and clumsy victim, till they have compelled him to relinquish every particle of the honey, he has been so laboriously gathering. They then liberate him to return to his labors under the discouraging anticipation of being again in like manner pilfered of whatever he may collect.

Though the honey bee appears to have no antipathy to fraud, he is the inveterate enemy of idleness. The lazy drones are permitted to live during the summer months, when every flower is laden with its sweet treasures, but as soon as autumn comes, and the bees must be sustained during the winter upon what they have been able to collect in the summer, the then useless drones are murdered. They seem to adopt most rigidly the sentiment, 'If any one will not work neither let him eat.' The drones are born in April or May. For a few weeks, they live in genteel luxuriance, but in August they are indiscriminately massacred. Huber who has with great diligence and perseverance studied the habits of this insect observed one day the commencement and the termination of this cruel slaughter. As the drones are unarmed they have no safety but in flight. The rage of the whole hive seemed to be simultaneously roused. The drones fled in terror; but overpowered by numbers escape became impossible, and they were all soon stretched lifeless upon the bottom of the hive. And what is very remarkable, in six different hives, this work of extermination was going on at the same hour. It is not unusual for some of the workers also to be included in the list of proscription; obnoxious in consequence of old age or some other cause unknown to us, their associates put them out of existence.

'Among other virtues possessed by bees, cleanliness is one of the most marked: they will not suffer the least

filth in their abode. It sometimes happens that an ill advised slug, or an ignorant snail, chooses to enter the hive, and has even the audacity to walk over the comb; the presumptuous and foul intruder is quickly killed. But his gigantic carcase is not so speedily moved. Unable to transport the corpse out of their dwelling, and fearing the noxious smells arising from corruption, the bees adopt an efficacious mode of protecting themselves; they embalm their offensive enemy by covering him over with propolis; both Muraldi and Reaumur have seen this. The latter observed that a snail had just entered a hive and fixed itself to the glass side, just as it does against walls, until the rain shall invite it to thrust out its head beyond its shell. The bees it seems did not like the interloper, and not being able to penetrate the shell with their sting, took a hint from the snail itself, and instead of covering it all over with propolis, the cunning economists fixed it immovably by cementing merely the edge of the orifice of the shell to the glass with their resin, and thus it became a prisoner for life, for rain cannot dissolve this cement, as it does that which the insect itself uses.'

BEE HUNTING.

In many parts of the world bees are found in great numbers in the woods. In the unbroken forests of our own country honey is found in great abundance, and there are men called bee hunters, who make a living by obtaining the treasures of their hives. In the forest of Maine, it is not an uncommon amusement for young lads to go through the woods in quest of bees. A boy will take a small box of honey in his hand and a little flour in a paper, and walk along till he finds upon some wild flower a honey bee. He opens his box, and the bee allured by the fragrance of the honey, immediately seeks a supply from its abundance. While the bee is feeding the boy carefully sprinkles upon it a little flour. As soon as the bee has obtained its load, it sets out in a direct line for the hive. The boy watches the direction of its flight and quietly sits down and waits its return. By and by the bee returns, bringing others with him. The boy

identifies the insect, by the flour which he has sprinkled upon its back, and judges of the distance of the hive, by the time it has taken the bee to go to it, and return. An experienced bee hunter, will in this manner judge with great accuracy. The boy having thus ascertained the direction of the hive, and having formed some estimate of its distance, proceeds till he supposes he has gone far enough, and then if he does not find the hive he again seeks a bee and repeats the experiment. Perhaps the next bee he finds flies in a very different direction from the first. This informs him that the second bee belongs to some other hive. And thus he has the trace of two hives. By one or two such experiments he is almost invariably conducted to the treasure for which he is in search. Having found the hive, he marks the place and returns home. 'Sometimes the honey hunters, set a plate of honey or sugar upon the ground, and in a short time this is discovered by the wild bees. Having caught two or three of those that have taken their fill, the hunter first releases one, which rising into the air, flies straight to the nest. He now walks at right angles to the course of the bee, for a few hundred yards, and then lets another go, which also after rising, flies to the nest. Observing with his pocket compass, the angle where the two lines formed by the two courses of the bees meet, there he knows will be the spot, at which the nest is placed.'

A few years ago I was in the north-western part of the state of Maine, and hearing of a party who were going out to take a nest, which had previously been found, I accompanied them. Four or five men with axes and pails, and materials for striking fire, set out in a damp and cloudy afternoon. After groping our way over stumps and logs and through thick woods for about a mile, we came to an old and partially decayed tree of unusual size. One of the men pointing towards the top of the tree, said, "there's the nest." About thirty feet from the ground I could just perceive a few bees hovering about the hole through which they found their way into the hollow of the decayed tree. Having decided in what

direction it would be best to fell the tree, two men commenced with their axes at its root. As one stroke succeeded another the bees seemed a little alarmed, but they did not come down to offer any resistance. While two were cutting down the tree, others were collecting large strips of birch-bark for torches. Just as the tree was ready to fall two or three stood ready with their birch-bark flambeaux, and at the moment the tree fell, they ran to the hole from which the bees were rushing, and burnt them down as fast as possible. The bees however were in spite of their torches, flying thickly about, and making a most desperate resistance. All the men were stung more or less, but they did not seem to mind the bees more than a swarm of flies. Very soon the ground was covered with the poor little insects crawling about with their wings singed off. The bees seemed now perfectly satisfied that resistance was in vain, and with a prudence which was perfectly amazing, they gave up the contest. The men very soon split open the tree and exposed the honey to view. The comb was still covered with thousands of the insects, who were endeavoring to save all that they could from the dreadful ruin of their happy home. Much as I loved honey I could not restrain a feeling of sincere compassion. And I would gladly have seen the tree again erected, and the bees in the untroubled enjoyment of their well earned stores. A man would take up a large piece of comb, and with his bare hand, brush off the thousand of bees collected upon it. Soon the honey was all deposited in the pails, and our party returned triumphantly home with their booty. The poor bees were left, some to seek another home, and others to linger and die in protracted agonies on the ground. In this way immense quantities of honey are every year taken. And this is generally the only reward the bee receives for the long labors of the summer. In the autumn we suffocate them with the fumes of sulphur, and ourselves revel upon the sweets which they had collected for their winter stores.

MANAGEMENT OF BEES.

It is agreed by the most judicious observers, that the apiary, or place where bees are kept, should face the south, and be situated in a place neither too hot nor too much exposed to the cold; that it be near the mansion house, on account of the convenience of watching them; but so situated as not to be exposed to noisome smells, or the din of men or cattle; that it be surrounded with a wall, which however should not rise above three feet high; that if possible a running stream be near them; or if that cannot be, that water be brought near them in troughs, as they cannot produce either combs, honey or food for their maggots without water; and that the garden in which the apiary stands be well furnished with such plants as afford bees plenty of good pasture. Furse, broom, mustard, clover, heath, &c, have been found excellent for this purpose. Hives have been made of different materials, and in different forms, according to the fancy of different ages and countries. Not only straw, which experience now proves to be rather preferable to anything else, but wood, horn, glass, &c, have been used for the construction of them. Single box hives, however, when properly made, answer very well, and when painted last long. They have several advantages above straw hives; they are quite cleanly and stand upright; they are proof against mice and are cheaper in the end, for one box will last as long as three of them. They are however rather colder in winter; but a proper covering will prevent all danger from that quarter. Straw hives are easiest obtained at first, and have been used and recommended by the best of bee-masters. If the swarm be early and large, it will require a large hive, but if otherwise, the hive should be proportionally less. If the bees appear to want more room it can easily be enlarged by putting a roll or two below it; but if it be heavy enough for a stock-hive, it will do although it should not be quite full of combs. Any person (says Mr Bonner) who intends to erect an apiary, must take particular care to have it filled with proper inhabitants. He must be particularly attentive to this, as all his future profit and

pleasure, or loss and vexation, will in general depend upon it. He must, therefore, pay the utmost attention to the choice of his stock-hives; for the man who takes care to keep good stock-hives will gain considerable by them, but he who keeps bad ones will, besides a great deal of trouble and little or no success, soon become a broken bee-master. In September every stock-hive ought to contain as much honey as will supply the bees with food till June following, and as many bees as will preserve heat in the hive, and therefore resist the severity of a cold winter, and act as so many valiant soldiers, to defend the community from the invasion of foreign enemies in the spring. They should be full of combs, and well stored with bees and honey, and should weigh at least 30 pounds each; if heavier, so much the better; for light hives run a great risk of perishing by famine, unless the bees are well supplied with food, whereas a well chosen hive of 30 pounds weight, allowing 12 pounds for the empty hive, comb, bees, &c will contain 18 pounds of honey, which will supply the bees with food till June; a time when it may be presumed they will find abundance of provision for themselves among the flowers. When a choice can be obtained, the youngest hive should always be preferred, because old hives are liable to vermin and other accidents. But although a hive should be four or five years old, it should not be rejected, if it possess these two essential qualities, plenty of bees, and plenty of honey.

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