Nest of the Common Wood Ant (*Formica rufa*). The Nurseries.
SOLOMON'S LITTLE PEOPLE:

A Story about the Ants.

BY

JAMES CROWTHER.

"There be four things which are little upon the earth, but they are exceeding wise: the ants are a people, not strong, yet they prepare their meat in the summer. Go to the ant thou sluggard; consider her ways, and be wise."

Proverbs of Solomon.

"And God said, Let the earth bring forth the living creature after his kind, cattle, and creeping things, and beast of the earth after his kind: and it was so. And God made the beast of the earth after his kind, and every creeping thing that creepeth upon the earth after his kind: and God saw that it was good."

Genesis i. 24, 25.

London:

Sunday School Union,
56, Old Bailey, E.C.
"Nature will be reported: all things are engaged in writing its history. The planet, the pebble, goes attended by its shadow. The rolling rock leaves its scratches on the mountain, the river its channel in the soil, the animal its bones in the stratum, the fern and leaf their modest epitaph in the coal. The fallen drop makes its sculpture in the sand or stone; not a footprint in the snow, or along the ground, but prints in characters, more or less lasting, a map of its march; every act of man inscribes itself in the memories of his fellows, and in his own face. The air is full of sounds, the sky of tokens, the ground of memoranda and signatures; and every object is covered over with hints which speak to the intelligent."—Hugh Miller.
OME of my readers will recognize in the title as well as the matter of this little book, a lecture which I have given in various parts of London and the country during past years. Like its predecessor, "The Five-Barred Gate," it was written at the suggestion of a dear friend, that the story might be preserved when it became necessary that the lectures should be given up; and, with the desire to do the greatest amount of good in the shortest of space, I have endeavoured to make the book attractive for the general reader, amusing and instructive for the young, and useful and suggestive for the Lecture Committee of the Sunday School Union, to whom, in token of my admiration of the excellent manner in which they manage the important work they have undertaken, I have presented the re-written manuscripts of my lectures, and, when complete, the diagrams with which they have been illustrated. And should these volumes only prove to be as acceptable and as useful as I have good reason to know the former have proved to be during upwards of a quarter of a century, I shall have a twofold reason for thankfulness, that the delight I have so long experienced in testifying to the wonderful works of God has been used to His glory and the good of my fellow-men.

Interspersed with numerous anecdotes disconnected immediately with the subject, and sometimes suffering from repetition, this story of comparisons aims chiefly at illustrating, confirming, repeating, and establishing in the
reader's mind, some virtuous principle, never forgetting life's chief lesson, the preparation for a future state; and if sometimes the pen is dipped in bitter ink in reference to materialism—the fashionable speculation, alas! of too many scientific men of the day—it is from conviction that this pernicious doctrine is in direct opposition to the Word of God, insinuating its deadly venom into the minds of teachers otherwise trustworthy, under the primeval form of "Yea! hath God said?"

Since the book was written the great leader of the revived theory of the origin of species has gone to his account; but his disciples remain, some of whom have out-Darwin'd Darwin: the doctrine of one as to the origin of matter, both in the world we live on as well as the house we live in, body and soul, is, to my mind, such rank atheism, that I consider it a matter of duty to warn my readers to what it may, and must, ultimately lead. "Darwinism," writes one, in a first-rate serial, "leaves no room for what is dearest to the Christian's heart. Natural selection denies the fall, leaves no room for Providence, prayer, or redemption; and were it true, the Bible would no longer be a God-given revelation. But Darwinism not only robs us of revelation, but removes the very foundation from under the whole structure of natural religion: Darwinism, in deriving man from the brute rather than a fallen spirit, at one blow robs morality of its sanction" (Scribner's Magazine).

No one will accuse the French newspapers of being over-religious, whatever may be said of my anti-Darwinism; but one of them, the Patrie, referring to his recent decease, concluded its article in these words:

"While rendering justice to the enormous knowledge of the illustrious naturalist, and to his prodigious power of work, it is impossible to acquit him of an abuse of his theories by rearing upon them the desolating system of natural philosophy, at which his disciples, under the authority of his great name, are still at work, with the view of dethroning religion and setting it up in its place."

These words exactly re-echo my views, and I recommend them to my readers. 

J. C.

July, 1882.
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SOLOMON'S LITTLE PEOPLE.

CHAPTER I.

BUSYBODIES.

"In these beings so minute, and as it were such nonentities, what wisdom is displayed, what power, what unfathomable perfection."—Pliny, a.d. 50.

UNDER this title I purpose describing something of the natural history of the Ant, an insect which has attracted the attention of the curious ever since the wise king of Israel directed every sluggard to go to it for wisdom. It was Solomon who said, "There is no new thing under the sun. Is there anything whereof it may be said, See, this is new? it hath been already of old time, which was before us." And you will say this of my story, and perhaps remind me of another saying of the same wise man, "Be admonished: of making many books there is no end; and much study is a weariness to the flesh."

Solomon is true; his wisdom is proverbial; but he lived nearly three thousand years ago, and since his time what
strange discoveries have been made, and how many of these are owing to what is to be found in Nature's great picture-book!

Like a kaleidoscope, you may turn its wonderful pages over and over again, and every time get a different view of the same thing. Every lover of the true and beautiful sees something which others have overlooked; and so it is that I gather up, and then scatter, not only the wisdom of others not generally known, but illustrate it by my own experience.

Let me make clear my meaning. You will find among the Proverbs these words, "There be four things which are little upon the earth, but they are exceeding wise: the ants are a people not strong, yet they prepare their meat in the summer." These words, truly, are not Solomon's own, but his friend's; but can you doubt that, placed as they are amongst Solomon's proverbs, they were considered as borrowed by Agur from the king?

"The ants are a people:" it is a remarkable expression; a "little people"—not a strong people, but a wise people. I made this remark before a number of entomologists at a scientific meeting not long ago, calling attention to the resemblance of the wisdom of the ant to the wisdom of the man; when one who had made the study of insects the great work of his life declared frankly that he had never thought of that before—how exactly the ants, of all animals, deserved the name of "a people."

Have you not sometimes wondered why Solomon directed attention to the ant in preference to the bee, as a model of that which is wise? Wisdom, you know, was what he asked for, coveting that beyond gold and silver, as being the most precious then as it has ever been. He knew how to appreciate wisdom wherever it should be found. There is no doubt that he must often have observed the bees humming their merry hymns in his garden on the sunny slopes of Mount Zion, because he often speaks of honey
and the honeycomb; then how is it that out of the four things referred to as teachers of wisdom, although three out of the four are insects, the ant is preferred to the bee?

I think I have discovered the reason. Amongst the thousand and one things I can remember of the Great Exhibition in Hyde Park in 1862, is one which produced so strong an impression on my mind, that while I can remember anything I am sure I shall remember that. Standing on a good-sized table, and measuring about six feet in length by about half the width, was a beautiful model of Lincoln Cathedral. My thoughts of this model and the lesson it taught me were something like those of one who wrote a description of the grand old building itself, who said, “The first view of Lincoln Cathedral obtained by the approaching traveller is something to remember for a lifetime.”

And the story of the Norman founder, who came over with William the Conqueror, is not altogether unlike the story of the modeler; of both, the historian’s description of the architect holds good, “His mind exerted itself to excel and shine,” for not only was Remigius the founder, but the builder, it being reported of him that he actually carried the stones and mortar upon his own shoulders.

This is not the place to describe the glories of the beautiful pile, with its towers and turrets, its gables and capitals, but there, in the Exhibition building, stood its model, made to scale, with all the external parts beautifully carved in—what do you think?—cork! “And,” you will say, “pray, who was the sculptor?”

Standing by the model was a working man, his coat off, his apron on; upon the table lay the worn-out remains of two old knives, and a stone very much the worse for wear, upon which they had been sharpened. He was an agricultural labourer; and this poor working man had employed all the spare hours, after working during the day in the
field. First, going from house to house and asking civilly if they would save him all the old corks drawn from their bottles;—and how many of those corks do you think he collected during the spare hours of ten years? *One million, eight hundred;*—and then with these and his two knives, and without any assistance or drawings, with nothing but mere brain, he sculptured this beautiful model of the grand cathedral at Lincoln. Don't you think he was well repaid by being allowed to receive any subscription which visitors might choose to drop into his box to reward his perseverance, and may we not say exactly the same of him as was said of the founder of the building eight hundred years ago, "His mind exerted itself to excel and shine"?

"Well," you will say, "but what has all this to do with the discovery of Solomon's saying about the wisdom of the ant being superior to that of the bee?" Much.

Don't you think of the two builders the agricultural labourer was the wiser? Without plans, or education, or implements, he carried out his model. What sketches, what tools, what material, what assistance the Norman architect employed!

Now we must compare the tools, first of the bee, then of the ant, and in order to do this effectually we must take down our miscroscope and examine these curious instruments with our own eyes.

First, the Bee. Of course you know what this wonderful little insect has to do: from the nectar, and pollen, and propolis of flowers and buds, it has to make *pap* for the baby-bees; *bread* of a peculiar kind for the royal family; ordinary bread for the workers; *wax* for the houses; *varnish* for the walls; *poison* for its enemies, besides other things, the raw material for which, collected from the flowers, is carefully transported in the pockets in its hind-legs.

But what is that complicated instrument we are looking
at through the magic tube of our instrument? The tongue.

You will easily understand that of all tools necessary for the curious work the honey bee has to perform, trowels and scissors would be the most appropriate. "Why?"

Hind-legs of Bees, showing the opening of Bread-pockets.

Because it needs the first to spread the wax, as a plasterer uses a trowel to plaster a wall, and the second with which to divide the sheets of wax when the geometrical divisions are fixed, in order to fit into the most wonderful building in the world, the hexagonal cell with its six different sides.
Head and Tongue of the Common Honey Bee, drawn from nature:

a, compound antennae; b, mandibles, or larger jaws; c, lesser jaws, showing a combination of trowels and scissors; d, the brush with which pollen is collected; e, the 3,500 compound eyes; f, three simple eyes, supposed for shorter or nearer sight, as the former are for longer, or distant objects.
Then, again, the pollen from which much of its food is made, and with which the great business of its active life is occupied, namely the multiplication of variety and beauty in the world of flowers, needs a fairy-like brush with which it shall be delicately swept from the stamens on which it is so delicately suspended, like gold-dust; well, there they are, all combined in one complicated instrument.

This is the tongue of the honey bee, *three instruments in one*, and one in three. A trinity in Nature, you see; an illustration in the natural world of the saying of the apostle, "The invisible things of God from the creation of the world are clearly seen, being understood by the things that are made;" and also to that other saying of one of poor Job's comforters, "The secrets of wisdom are double to that which is."

Thus we learn that natural facts are symbolic of spiritual truths; that the scenes of Nature are the pictures by which spiritual truth is taught in the grander revelation; and that, therefore, the best of all merely human "helps to reading the Bible" is the miscroscope, because it describes spiritual truths in sensible pictures.

But what evidence have we here, in passing, of design in this wonderful tongue of our friend?

And now let us change the picture. The object I now place on the stage of our instrument is the tongue of the common wood ant.

"How unlike the bee's tongue!" Indeed it is. There is nothing in comparison.

First, how extremely small. We had to change our magnifying glass twice, you observed, before we could see it effectively. A power of four hundred times was sufficient to discover most of the wonders of the bee's tongue, but now we find one of thirty-eight thousand insufficient. The entire tongue, you see, is scarcely visible to the eye without the glass. Stretched out almost in the shape of a lady's fan when opened, it is covered with an innumer-
able number of teeth, and the edge shows them curved and bent over the sides, exactly like the rasping teeth in a carpenter’s file.

“How many of the teeth are there?”

I cannot tell, nor count them. The ant is not the only animal that has its teeth on its tongue. Amongst others I may remind you of the great black slug which is so fond of our garden plants; it has no fewer than 26,800 teeth, all on its tongue, and these are so hard, being formed of flint,
that they will blunt the edge of a sharp penknife when pressed against them. You are more familiar, perhaps, with the "penny winkle;" it has about 24,000 of these teeth, all on its tongue, which forms the palate of its mouth.

But this cutting and scraping tongue of the ant is the only stock-in-trade of tools it possesses, and with it all its labour has to be done. What this is we shall see in another chapter; but I think you will see how much better off the bee is than the ant; and, like the agricultural labourer, how very clever the ant is, who also, with so simple an instrument, can produce such cunning and clever work. And so, just as I think the labourer excelled above the architect, so do I think the ant excels above the bee; and so it was, I believe, that Solomon selected the one above the other as a pattern of wisdom.
CHAPTER II.

TRANSFORMATION.

"Do you not perceive that we are caterpillars, born to form the angelic butterfly?"—An Italian Poet.
"We shall be changed."—St. Paul.

The ants are a people." Yes, just as there is the white man of Europe, and the black man of Africa, and the red and yellow men of Asia and America, so are there white ants, and black ants, and red ants, and yellow ants; and, curious enough, just as in America the white people made slaves of the black, so too do the white ants make slaves of the black ones; and just as both the white people as well as the black employ vast armies of soldiers in gratuitous slaughter in war, so do the ants;—did they learn the bad habit from us, or we from them, I wonder?

Have you ever thought that if you could be lifted up a very considerable height, on looking down upon the little speck of matter—hung, as Job says, "upon nothing"—our earth, with its twelve or fourteen hundred of millions of human beings, running hither and thither in all directions, now jostling against each other, now pushing and running and quarrelling—how very much they would resemble that
large ant city which you must have sometimes seen in your rambles in the woods?

This very idea occurred to me one day while standing on the Castle Hill at Hastings. As I looked over the old town on to the new, and all along the parade at St. Leonards, “After all,” I said to myself, “‘tis nothing more to me here than a huge ant-hill.”

We have already been reminded of Solomon’s saying, “There is nothing new under the sun,” and so I found it with my new idea, for I met with the same thought in the comic writings of the late Thomas Hood. He was standing on the top of St. Paul’s Cathedral, nearly four hundred feet above the heads of the hundreds of passengers running over the paths below. He remembered that the insect we have before us was called in some counties *emmet*, in others *pismire*, and in most others *ant*. So punning was his nature that he thus punned upon the sight under him, in connection with the three names given to the insect—

“Seen from these skies,
How small these *emmets* in our eyes!
What a hustle,
And a bustle!
Some carry sticks, and one
Her eggs, to hatch them in the sun;
And there’s my *aunt*, I know her by her waist,
So tall and thin,
And so pinched in,
Just in the *pismire* taste!”

Dr. Watts, too, you remember, describes the ant as an *emmet*—

“These *emmets*, how little they are in our eyes;
We tread them to dust and a troop of them dies,
Without our regard or concern:
Yet, as wise as we are, if we went to their school,
There’s many a sluggard and many a fool
Some lesson of wisdom might learn.”
The ant belongs to the order of insects termed Hymenoptera, a name derived from two Greek words signifying a “membrane” and a “wing.”

The class of hymenopterous insects includes those which certainly exhibit the most astonishing amount of instinct, such as the bee and wasp, the sawfly, and, above all, the ichneumon.

It will be interesting to illustrate the comparative instinct of ant people with human people, and profitable to draw our own conclusion; but in this chapter we will briefly consider the early history of our friend, merely premising that in the ant and the bee families are observed mental acts more closely resembling man than any other articulata, but unlike any such organ as a brain; possessing powers, too, certainly unlike any we possess, for I can tell you of a wasp my friend cut in half as a speedy method of killing the intruder, one half of which stung her some days after, when she took up the body to pity the “poor thing;” while I know of another who cut a bee in two, when, to her amazement, as it would have been to yours, the part with the head devoured its own body, which remained in the other part!

Life begins with the ant in the egg; so it does in everything. A simple cell is the first step in the history both of animals and plants: this simple cell in the animal kingdom is called an egg; in fishes it is known as spawn: in plants it is seed. What the acorn is to the oak, the egg is to the chicken; what the bulb is to the lily, the ovum of the ant is to the insect.

And yet not quite so, because the bulb of the lily and the acorn of the oak pass away directly to those plants, while the egg of the ant has two processes through which it must pass before ever it can reach the ultimate part of its wonderful life.

It is with these two parts, these connecting links in the life of our little friend, that I would really begin our story.
Nest of Common Wood Ant. Exterior.
Life, as I have reminded you, in every case begins with an egg. In a colony of ants there are males, females, and workers, besides eggs, pupae, and larvae; they choose one for their queen, and she, like the queen bee, becomes both the mother and monarch of the whole colony, leading and guiding them both in their journeys and battles.

The structure of an ants’ nest is very curious. What you have seen in the woods would have given you but a small idea of the remarkable depositories below; you look upon a little hill of insects, and are reminded of Hood’s lines—

"What a hustle,
And a bustle!"

but below the surface of the earth they have tunnelled out, very cleverly, roadways to their dormitories where the eggs are laid, or where the larvae are passing towards pupae, or where the pupae are enjoying that strange sleep the awaking from which is attended with such wonderful result; for who would believe that from that tiny egg would come that simple, wingless thing which in the silkworm we call a caterpillar?—or who would believe that from it would come that still more mysterious thing which in the silkworm we call “chrysalis,” in the ant we will call “pupa”?—or who that had not already beheld the phenomena would credit that from that strange pupa of the ant would issue that model of perseverance and activity which King Solomon sent you and me to learn our lessons of wisdom from?

Have you ever wondered why the great Creator ordained insects to pass through three stages of being?

I have very often, and I think I see the reason; there must be a reason, because we know He does nothing in vain. A chicken has not three lives as an ant has; it is first egg, then chicken, then egg, and then again chicken; between the little chick and the big fowl there is nothing but growth both of flesh and feather.
Will you first open your New Testament, and turning to Romans i. 20 you will read, "The invisible things of God from the creation of the world are clearly seen"—how?—"being understood by the things that are made." This is Paul's favourite comment on the philosophy of Zophar, the unconsoling friend of the patriarch Job, who exclaims (Job xi. 5, 6), "Oh that God would show to thee the secrets of wisdom, that they are double to that which is."

Larva (a), Pupa (b), and Imago (c) of the Common Gnat.

What is the logic of this Divine philosophy? This: that we are to understand the things which we cannot see by the things we can see, because everything in nature is a symbol of what is above and beyond nature. True it is that we are surrounded by the supernatural; it needs spiritual eyes to see spiritual things, I know, because spiritual things can only be discerned by spiritual sight.

Have you spiritual eyes?—that is, have you "the secret of wisdom" spoken of in the oldest poem in the world? If not, why not?

"Ask, and it shall be given you." "If any of you lack
wisdom, let him ask of God, that giveth to every man liberally, and upbraideth not; and it shall be given him."

You know the Book of promises from which these words are taken. The Bible is the great God’s promissory notebook, and when you go to Him in prayer always take one of the Divine promises in your hand, just as you would when taking a Bank of England note to be exchanged for gold; you wait till your turn comes, and you realize the fulfilment, “I promise to pay,” when you receive the coin with the royal portrait glittering on its side, reminding you of Him who is kingly Head over all.

Now, after this little intrusion, let us go back to the inquiry why there is first larva, secondly pupa, and thirdly imago; for as the first and second characterize the first two stages in ant life, and are translated from their foreign language into plain English by “mask” and “mummy,” so the last describes the ultimate state of the insect’s life, the perfect image of the creature, “imago,” which may be rendered “an apparition,” and that, you know, means again a visible spirit—that which shall be when that which is earthly is done away.

Now isn’t this all full of suggestion? This is one of the many visible things which illustrate the invisible of the apostle.

You and I now are “larvae,” soon we shall be “pupae,” and by and by “imago.”

Suppose I were to hold an imaginary argument with our ant in life number one, and it could answer me; what kind of conversation do you think would be the most appropriate for me to employ?

If I said, “Well, little ant, you are a queer kind of a creature, you are; you haven’t eyes, so you can’t see; and you haven’t feet, so you can’t walk; and you haven’t wings, so you can’t fly;—what’s the use of you?” What do you think would be the most appropriate answer I should receive?
"All the days of my appointed time will I wait till my change come." "It doth not yet appear what we shall be."

And when the time for the last life came, just as the imago—that is, you know, the last state of its wonderful being—was consummated, as it was passing away, throwing aside its earthly covering, emerging therefrom with its gauze-like wings, don't you think if it could, like the fabled swan, sing while it was dying, as I should wish to do, the most appropriate words it could use would be what our poet Pope has put into the mouth of the dying Christian to his soul—

"Trembling, hoping, lingering, flying, Oh, the pain, the bliss of dying!"

I have told you of the threefold transformation of the insect: larva (mask), its future life being hidden; pupa (mummy), it is curiously covered up or enfolded as mummmies used to be in Egypt, after the process of embalming; then, finally, imago (the ultimate image).

All insects do not pass through this remarkable transformation. I wonder why not?

Perhaps to show us that the exception is to teach the wonder of that which is exceptionally wonderful. But the transformation of our friend the ant is amongst the most wonderful of all, for it is not really after all the same kind of transformation exactly which the moth or butterfly undergoes, nor yet that of the beetle tribe; but, strange to say, one stage of life is enfolded or, mysteriously enveloped in the next, each enwrapping or enclosing the other; the egg swells out into the larva, and the larva encloses and conceals the pupa, and the pupa gradually passes away into its final stage, the imago.

"Why," you exclaim, "then here is another illustration of the great Bible wonder, the Trinity!"

Yes, this is one of the secrets of wisdom—it is "double
to that which is;" this is one of Nature's illustrations of Bible truths. Here is the sensible picturing the spiritual;

The Final State.

this is one of the apostle's things that are "made" which are "clearly seen," symbolizing "the invisible things of God."

Here is the supernatural in Nature. There is a trinity
in everything, ourselves included—body, soul, and spirit; one in three and three in one; a triune compound—dust enveloping the spirit of deity: "God made man in His own image."

But here is a touching lesson for you and me, and we must not lose the profitable suggestions it contains.

Perhaps the great sin of the latter days of our world's history will be a denial of the existence of the great God who made it. I think it will; and I think that what is now so fashionable in the scientific world, known by the word "materialism," fast tends to that dismal and dreadful conclusion. Would that reasonable men would argue that if there be a future life it must have some connection with the present!

When we calmly sit down and examine the constitution of our own spiritual nature, do we not discover that everything both around us and within us is preliminary to something higher and better? And if preliminary, shall we not ask of what? An old author says, "Good eyes see light through the smallest chinks;" and another old writer says—

"Clouds of affection from our younger eyes
Conceal that emptiness which age descries;
The soul's dark cottage, battered and decayed,
Lets in new light through chinks which time hath made."

God, it has been said, is a circle, whose centre is everywhere, and whose circumference is nowhere. And can we bound or describe the circumference of our own mysterious being? Our present life is a segment only; what we call death is but ceasing to be mortal, it is not ceasing to be!

"There is no death!
What seems so is transition;
This life of mortal breath
Is but the suburb of the life elysian,
Whose portal we call death!"
The threefold envelope of the ant is the hieroglyphic of our life. The death of the first life is only the putting forth of a new existence, the necessary process in order to a higher life, just as the burial of the acorn is necessary to the development of the oak. Decay and change are necessary in order to release the life which is hidden, and the beauty concealed beneath.

Must it not likewise be that our future being is enwrapped within us now, waiting to be unrolled when the material shall fall off as it does really in the moth and butterfly, where the grand possibility is fully visible and demonstrable?

The whole life-story of the ant, you will have seen, is laid up within it at one and the same time. It is only one state of its being that prevents the other from being seen.

Is it not so with us?

"Death!" the little ant says—"death! that is, what you call 'death,' is a suspense, not an end." The philosophy of a future life is best illustrated by the things which are seen and which are temporal; and the parables of Nature, to him who reads them aright, like the dial of a watch, are significant intimations of the greatness and grandeur of the almighty Workman, and of the upper and higher life.

And now, having given you a double preface to our story, we will become a little less theoretical and a little more practical. Let me take one of our favourite insects from my cabinet, and, with my microscope, show you some of the anatomical wonders of the ant.
TRANSFORMATION.

Seeing, you know, with some people is believing; though, alas! there are many who are unbelievers whether they see or not.

This specimen has been carefully prepared and mounted for our microscopical examination. It is described, you see, as *Formica rufa*, and is the largest of our British wood ants.

I told you the ant belongs to the most important of all classes of insects, *Hymenoptera*—that is, having four membraneous and finely-veined wings. This is a choice specimen, and has been especially prepared to illustrate its internal muscular structure. You will observe first the antennæ, then the very large head, then the "waist—so tall and thin, and so pinched in;" then the small round abdomen, and then the three pairs of legs—each pair, you observe, longer than the others, the foremost being the shortest.

To examine all these parts perfectly we shall require a magnifying power; so we take up our instrument, and the first part of the ant I want you to examine is, perhaps, the most important of all, for it is the two feelers at the head of the insect which are called *antennæ*. 
CHAPTER III.

CO-OPERATION.

"The race of mankind would perish, did they cease to aid each other. From the first time the mother binds the child's head, till the moment some kind assistant wipes the death-damp from the brow of the dying, we cannot exist without mutual aid and help; all, therefore, that need aid have a right to ask it from their fellow-mortals; no one who holds the power of granting can refuse it without guilt."—Sir Walter Scott.

HAVE all insects antennae?"

All true insects certainly have; but before we bring our glass to examine the structure of these wonderful organs, let me explain to you the meaning of the term insect; it refers to the insects or divided appearance you are observing in the ant's body. All true insects have six legs, two antennæ, two compound eyes, and very often three simple ones—the one, perhaps, for long sight and the other for short, as the eyes of an insect, unlike yours, are fixed and never close, a small brain, the ant's being the largest of all in proportion to the size of the whole body, and a nervous chord running over the entire animal.

Were I to attempt to explain to you all the various pro-
cesses of locomotion, digestion, respiration, and the rest, I should weary you. In another specimen I will show you there will be found what also is to be seen on all true insects, two pairs of wings, about which we shall find some interesting matter; but at present let us fix our attention on what I have reminded you is, perhaps, the most important part of the body, namely, the antennae.

End of antenna of Honey Bee, greatly magnified, showing stethoscopical forms of the sacs; drawn from nature.

How many joints did you count in each of the antennae? Yes, thirteen. You remarked on each articulating in the other, and the basal joint articulating in the big brain of the insect.

All these are very well seen with a magnifying power of twenty diameters—that is, four hundred times; but to examine the true structure of the antennae we must
employ a magnifying power of ninety-five diameters, or upwards of nine thousand times, and then what do you see? A number of small entrances, each surmounted with a hair, while the end joint is clubbed, and very hairy at its margin.

These antennæ are believed to be compound organs, as much of smelling as talking.

Remember, it is not really needful to have a tongue to talk with, for how do we talk to our deaf and dumb friends? Do we not this most effectually with our fingers?

Now, I quite believe that insects generally, and ants particularly, understand each other by means of the communications they make with their antennæ; and what I shall tell you of my experience with my live ants will, I think, prove the truth of the remark.

When Professor Tyndall looked at the antennæ of Sir John Lubbock's ants, he declared the antennal sacs—that is, those little entrances you saw on each joint of the
antennæ—resembled "microscopical stethoscopes." Now, you know that a stethoscope is an instrument like a small trumpet, and is used by medical men in listening to the sounds produced by the action of the chest, and the word, coming to us from the Greek, means "I view the breast."

Here, then, we get an idea that these organs are those of hearing; but I believe they are also organs of communication. The bee's antennæ have been removed from a queen, and her majesty is no longer able to express her royal wishes or issue her commands, and there is anarchy and confusion all over the hive; and I believe there is much greater evidence in favour of the antennæ being organs of communication than there is of their being organs of hearing, as my story presently will prove.

And this subject—antennal communication of insects—will introduce another which is so full of interest that we shall be astonished at the wisdom of God in creation; and we shall, I hope, declare with David, first, that "the works of the Lord are great;" secondly, but that they must be "sought out;" and thirdly, it must be by "those who have pleasure therein."

That other subject will be a comparison of the intelligence of man with the instinct of the brute.

Assuming, then, that the antennæ are organs of communication, let us inquire how they are employed.

Come with me into my garden, and let us go over, in our minds' eye, an instructive lesson I learned one day there which first drew my attention antwards.

The gardener has been at work, and has upset a vase, at the bottom of which was a nest of the garden ant. My attention was called to the débris, and so let me call your attention to it also.

See, among the particles of earth there are a number of ants all running over each other, half crazed, it would appear, at the wreck and ruin of their home. Let us throw some of the mould into a saucer, and with a hand
magnifier watch the movements of the insects as they madly run about in it.

Look, one has a small whitish object in its mouth, about the shape and size of a grain of rice, rushing wildly round the margin of the saucer and among the ruins, never letting the object of its anxiety go. Presently it meets with another ant; then it stops, and the antennae of the two friends begin to touch each other and move about with nervous rapidity.

Presently, ant—let us say—number two, rushes away from the first ant, leaving it still with its charge fixed firmly between its big jaws; and if you have watched number two ant closely you will have observed that presently it meets with a third of its unfortunate family. Number two and number three now begin a chat, and number three hurries off, you see, to number one; and then, after a little antennal talk with their fingers after the deaf and dumb fashion, number one gives its tiny load to number three, and then goes about its business.

Now, what becomes of number three? Do you notice that amongst the earthy débris a very small piece of straw lies there, half-split, so that the under part is concave, and therefore the upper convex, a little mimic covering?

Well, look now! the number three ant carefully hides its load under this bit of straw; then, covering it over with surrounding earth, goes away apparently quite satisfied with having done its duty.

You say, "What does all this mean?" And that was just what I said. Now I can tell you.

The most important part of a family of ants, which family often consists of many thousands, are those who are chosen to do the work of nurses, for ants, like human infants, require the greatest care in their babyhood.

I cannot tell you whether it is by election or compulsion, but certain of the worker ants are told off for nurses,
and these have almost exclusively to discharge all the duties of a nurse proper.

These are, first, a general charge concerning the insect in the first stages of its transformation—that is, cleaning it, taking it out for an airing, putting it to rest at night, defending it against all its enemies, and, above all, preparing and administering its food.

The wisdom of the ant, like that of the bee, is intuitive: that is, the mind, if mind it must be called, of the insect sees as much directly it arrives at perfection as it ever sees. An ant or a bee at five minutes old knows as much as another at a year old; it has nothing to learn. So that nurse ants have not to be taught their business; it is born with them, and they know exactly what they have to do directly it is decided that they shall do it.

Now, as you have seen, when our gardener upset their home there was a terrible scramble among our friends: it was to them what an earthquake would have been to us, scattering our work, demolishing our dwelling, and sending our children and our household to wreck and ruin.

Ant number one, not being a nurse, was scampering over the confused remains of the colony, when a baby—that is, a larva or pupa—was discovered. Ordinary human workers, not being nurses, might have exclaimed, "Let the nurse look after her own business, it's no affair of mine;" and so the baby might have been neglected. Did you observe how very differently the little people—who are "exceeding wise," you know—act?

Taking up the helpless baby-ant, number one scampers off with it after a nurse, and meeting with number two hopes it is she. Alas, no! Then it asks number two to fetch one immediately, while it retains its charge; accordingly off runs number two, when, luckily, just like the mother and sister of Moses, the right nurse is found at last, who, having received the proper directions, hurries off to number one, receiving the precious charge; then carefully putting
it to bed under the tiny bit of straw, goes off in search of other employment:

Tell me, now, isn’t that a romance in real life?

Now, do you see what I meant by “antennal communication”? And do you see these compound organs are to the little insects just what fingers and thumb are to the poor deaf and dumb? They talk with them; and you will observe on the specimen we are still examining the antennæ articulate immediately in the creature’s brain. And how large the brain is!

The ant is not only very big-headed and big-brained, but it makes good use of both, as you and I should do; for it is my faith, the better we use the gifts we have received the oftener do we get a repetition from the Giver.

Before we leave this chapter about antennal communication, let me tell you that the form of the antennæ settles the question as to whether Lepidopterous insects (that is, “Scale-wings,” such as moths and butterflies) are really one or the other; for whilst the latter are clubbed at the end something like a drum-stick, the former are often feathered and fan-like, and of forms of extreme beauty.

A very extensive page in natural history is open to the study of him who will observe the movements of insects in this branch of their anatomy. Much has been already done, but the experience of all observers unites in the opinion that when deprived of the antennæ the insect is nowhere. The singular diversity of these organs would almost suggest to us either that insects have a sense of which we know nothing, or else that their sense of feeling and hearing is infinitely finer than our own; and it surely suggests above all things what the spiritual body we shall have may be, and that “it doth not yet appear what we shall be.” You observed the antennæ of our friend to consist of eleven joints, the basal joints articulating with the head; in those of the lace-wing fly—a creature of bewildering beauty, whose eye when fresh caught is like
golden net-work on dark green velvet, each of its thousands of eyes sparkling with the brilliancy of the finest diamond—we may count one hundred of these antennal divisions. And its wings. "Lace-wing," indeed!—pray let us place a piece of the very finest lace under the microscope with an ordinary magnifying power and then compare it with

Antennæ of Insects: 1, Cockchafer; 2, 3–5, 7, various ordinary insects; 6, the House Fly; 8, Gnat; 9, Silkworm Moth.

the wing of the fly. Behold! the wing is infinitely finer to the eye even when magnified than the lace, while the lace when equally magnified is considerably coarser than the door-mat.

Such difference is there between the works of God and those of man.

Now, the larva of the lace-wing fly is a most earthly creature, a grotesque grub, feeding upon plant lice, and suggesting in its wonderful transformation—what?
I reminded you that in his remarks upon the antennæ of Sir John Lubbock's ants, Professor Tyndall gave them the original name of "microscopical stethoscopes;" that would imply they were organs connected with hearing. Atmospheric impressions are certainly received by insects as sensibly as they are by us: a honey bee always anticipates the weather; the cockchafer has antennæ as compound as its eight thousand eyes (in each of which I can show you your own portrait), spread out, when in use, like a lady's fan, in five or six leaf-like appendages; it is closed like a fan when alarmed.

Mr. Gosse tells us that after the alarm is over this insect pauses, widely opens the leaves of its antennæ, then, after an instant's pause to test the perceptions, away it travels.

What suggestions are offered by such wonders in the natural kingdom as we have here! What possibilities are within us!

You may take any insect you like: here is the honey bee, there the house fly, there again the house cricket, here the male gnat. Compare them with the ant, you will observe not one is like the other; and, in their variety, what harmony!

I said there was a trinity in everything. Doesn't it appear so in this wonderful part of an insect's body? In the honey bee's tongue we saw a combination of trowels, scissors, and brush; here is an instrument combining the barometer, the telephone, and the telegraph—and "these three are one."

The curious uses to which these remarkable instruments are applied will suggest to us that in the imago, or perfect image of a fly, there is an amount of instinct given far surpassing the intelligence of many men, and that was what Solomon's friend meant when he said, "The ants are a people not strong, yet are they exceeding wise."
CHAPTER IV.

MEMORY.

"The powers of memory are twofold. They consist in the actual reminiscence or recollection of past events, and in the power of retaining what they have learned in such a manner that it can be called into remembrance as occasions present themselves or circumstances may require."—Cogan.

HAVE I wearied you in antennal philosophy? Let us come to the practical part.
An entomological friend, for whom I have the greatest regard, assured me of the truth of the following story:—

He went from London to Gravesend to catch night-flying moths; some, in particular, being very fond of the woods in that neighbourhood. He caught the female he went in search of, and he secured his prize in a box, which he deposited in his coat pocket. He came from Gravesend to London Bridge by steamboat, thence he walked to his house in the City Road: all the way from one end of the journey to the other he was followed by several male flies, who were courting the lady in his pocket.

Now, will you tell me how this was done? Shall I tell you?
I cannot; but this novel experiment is familiar, in a more or less practical kind, to every entomologist, and I might repeat many instances of the extraordinary power possessed by nocturnal moths of following and detecting their mates in the dark.

The explanation is beyond us; it is the supernatural in nature again. Do we leave our impressions behind us: and may other eyes than ours see them?

Again we exclaim, what possibilities are within us!

Mr. Coleman, in his charming little book on "British Butterflies," says: "Investigators have perhaps erred by assuming, at the outset, that antennæ must be organs of some sense that we ourselves possess; whereas I think that there is much evidence to show that insects are gifted with a certain subtle sense for which we have no name, and of which we can have as little real idea as we could have had of the faculty of sight had all the world been born blind.

"For example; if you breed from the chrysalis a female Kentish Glory moth, and then immediately take her—in a closed box, mind—out into her native woods, within a short space of time an actual crowd of male 'Glories' come and fasten upon or hover over the prison-house of the coveted maiden. Without this magic attraction you might walk in these same woods for a whole day and not see a single specimen, the 'Kentish Glory' being generally reputed a very rare moth; while so many as some 120 have been thus decoyed to their capture in a few hours by the charms of a couple of lady 'Glories' shut up in a box.

"Now, which of our five senses, I would ask—even if developed with extraordinary acuteness in the insect—would account for such an exhibition of clairvoyance as this?" And the author then adds, "May not, then, this undiscovered sense, whatever may be its nature, reside in the antennæ? for it is a remarkable fact, that the very moths, such as the Kentish Glory, &c., which
display the above-mentioned phenomenon most signally, have the antennae in the males amplified with numerous spreading branches, so as to present an unusually large-sensitive surface. This seems to point to some connection between these organs and the faculty of discovering the presence, and even the condition, of one of their own race, with more, perhaps, than a mile of distance and the sides of a wooden box intervening between themselves and their object."

It is very clear that "there are more things on earth than are dreamt of in our philosophy;" but now you will be prepared for my ant stories, drawn from life.

The first of these I owe to my friend the late Rev. W. Faithful, Vicar of Cheshunt. Walking in his garden there he observed the gardener had made a rut in a path with the wheel of his barrow. Down this rut an ant was toiling and tugging with what to it was a ponderous log of wood, with which to contribute in the building of its distant house. With a view of watching what an animal so remarkable for perseverance would do if baulked in its object, he stopped up the rut some distance before the worker ant could reach it, making a heap of dirt appear to the insect what an Alp would do to you or me.

The ant tugged on with its load till it reached the mountain, then it paused and considered what was best to be done; then it left the load, giving it up, as you would have supposed, not feeling disposed to venture across such an object with such a weight. Ah no! it went to its fellow-ants; then quicker and quicker went their antennae—it was an evident invitation for help; then several came, shoulder to shoulder endeavouring to get the log up the hill, but all in vain; till at last several went in search of more, and their united strength at last succeeded.

Here you will see what should interest you in nature, and instruct you in duty.
Mr. Coleman, to whom I have already referred, quoting an American naturalist, states that deprivation of a moth's antennæ interferes with or entirely annihilates the power of flight, and that in its attempt it tumbles headlong to the earth; and experiments made on the antennæ or "feelers," as some call them, of the queen bee, have frequently resulted in ruin to the whole hive where they have been injured.

Are you tired of my ant stories?

Listen to another from the same respected source as the last.

My friend, like Solomon's of old, loved to watch the habits of these remarkable little people in his garden; and one day he was much amused with the perseverance of a little fellow who also was working hard with a load too heavy for him to bear, when a breeze springing up, he quietly picked up a dead leaf, and holding the load with his legs and the leaf with his mouth, hoisting it up as a sail, waited till the wind blew him and his load home together.

Now, if this isn't reason, pray tell me what is? The ant here—like the spider casting its web from the workshop in its abdomen, when it comes out in a glutinous and semi-liquid form, and waiting in the structure of its bridge till the wind shall be in the direction in which it desires to travel—must reason upon the quarter of its abode and the relation of that to the breeze, which might otherwise convey it in an opposite direction.

"The ants are a people:" would that other "people" were as self-denying, and as foreseeing, and as self-helping as they. Here's a true story as given me by another friend.

He was lying in his bath in India, when he observed a frog on the floor. Presently bouncing into the room came a merry bee, who immediately attracted the attention of the frog. This class of animals, you know, feed on
insects; so the frog, thinking, I suppose, that the bee was the right thing in the right place, made one clean leap towards it and swallowed the insect whole.

Alas, poor frog!

What the whale was to Jonah, of course the frog was to the bee; but—ah, that little word "but"—even if Jonah had possessed a sword, he could have made but little use of it in that sub-aqueous world in which, through his cowardice, he found himself; but the bee is better off, and with one plunge he sent his poisoned blade right into the frog's heart.

He is happy who never makes a mistake; but he is happier who, having made a mistake, has both the courage and wisdom to confess and correct it. So with a great effort the frog did to the bee just what the whale did to Jonah—vomited him up; but the terrible words "too late!"—ah, what a lesson!—the poison got into the blood of the frog, and while the bee was disporting himself harmlessly in the air, none the worse for his temporary entombment, the frog began to swell, and presently became a bloated corpse.

My friend, the frog, and the bee were not the only spectators of this bath-room adventure; an ant, up in the ceiling corner, had been watching the fun below, when, finding its friend the bee at liberty and the frog no more, down it came to reconnoitre. Now we shall see what the antennæ are really for: first, the ant began to feel the body of the frog in every direction. I suppose being satisfied that it had nothing to fear further, and frog's flesh being an extreme delicacy to the ant family, it would, my friend imagined, immediately set to work and fill its own belly with the choicest parts before it.

I can't say I quite agree with one of our learned naturalists of to-day that insect intelligence is on an average more than the equal of that of man; but I do know that a hungry meal-hunter among my own species, finding a
choice dainty at some rich man's gate, would very quickly have demolished all he could carry inside, and would carefully conceal on his outside what remained.

What do you think the ant did? Hurry away to its companions, communicate the good news, and invite them to join in the feast, and in a few minutes thousands of them marched towards the frog, leaving nothing behind but his skeleton.

I think, now, you will be satisfied that there is little doubt that the antennae of insects are organs of communication, whatever else they may be, and it only remains that I give you another illustration which will be sure to confirm all the foregoing.

What is memory?

This question is more easily asked than answered. When we have passed the meridian of life, we all know very well it is much easier to remember the event which happened thirty or forty years ago than what may have happened as many days ago. But then we are taught to believe that once in from four to seven years every bit of our physical part is taken out and built in again, so that a man at the age of fifty has had at least seven separate bodies—of course the brain changing with the rest. Then how is it he can remember with brain number seven what he did with brain, say, number two, supposing the brain to be the seat of memory?

This is the hardest nut you can give a materialist to crack, for it destroys at one blow the outwork of that chapter in infidelity.

But then it only leads us out of one difficulty into another, for if memory be immaterial it must be spiritual; and if spiritual, and brutes have memories, are they, too, spiritual?

Perhaps the greatest living authority on ants is Sir John Lubbock. He has many nests in his country home, and he keeps them from running away by making a small
moat filled with water surrounding the tables upon which the formicaries—that is, the homes of the ants—are placed; for the scientific name for the ant family is *Formicidae*, from the Latin word *formica*, an ant.

Well, he desired to test the memory question with some of his ants; so, having removed a number from one of their nests, and keeping them absent about six months, before he returned them he made some of them quite drunk, and then returning the whole company of absentees, sober and drunken together, he curiously watched the result.

The undisturbed part of the colony came out to receive the new-comers, welcomed the sober ants into their old home, and dropped the drunken ones into the water below.

This almost surpasses belief, I must confess; but the author of the story is, beyond doubt, worthy of all confidence.

Now, this little illustration of antennal communication, belonging as it does to the instinctive chapter in insect life, reminds us of the mysteriously thin line that separates the instinct of the brute from the intelligence of the man, reminding us of that passage in the oldest poem in the world, the poem of Job: "Ask now the beasts, and they shall teach thee; and the fowls of the air, and they shall tell thee; or speak to the earth, and it shall teach thee; and the fishes of the sea shall declare unto thee" (xii. 7, 8). You will find it profitable exceedingly to observe the superiority of the brutes' instinct sometimes to the human intelligence; hence, as the more mental functions are used the stronger they become, you will wisely endeavour to use your intelligence more, that you may advance in the spiritual life, and learn the true meaning and value of the word "Excelsior!"

And here is a hint for you to begin with, a key to the riddle I wish to introduce in the next chapter.

Surrounded as we are on all sides with the certainty of our own mortality, and convinced, as all men and women
in their right minds must be, of a great future when this life is over, wouldn't you expect they were constantly preparing for the migration?

Are they?

Now, see what is suggested in the life of our "little people" in Siam. There the ants build on the ground, but sometimes the places in the neighbourhood of their nests are flooded with water. Ants cannot swim, and the consequence of unpreparedness would therefore be fatal. Now what do you think the Siamese ants do? Well, as I suppose, they ascertain through the barometrical structure of their antennæ that the rainy season is approaching, just as our honey bees do; they then remove their residence, and rebuild up higher, constructing their habitations in the trees between the branches, which of course the water never reaches. "Ask now the beasts, and they shall teach thee"—what?

A Worker Ant with the Family Dinner.
CHAPTER V.

INSTINCT.

"Beasts, birds, and insects, even to the minutest and meanest of their kind, act with the unerring providence of instinct; man, the while, who possesses a higher faculty, abuses it, and therefore goes blundering on. They, by their unconscious and unhesitating instinct to the laws of nature, fulfil the end of their existence; he, in wilful neglect of the laws of God, loses sight of the end of his."—Southey.

I promised you a story illustrative of the mysteriously thin line that separates instinct from intelligence.

It is a subject which has occupied the minds of many great men, and will till the end come, but they all leave off just where they began; they can reason and draw conclusions, but what makes the one, or whence the reason of the other, no man can tell.

Nearly all the qualities and characteristics of good men and women are found belonging to brutes: self-help, self-denial, mutual help, affection, foreknowledge of the most surprising kind, and the most extraordinary skill in preparing for a future life.

Here is an illustration, in my own experience, in the life of a spider.
Now, this creature has little to commend it; it has a bad character almost from everybody. People say it is fierce, cunning, ugly, useless, hateful; nobody, you say, has a good word to say for the spider.

Haven't they?—let us see whether I haven't. One winter month, when spiders are very difficult to find, a lady gave me a spider's nest which she had removed from a snug corner in her garden wall. I put this nest into a small pasteboard box, and carrying this in my pocket all day, at night proceeded to experimentize on it; but imagine my surprise on opening the box to find the heat of my body had hatched most of the eggs during the day, and the tiny spiders were running in every direction about my trousers pocket.

I found the egg-bag to consist of the most exquisitely fine-spun silk, covering over about 240 eggs; and after clearing out the bag, again imagine my surprise on finding, packed away for a foundation, a fine large dead blue-bottle fly.

I might detain you here some time while I related the story of those little spiders—what I did with them, and what they did for me; but I must only ask you to reflect upon the forethought and self-denial of that loving mother, who deprived herself of a delicious meal in order that her 240 babies might have food at hand directly they needed it.

"What a lesson!" you exclaim, asking, perhaps, "And do all spiders thus provide for their infants?" To which I can only reply, it is with spiders as it is with other animals—there are exceptions to the general rule, happily.

Of the spider's instinct compared with human intelligence let me give you another illustration. A boy removed a small spider to place it in the centre of a big spider's web, which was hung among foliage, and distant some four feet from the ground.

The larger animal soon rushed from its hiding-place
under a leaf to attack the intruder, who ran up one of the
ascending lines by which the web was secured.

The big spider gained rapidly on the little one, but when
the little spider was barely an inch in advance of its
pursuer, the small one cut the line behind it, so that the
enemy fell to the ground, thus affording time and oppor-
tunity of escape along the ascending web. I may remind
you that spiders are sometimes cannibal, the larger, the
efemale, frequently turning into web the mangled remains
of her husband shortly after the wedding ceremony is over.
But what reason is involved in this story; and remember,
insects never go to school, nor ever teach each other, nor are
they educated at home, but all their knowledge is intuitive—
that is, it is born with them.

Shall we compare the instinct of other animals than
spiders with that of ants?

Let me first give you a curious illustration of what again
sometimes shows the superiority of the instinct in the brute
to the intelligence of the man.

Some time ago a gentleman living in the country, think-
ing his imprisoned canary would like to feel at home in
the branches of a tree, hung up the cage containing the
bird there; presently his attention was directed to another
bird chattering at the prison-bars, holding something in
its mouth, which "something" proved to be a worm the
visitor to the prison had brought as a delicate morsel for
its captive friend.

"Some time ago," too, a friend of mine who was travel-
ling in the country had occasion to stay in some country
town where there was a prison. It was an old-fashioned
place, and just as years ago our Fleet prison had its
prisoners placed in rooms or cells looking through the
divisions between the iron bars of the windows into the
street, so was it in the place I am describing, but the bars
were too close together, of course, to allow anything much
bigger than a finger to pass. An acquaintance of one of
the prisoners passing had his attention attracted by the other calling to him to get him some beer; but how could a jug pass between those narrow openings? Necessity has been said to be the mother of invention, and certainly in this case the parent might be congratulated on the shrewdness of her offspring, for behold the captive drinking his beer from the small end of a tobacco-pipe which his ingenious acquaintance had borrowed, pouring the drink into the bowl at the outer end!

While describing the comparative instinct of birds with ants, let me relate what happened to a countryman's dog eating his dinner in the fields. It is quoted in Samuelson's "Honey Bee," in a chapter on instinct and intelligence.

Two crows were watching a dog gnawing a bone, of which they were very anxious to obtain possession. The dog, however, kept such a sharp eye upon them that they dared not approach him openly, but one of the crows slipped quietly round to the back of the animal and began to peck at his tail with its beak. No sooner did the dog turn his head to defend himself from this rear attack, than the other crow hopped up, and, seizing the coveted bone, flew off with it.

Here is not only an evidence of design, but a cunning premeditated plot, and it strangely reminds me of what happened with another description of thieves recently near London. A pious family, having a desire that all the members of their household should attend divine service on Sunday evening, left the house on one occasion with no one to take care of its contents; and on their return from church they discovered that thieves had been on the look out, had entered the house during their absence, decamped with all they could carry, and on a piece of paper left behind they had given the text for a future sermon for the inhabitants, "Watch, as well as pray!"

Here's another illustration of instinct in insects curiously
resembling intelligence in man, showing that just as the intelligence of the man may be used for a wrong purpose, so may the instinct in the brute. My friend, a bee-keeper in the country, fond of making observations on men and manners, took one of his bees from one hive to introduce it to the bees of another hive; he first covered the insect over with a quantity of liquid sugar, then placed it in front of the strange hive. Several of the sentinels came to over-haul him, and others presently joined, and he was allowed to enter. The bees had spoken to him with their antennæ, and it appeared, to use my friend's words, as if they had said, "Ah! how d'ye do, old fellow! How very glad we are to see you! pray come in and make yourself at home;" but in a minute or two they showed that selfishness can be exhibited even in a bee, for, having licked all the honey from their visitor they then turned him out of the hive, forbidding him to enter again.

Have you ever known the "lord of creation" to act in a similar manner? Alas! it is too commonly the case, I fear, that intelligence may be used, like instinct, for a wrong purpose, to accomplish a selfish end.

Perhaps this is exhibited nowhere more than in the class of insects called the "Praying Mantis"; this word mantis, you must know, comes to us from the Greek, and signifies "divine" or "diviner." In Central Africa it is an object of worship. Holding up its long front-legs as if in an attitude of prayer, raised like arms to heaven, it appears the most saintly of insects; and among the superstitions of the poor Hottentots, if by any chance the praying mantis should happen to settle on his person it is considered a special divine favour, and the fortunate person so favoured immediately is looked upon as a saint.

In the South of France, too, where the Mantis religiosa, that is the praying mantis, is commonly found, they call it "Prie Dieu," believing the creature is absorbed in its devotions.
"Watch, as well as Pray!"

Various "Religious" Flies: a, Mantis religiosa; b, larva of same; c, another, with its victim; d, its larva.
Now, what is the fact?

This serious, this sacred, this saintly fly, which appears so strangely pious and good in the constant act of prayer, is a devout cheat, a pious swindler: it is watching for its prey, and nothing else.

Have you ever watched a cat in the garden after a bird? Slyly and slowly she steals along till within one leap, and then the poor unwary songster is in her mouth. Just so with our pious insect. So slowly does it move towards the imprudent fly that remains near to its apparently stationary saintship, that you can hardly see its motion; but, presently, one leap with those heaven-directed legs and the victim is seized, impaled on the long, sharp spiky spines with which the "aids to devotion" (!) are furnished, and the fly may be numbered with the things of the past.

Will you think me very uncharitable if I pass an opinion that there are sometimes, in other places than green fields, creatures with reason and intelligence who very much resemble the Mantis religiosa?

Have you and I ever been seen by an invisible eye among them?

My friend the dragon-fly, that affords me so much delight in its resurrection dress, with its twenty-four thousand wonderful eyes, what a downright savage it is in life number one; it is not much better, I am sorry to say, in life number three. And one lesson we may learn from the beautiful creature which our French neighbours love to call "Demoiselle" is, that what we are here we shall be hereafter. And there was another lesson, too, we might have learned from the hypocritical mantis, for, do you know, in China the children there amuse themselves by catching the insects during their mimic prayer-time, then putting them in closed cages, they enjoy the spectacle of the fierce battles which take place between the insects; for these fore-legs, these "aids to devotion," as we have called them, become instruments of destruction, and banging
each other about till one becomes stunned by the blows of the other, the business is then settled by the conqueror biting the head off its victim.

May such be the occupation of the hypocrite in another world, less the fatal bite?

Now let us come back, in our lesson, to the French demoiselles, these handsome "young ladies," as Monsieur would have us call them, who teach us that we shall carry our nature with us into another world.

Here is the larva of one; it is aquatic. If you look in the front of its head you will see there a perfect mask; it hides with it those terrible jaws which are behind. The unsuspecting little insect that is enjoying itself in that tiny drop of water, which is to it what the great world you and I inherit is to us—ah! how little it thinks it is in the immediate presence of one who is seeking whom it shall devour. Can there possibly be any harm in so innocent a looking creature as the larva of Demoiselle?

Wait, and you will see.

Nearer and nearer draws the leviathan towards the animalcule, when down goes the mask just as it is within reach, and it is another case of Jonah in the belly of the whale.

Now look at this specimen I lay on the microscope for your inspection. It is the imago, the perfect image, of the charming "young lady" who performed the suggestive operation you just witnessed. Look at its gauzy wings, its countless eyes, its curious feet—all, mark you, as different from its former life as one object can very well be from another. It now inhabits, not the water but the air; now it has organs of locomotion, too, differing altogether from what it had in life number one. Truly was its former life described by the entomologist as larva, that is, a mask, for it did not appear what it should, in the other world, be. But only let me add to our magnifying power, and behold its body is full of its undigested meal;
Transformation of the Dragon-fly: a, the perfect insect; b, the pupa undergoing the great change, showing the method of escape; c and d, life underneath in the first and second stages, as larva and pupa.
—and what does this consist of? Why, the fragments of very minute insects; there are the remains of the legs of one, the eyes of another, the wings of a third, and the little feet of a fourth.

Do you not see it has carried its nature with it into another world? Shall we not do so, also?

But we are wandering far away from Solomon's little people, you will say. Then let us return to the ant, and perhaps there we shall discover a still deeper lesson.

In some parts of France there is an insect called the Myrmeleo formicarius, which being interpreted means the "Ant Lion." As I have had some living specimens brought me for examination, I shall give you my own experience, truthfully but pictorially.

The larva of the ant lion is a savage, ill-looking grub, living in sandy places where there is little vegetation and very much sun, just the place where a worker ant has no business to be. We place one or two of the living larvae in a basin filled with sand; presently they disappear, beguiled into the belief that they are in their native soil, and prepare for work.

Did you observe the strange spade-shaped form of the head, adapted for the purposes of engineering and shovelling, with which the insect is endowed? Now, watching carefully, you will observe by working backwards in a
spiral direction, patiently but perseveringly, it succeeds in excavating a curiously funnel-shaped kind of snare. Now, lacking an ant, we are reluctantly obliged to take the common house fly; let us watch what takes place as the one seeks to devour the other which we have placed on the margin of this sandy pit. Just at the bottom of the funnel appears a little head, a tiny black speck, nearly the whole of the body being hidden below. The “lion” presently sees its distant meal, and prepares to take it. “How?” Ah! regular part of the four thousand eyes, the hidden enemy these eyes; so pitch-grain after grain of sand into the eyes it falls down the in-

The Ant Lion: a, Larva; b, Pupa; c, Pupa-case; d, the final state, Imago.

and is devoured.

The favourite food of this monster is ants, but only those ants who have wandered away from home and home duties find themselves where the enemy abides. But—would you believe it?—this ant lion, after it has passed through life number two, is one of the most beautiful four-winged flies you can possibly imagine.
Now, what is our lesson here? Let us turn to the other revelation. In 1 Peter v. 8 we read thus, "Be sober, be vigilant; because your adversary the devil, as a roaring lion, walketh about, seeking whom he may devour."

You observed how singular was the transformation of the ant lion from life number one into life number three; now look at 2 Corinthians xi. 14, "Satan himself is transformed into an angel of light;" and yet, once more, the same epistle, just as if St. Paul had the ant lion before him, and he was thinking of the words with which he began his famous letter to his Roman friends about the visible things in one world being symbolic of the invisible things in the other (Rom. i. 20), he wrote, "The god of this world hath blinded the minds of them which believe not, lest the light of the glorious gospel of Christ, who is the image of God, should shine unto them."

But, returning to the comparison of instinct and intelligence, let us see whether man has learned the lesson of reciprocity from the ant, or the ant from man.

You know the little green fly that infests your pretty roses, often suffocating the breathing parts of the plant, sucking the vital juices from the leaves, and causing the withering up of both flowers and bud. Ah, you know them very well! This little green fly, with its hundreds of golden eyes sparkling like gems on ruby velvet, this is the Aphis of the entomologist. In Rennie's work on "Insect Transformations," the most reliable and interesting of all entomological works in our opinion, we read: "The almost instantaneous appearance of the destructive insects in great numbers at the same time is taken notice of with wonder by almost every writer. This circumstance, it must be confessed, gives considerable plausibility to the notion of their being brought by winds; for whence, we may ask, could they otherwise come? Simply, we reply, from the eggs deposited the preceding autumn, which, all having been laid at the same time, and exposed
to the same degree of temperature, are of course all simultaneously hatched." In the case of the aphides, also, the fecundity is almost incalculable. Réaumur proved by experiment that "one aphid may be the progenitor of 5,904,900,000 descendants during its life"—that is, five and a half billions, or, to make it comprehensible, that is upwards of four times the population of the whole globe; and Latreille says "a female during the summer months usually produces about twenty-five a day. Réaumur further supposes that in one year there may be twenty generations. We ourselves have counted more than a thousand aphides on a single leaf of the hop; and in seasons when they are abundant, when every hop-leaf is peopled with a similar swarm, the number of eggs laid in autumn must be, to use the words of Good, 'myriads of myriads.'"

"Well," but you ask, "what has all this to do with our story?"

Everybody knows that the atmosphere has certain effects as well upon plants as it has upon animals. Amongst these effects may be reckoned the curious deposition of a moist matter called honey-dew; whether this honey-dew is brought by the atmosphere under peculiar circumstances from the plant, or deposited by the atmosphere on the plant, it is difficult to determine. From experiments made the former theory would appear to be the more correct; if so, then it is a literal distillation of the plant, a clear, limpid, honey-like mass of globules covering both sides of the leaf.

Now of this sweet juice the aphid is particularly fond; but just as the nectar in the flower has to be re-manufactured in the stomach of the bee, and then brought up again (regurgitated), before it becomes the honey with which we are familiar, so has honey-dew to be reformed in the little green workshop of a body of the aphid before it can be fitted for food for ants. But here is the odd part
Aphis: One on the wing; an Ant "milking" another.
of our story: the bee regurgitates its food—that is, pours it forth in the form of liquid honey by its mouth, while the aphid pours out the honey-dew through two curious paps upon its hind-quarters.

The "little people" have discovered the whereabouts of this delicacy; but, then, shall they kill the goose that lays the golden egg? They are better taught; they cultivate the friendship of the aphides, and milk them just as we do our cows, and in exchange for the constant supply of this sweet honey-dew they nurse them and protect them from the aphid's enemy, the ear-wig, declaring perpetual war against that enemy. But ants—being, I am sorry to say, carnivorous—will sometimes devour one another, and though a flock of aphides should prove a delicacy, have learned the meaning of the proverb that one good turn deserves another, and so give as well as get; and with their little instinct read a lesson to you and to me as to what we, who have reason and intelligence, should do with both.

How many lessons, not only of self-help but mutual help, may be learned from insects generally, and our "little people" particularly. Confirming all we have said about antennal language, the Rev. J. G. Wood relates the following story in his very useful little work, "The Common Objects of the Microscope."

"I once," he says, "saw a very curious scene take place at an ants' nest, near Hastings. A great Daddy Long-legs had unfortunately settled on the nest, and was immediately 'pinned' by an ant or two at each leg so effectually that all its struggles availed it nothing. Help was, however, needed, and away ran four or five ants in different directions, intercepting every comrade they met, and by a touch of the antennae sending them off in the proper direction. A large number of the wise insects soon crowded round the poor victim, whose fate was rapidly sealed. Every ant took its proper place, just like a gang
of labourers under the orders of their foreman; and by dint of pushing and pulling, the long-legged insect was dragged to one of the entrances of the nest, and speedily disappeared.

Here was a lesson in mutual help. Here's another in self-help, from my own experience.

Some people's legs are a sore hindrance to them one way, whatever help they may be in another. They walk into temptation, and fall an easy prey to the great adversary, who lays his snares just at the right time and in the right manner suitable to the desires of his victims.

Standing at the parlour window one day, I observed a large garden spider had woven its beautiful geometric web outside the pane of glass; there it stood in the middle, Nimrod like, "a mighty hunter." Suddenly a "Daddy Long-legs" dashed furiously on to the web, and its beautiful wings presently became the means of its ruin.

The garden spider it is that spins a beautiful spiral line which, in its roundabout structure, is covered with about 120,000 viscid globes, in less than three quarters of an hour; and just what the bird-lime is to the bird-catcher, these gummy drops are to the fly.

On those viscid globes the beautiful wings of the Daddy Long-legs became entangled. Now was the spider's opportunity the fly's extremity, so rushing down upon the prey it cleverly tied up its wings, first to prevent escape and then to prevent further damage to its web; then it commenced to suck the life of the unfortunate captive, whose dried-up remains in half an hour were hanging from the broken web, as a warning to me and to you to be constantly on the look out for our greater adversary.

I have alluded once to the family of one of my many domestic pets, the common house fly, who rejoices in the aristocratic name of Musca domestica. Let me tell you why I mention it again.

The smallest known organic form is supposed to be the
The Garden Spider, showing the geometric lines of web.
monad. It consists, as its name implies (the word coming from the Greek monos, alone), of one simple single cell, an indivisible atom, measuring the \( \frac{1}{12000} \)th of an inch in diameter; it belongs to the animal kingdom, and requires a very high magnifying power to be discerned. The largest known animal in living form we may take to be the whale. Now, between the monad measuring the \( \frac{1}{12000} \)th of an inch in length, and the whale measuring 100 feet, we may be sure amidst the hundreds of thousands of living beings there is a half-way house.

Where do you think that half-way house is to be found? In my friend Musca domestica, the common house fly.

It is, therefore, a great leap to jump from the ant to the dog for a comparison of instinct, and so, in this part of our story, we will wait for another chapter, when we will compare instinct [with intelligence in some of the animals that are greater, physically, than the ant as the ant is above the monad, and should be as much below the intelligence of the man as they are below him in stature.

**NOTE.**

"ANTS PREPARE THEIR MEAT IN THE SUMMER."

Reference has been made in the foregoing chapter to that romantic page in entomological history, the love of the ant for the aphids. Lest my readers should be inclined, notwithstanding the authorities quoted, to doubt the reality of this part of my story, I will add the experience of another prince of naturalists, Mr. Kirby, who, with his friend and companion, Mr. Spence, has contributed the most charming pages about insect life for the study of the curious to be found in any language.

"That ants should have their milk cattle," he writes, "is as extraordinary as that they should have slaves. Here, perhaps, you may again feel a fit of incredulity shake you; but the evidence for the fact I am now stating being abundant and satisfactory, I flatter myself it will not shake you long.

"The loves of the ants and the aphides have long been celebrated; and that there is a connection between them you may, at any time
in the proper season, convince yourself, for you will always find the former very busy on those trees and plants on which the latter abound; and if you examine more closely, you will discover that their object in thus attending upon them is to obtain the saccharine fluid, which may well be denominated their milk, that they secrete; the French writer Léuné remarking on this subject that 'the ant ascends the tree that it may milk its cows, the aphides, not kill them.'

And I may remind you here that this is just the contrary act of the ear-wig—or ear-wing as it should be called, from the curious resemblance of the wing of this insect to the outward form of the human ear—the ear-wig seeking the aphis to destroy it, and thus creating perpetual war between itself and the ant.

'This saccharine fluid,' continues Kirby, 'which is scarcely inferior to honey in sweetness, issues in limpid drops from the abdomen of the aphis, not only by the ordinary passage, but also by two setiform tubes, placed one on each side just above it.

'Their sucker being inserted into the tender bark, is without intermission employed in absorbing the sap, which, after it has passed through the system, they keep continually discharging through these organs.

'When no ant attends them, by a certain jerk of the body, which takes place at regular intervals, they ejaculate it to a distance; but when the ants are at hand, watching the moment when the aphides emit their fluid, they seize and suck it down immediately. This, however, is the least of their talents, for they absolutely possess the art of making them yield it at their pleasure; or, in other words, of milking them. On this occasion their antennae are their fingers; with these they pat the abdomen of the aphis on each side alternately, moving them very briskly; a little drop of fluid immediately appears, which the ant takes into its mouth. When it has thus milked one it proceeds to another, and so on, till, being satisfied, it returns to the nest.

'But you are not arrived at the most singular part of this history—that ants make a property of these cows, for the possession of which they contend with great earnestness, and use every means to keep them to themselves. Sometimes they seem to claim a right to the aphides that inhabit the branches of a tree or the stalks of a plant; and if stranger ants attempt to share their treasure with them they endeavour to drive them away, and may be seen running about in a great bustle, and exhibiting every symptom of inquietude and anger. Sometimes, to rescue them from their rivals, they take their aphides in their mouth; they generally keep guard round them, and when the branch is conveniently situated they have recourse to an expedient
more effectual to keep off interlopers; they enclose it in a tube of earth or other materials, and thus confine them in a kind of paddock near their nest, and often communicating with it.

"The greatest cow-keeper of all the ants is one to be met with in most of our pastures—I mean the yellow ant. This species is not fond of roaming from home, and likes to have all its conveniences within reach, usually collecting in its nest a large herd of a kind of aphis that derives its nourishment from the roots of grass and other plants; these it transports from the neighbouring roots, probably by subterranean galleries, excavated for the purpose, leading from the nest in all directions; and thus, without going out, it has always at hand a copious supply of food.

"These creatures share its care and solicitude equally with its own offspring. To the eggs it pays particular attention, moistening them with its tongue, carrying them in its mouth with the utmost tenderness, and giving them the advantage of the sun. This last fact I state from my own observation; for once, upon opening one of these ant-hills, early in the spring on a sunny day, I observed a parcel of these aphis eggs, which I knew by their black colour, very near the surface of the nest. My attack put the ants into a great ferment, and they immediately began to carry these interesting objects down into the interior of the nest.

"It is of great consequence to them to forward the hatching of these eggs as much as possible, in order to insure an early source of food for their colony; and they had doubtless in this instance brought them up to the warmest part of the dwelling with this view.

"Our yellow ants are equally careful of their aphides after they are hatched; when their nest is disturbed conveying them into the interior, fighting fiercely for them if the inhabitants of neighbouring formicaries, as is sometimes the case, attempt to make them their prey; and carrying them about in their mouths to change their pasture, or for some other purpose. When you consider that from them they receive almost the whole nutriment, both of themselves and larvae, you will not wonder at their anxiety about them, since the wealth and prosperity of the community is in proportion to the number of their cattle."—(Kirby and Spence's "Entomology," pp. 334–35, 1858.)

The observations of the above worthy naturalists, whose fascinating chapters are sermons and addresses as eloquent as the first ever preached in his church, or the second ever delivered in the Royal Society, refer to the care ants have for their young.

"The most determined despiser of insects and their concerns," they write—"he who never deigned to open his eyes to any other part of their economy, must yet have observed, in spite of himself, the
remarkable attachment which the inhabitants of a disturbed nest of ants manifest towards certain small white oblong bodies with which it is usually stored. He must have perceived that the ants are much less intently occupied with providing for their own safety than in carrying off these little bodies to a place of security. To effect this purpose the whole community is in motion, and no danger can divert them from attempting its accomplishment. An observer having cut an ant in two, the poor mutilated animal did not relax in its affectionate exertions. With that half of the body to which the head remained attached it contrived, previously to expiring, to carry off ten of these white masses into the interior of the nest!

"You will readily divine that these attractive objects are the young of the ants in one of the first or imperfect states. They are, in fact, not the eggs, as they are vulgarly called, but the pupae, which the working ants tend with the most patient assiduity.

"These, which are so small as to be scarcely visible to the naked eye, as soon as deposited by the queen ant, who drops them at random in her progress through the nest, are taken charge of by the workers, who immediately seize them and carry them in their mouths, incessantly turning them backwards and forwards with their tongue for the purpose of moistening them, without which they would come to nothing. They then lay them in heaps, which they place in separate apartments and constantly tend until hatched into larvae; frequently in the course of the day removing them from one quarter of the nest to another, as they require a warmer or cooler, a moister or drier atmosphere, and at intervals brooding over them as if to impart a genial warmth" (p. 206).
CHAPTER VI.

REASON.

"Within the brain's most secret cells
A certain lord of justice dwells,
Of sovereign power, whom one and all,
With common voice, we Reason call."—Churchill.

"Oh, Reason! who shall say what spells renew,
When least we look for it, thy broken clue!
Through what small vistas o'er the darkened brain
Thy intellectual day-beam bursts again;
And now, like forts, to which beleaguerers win
Unhoped-for entrance through some friend within,
One clear idea, waken'd in the breast,
By Memory's magic lets in all the rest."—Lalla Rookh.

Volumes have been written about dogs. The instinct of the animal is its great attraction, and if it has learned some of the vices of men it has also learned much of their virtues; but has a dog ever built such a wonderful house as either the bee or the ant?

Have you ever observed a dog making its bed? It turns round and round, and at last, comfortably covering its head in its tail, it goes off to sleep. That is the habit peculiar to its wild nature which through ages of civiliza-
tion it appears never to lose; but give it straw upon which to sleep, and then compare its self-made bed with an ants' nest or a bees' hive, and you will see how much better it is to have little brains and make good use of them, as an intelligent being, than to have much and to use them badly.

I have given you several illustrations of mutual help in the history of the ant; now to compare one with the other, let me give you one of the dog.

A personal friend, and a great lover of nature, living in the crowded streets of the West End of London, once had a highly intelligent dog named "Jerry;" he was the dog of the place, if not the dog of the period. I knew him well, and among others Jerry was always amongst the first to give me a hearty welcome. Jerry's department was downstairs in a subterranean kitchen, and to reach this a flight of some twenty stone steps had to be trodden. A poor beggar-dog was one day found at the top of the stairs asking alms of his more fortunate companion, and Jerry was actually seen taking from his own provision, up all those steps, to his hungry relative, whom he wouldn't allow to come into the building, a bone with which to satisfy his appetite; then telling him in canine language to go about his business.

Now, shall we compare that with another illustration taken from another animal's experience, and then draw our conclusion?

A clockmaker was once employed to make a clock for the Temple, in Fleet Street, very near to where Jerry lived. An inscription was required for the clock. Many people like inscriptions on their clocks; here is one on the pendulum of mine—

"NOW is the Accepted Time."

Before the clock was brought home the maker came and
waited for the inscription; but the chief of the office, not
knowing the man or his errand, ordered him off, saying,
"Go about your business." So the simple fellow, supposing
this was the motto to be put on his clock, engraved the
words, "Go about your business," which so tickled the
fancy of the owner that it was allowed to remain.

Now, compare this language of a dog with the antennal
language of an ant, in its use as respects self-help, with the
use which we should make of our intelligence, and then
our story will have a moral.

Here is another like it in its lesson of sympathy and
self-denial.

Another friend had a French dog, who, like Jerry, was
a terrible enemy to cats. One cat, left in the house, was
the object of his intense hatred, upon whom he repeatedly
made very savage attacks, so that at last it was thought
necessary to part them, illustrating the truth of the saying
of other animals than cats and dogs, who sometimes,
nevertheless, lead a regular dog-and-cat kind of a life.

The chief characteristic of the enmity between the
animals now mentioned was that the dog would never
allow the cat to eat her meals in peace, not only disturbing,
but robbing her of her food.

One day the cat became the mother of several kittens,
and to keep them from her angry enemy the dog, they
were deposited in a lower drawer under the side-board of
the kitchen, where the mother nursed her little charge.
As soon as she took possession both of her family and the
drawer, she was seen to go boldly up to the dog; when
presently the latter was seen to go, accompanied by the
cat, up to the drawer wherein the family was hidden,
and both dog and cat looked in, and the dog appearing
perfectly to understand how matters stood never again
interfered either with meals, cat, or kittens.

Here was, undoubtedly, a mother's appeal; it was irre-
sistible, and it will fairly compare with the ant seeking a
nurse for the little ones and with the spider who gave us the useful lecture upon self-denial.

It is an old saying that "Reason is the glory of human nature, and one of the chief eminences whereby we are raised above the beasts in this lower world." And, again—

"Man is not the prince of creatures,
But in reason; fail that, he is worse
Than horse, or dog, or beast of wilderness."

But do not brutes reason?

Some years ago an old man had to attend to an old horse in the stable; giving him corn from the loft above he fell through on to the stable floor, and there lay insensible. The horse was loose; they had been old friends for many years together, and had you been there you would have seen the poor brute taking up his dead friend by the clothes, and walking with him in his mouth to his family.

Wasn't this something very much like reason? Another horse had every week to carry home a drunken driver from a country market. The "lord of creation" was too far "gone," as it is said, to guide the brute, and more than once on the homeward journey he rolled quite out of his cart, and there lay in the roadway. Now wouldn't you have said, after he had received warning after warning, "Let him alone till he come to his senses; 'as he has made his bed, let him lie on it?'" &c. What do you think the brute did? Stood across the man's body, having him under his four legs, and thus protected him every time till assistance arrived, when he was restored to the cart.

Wild beasts will exhibit the same character of reasoning in a lesser or greater degree. The Bombay ape, found in large numbers in Gibraltar, has a strange fancy that its little ones should appear with clean faces and nicely-combed hair; but it has neither soap and water, nor towel, nor brush nor comb with which to accomplish the toilet.
Then how is it done? It fills one hand with its own spittle, rubs it well in with the other, and gives the finishing touch with the bushy end of its tail, using its claws as a comb.

You would naturally expect to find a wonderful amount both of affection and decision in the elephant, and so you do; the remarkable eye of this survivor of a former world is indicative of great regard for its species, while its natural history exhibits the most untiring energy perhaps of any quadruped.

In the Zoological Gardens, recently, a large female elephant had a calf, which she was bringing up with maternal solicitude. Now this calf was possessed with a spirit of obstinacy, and disliked the necessary bath as much as other babies too often do. The mother was observed to do all that a mother either could or should, and, at last, finding every other power fail, she was seen deliberately to take hold of her baby with her huge trunk—which we are told has so many as forty thousand muscles, that is one hundred times as many as you and I have in our whole bodies—and throw it into the water to give its hide a thorough cleansing. But before this, my friend, who related this story to me as the result of his own observation, observed the old mother roll the baby elephant over and over in the mud of her bath, then casting it into the water as described; and on asking the keeper for an explanation, it appeared that the juvenile elephant was swarming with fleas, and the mother, trying without effect to get the little one into the water that they might be got rid of, threw her baby in, first having the forethought to smother the parasites in the mud.

Now contrast this once more with the ant. The nurses, without any experience—for there are no "Florence Nightingales" amongst them—the nurses at once "go about their business;" and if I were to transcribe the duties of nurses for their instruction, as soon as it is
decided they should devote their lives to that profession, this is something like what it would be. But as sometimes the nurses become workers, and the workers nurses, neither saying "it is no business of theirs," as in members of another family it is sometimes said, we may include both services under one.

INSTRUCTIONS FOR ANT NURSES AND WORKERS.

To collect stubble, wood, leaves, &c., with which to form a habitation.

To build the nest in such manner that it may be impervious both to wind and water.

To excavate tunnels from the summit, the number of tunnels to depend upon the population who shall have to traverse them.

To take care the apertures of these avenues are not large enough to admit an enemy, and barricade all the entrances, finally closing the outer entrance with leaves.

In the morning to clear away these barricades, but to leave sufficient to protect the nest in the event of rain or of threatening weather.

To erect special chambers as nurseries for the larvæ and pupæ, communicating with each other by galleries.

To deposit eggs in these nurseries, and when they become larvæ to form a body-guard specially to defend the infant ants as they are passing from one life to another, and to be prepared with a ready sting to attack all intruders.

To feed the larvæ, and, above all things, to take care the strength of the food is exactly suited to the age of the infant.

To ascertain the state and condition of the weather, and to communicate the fact of its general character to the world below; and when the weather is settled and clear to bring out the infants, placing them in such position that they may receive the rays of the sun.
To see they are never out for this airing for more than a quarter of an hour at a time, and to take care they are put into their cradles again; and then again in the afternoon to take them out for a short season for the same purpose as before.

To cleanse the larva, and keep free from all impurity, by licking over every part of its little body.

To watch for the proper time to assist the pupa from the case in which it is entombed, and to cut the silken cocoon made by the larva carefully with the mandibles, first scraping away the silken texture, inserting the point of the mandibles into the aperture, using them as other animals do a pair of scissors, cutting across the cocoon in a direct line.

To assist other nurses and labourers in the delivery of the perfect insect, and to keep it on its arrival into the world for which it had previously been prepared; and while some are employed cutting open the cocoon, others are gently to assist the new-born ant, so that its wings may not be damaged as it is being drawn into life.

When the perfect ant first comes into the world, to smooth down its antennae, palpi, legs, wings, and body, and to help it to stand on its six feet; to cleanse its eyes in the front of its head, and to encourage it by fond caresses.

To remove the empty cocoon and the remains of the old body to the extremity of the nest, and to watch with the greatest care over the new-born insect.

To attend them in their wanderings about the nest, and to direct them through the dark tunnels and chambers in which their future life is to be spent.

When a portion of the old colony shall decide upon migration, to watch the females as they disrobe themselves of their wings, and to offer assistance to such as shall decide upon becoming nurses to the families, and especially to honour the queen, and to excavate a small chamber for the especial occupation of her majesty.
Lastly, to form bands of press-gangs for the purpose of kidnapping the workers of other tribes, and, treating them kindly, to compel them to labour for the rest, providing them with food and lodging in exchange for their work. To select the black ants only for such purpose.

To appoint scouts to ascertain the exact position in which a colony of negroes are to be found, and to see they return and report their successes; and then to constitute a grand body of soldiers, headed by a constantly replenished guard; and, when arriving at the destination, to surround the negro colony, then the foremost to commence the attack, to slay the black sentinels should they offer resistance; then quietly to wait the out-turn of the invaded, who will be greatly alarmed by the report of the attack without. To follow up the attack by tearing open the sides of the ant-hill and rushing into the midst of the citadel; then to secure the infant pupæ, and to retire with the captives, bearing the living burden tenderly home.

On arriving at home, to treat the slaves with care and attention in return for their labours; to see they repair the nest, excavate passages, collect food, feed the "superior" larvæ, take the young out for an airing into the sunshine, and perform every office which the welfare of the colony may require.

Now, tell me, don't you think Solomon was right when he wrote, "Go to the ant, thou sluggard; consider her ways and be wise"? whilst his friend said, "The ants are a people not strong, yet are they exceeding wise;" and if an insect can use its instinct in so wonderful a manner, how much more should we learn to use our intelligence?

But, do we?

This chapter is an inquiry: do not such cases as we have just read supply an answer?

The boundary-line between the highest type of instinct and the lowest of intelligence is very small indeed; man's
true reason begins where the brute's highest type of instinct leaves off. "Polished steel," says Foster, "will not shine in the dark; no more can reason, however refined, shine efficaciously, but as it reflects the light of divine truth shed from heaven."

Brutes, in a state of nature, exhibit very few of the higher orders of instinct they exhibit after living in the company of their captors. No, they learn from him; sometimes the more viciously inclined borrow his bad parts, while the gentle imitate his virtues.

Some time ago, in Paris, there was a shoe-cleaner by one of the Seine bridges who earned his living by cleaning the boots of passengers. It was remarked by many that very soon after their boots had been cleaned and paid for a mud-bespattered dog ran over them in a neighbouring street, rendering a second cleaning, and therefore a second payment, necessary. You will easily guess whose dog this was, and who had taught him to improve his instinct, so that he became a conspirator.

We read in Proverbs vi. 6 that the ant "provideth her meat in the summer, and gathereth her food in the harvest." Although in our own country we do not find Solomon's description of ant economy answer this character, in the East it is otherwise, where grain and other food is stored up for future use by the ants.

The Arabians, it is said, held the wisdom of the ant in such veneration that they used to place one of these insects in the hand of a newly-born infant, repeating the words, "May the boy turn out clever and skilful!"

But while complimenting "the little people" on their wonderful amount of wisdom, and while considering their economical habits in providing for the future, teaching us that we may show our intelligence to the greatest advantage by making provision for the great future before us, do let me say a word for a monkey.

The story I would tell came to me from one who was
the chief actor, a name well known in the literary world. This gentleman occupied some of his time every Sabbath in a Sunday-school, and he promised his boys a day’s treat at the Zoological Gardens; so one day he and his boys were on their way to Regent’s Park.

I must first give you my friend’s portrait. His face was large and round, he had two loving eyes, round and bright, an enticing mouth, and plenty of nose. Now these, with bushy hair and a couple of well formed ears, you know, would all go to make a very respectable appearance.

Do you think that brutes are good judges of character? Do you think the face is the index of the mind?

I believe brutes are very good judges, and that they judge by appearance, and that sometimes they reason.

Well, my friend, remembering his own boyhood, provided himself with a quantity of nuts, intending them for the monkeys. On arriving at the big monkey-house, and looking upon the frolics of the tribe inside, one very small animal came to the fore-part of the cage and looked very hard into the face of my friend; he was so very small a specimen, this monkey, that he might have gone into a quart pot.

The gentleman, pulling some nuts from his pocket, presented one to the little monkey, who after taking it looked seriously into his donor’s face; then he paused as if considering, then he put his arm through the wires and returned the nut to him. “How very unmonkey-like,” you say. But stop; much astonished at this, my friend, looking first at his boys, then at the monkey, exclaimed, “Why, I declare, I think he means me to crack it for him!” Whereupon, cracking the nut, he re-presented the kernel to the monkey, who devoured it forthwith.

My friend then presented the little fellow with a second nut, with exactly the same result; then a third, and a fourth, till at last he said, “Now, little man, if you want any more, you will have to crack them for yourself.”
"And what happened next?" you will ask. After waiting some time, and finding he had got all he could, the second chapter in this monkey-story begun. The monkey ran up into a corner, where, in a little box, was his home; from thence he hurried down to the friend below, who was wondering what would happen next, when, lo and behold! the little fellow had some uncracked nuts concealed up there, one of which he brought down, presenting it to my friend to be cracked. But now look at what happened.

The monkey did not stay to eat this nut, but, hurrying up to his little house, deposited the cracked nut there, bringing several uncracked nuts down, and again concealing the kernels as before.

Very much interested this kind man was, you may be sure; and wishing to know what all this meant, he ascertained from the keeper that the little fellow had such bad teeth that he couldn't crack a nut; that many came, and offering him nuts then withdrew them, and he had a decided objection to being made a fool of; that, looking into the large, kind face of my friend, he judged him trustworthy, and that, after getting all he could for his present use, he remembered that a to-morrow was coming when his old tormentors might deal very differently with him to the generous friend who was now supplying his necessities; so with those saved from yesterday he provided for to-morrow, by hiding them away in the corner of his house.

We know Solomon was fond of monkeys, because we read (1 Kings x. 22) the king, Solomon, once in three years, brought home from the east, ivory, and apes, and peacocks; and as the very next verse tells us he exceeded all the kings of the earth for riches and wisdom, you may be sure he gained something in the study of his monkeys as well as his ants.

Two of the noblest qualities of man you must have
observed were called into action in the monkey—*memory* and *reason*.

What is memory?—what is reason?

A few months ago some correspondence appeared in one of the best of our London newspapers on the wonderful instinct of dogs. One writer, who sends his name and address, writing about the wonderful power dogs have of remembering and calculating time, says this power was possessed in a remarkable degree by a mastiff attached to a school not many miles from London, whose inmates are roused every morning at six o'clock by "Rollo" tugging at the bell immediately he hears the clock strike the hour. On Sundays he will not do this till an hour later, when the family indulge in an extra hour's rest, on that day not rising till seven o'clock. "Rollo" also took the boots and shoes, some twenty pairs, round to their proper rooms, perplexed when a new comer appeared, but quietly first delivering all the rest, leaving the strange shoes till the last, and then depositing them at the vacant door.

Here, as in the monkey case, there is both memory and reason.

Doubtless both had made the best use of their instinct; and equally true it is that we, too, succeed or fail in life just in proportion as we make good use of that higher and holier quality and faculty we possess in having a reasonable and immortal soul enwrapped within the shrine of a superior intelligence.

"To him that hath (used the intelligence given him) shall (more) be given; but to him that hath not (used it), from him shall be taken even that which he hath" (not used).

Physiologists tell us the more we use the brain in reason the bigger it gets. We certainly know the more we use our arms the larger and stronger they become; notice the difference between the muscle of a man who works with a hammer and another who works with a pen.
Here, then, is a hint for the exercise of our intelligence.

Reason and memory we found belonging both to the dog and the monkey in a remarkable degree; so do they to the little people. I have heard of one of the many tribes—for upwards of seven hundred varieties are believed to be known—which has a special fancy for the little eggs of an aphis which deposits them upon sprays of grass. But here, first, let me ask your attention to another act in another insect, and then contrast the different application of the same thing in both, and tell me whether the instinct in the little people does not come fully up to the two remarkable cases mentioned in the monkey and dog.

When the queen bee marches from cell to cell to people the hive, the nurses and workers accompany her; they form a body-guard, and should her majesty make a mistake—for even royalty is not infallible—and put a worker egg in a drone cell, or *vice versa*, for there are drone cells differently made to worker cells, then the attendants remove and replace them. But another mistake sometimes happens: the queen lays more eggs than are wanted; there are more eggs than cradles to put them in. Now, they must perish or be wasted; so that neither disaster shall happen, *the workers eat them up*. Now I suppose they would not do this were they not fond of these new-laid eggs; what self-denial then must they practise as they carefully see that every egg is deposited, the right thing in the right place. Here is both reason and self-denial, two of the noblest qualities exercised: and now contrast these with the little people.

The species that has a fancy for the little eggs of the little green aphis that deposits its eggs in the autumn on the sprays of grass, you would suppose, by analogy, would either remove them to their nest to be enjoyed there, or feast upon them on the spot. Nothing of the kind, my dear: the insect that would ultimately come from that tiny egg is a particular friend of the ant, very useful to it in
its summer life, for the ant uses it in the same way and for the same purpose exactly as we do our cows, as already described in another place; and it knows that by nourishing the eggs during the ensuing winter it will be amply repaid in the next summer, and so it bestows great care in providing them with house-room in the dark nurseries which form an important part of the ant-colony.

But the aphis when born will require food, and the mother aphis, who, without any experience or instruction, remember, deposited her eggs on the sprays of grass, left them where that particular species of aphis would find the particular nourishment it would require; then how shall the food be brought to the aphis, or the aphis to the food? Now comes the most remarkable part of our story. When the warm summer weather comes the ants remove the aphis eggs from the winter home back to the sprays of grass, and thus the aphis is preserved and the ant rewarded.

We are contrasting the instinct—with its power of reasoning—of the insect with the quadruped. Which do you think has the best of it—not forgetting the bulk of brain and body of the one animal compared with that of the other?

Perhaps you will remind me of a dog of whom we have heard who was sent to fetch a dinner home from the baker's, and who, on meeting with a larger and fiercer animal than himself, and knowing he should be no match for him, and that his master would certainly lose his dinner, while his adversary would beat him in a fight and devour it, suddenly was observed to pause before the enemy got too near, then ate it all up himself.

If this be a true story I fear it was a very shrewd excuse, and that the reasoning power of the dog was used for a bad purpose, as we too often find in another family.

This has been a long chapter, this comparative illustration of instinct and intelligence; but I hope it shows to us the reason why it is written, "Ask now the beasts and
they shall teach thee," and why the sluggard is sent by the king to the ant to learn wisdom. I think I shall have proved to you that, without doubt, the antennae of insects have all to do with that wonderful power they possess, which in man we call reason, and that it is by using what they have they become as wise as they are.

An Ant's Method of Defence. The body is erected, the abdomen bent upwards, and formic acid ejected in the direction of the adversary, producing a smarting effect.—(See page 119.)
CHAPTER VII.

INFLUENCE.

"As a little silvery circular ripple, set in motion by the falling pebble, expands from its inch of radiance to the whole compass of the pool, so there is not a child—not an infant Moses—placed, however softly, in his bulrush ark upon the sea of time, whose existence does not stir a ripple, gyrating outward and on, until it shall have moved across and spanned the whole ocean of God's eternity, stirring even the rivers of life and the fountains at which His angels drink."—Elihu Burritt.

After the various illustrations in our last chapter you may naturally inquire—Then are brutes responsible for the exercise of their mental powers?

That is it which separates them from man. No; in many remarkable instances they know right from wrong; that is the culminating point of their reasoning power; they cannot but act as their instincts direct them. Man has that within him which not only in every case, if he will but listen, will silently but surely tell him whether he is doing that which is right in the eyes of another, but he has, and he only, the power of self-control; the intelligence bestowed upon him as the head of creation is given him that he may be the master of himself, holding the reins
of all his passions and desires, and governing all the members of the wonderful house he lives in.

Brutes die and are done with, notwithstanding the theory that their spirits will live in another world; which theory, however, is much more reasonable than the Darwinian doctrine, teaching that men came from monkeys, wearing off their tails by sitting so much, and that the tall neck of the giraffe is attributable to its stretching it out so much in browsing on the branches of trees; but both speculations are older than the Christian era, and both are opposed to that dear old Book to which alone we owe all our knowledge of truth.

No; man alone is responsible, because he alone has the everlasting spark of divine life implanted within him; man alone has a truly human soul.

All knowledge comes from experience, and experience comes from observation. Now that brutes do observe, and that very closely, is undeniable. Before leaving the story of instinct and intelligence, I would like to refer to some animals of whom it has been reported that they have learned to mimic man in a singular manner; as of a respectable dog, for instance, who would never think of such a wicked thing as stealing, but who joined a thief in the shape of a disreputable cat, on the sly, sharing the meal which she had stolen, with her.

Was this the result of merely animal observation? I should like to know the natural history of the family where this brute passed his puppyhood.

Dogs, like men and women, have their likes as well as their dislikes. While employed in writing this story much correspondence is taking place in the daily papers about "The Lewes Dog."

Here is a case, the truth of which is attested by several travellers by name on the London, Brighton, and South Coast Railway, where a fox-terrier for several years spends all his time in travelling up and down the line, settling.
himself in the guard's carriage, sometimes going to Portsmouth, sometimes to Horsham, sometimes only to a nearer station; but the most remarkable part of his arrangements was, that he always contrived to get to Brighton in time to go by the last train that left there for Lewes, where he invariably slept, leaving again by the first train in the morning. As the writer of one of the letters wisely remarks, "it certainly shows an immense amount of instinct and observation, and the regularity and punctuality of 'Jack's' daily life is a lesson to many a two-legged traveller." The writer of another letter, confirming the truth of the above, adds that the dog, adopted by the railway company, and now decorated with a collar bearing the inscription, "Jack—London, B. and S. Coast Railway Company," has his private apartments at Croydon, Three Bridges, Tunbridge Wells, and Eastbourne.

What a remarkable illustration this, both of reason and memory!

Let us contrast it with another amongst the insects. One of the men working on a line of railway, passing a nest of wild bees, thrust a stick into the nest and dislodged the bees. They waited his return, waylaid him, and picking him out from all the men who accompanied him from work, so severely stung him that he died from the effects in a few days.

And while we are thinking of those qualities upon the proper use of which so much of human happiness depends, let us think of the affections. You have seen Landseer's touching picture of "The Chief Mourner." It is the centre of a Scotch shepherd's cabin. The chief article of furniture in the humble apartment is a coffin, over which is thrown a black pall. A true Scotch hound is looking up to the coffin-lid, in which the body of the master he loved so well, and followed so long and so faithfully, is reposing; and, with a sorrowing eye, the poor brute is waiting and watching for his return.
Do you wonder that one day when I stood looking, not at, but into, this picture, I had to brush away two or three tears from my eyes?

That is a true picture of a dog's affection. Yours and mine should be like it, but of a higher and nobler nature; and woe be to us, for we are responsible for their higher and nobler use, if we don't use our affections aright.

"Have the little people sympathy with or love for one another?" I can answer most decidedly, "Undoubtedly." They love and obey a living queen and respect a dead one. I can tell you of one instance where an ant, drowning in some water into which it had accidentally fallen, was rescued by several of its family uniting themselves to each other by their legs, forming a living bridge, when another hurried over their bodies and dragged the half-dead insect to land, when they all began licking it into life again, till it became perfectly restored.

_Love for the Master!_ Ah, what a lesson is taught us by the lower orders of animal life in this respect: _Love for the Master_. Have you ever been to Edinburgh? In the chief thoroughfare of that Athenian-like metropolis there is a bronze fountain, erected by that noble lady the Baroness Burdett-Coutts. It is "to the memory of Greyfriars Bobby." And who, you will say, was he? A poor man's best friend, who was faithful even unto death, for, after living with his master for many years, when the latter was buried in the interesting old churchyard of Greyfriars, poor "Bobby," who saw the coffin lowered into the grave, would never, and did never, leave it; but for several years watched and waited, like Landseer's dog, by the grave of him he had loved and followed, till there he died. He was daily fed by the admiring neighbours, and the kind-hearted Baroness has taught us a practical lesson whenever we look at the figure of Greyfriars Bobby at her Edinburgh fountain, or when we hear the touching story repeated.
Like it is another story, the object of which I witnessed many years ago. A large Newfoundland dog, whose master had committed suicide by leaping from the parapet of London Bridge, morning after morning was seen by me, amongst many others, to visit the scene of its master's folly, and, standing on the parapet, look longingly and sorrowfully into the fatal water below, then mournfully retire.

How much of human nature there is in all this! And when we read the sarcastic question which Hazael put to Elisha, "Is thy servant a dog that he should do this great thing?" (2 Kings viii. 13), we wish that many who call themselves men by reason of their intelligence equalled the dog in its instinct.

It is recorded of a fine pair of chimpanzees in the Philadelphian collection, who lived in constant matrimonial happiness and seclusion, that one morning the female dying suddenly the male ape broke out into a truly Asiatic lamentation, tearing his hair, and with a bitter howl, unlike any cry the keeper had ever heard from him before, lamenting his beloved mate. While he cried he was observed to lift up the fallen head and the lifeless fore-paws of his companion, all the while howling most piteously.

We say of each other—we, according to Darwin, we superior apes—that "absence makes the heart grow fonder;" so did our very distant relative in my story. His grief by no means passed away with the body of his friend, and he would never again sit in the cossey corner where he and his wife had so long dwelt in constancy and affection.

You will see where the great difference lies between the man and the brute. The former anticipates affliction, and, so far as he can, applies for and obtains the remedy; this the latter never does because it never can. I once heard of a decidedly exceptional cat, who, on the drowning of her young family of kittens, after exhibiting an unusual amount of anxious concern and sorrow, in the course of a few days suddenly ceased, and, being missed, was found
hanging between the forked branches of a tree, in which it was supposed she had ended her life by suicide.

Before we leave this portion of our story let us think of the ass, supposed to be as stupid as any quadruped, and which has given birth to a variety of disagreeable epithets. When properly trained he will become a very obedient and useful brute, as we learn from the following anecdote.

A Spanish peasant living in the suburbs of Madrid, who had long been in the daily habit of selling milk to his numerous customers, and whose donkey was the bearer of the milk-cans, was one day taken ill. How should the customers be supplied? The wife suggested the donkey should be laden as usual, and allowed to go on the daily round alone. Accordingly the donkey started, having tied to his ears a piece of paper, upon which the thoughtful woman had taken care to write that the customers were to help themselves to their usual quantity, and replace the measures. The donkey accordingly started on his "milky way," with everything in order, stopping at all the houses in their regular order, and returned at night with the cans empty; and it was found that of all the customers he had to supply he had not neglected one, and that in some instances, when kept too long, he had actually pulled the bell-handle with his teeth.

We are not told how the poor ass managed if the servants left their empty jugs at the street door to be filled, as they sometimes do; but two lessons are taught in the story, the sagacity of the donkey, and the honesty of the customers. I greatly fear from my London experience, that such an experiment in my neighbourhood would never answer, either with the beast or the milk.

You may tell me the force of habit is so great that animals, like man, act instinctively, not intuitively. Now these words want digesting before we can really understand what they mean. Let us, then, look at them. *Instinct* means a mental power or faculty by which, independent of
all instruction or experience, animals do what they do. By *intuition* we understand that power by which the mind perceives the truth of things without reasoning about them: *immediate perception* may define in two words the meaning of the word "intuitive."

But the lower order of animals have a combination both of instinct and intuition. Wanting a word exactly to express what this combination is, perhaps we may describe it as "**intuitive instinct**." Here is an illustration: it is an instinct of the honey bee to collect nectar and pollen with which to make honey, and other material with which to elaborate wax. The former, the honey, is deposited in the comb in summer to supply food for the winter; and the latter, the wax, is necessary to construct the storehouses in which the sweetmeat is to be treasured.

In some parts of California there are flowers all the year round. There is no winter there, and I learned from one who was familiar with the fact, that in the early history of that splendid country they could not get the bees to make honey; there were plenty of bees, but all they could do the Californians could not prevail upon the insects to make more than enough to last them for the day. A friend to whom he mentioned this interesting circumstance was highly amused, and, laughing at the story, complimented the bees on their good sense, exclaiming, "Who likes to eat preserved meat when he can get any amount of fresh!"

Here was reasoning and intuition combined. These wise insects, you see, were ready for the occasion; there was something more than instinct in what they did.

Who would expect to find a like power or faculty in that very disagreeable creature our large garden slug, who, with its 26,800 teeth, commits such havoc with our plants and vegetables?

A friend living at Croydon told me, very recently, that having been pestered by a large number of these creatures
he was advised to cover his garden paths with cinders, to which the slug family has a decided aversion. He did so, but still they found their way to his favourite beds. He was puzzled to find how their soft bodies could crawl over such an alpine way as he had made for them, so gave some dark hours to watching, and was amazed to find they made a pathway first of dead leaves, laying down first one, then walking over that to and with another, until at last the whole breadth of the path was covered with leaves upon which they crossed over.

Now, compare this with the ant whose story I told you, who, having a load too heavy to carry, and not choosing to leave it, patiently waited till the wind blew him and his load home together by reason of his improvised sail, formed of a dead leaf held up by the stalk, and tell me, could any animal amongst the highest kind have acted wiser or better?

In concluding our long story about instinct and intelligence, a subject which has occupied the minds of thoughtful men since man began to think, and will till there is no one left to think, let us learn one or two lessons, and then revert to the little people in their home duties and pleasures.

I observed a dog the other day from my dining-room window; he wanted to get through an outer gate which led to his kennel, but which the wind had effectually closed. He made several ineffectual leaps up at the latch, which stood about six or eight feet above him. Finding the reaching and lifting of the latch to be impracticable, the dog watched till a passer-by approached. I watched the dog then quietly go up, waggle his tail, and look first toward the face of the stranger, then toward the latch. The person at once understood the request, and of course immediately admitted the animal.

Another day I stood in a wine-merchant's cellar in the city. A large black cat was on the floor; she had a desire
to reach a very high shelf on which were packed, close together, a number of empty bottles, standing upright. There appeared to me no possibility of the cat reaching this elevation without a smash. As I narrowly watched her I could see very plainly she was measuring the distance from the floor to the shelf, as first she looked downwards, and then upwards; and at last one leap and there she was, and no sound, neither one bottle knocking against another.

May we not learn a lesson here, remembering the words, "Ask now the beasts, and they shall teach thee"?

From the dog I learned a lesson of patience and civility. Both are cheap commodities; they cost nothing, but they are invaluable.

From the cat I learned a lesson of caution. Pussy's motto was what I wish yours to be, "Look before you leap."

A lady I know very well, accustomed to ride a horse which would allow no one else to sit upon him, explained to me as a secret how this was done. She was of such a nervous constitution she dared never go about in the dark alone, and yet she had conquered that restive horse of hers. How? By taking with her, whenever she went into the stable, a bit of sugar, for which her horse had a special fancy.

From this I learn that you can do more with the tongue than you can with the fist; and as honey is more palatable than vinegar, so is a kind word better than an angry one. "A word spoken in due season, how good it is."

I once gave an elephant a penny, which he took readily with some of the forty thousand muscles which Cuvier says make up that singular trunk of his. A man was standing by, selling three brown cakes for a penny. Of what use was an idle coin to the beast? About as much use as it would have been to you. No, the money was useful to-
the owner only for the good it would enable him to do; the greatest good to the elephant was food, so tapping the vendor of the cakes with his trunk and tendering the penny, he first received one cake, then a second, and the seller of gingerbread neglecting the third, the elephant reminded him, in a truly elephantine manner, that he had not faithfully executed his contract, and refused to go until he received the amount in full.

From this I learn what I was reminded of in an old English market-place some years ago, where was a couplet to this effect—

“Who'd seek to find eternal treasure,  
Must use no guile in weight or measure.”

“Nature is a friend to truth,” says our poet, and he who is not above receiving instruction from such humble teachers as dogs and cats, and ants and elephants, will discover the true meaning of the Bible language, “Ask now the beasts, and they shall teach thee.” So let us now hear what our little heroes teach us in their lessons of home-life, where, far from cities, under the shadows of our old green woods, they love best to dwell.

**NOTE.**

“The Lewes Dog.”

Since this part of the story was written poor “Railway Jack” has come to grief; but the extraordinary amount of good sense displayed in his suffering, and the extraordinary amount of sympathy exhibited toward him, has only brought his singular life more prominently before the public.

To the kind-hearted family of J. P. Knight, Esq., the General Manager of the railway, I am indebted for the following particulars:

Attention was first drawn toward the dog about three years ago; he would follow no one out of the Company's livery, but was the friend of all the officers in its employ. Having a free pass to all the trains he enjoyed an excursion every day, spending almost all his daily life in travelling. One day an account was kept of his move-
ments. Starting from his native place, the Lewes station—the station-master there being Jack’s owner—by the 7.27 a.m. train, he left for Falmer, where he just alighted to say “good morning” to the officials; he then returned to Lewes by the next train, leaving again for New-haven in the 10.15 tidal train, getting home at 11.12; he then started for Hastings by the 11.35 train, returning to Lewes at 3 p.m., and, after resting, left for London by the 6.13 p.m. train, leaving the City for Lewes by the last train at 9.30, sleeping, as usual, at home.

Fond of the seaside, Jack would sometimes visit Brighton, completing the triangle by changing carriages for Hayward’s Heath, thence reaching Lewes. He would lie still on the line, carefully jumping on to the platform on the approach of a train, and coolly walking under the carriages when the train was standing still at the station.

Jack’s misfortune happened about the beginning of the present year, 1882. He had been absent from home for several days, when he was brought back with one of his legs completely crushed. An alteration had been made on the platform of the Norwood Junction station unknown to Jack. Previous to this, whenever the dog was on one side and wanted to reach a train starting from the other, he would, in the proper manner, pass under the line through the tunnel; but this time the platform alteration seems to have caused him some confusion, and regardless of the caution, “It is dangerous to cross the line,” poor Jack jumped on to it just as a train was passing, and, falling under the engine, his left forefoot was severely fractured. He was taken to a neighbouring surgeon, who bound up the broken limb and sent him home; there, under the influence of chloroform, the broken leg was taken off. He was constantly watched and well cared for, the only person who was excluded from his company being his master, his presence being feared to be too exciting at a time when the greatest quiet was necessary. Messages and telegrams from many quarters arrived inquiring after Jack’s welfare. Miss Knight, who has favoured me with these interesting particulars, together with a photograph of the dog, writes (June, 1882), “I have just seen poor Jack, who is now well again, but has not been allowed to travel since his accident, as the strain of long standing on his three legs is rather too much at present. It has been proposed to get him an indiarubber leg.” I am told that Jack’s last public appearance at Lewes was when he returned from a wedding (my informant does not say whether canine or otherwise) at Berwick, when he arrived gaily bedecked with ribbons in honour of the event.

He exhibited the most extraordinary patience in the amputation of the limb, licking the hands of the operator, and evincing every token of gratitude.
Solomon's little people.

Jack's longest recorded journey was from Paris to Scotland. So indicative of good sense is his photograph, that any lover of dogs, without any knowledge of his character, looking into his intelligent face would say, "He's no fool!"

Round his neck he wears a fine new shining silvery collar, on which is engraved, "I am Jack, the L. B. and S. C. Railway dog. Please give me a drink and I will then go home to Lewes. This collar was presented by Mrs. J. P. Knight, Brockley."

An Ordinary Labourer.
CHAPTER VIII.

DESIGN.

"It has been well said that in the book of Nature is written in the plainest character the existence of a God which revelation takes for granted; of a God how full of contrivance! how fertile in expedients! how benevolent in His ends! At work everywhere—everywhere, too, with equal diligence, leaving nothing incomplete; finishing the hinge in the wing of an insect as perfectly as if it were all He had to do; unfounded by the multiplicity of objects, undistracted by their dispersion, unwearied by their incessant demands on Him; fresh as in that day when the morning stars first sang together, and all nature shouted for joy."—Jesse.

In a former part of our story I told you there are a great variety of ants. Sir John Lubbock—perhaps the first authority on the habits of this insect in our day, and to whom I am personally indebted for much of the matter here introduced, and who has very kindly authorized its use—tells us there are upwards of seven hundred kinds in the warmer regions; even in our own country he knows of nearly thirty different species.

He has upwards of thirty nests, belonging to about twenty species, and he says that no two species are identical in their habits.
We can make many observations about bees in the daytime by means of Marriott's glass hives—which we very strongly recommend you to see when you visit the Crystal Palace, where Mr. Marriott will oblige you by showing you the queen, whilst her great colony all turn with their faces towards her majesty as she passes amongst them; but our difficulty with the little people is that they prefer working in the dark. In my garden are two large vases; the pedestal and the leg of the vase is hollow. The ants have chosen these vases, unfortunately for us, in the hollow parts, and they have tunnelled the paths and hollowed out the subjacent earth, and made themselves quite at home, making daily excursions to their favourite aphis and our favourite fruit.

Ants are the gipsies of the insect world; they beg, borrow, and, I am sorry to add, they steal.

Perhaps you will ask me what good do they? If no other good, surely the lessons they teach would more than counterbalance the little harm they do. How much more we think of the effect of a good teacher of music, for example, than we do of the harm of his not scraping his boots in dirty weather when he comes to give us a lesson!

Yes, ants are the gipsies of the insect world; they have their fancies for particular localities, and their restless, roving natures are very much like those of the ancient people.

I have explained to you how the ant passes through a trinity of life, first appearing as larva, then pupa, then imago—words signifying "mask," "mummy," and "perfect image;" and in the ant's duties I have briefly directed your attention to the varied employment both of workers and nurses. At different stages of growth in larva state, ants require different food and different temperature. Sir John Lubbock says, "I have observed, also, that they are very often sorted according to age. It is very curious in
my nests to see them divided into groups according to size, so that they remind one of a school divided into five or six classes."

Amongst the varied duties of an ant's life is that of watching the proper time when the release should come, when the chrysalis case should be removed, and a free passage made for the perfect insect to escape from the tomb in which it had been enshrouded.

Unless the nurses properly discharged this important part of their duty the helpless infant ants must perish, for, baby-like, they cannot help themselves, nor extricate themselves from their perilous condition. "It is very pretty," says Sir John, "to see the older ants helping the larvae to extricate themselves, carefully unfolding their legs and smoothing out their wings with truly feminine tenderness and delicacy."

The queen bee is the only perfect female, and while the subjects insist upon one monarch only reigning at a time—though they bring up several royal princesses to take her place in case of an accident—ants have several perfect females in the nest at the same time; but by far the greater part of the colony consists of workers, or imperfect females, males, and a few perfect females.

Let us now look at a couple of wood ants (Formica rufa) under our microscope. The first thing that will attract your attention will be that one is winged and the other wingless. When the perfect insect emerges from the pupa in which its future life has been "masked" or hidden, the nurses, as you have already heard, carefully
unfold the wings and straighten the legs. As soon as the members of the increased colony discover their family is getting too large they migrate to another locality, and the new-born ants then use their wings in flight; this applies more particularly to the males and females. They settle down upon the plants which are near to their future abode. Before they left the old home the workers, those patient labourers, might have been seen feeding them, and to be very solicitous about their welfare; now running from one to another, as if conscious the hour of their departure was at hand, they again and for the last time offer them food; then they have been seen touching each other with their antennae, as if taking a long and last farewell. In a moment there would have been some extraordinary excitement, the word of command has been given—"Forward!" and the winged males and females have disappeared on their way to another home.

One of the greatest observers of these interesting insects declares that the workers seem to be assured of the approaching flight—making their exit easy by clearing away every impediment, forming many apertures in the ant-hill to give ready passage to the crowd that are about to quit it.

When they have departed these willing workers reclose the entrances, lest some enemy should steal in, and again resume their work.

It were an easy as well as a happy thing to draw a lesson from all this. The little people are, you see, "exceeding wise" in their preparation for the future: would that big people were equally wise. The ant fully realizes what it was born for and why, and that there is a higher life in which its future is to be passed. What gospel preachers, in a literal sense, these patient workers are! How they help their brethren and sisters in the work before them! How self-denying, how persevering in well-doing, how impatient of delay, how remarkably decided!
"Go thou, and do likewise."

If any of my readers should have any love for the study of the ant, let me recommend them to that prince of entomologists, Kirby. This valuable book, so full of easy-reading matter, is now published in a cheap form, and it is full of the most astonishing proofs of the wisdom of God in this particular department of creation. The swarming of ants is there described in the following manner:—

"In the warm days that occur from the end of July to the beginning of September, and sometimes later, the habitations of the various species of ants may be seen to swarm with winged insects, which are the males and females preparing to quit for ever the scene of their nativity and education. Everything is in motion, and the silver wings, contrasted with the jet bodies which compose the animated mass, add a degree of splendour to the interesting scene. The bustle increases, till at length the males rise, as it were by one general impulse, into the air, and the females accompany them. The whole swarm ultimately rises and falls, with a slow movement, to the height of about ten feet, the males flying obliquely, with a rapid zig-zag motion; and the females, though they follow the general movement of the column, appearing suspended in the air, like balloons, seemingly with no individual motion, and having their heads turned toward the wind. Sometimes the swarms of a whole district unite their infinite myriads, and, seen at a distance, produce an effect resembling the flashing of an aurora borealis.

"Rising with incredible velocity in distinct columns, they soar above the clouds. Each column looks like a kind of slender net-work, and has a tremulous undulating motion, which has been observed to be produced by the regular alternate rising and falling just alluded to. The noise emitted by myriads and myriads of these creatures does not exceed the hum of a single wasp. The slightest zephyr disperses them and if in their progress they
chance to be over your head, if you walk slowly on they will accompany you, and regulate their motion by yours."

Like the drone bees, the males have but a very short although merry life—they are here to-day and gone to-morrow; only the real workers are of any use amongst the little people, and when once they have selected the spot where their little lives are to be spent they work together right ant-fully.

Like the drone bees, too, the unfortunate male ants are without any weapon of defence; they lead a lazy, indolent, short life, and very soon become the prey of numerous enemies.

The founders of the new colony are the workers and nurses, who, as we have before seen, divide themselves into various classes, some staying at home to provide for the colony, others going abroad in search of fodder and building material; others performing the office of sentinel, watching by the entrance to the nest, ready to summon the host within should it be necessary to make a combined attack.

Nothing can exceed the patience and perseverance of these interesting little creatures as they go about their daily work. Look at an ant-hill very closely; you will be surprised at the industry which called forth such a collection of minute particles, each, remember, brought separately, and often from a considerable distance, by individual ants, over rough pathways, or, more probably, through dark tunnels, all contributing regularly and perseveringly to the common stock. Solomon must have watched all this in that eastern garden of his in the king's dale at Jerusalem when his friend wrote, "Go to the ant thou sluggard; consider her ways, and be wise." "Her ways." I wonder if the king knew what we have just been told—that the males, just like other males we know something about, have little to do with making a happy and well regulated home! "Consider her ways, and be wise?" How correct is the very letter of the Bible!
By patient and careful attention, the actions of ants in the construction of their nests have doubtless led to many important improvements in our own dwellings. We know how much we owe to the unconscious teaching of both animals and plants. The Thames tunnel was suggested to its great engineer by the boring of a little worm; the Glasgow water-works by the structure of a lobster’s tail; and the Crystal Palace was seen in miniature, by the late Sir Joseph Paxton, in the ribbed structure of a Victoria Regia lily-leaf.

I can show you the method of propulsion of our large screw-steamers which float on our river in the tail of the larva of the dragon-fly; the correct principle of an anchor for holding on to an opposing substance, in the spines of an aquatic animal called the *Synapta*, commonly found in the water surrounding the Channel Islands—the “stock” articulates in a socket, and the “flukes” are serrated, insuring a firmer hold. I was showing this remarkable specimen of design to an admiring friend some years ago who had patented a new anchor of his own invention, when he put up his hands exclaiming, “Why somebody has stolen my idea and copied my patent!” The animal above mentioned is very soft, and it needs protection, and so its skin affords a soft cushion upon which rests an armour of thin and semi-transparent flint, in which these silicious plates or anchor-spines articulate.

“And now,” you say, “pray tell me for what purpose are these flinty anchor-shaped spines!”

For protection. When the *Synapta* is attacked, as it commonly is, by a host of adversaries, up go its spines—as you may have seen a regiment of infantry act with their rifles when ordered to prepare to receive a charge of cavalry, or as a porcupine receives the attack of a dog—and the enemy gets impaled on the serrated flukes of the anchor-shaped spines, and so becomes the prey of the *Synapta*.

Again, let me show the eyes of a beetle; what wonderful
things these eyes are! If the microscope—that wonderful instrument which is the mystic key that opens the door to a new world, or which we may truly describe as a new sense, and the very best companion to the Bible—if the microscope be employed in the examination of the eyes of an insect, what an astonishing fact does it disclose!

In the head of the ant we can count upwards of fifty

Common House Fly (Musca domestica): 1, head; 2, three simple eyes; 3, front view of portion of its 4,000 compound eyes; 4, one compound eye detached; 5, transverse section.

eyes, but in larger insects many more; we can see upwards of 8,000 in the cockchafer, and more than 34,000 in another beetle. But the part of their structure which applies to this portion of our story is this: that just as we find our best and most expensive optical instruments to be composed of several lenses all ground to a geometrical
exactness, one lens fitting on to another, so we discover that this scientific invention was unconsciously borrowed from the wonderful structure of an insect’s eye. Then think of their minuteness. I could show you that the 8,820 eyes of the cockchafer are nothing near so large, all put together, as the head of a doll’s pin.

Then, remember, all this marvellous contrivance was going on while the insect was passing away from life number one to life number three—in fact, in the intermediate state, when it was, to use the words of a Saxon naturalist, nothing but "skin and squash."

May I say once again, "What possibilities are within us!"

It would do you good to go on with our examination and comparison of the works of God with the works of man; and as to their being the discovery of the latter—nonsense! They were invented by the great Patentee, God Almighty, long before man was born, and they prettily illustrate what He tells us in His dear old book, that "God made man in His own image."

"Show you more of these illustrations!" Well, now look at the scales on a butterfly’s wing; nearly half a million have been counted on those of the silkworm moth. These wings cover and protect the body of the fly. Do you see we have imitated them in the coverings of our house-roofs? and the Swiss have exactly copied nature in this respect, in facing their chalets with butterfly-scale lappings of wood.
In the trachea—that is, the breathing tubes—of a caterpillar we see the idea of our spiral wire forming elastic springs, so useful and necessary in mechanics; and while we observe the harmony of Nature, we remark that exactly the same breathing contrivance is to be seen in the leaf of the commonest plant; and then we reflect upon the goodness and wisdom exhibited in both, and learn a lesson of humility.

Look at the foot of a common house fly. It is covered with innumerable suckers which have the power of atmospheric exhaustion, just like the old-fashioned sucker made by the schoolboy, when, tying a piece of leather on to a string and saturating it in water, by pressing it with his foot on a stone, he lifts the stone by exhausting the air.

Some years ago, a man contrived to walk head downwards along the ceiling of one of our London theatres, to the bewonderment and delight of crowded audiences.
"How did he manage it?" Why, he contrived a kind of exhaustive shoe with a valve which shut out the air, and as he lifted one foot he let down the other, being attracted to the smoothened ceiling by one foot at a time. But the house fly does exactly the same thing.

Here is the sucking tongue, or proboscis, of a common butterfly. In your body and mine there are upwards of four hundred muscles; in the caterpillar of the goat-moth there are ten times as many—that is, upwards of four thousand; in the trunk or proboscis of the elephant, you remember, about forty thousand; but how many do you suppose there are in the butterfly's tongue?

Ah! they are innumerable. And what is it after all? Why, the most wonderful sucking-pump in the world; and how admirably contrived to insert itself into the little complicated nectaries of flowers!

Look at the columnar structure of a bit of the bone of a cuttle-fish. Were it solid it would be a heavy hindrance in the locomotion of the animal in the water, so it is built in columns, one tier supporting another, exactly as the great Constantine built the huge reservoir at Constantinople fourteen hundred years ago for holding water in case of a siege, now called the "thousand and one columns." Did the "First Christian Emperor," as he was called, borrow it from the structure of a cuttle-fish? He could only have seen this with a microscope, and microscopes were not invented till very long after Constantine died.

The common garden spider's web is the exact idea of our electric telegraph, as the human ear is of the telephone; but the combination of one instrument with another is very well seen in the structure of the foot of the cellar spider, where upon each of its eight feet we can see a comb and brush, especially needed and especially provided by and for an animal whose abode is a place of perpetual dust and dirt; without such useful appendage, in a
strange predicament, when the threads of its web are made useless by the dirt and dust of the place.

But this has not much to do with ant-life, has it? And yet so intimately are the phenomena of nature related, that as we pass from one of its departments to another, just as we do from one chamber to another in the halls of our great national museum, we are astonished to find how at last we have wandered from the original object of inquiry; for even as in the British Museum we begin with Roman antiquities, and walking through the ruins of Greece and Babylon stop to reflect on the protruding toes of the Egyptian mummies, or endeavour to decipher the hieroglyphics on the sarcophagi—then suddenly find ourselves in the region of cats, and monkeys, and birds—presently to mix harmlessly with stingless serpents and stuffed reptiles—afterwards to long over saucers filled with precious stones and glass cases filled with the fossil remains of a pre-Adamite world—leaving off with wasps and bees, and finally coming suddenly on to the nest of an ant—so just do we with our observations in the contemplation of natural phenomena. And just as when we retire from our museum visit we thoughtfully leave off with a comparative lesson on Divine wisdom and goodness, so may we in our chapter, returning in our next to our subject proper.

NOTE.

INSECTS' EYES.

While these pages have been composed, a correspondence has been going on in the daily newspapers relating to the expulsion of an atheistical member from the great council of the nation. In this correspondence some very unwelcome light has been thrown as to who is to blame for the spreading of that materialistic atheism which infects the minds of our scientific giants, who, great in one sense as the Syrian captain, Naaman, like him partake, metaphorically, of his leprosy; and because, like the literal disease, this deadly malady is
infectious and corrupts everything it touches, I would direct the devout reader’s attention to a practical lesson in connection with demonstrative evidence of design in the structure of the eyes of an insect.

First, that he may not think we are fighting with a shadow, let me quote, from a periodical called the National Reformer (!), the sentiments of one who, without any concealment of his name and office—being one of the recognized teachers of the people at the Governmental School of Art, South Kensington—writing a series of articles under the heading of “Design in Nature,” is not ashamed or afraid to write of the Almighty in this manner—

“I will only select one striking case of blundering on the part of the almighty Designer. . . . Blunders of the most execrable kind, on the design assertion, they are helpers to the evolutionist of almost incalculable value. . . . That certain unfortunate members of the human race should be born devoid of the sense of hearing is a blunder of the cruelest kind. . . . That this loneliness should result from the deliberate planning of God seems evidence that God is not good. I do not refer now to the many cases of long or short sight daily encountered amongst us, though even these cry ‘shame’ on God. . . . These are as so many arguments against clear-thinking design on the part of the planner of the universe.”

The author of these and many similar atheistical remarks is, you must observe, a governmental teacher in our great public school; and unless such deadly materialism is controverted and dispelled, it may spread amongst the students, who will carry it with them into their schools and disseminate it amongst their pupils.

The so-called “blunders” of the public teacher—the patron and companion of the expelled atheistical member—remind us of the devout Pascal’s saying: that what we call Nature has perfection in order to show that she is the image of God; and defects in order to show that she is only His image.

Now let me give you my illustration.

I have already reminded you of the mechanical structure of the eyes of insects—how, that exactly as our most perfect optical instruments contain a number of lenses all geometrically ground, one upon another, so we find the eyes of insects; while different descriptions of eyes are found to be placed exactly in and where the particular insect or other animal requires it. Now, then, for our experiment.

I take down my microscope, and calling your attention to Sir John Lubbock’s statement that insects only see part of the object with each eye, the whole combining to form an image on the optic nerve, with all submission to that celebrated naturalist I think we shall find him mistaken; because first, you see, I have contrived to cut out of the
bon-bon paper wrapped round our sweets a big and very gaudy butterfly: it measures an inch from wing to wing; it is about the size of life.

Could we see this paper fly through the microscope with our lowest magnifying power of thirteen diameters, or 429 times, we should find that in order to see it correctly we must, as usual, invert its position, placing it head downwards. But if we moisten the picture, and fasten it on to the flat side of the condensing lens, turning its convex side towards the lamp, so throwing the image on to the mirror below, and then employ a magnifying power of 850 diameters, or 722,500 times, looking at the fly through the beetle’s eye, we shall behold a perfect but very greatly diminished butterfly in each.

A similarly interesting experiment was made some time ago with a watch, the face of which was removed. The works were seen in motion in each of the insects’ eyes, the balance wheel and spring, although extremely minute, being distinctly visible.

Amongst other lessons suggested by these experiments may be that an object seen by the living fly may appear very considerably smaller than it appears to us; but, passing to a more important inquiry, don’t you think this effectually disposes of the idea that insects see only a portion of the object in each eye?

But, what relates more particularly to our experiment—for the latter remark is only incidentally introduced for the purpose of showing that some of our most learned men, not atheistically inclined, may be easily mistaken, and that we must, therefore, receive even their remarks with caution, and sometimes even suspicion—is the fact that, passing the image through the eyes of the insect, we no longer need to invert the image, because the cockchafer’s 8,820 eyes form a correcting lens.

“Ah! but the condensing lens!” you doubtingly exclaim. That does not affect it; and, that I may clearly prove to you the illustration, I will now take my own initials, “J. C.,” and I will print the date, “1882,” under them and together, in thick type, each character being about from one quartere to half an inch in length; they are shown thus, J. C. 1882. I place the card with these letters and figures inscribed on it on the mirror, using the latter for a table, and this time use the condensing lens for another purpose, throwing all the light from the lamp on to the card, looking at the object through the eight thousand eyes, which I lay on the stage of the microscope in an ordinary way, placing, you must observe, the card in a proper, not an inverted, position, and we then see the image, not inverted, but just as we should did we look at it in an ordinary manner without any optical assistance, but still a perfect image in every one eye.

Clearly, therefore, the insect’s eyes form a correcting lens.
Now let us examine the belongings of the instrument, invented by man—an excellent evidence of human ingenuity you will admit.

Here is another lens, called by the optician a "meniscus," from the Greek mene, the moon; it is concave on the one end, and convex and plain on the other, having a sharp edge, the flat side going towards the object, and concave side towards the eye of the spectator. It measures, in the brass tubing, about three inches in length, and fits into the body of the instrument.

This "meniscus" lens was invented to correct the image, for you will observe that on placing any object on the stage of the microscope, with the correcting lens in the body, we no longer require to place the object in an inverted position, but as we would see it after the ordinary manner; so that the conclusion at which we arrive is this, that what the meniscus is to the microscope the eye is to the insect; and this, too, in every eye, though each shall be no larger than the fine point of a small needle.

Now what would you say of me as a teacher were I to say to you—"My dear friend, all this has nothing whatever to do with design; it is all the effect of accident. The sand and the flint and the alkali all happened to tumble into such juxtaposition that they accidentally made the glass; and by accidental friction it came to pass that while one glass which, you see, happened to fall into its place, came out concave, the other happened likewise to have one side plain and the other convex. And then as for the brass metal into which these compound glasses accidentally slipped. Ah, you know the composition of brass, don't you? Well, first the copper went after the tin, and then the one became united to the other—as an illustration of the schoolboy's arithmetic, 'two's into two, one.' So here, for the copper and the tin became a new metal, and the brass tubing, circular and perfect in its form from end to end, was all the result of accident and nothing more, the whole together forming the meniscus."

What would you think of me?

What I think of a public teacher who declaims against design in nature, and is not ashamed or afraid to cry "shame" on God, whom he accuses of "blundering" in His almightiness.

"The fool hath said in his heart, There is no God," says the Psalmist. "Yes," said a working man once, "in his heart, not his head, because his reason would have been against his theory; his affections are all in a wrong direction."

In the original Hebrew the words "there is" are not to be found; in our translation you will find them in italics, to supply the English sense: "no God"!—that is, the "fool" does not want there to be a God.
CHAPTER IX.

SYMPATHY.

"Nothing is more odious than that insensibility which wraps a man up in himself and his own concerns, and prevents his being moved with either the joys or sorrows of another."—Beattie.

"Sympathy may be considered as a sort of substitution, by which we are put into the place of another man, and affected in many respects as he is affected."—Burke.

"THE ants are a people." Some people have very curious opinions of other “people”; and so some two-legged animals have very singular ideas of our six-legged friend. In Ceylon the natives believe the ants feed serpents who live underground, by picking the leaves from the trees and conveying them through their subterranean chambers; and because reptiles’ appetites are insatiable, the ants have always to go on working. It is astonishing what quaint ideas attach to insects in various parts of the world. From Oxfordshire another letter just reaches me describing a peculiar caterpillar, which if it should get on to one’s fingers would wring one of them from the hand; and so the “natives” call them “wring-fingers.”
Nor need we wonder at the horror and superstition attached to insects, when we consider what they are capable of doing.

To all the misfortunes of Turkey there happened only last season that which appears to be incredible. Mr. Goschen, describing some of that unfortunate country's disasters which have crowded upon it lately, says—“I am sorry to say I have not exhausted the list. A plague of locusts came on the shores of Asia Minor and laid low the crops, and only this morning (in July, 1881) I received a letter telling me that the plague had reappeared, devastating crops and corn in some parts of Asia Minor. My correspondent states that one thousand seven hundred tons of young locusts had to be buried in his district alone.”

“But now,” asks some one, “can you tell us what may be the use of such a mighty host as this? Why do you suppose they were sent?”

That locusts, like ants, have some special work to do, I am as fully persuaded as that you and I have something to do. Often it pleases God to chastise wicked nations with a sorer punishment than war. Not the invading hosts of Russia, not the anarchy and bad government of Turkey, not the tremendous influx of Mussulman emigrants which, rushing from Muscovite rule, poured into the already overflowing cities—not any or all of these were calculated to visit the doomed land as that “army” of God sent into the interior to destroy the staff of life there, producing poverty and starvation indescribable. The readers of our Bible will remember the accurate description given by the prophet Joel where, under the figure of an invading army, an extraordinary plague of locusts, such as has happened recently in Turkey, is described: the same fierceness and speed in flight, the same regularity in their march; the same darkness at noonday, caused by the great clouds of insects; the havoc they should occasion, the places they should attack, and their method of invasion; the appalling
misery they should bring upon all the inhabitants—all these and other particulars, used there metaphorically, were again last summer used by God literally, in bringing to nought that typical "Euphrates," which in His time is to be "dried up," and which is being dried up now.

A Madras paper narrates the following curious occurrence. On the 13th of May, 1878, a very large number of locusts settled on a portion of the Madras line of railway, covering the metals for some distance. A passing train crushed some thousands of them, and the glutinous substance from their bodies rendered the rails so slippery that the wheels refused to take the metals, and the engine had to be brought to a stand-still, and the wheels and metals cleaned before the train could proceed. The train which followed was also detained by the same cause. This is not the first time I have heard of a railway-train being stopped by insects.

No wonder, therefore, when a multitude of insects which no man can number, can by their united strength accomplish so much, that people should attach such mysterious powers to them.

In our western part of England—Cornwall—the people call the ants "murians." I cannot tell whether there is any connection between this old Cornish word and our ordinary "murrain." The latter we know to signify cattle plague; but the people of Cornwall suppose the ants to be a race of "little people," separated from the world of men and women, and condemned for some crime to perpetual labour.

But of all ant stories, that which lately reached us from Colombo is perhaps the most astonishing. This ant hatches its eggs by artificial heat. It collects quantities of leaves, which, during the stage of decomposition, produce a high degree of temperature, giving life to the embryo.

Travelling through Alpine villages in Switzerland, and observing the ants there as well as the habits of the other
"people," I was struck with the dung-heaps of the natives: they placed them invariably just under their bedroom windows. What a lesson the Swiss might learn from the Colombo ants! for, so soon as their eggs are hatched, and as decomposition goes on, before the foliage becomes putrid they carefully carry it away, and stack it by itself at a distance from the nest.

Such mischief do the Colombo ants inflict on the branches of the trees, which they strip of their leaves in order to make a hot-bed for their eggs, that all manner of means have been employed to destroy them, although without success. It is said that the nests may be dug up with a plough or blown up with gunpowder; soaked with hot water or swamped out with cold; smothered with smoke or made abominable with chemical compounds; strewn with poison or scattered abroad with pitchforks;—the ants return all the same, and apparently with a gaiety enhanced by their trials. Their motto appears to be what another class of people would do well to remember—

"Incessant pains the end obtains."

One plan alone was found to succeed, and that was so very curious and so suggestive that it is worthy of record. These Colombo ants were found to be excessively clean in their habits, and to have a detestation of dirt in their homes; so advantage was taken of their "amiable weakness," just as advantage is taken of other amiable weaknesses in human life: the refuse foliage which the ants had so carefully stacked away from the nest in tidy heaps, mixed with grosser rubbish, was persistently scattered over and about the nest, when the whole colony was observed to decamp in disgust.

The late much-esteemd Frank Buckland had his singular household pets, consisting of tame monkeys and creatures of other lands, brought into a state of animal civilization by his kind treatment. Our poet Cowper, we
know, had his tamed hares, upon one of whom he wrote in his epitaph—

"I kept him for his humour's sake,
For he would oft beguile
My heart of thoughts that made it ache,
And force me to a smile."

And so, while several persons have applied to me for the means of destruction of their household pests, others have favoured me with interesting descriptions of their household pets, in either case the object being the same, namely, the "little people"—the common ant.

A few years ago, I received from a gentleman at the Crystal Palace a deeply interesting report of his observations on an ant's nest discovered in the joists of his house, between the floor of one room and the ceiling of another. The nest was composed entirely of masticated wood taken from the beams of the chamber near where the nest was discovered.

They worked as ants and bees commonly do, in the dark, never sleeping when in the imago or final state of life, but carrying on the family work between sunset and sunrise, bees gathering nectar and pollen between sunrise and sunset. The ants here mentioned made their large nest, then, in the dark, and the first observation made was with the nurses, who carefully promenaded with their pupae every fine day, carefully depositing them in cradle-like compartments when the airing was complete. He observed, too, how, when a special messenger was hurrying about its business, when it was met by other ants they stopped, and after saluting each other with their antennae it proceeded speedily about its business. This common mode of ant salutation may be observed any day near an ant-hill, and from it we may learn lessons of friendliness and politeness.

He was struck with their little notion of locality. Ants
generally appear to attach themselves to one spot, and they wander about apparently objectless if removed to another quarter; though should one ant, out of the way, meet with another ant from another nest, each will address the other. Is the last one inquiring the nearest way home?

Some animals, especially the cat and dog, have a very remarkable sense of the locality where they have lived, and cannot be persuaded to leave even an empty house where they may have been accidentally or designedly left behind, even though starvation is before them. Too little is known, in one sense, of the habits of cats—too much in another, truly; but how wonderful is the bump of locality in a cat’s brain; and yet if we look at the cerebral mass with the microscope, and compare it with the human brain, how little is the difference! I know of one cat who was frequently taken from Plymouth to Portsmouth, or vice versa, by steam-boat, and who always found her way back again; she would thus have to travel through three counties—Devonshire, Dorsetshire, and Hampshire—before reaching her home. Of another cat, removed from Dalston, in the northern part of London, to Peckham, in the south, in a basket, and secured in a cab, who quickly decamped from her new home, a neighbour writing to the owner from Dalston informing him that the cat was crying at the old door for admission. “Puss” must have crossed the bridge over the river, and, travelling through the crowded streets of London, have left the quiet of her new southern home for the old one in the north.

“I will not believe what I can’t understand,” said a gentleman in an argument over our dinner-table the other day. His knowledge, you see, was, like many others, just the limit of his belief. Would he explain this phenomenon—could he “understand” how this was done? How much we are compelled to believe which surpasses our understanding!
But even this story of the cat sinks into insignificance when we consider the marvellous passage of migratory birds, of which advantage is taken by an ancient translator, Beza, in St. Paul's second Corinthian letter, where he says, "We are willing rather to migrate from the body." *

Ants migrate from one locality to another very seldom. The ants at the Crystal Palace exhibited their usual sagacity in their devotion to one another, though it must be admitted that it showed itself upon another occasion in a curious manner, for they got rid of the dead body of a comrade by eating him; but if they dispose of their defunct companions in so summary a manner, they manifest the most self-denying care for the living, being ready to sacrifice their own lives for the salvation of another.

One ant, having fallen into the water—always fatal to this insect—was on the point of being drowned, when another, observing its danger, immediately came to its rescue and drew it out again. But the half-drowned ant was too much exhausted to stand upon its legs, and its helper too weak to carry it home, making several vain attempts to remove it, touching it with its antennae, and, I suppose, cheering and encouraging it in the ant language. All appeared to be over; the patient fell down, remaining apparently lifeless below, when the friend who came to the rescue ran away, but presently returning, still alone, made another endeavour to restore animation, but again without effect; when, as if a new idea had struck him, he appealed to another ant, and together they succeeded in placing their restored friend in safety in the nest, where he would meet with the caresses and congratulations of his family—"and," I think I hear some sharp young friend exclaiming, "of course the other would receive the medal of the Royal Humane Society!"

This care which one ant exhibits for another, teaching us so touching a lesson in brotherly kindness, was taught.

* 2 Cor. v. 8.
me while writing this story. In our garden there was a nest of the garden ant undermining the borders of the flower-beds. It was necessary to disturb them, and numbers having built in and around the box edging they had to be summarily dislodged; a fluid, fatal to insect life, sent numbers to the right-about, and with them a number of helpless pupae. The liquid being glutinous, these latter were transfixed to the gravel; but no sooner had the careful nurses recovered from the shock which spared a few of themselves, than they returned to their charge, and the day after all the pupae were removed to a place of safety, though in all probability they were all destroyed.

Our Crystal Palace friend observing his ants exhibited some fondness for a small spider, an experiment was made with a black beetle, which was put alive amongst them. One little fellow of an ant immediately grabbed hold of one of the beetle's legs, and held on as an ant will hold, as in a vice. The beetle proving the stronger and getting free, it must have been very amusing to see such a black Goliath fleeing before such a red David. But the beetle ran into a cluster of ants, in his frenzy, who were feeding upon some dissolved sugar; directly the monster made his appearance they flew at him in a body like an army of bull-dogs, hanging on him, so that he could only rid himself by madly plunging into the water which was at hand. This was terrible for the ants, and but for the observer's help this would have very soon settled the ants' business. The beetle was now safe, his ability to swim proving the means of escape; but it was only for a time, for on again venturing on land he was again attacked by his indomitable foe, and very soon there was nothing left but an empty shell.

There would appear to be the same diversity of "mind"—if we may call instinct by that name, as we do intelligence in ourselves—amongst insects that there is amongst men; there are stupid ants as well as selfish ones. Are there not plenty of each in human kind?
A foreigner recently describing a grand picture illustrating our Lord's parable of the wise and foolish virgins, pointing to the latter said, "Zem is ze stoopids!"

Thus many of the ants at Sydenham showed no regard either for their own safety or others' welfare, appearing to be entirely absorbed in their own consideration; for whilst nurses of some nests would attend to an infant although belonging to another nest, some would even neglect the little ones which especially belonged to themselves.

When food fell short, to save themselves the inconvenience of dying, many slaughtered each other, and I suppose, cannibal-like, then fed upon the remains. Episodes of insect life in the matter of self-destruction certainly rank amongst the most romantic in all natural history. I have told you of a certain wasp which, being cut in two, with its severed head proceeded to devour its own abdomen. The Romans, we know, murdered in cold blood their sickly children;—perhaps they had studied only the worst features in ant life.

Amongst the varied duties of a nurse, to which attention has already been directed, those of attending the birth of an infant appears to be the most striking. Every observer of ants may see for himself an analogy which will surprise and delight him, as he notices the care and patience they exercise in the delicate work they have to do when the right time has arrived; for, just as in the life of the honey bee the nurses there know exactly the time when the cell may be broken into and the prisoner released, when, passing through its former life, it has reached the perfect stage of being, so do the ant nurses know when the pupa case which encloses the perfect insect, waiting to be unrolled, may be safely opened; and this operation is performed with all the attention and care of the most experienced surgeon. The larger jaws act the part of scissors, and the feet and antennae supply all other necessaries in the operation. An incision is made round the middle of the pupa;
then two of the six legs are gently withdrawn from the enclosure; and then, bit by bit—often other assistance being necessary when the first operator is unable to succeed—the baby ant comes into the world. It sometimes, however, happens that failure attends the operation, either from the inexperience of the operator or the position of the pupa. That there are skilled ant nurses and ignorant ones there is no doubt, for it happened with the Sydenham ants that what one left as "impossible," others, passing while the operation was being performed and lending a hand, succeeded in accomplishing.

When an ant is irritated it emits a sour fluid containing both formic and mallic acid; these have not only a very disagreeable flavour, but an extremely pungent smell, and to an opposing ant the effect of an adversary's "squirt" appears to be the most effective of defence. The Bombardier beetle has a similar method of defending itself; for when hotly pursued, and its enemy is close upon its track, a small report is heard, and a horrible liquid is forcibly thrown from the hinder part of its body, which, blinding the enemy, facilitates its victim's escape.

It was so with some of the ants at the palace. Their owner got up a fight between a large red ant and some black ones. The moment the former, who was a stranger and a foreigner, came near the latter he seemed in a great state of alarm, and turned tail directly one of the black ones came near him; but when one came forward and challenged him to single combat the Edomite seized the negro by the fore-legs, hugged him as bears do hug each other when they are not affectionate, using his powerful jaws in a very terrible manner, and then, leaving his black adversary senseless, he ran wildly about for some time seeking an exit, but falling in with an army of his adversary's companions he was mercilessly despatched.

The wounded ant in the above insect duel again exhibiting signs of life, microscopical examination discovered his
legs completely disabled, and the head deluged with formic acid; but it must have repaid the observer's patient attention to have seen other of the wounded insect's friends at last coming to the rescue of their fallen brother, for a number collected and began striking him with their antennae; at last they helped him into the nest, where we may hope his recovery was completed.

It has been often observed that the eye was formed for light and light for the eye. Ants and bees, however, appear to prefer the darkness for their work—and yet their deeds are not evil; for while the bee collects its raw material during the day, and prepares its honey during the night season, the ant will avoid all light for carrying on the various duties in its home.

Bees have, without doubt, the power of distinguishing colour. A friend near Leatherhead, in Surrey, having a great number of bees, has contrived in some large hives to keep the colonies separate by painting the entrances in different shades of colour. But Sir John Lubbock ascertained by experiment that different rays of the spectrum act on ants in a different manner from that in which they affect us. He endeavoured, with admirable patience, to determine how far the limit of vision in the eye of an ant agrees with that in the eye of a man; and how deeply interesting was the result! He first observed, that directly an ants' nest is disturbed the nurses carry their young away into a place of safety; this is invariably into the dark, and he appears to think this is because the insect has an objection to light. By various scientific experiments with the spectrum he found they invariably preferred darkness to light, and that colour which to us was the most transparent was otherwise to them; and that an ant can see colour which to us is invisible except under extraordinary circumstances. He therefore arrived at the conclusion that colour has not the same effect upon ant vision that it has upon man; and that, therefore, light may have a
different effect upon an ant's brain to what it has upon our own. The wise king said, "A pleasant thing it is for the eyes to behold the sun;" and sure we are that He who made the many eyes which you would admiringly see with the microscope in the head of the insect, intended it should enjoy the light when performing its duties in the upper world.

Variation of food in the life of a bee, strange to say, will vary the character of the insect. We know the effect of feeding upon the roots of plants on some of the uncivilized tribes of Africa: it produces horrible distortion and premature decay, but we could never believe it could change the species. But as with the bee, so with the ant; we have it on Sir John's authority that, by selection of food, ants can produce either a queen or a worker at will from a given egg. This is very remarkable in the case of the bee, because a queen bee is totally unlike any other bee, both in size and structure: only the queen lays eggs, both amongst ants as well as bees; the workers and nurses never, and certainly never the drones; and yet a worker egg developing a worker larva, when fed with royal bread, which is different from ordinary bread, becomes a queen. This is most remarkable, and almost incredible in the case of the bee, and, according to the highest authority, the ant also. The worker larva, royally fed, "comes out" one third earlier in time than if it had been reared as a worker; and yet it has to be much more developed, and according to ordinary analogy should have had a slower growth. Then its reproductive organs are more fully developed: the ovary of a queen bee is amongst the most remarkable part of her majesty—totally unlike that of an ordinary bee. Then, again, its size, shape, and colour are all different; its jaws are shorter, its head rounder, its hind-legs without bread-baskets. A queen has never to do any work, of course, nor has she need of wax-pouches, for she neither collects pollen nor makes either wax or honey
Moreover, the royal sting is differently curved, and its instincts are entirely changed; for, while as a worker it would have thrust out its sting at the slightest provocation, now you may torment it in any way you please, but it will not resent the affront. As a worker it would have treated a queen with the greatest respect, never allowing her majesty to pass by without salutation and presenting, not "arms," but the whole fore-part of its body in the direction of the royal face, never once turning its back upon the sacred person; but now, if only brought into contact with a rival queen, it uses every power it possesses to destroy it. As a worker it would have left the hive frequently, either for exercise or for labour, but as a queen it never leaves it after its wedding except to lead off a new swarm; and lastly, as a worker it probably would not have lived more than from six to seven months, while as a queen it may live six or seven times as long.

Whence this extraordinary difference?

Bee bread is a compound of pollen and nectar, elaborated in the stomach of the insect. To you and to me there would appear to be no difference in its appearance. There are "bakers to the royal family," you see, in bee-land, and they know more than do other bakers; but here is that which is utterly beyond our comprehension. But it suggests what we may become hereafter when we shall eat angels' food, for there may be more than we think in such words as we read in Psalm lxxviii. 25, "Man did eat angels' food," and in Matthew xxvi. 29, "I say unto you I will not drink henceforth of this fruit of the vine, until that day when I drink it new with you in my Father's kingdom."

Not all the characteristic differences that mark the queen produced from a worker egg of a bee may describe that of an ant; but we are authorized in saying that the egg of a worker ant when, at pleasure, differently treated by the nurses with other food, becomes a queen, and, vice versa, a royal egg fed with ordinary bread becomes a worker.
How many things there are in the world that are "never dreamt of in our philosophy," and, too often, never believed in our incredulity! Again we think of the multitude of men who characterize this privileged nineteenth century, whose knowledge is the limit of their belief, and who reject all that may be beyond their understanding.

Ants appear to outlive bees. Drones seldom live more than four months, workers often die in their first year; the queen outlives both. But amongst Sir John Lubbock's household pets is a company of ants, in perfect health, which he began to observe in 1874, and which therefore must be more than seven years old, and are said to be by far the oldest insects on record.

Perhaps there is no cleaner anatomist than an ant. Place a dead mouse in a paper box, then bury it in the ground in a neighbourhood where the ants are; then a month after go and look for your mouse, and you will behold the cleanest, best licked and bleached skeleton you can desire, the joints all undisturbed and the skeleton complete. A sparrow thus served will occupy about ten days to devour; but care must be taken to afford drink as well as meat—eating hair or feathers must be thirsty work. I well remember, many years ago, witnessing a fight between a monkey and a cock. You would have thought the former would have certainly been the victor, but when he bit at the cock he was in a truly ridiculously awkward predicament, with his mouth full of feathers, which "bold chanticleer" lost not a moment in taking advantage of. So, if you would have your specimen perfect, moisten the skin either of mouse or sparrow, or else the wily ants will get inside, moisten their food with the animal's juices, and leave the skin covering the skeleton.

Ants appear to serve a caterpillar just as we do a cucumber: they cut him up in slices, carrying portions to the young ones or their queen. You may cause terrible
disappointment to an insect by deceiving it with food if you would indulge in a harmless joke. Try this recipe: there is a spider patiently hiding in his corner, expecting the arrival of his living dinner; now let us, with a feather, drop a "black" from our chimney unperceived by arachne, and we shall be mischievously delighted with the result of our "sell," for, behold, he rushes down upon the supposed fly and is enveloped in soot. Perhaps this trick would be hardly justifiable; but would you have pitied a monkey I once saw, who, having stolen an egg from a cabin on ship-board, ran away with it, conscience-stricken, I supposed, and, sitting on the upper yard-arm, beheld it, broken, falling from beneath and between his fingers, his face smeared all over with the yolk, and he unable to get any of the stolen fruit?

A dead sparrow, whose body was infected with blow flies, was an object too unsightly for the Sydenham ants; they threw the larvæ of the fly into the water, and would have nothing to do with them. They must have come to the conclusion it was the right thing in the wrong place, I suppose, notwithstanding their devotion to their own similarly formed larvæ.

The most cruel case of torture ever heard of in the history of man is one where the human victim was bound hand and foot, and left among some large nests of tropical ants to be slowly devoured.

"The ants are a people." The same difference of character and habit that marks men and women applies to the ants; some are all politeness and hospitality, others are sulky, savage, and silly. There are hunting ants, pastoral ants, and agricultural ants. The first live entirely by hunting; unlike other branches of the family, who fight their battles in company, they prefer single combat. The second forms by far the largest class of the entire family, living in company, each helping the other, and all contributing to the general economy of the home.
There are family quarrels too amongst the little people, just as there are amongst the "more advanced" animals; and the manner of the little people is very suggestive, showing how they can distinguish between friend and foe, for if they desire to remove a suffering friend to a place of security, the friend rolls itself up into a ball, and is thus easily and harmlessly conveyed out of the danger; whereas an enemy is served very differently, for it is handed about by the legs or antennæ.

Sir John Lubbock, having made one experiment with his ants with the view of ascertaining their powers of recognition under exceptional circumstances, made another by taking some out of a nest and suspending them in a bottle covered with muslin. Those in the nest took no notice of them, but when he put strangers into the bottle those in the nest were terribly put out, and would not rest until they cut through the muslin and attacked them. How strangely does this illustrate insect-reason!

Quickly will a mother sheep detect her own little lamb amongst the flock; and amongst several hundred mothers, how quickly will the lamb, only perhaps a few days old, recognize its mother among the crowd. You and I can see no difference; this, too, is worthy of our attention; but how much more striking is that we are told of the power of recognition among the little people.

With the desire of confirming other opinions as to the power ants possessed of recognition, the same authority marked several with paint, but their friends soon removed it; a stranger put into a nest is restless, and endeavours to find his way out as quickly as possible. Ant pupæ taken from the nest, when restored after some months' absence, were received as old friends, while some put into another nest were attacked. This is very remarkable, because, little as is the difference between one fully developed ant and another, still less is there between one pupa and another; indeed, we might just as well endeavour
to detect a difference between one grain of rice—which the ant in the pupa form nearly resembles—and another.

It has been generally said, that as the queen bee is both mother and monarch of the whole hive, so is the queen ant; but that is not strictly correct. There are cases where worker ants give out eggs, although such cases are quite exceptional. Queenless nests have, nevertheless, been found to be provided with eggs, but all the eggs produced male ants.

Ants, like bees, are capable of distinguishing between colours, and very curious and interesting experiments have been made to discover the effect of certain rays of ordinary light upon the vision of the insect; the violet colour does not seem to be approved by the family.

Again, wishing to ascertain whether the limits of vision in the case of the ants was the same as his own, Sir John Lubbock availed himself of the habit of the little people, who when the nest is disturbed immediately rush off with their babies underground to a place of safety. He placed some of the disturbed nurses with their larvae and pupae between two plates of glass about one-eighth of an inch apart—a distance which leaves just room enough for the ants to move about freely. He found that if he covered over part of the glass with any opaque substance, the young were invariably carried by the watchful attendant into that dark part. He then tried placing over them different coloured glass, and found that if he placed side by side a pale yellow with a deep violet glass, they chose the former and avoided the latter; and he thinks, therefore, that though the pale yellow was much more transparent to our eyes, it was, on the contrary, much less to the ants. Other experiments convinced him that the colour of objects, and therefore the appearance of things, must present to the insects a very different appearance to what it does to the man. But in our humbler judgment, the experiments made with insects in respect of their favourite colours must be received with a considerable amount of caution.
CHAPTER X.

CHARITY.

"It is another's fault if he be ungrateful, but it is mine if I do not give. To find one thankful man I will oblige many that are not so." —Seneca.

HAVE insects, whose power of vision appears to differ from our own, any perception of musical sounds?

That is a question which is not easily determined. Ants do not appear conscious of sound. Everybody knows how black beetles will scamper off when a footstep approaches; but then, perhaps the vibration of the floor is appreciated by them, for, without doubt, if the compound antennæ are not organs of hearing, in a very remarkable manner they are of feeling. My own opinion is that both senses in insects are combined in the antennæ; indeed, more so, that there is a trinity of purpose in them—that what our tongue, fingers, and ears are to us severally, the antennæ are to insects unitedly.

Here is a story illustrating the influence of a tuning-fork on the garden spider.

While watching some spiders spinning their beautiful geometrical webs in the garden, it occurred to an observant
entomologist to try what effect the sounding of a tuning-fork would have upon them. Let me give you his words: "On sounding an A fork," he says, "and lightly touching it with any leaf or other support of the web, the spider, if at the centre of the web, rapidly flew round so as to face the direction of the fork, feeling with its fore-feet along which radial thread the vibration was travelling. Satisfied on this point, it next darts along that thread till it either reaches the fork itself or a junction of two or more threads, the right one of which it instantly determines as before. If the fork is not removed when the spider has arrived, it seems to have the same charm as any fly; for the spider seizes it, embraces it, and runs about the legs of the fork as often as it is made to sound, never seeming to learn by experience that other things may buzz besides its natural food.

"If the spider is not at the centre of the web at the time the fork is applied, it cannot tell which way to go until it has been to the centre to ascertain which radial thread is vibrating; unless, of course, it should happen to be on that particular thread, or on a stretched supporting thread in contact with the fork.

"If when a spider has been enticed to the edge of the web the fork is withdrawn, and then gradually brought near, the spider is aware of its presence and of its direction, and reaches out as far as possible in the direction of the fork. But if a sounding-fork is gradually brought near a spider that has not been disturbed, but which is awaiting as usual in the middle of the web, then, instead of reaching out towards the fork, the spider instantly drops—at the end of a thread, of course. If under these conditions the fork is made to touch any part of the web, the spider is aware of the fact, and climbs the thread and reaches the fork with marvelous rapidity. The spider never leaves the centre of the web without making another thread along which to travel back (!) If after enticing a
spider out we cut this thread with a pair of scissors, the spider seems to be unable to get back without doing considerable damage to the web, generally gumming together the sticky parallel threads in groups of three or four. By means of a tuning-fork a spider may be made to eat what it would otherwise avoid. I took a fly that had been drowned in paraffin and put it into the spider's web, and then attracted the spider by touching the fly with a fork. When the spider had come to the conclusion that it was not suitable food, and was leaving it, I touched the fly again. This had the same effect as before; and as often as the spider began to leave the fly I again touched it, and by this means compelled the spider to eat a large portion of the fly."

I am reminded in this story of the striking resemblance between the spider's web with the threads running from the centre to the circumference, and the spider detecting the sound which came from that thread which was touched with the tuning-fork, of the "switch-board" of the telephone, to which the connection is made between two parties at the central station before they can be brought into direct communication. What the wire is in the case of the telephone, the web is in the case of the spider.

That some insects appreciate sound there is no doubt. A garden spider when closely watched exhibits nearly the same excitement at the sound of a fly that the carnivora do in the Zoological Gardens when their feeding-time approaches.

In the story of Silvio Pellico, who suffered much under the Austrian Government when it exercised the most despotic influence amongst politicians, there occurs this reference to insects as affording an instance of the effect of kindness upon ants and spiders. "Seeing human creatures so rarely," wrote the prisoner, "I turned my attention to some ants which came to my window, and I fed
them so sumptuously that they brought a whole army of their companions, and my window was soon filled. I occupied myself also with a spider which spun its web on one of the walls; I gave it gnats and flies, and it became so familiar as to come upon my bed and into my hand to seize its prey."

In the chapter upon instinct you must have almost reached the conclusion that animals are possessed of the power of reasoning. Such is very observable in many quadrupeds and birds. Every observer of Nature knows that when the skylark has a brood of eggs in her nest on the ground she will allure you from the locality by inviting your attention to her song, neither will she fly down into her ground-built home, but at some distance from it, and then, step by step, approach it in a manner that escapes your detection. The disciples of evolution will try to make us believe this is simply the result of habit and desire, a natural law—and so it is; but who ever heard of a law without a law-maker? Who and what is "Nature?"

Who implanted the habit and desire in the bird?

Take another case. Among all insects—although, speaking correctly, spiders are not "insects," the body is not \textit{insected}; the method of breathing is different to that of a true insect; the feet, moreover, are eight instead of six, and the antennae are entirely different—of the whole family of spiders, and it is a very large one, perhaps the trap-door is the most cunning and clever, affording a remarkable instance of reasoning power in so small an animal.

In the latter part of the Book of Job, one whole chapter consisting of thirty-four verses is occupied in describing the structure and habits of the then largest known animal, the crocodile; and by reason of its great power and impene-trable armour the lesson is read, "None is so fierce that dare stir him up; who, then, is able to stand before \textit{Me}?"

May we not, after a similar manner, argue in respect of the New Zealand trap-door spider? This creature is so
Trap-door Spider. Open nest, and section of same.
close an observer of Nature that it builds its mud house in such a manner—ornamenting it exteriorly with grass and mosses, and placing broken pieces of stick in so exactly similar a position as they would be found naturally—that no one would dream of finding a spider behind. And then the entrance to its house—how well guarded! Ropes of spider-web are attached to the door from within, which it holds fast when there is heard or seen from without the approach of an enemy; and should the latter prove too strong for it, there is a way of escape already prepared by a back door, through which the spider retreats.

Then, again, the class of spiders who practise this description of deception upon larger enemies, practise the same upon each other. You never find any two trap-door spiders' nests exactly the same. Selecting the building material at some distance, each will contrive so to complete the curiously constructed house it is to live in with mud or clay, and hedge it in differently to another of the same species, that a family adversary is unaware of its presence.

One who closely watched the habits of this reasoning creature, as an instance of its powers of observation, mentions the case of a nest discovered in a line of holes in the ground made by raindrops. "This cunning observer," he says, "completes the series by adding one at its proper distance at the corner, which exactly imitates such holes. So complete was the deception that, though I and others must have seen this hole scores of times, being in a much frequented and prominent position, we never thought it was anything else than a raindrop-hole; and it was not till the accident of my having dropped something at the spot led me to examine the hole narrowly, that I discovered it was in reality a trap-door spider's nest." He speaks of the door of such a nest and its outer covering as a marvellous "piece of deception," and remarks that "the simplicity and prominence of its mode of construction was the very perfection of concealment."
We have an old proverb, "Set a thief to catch a thief," now just see how this is illustrated in the life of a Nicaraguan wasp mentioned, with the case of the trap-door spider, in Dr. Lindsay's "Mind in the Lower Animals."

If the wasp attempted to attack the spider as the latter was in its glutinous web, the insect's wings would—as in England they sometimes do—become so entangled that the creature becomes an easy prey. The wasp above-mentioned, aware of its danger, makes a sudden dart at the web; spiders, who are so savage, are also very nervous, and the rush the wasp makes with its whole body against the web frightens the spider, who, falling out of the web, becomes the prey of its enemy.

But what reasoning power is here!

The author of the above exhaustive work on mind amongst brutes has some interesting remarks about the little people, and it is strikingly suggestive of the reasoning power of ants that he gives to them a very prominent place in an early chapter of his work.

You would be reminded of the striking resemblance of ants to human communities, and even families, the mental character of one species or genus of ant differing as much from that of another species as one household does to another even in the family of man. He then enumerates the qualities of mind which are to be observed in ant-life, several of which have been already considered; but viewing them here as a whole we may well endorse the exclamation of Solomon's father, who was as great an observer of Nature as his son—"O Lord, how wonderful are Thy works; in wisdom hast Thou made them all!"

The characteristics of an ordinary family or colony, then, of our little people is thus enumerated in the work referred to—

1. Co-operation for a given purpose.

2. Division of labour, including the workings by turns and the use of relief parties.
3. Use of, and obedience to, authority, including the employment of a language of command.

4. Understanding each other's language—a language apparently of touch.

5. Organization of ranks, including military organization and discipline.

6. Knowledge of the possession of power and the use of it, including the subjection of the weak by the strong, and the subserviency or servitude of one race or rank to another.

7. Judicial punishment of disobedience or rebellion.

8. Forethought, or providence, real or apparent.

9. Practice of agriculture, including harvesting and storage.

10. Respect for—including interment of—the dead.

12. Funeral or other ceremonies, including processions.

13. Use of natural tools, or instruments, and weapons.

These are amongst the links in a long chain of interesting matter, to which may we not add the most important of all?

14. The constant preparation for another life.

Say, after reading these fourteen characteristics of ants, whether it is not perfectly true that they are a "little people, exceeding wise"?

To this entertaining author on the wonderful manner in which animals resemble man in their actions I am indebted for several hints in respect to ants. His work embraces almost every description of animal from an ant to an elephant, and I recommend "Mind in the Lower Animals," by Dr. Lindsay (1879), as one of, if not the most interesting work on the subject in our language. The two volumes of upwards of five hundred pages each abound with facts which fill the devout reader with astonishment at the wisdom of God in the natural world.

As an instance of intelligence he quotes an anecdote from Kirby and Spence, but which I have had confirmed
from experience. It was the case of a dead frog, impaled upon a spike on the top of a stick secured in the ground, the pathway up which was so hindered that the ants could not climb it; so with their united strength they attacked the base, which soon gave way, the stick with the weight at the top soon falling to the ground, and the frog was quickly demolished.

To those who feel inclined to follow the deeply interesting subject I would also highly recommend Wood's "Man and Brute," in which are many of the most deeply interesting illustrations, from verified facts, proving how very near many animals approach our race in powers which we call mental, showing, after a similar manner to that in the more learned work of Dr. Lindsay, that the lower animals share with man the attributes of reason—language, memory, a sense of moral responsibility, unselfishness, and love.

Nothing can exceed, as I have said, the wisdom of the Siam ants, who are reported to be forewarned of an approaching flood, and who, building their mud nests on the ground, in good time remove them to the topmost branches of the trees, where, when the ground below is submerged, they are in safety, giving a very practical hint to the "upper classes" in the natural kingdom. But an equal amount of reasoning power has been observed in the ants in Texas and Mexico, answering all the descriptions of the most experienced agriculturists, and hence in those countries they are called the "agricultural" or "harvesting ant."

There are several races of savage people who never cultivate the soil nor practise agriculture of any kind. What a lesson they might learn from the American ant, of which it is said that it not only stores up seed, as Solomon declares his ants did, but cultivates the plants which are to provide it, and carefully gathers in its crop at the right season!
Now, you will remember a similar trait in our own wood ants, who nurse with the greatest care the little green aphid, treating it exactly as the most sensible of dairymen would their cows, and even nursing the baby larvae, although they bear not the slightest resemblance to the perfect image of the creature.

In the wet season these harvesting ants of Central America, when the stored seeds in the ant granaries are apt to get wetted and to sprout, are seen bringing out all the damaged grains on the first fine day, setting them in the sun to dry, returning to the store only such as are uninjured, further particulars of which we shall find in our chapter about tropical ants.

But another author declares that ants nearer home do the same thing—with this extraordinary addition to the wisdom of their American cousins: they bite off the young sprout of the germinating plant in the side, thus preventing its further growth.

These American ants are said truly to cultivate their estates. They have grass paddocks round their nests, which they keep weeded, clearing off what hinders them, leaving one plant only, a grain-bearing grass called "ant rice," again sowing the seeds of the same grass for a future crop. Here it is very interesting to compare this act of reason with the honey bee. The attendants who accompany her majesty as she visits the cells deposit particular eggs in particular cells; but should there be, as it sometimes happens there are, a surplus number of eggs, these they greedily devour. We think of the self-denial which keeps them from swallowing other eggs instead of storing them in the cells; and the self-denial practised by the bee we see is similarly exhibited in the ant, for the seed of a plant so exactly answers to the egg of an animal, that many in the author's collection so nearly resemble each other as to be scarcely distinguishable.

These American ants exhibit still further proofs of fore-
though and prudence; for they not only sow the seeds of
the ant rice, but when it has grown and the new seed is
ripe they separate the chaff and harvest the grain, garnering
several other descriptions of seeds in a similar manner.

In a former chapter I gave you an account of Sir
John Lubbock's experiments with his ants to ascertain
whether they possessed the power of recognition, proving
beyond doubt that they do. Various naturalists have
contributed towards this interesting branch of natural
history, and, however incredible it may appear, insects
certainly have the power of distinguishing a friend
from a foe. My Oxfordshire friend tells me he is on the
most familiar terms with his bees; they come about him
and crawl over him without attempting to sting. He
doesn't smoke tobacco; bees hold that "weed" in detesta-
tion, and will generally attack a smoker: his chief diffi-
culty is when they get up his nose.

We all know how a dog or a horse will distinguish his
master's voice and step from that of a stranger, even
when out of sight. Ants, we have seen, know how to
welcome home their absent friends, and how to deal with
the intruder from another nest; so, sentinel bees at the
door of the hive will allow one of their own company to
pass, but a stranger is refused. And yet you or I would
certainly fail in distinguishing the faintest difference-
between them.

We all know what kindness will do. I once heard of a
soldier in the army of a most vicious character, always
being reproved and punished. One day the serjeant again
brought him in, when the officer exclaimed, "We have
tried everything with him; what can we do with him now?"

"There's one thing, sir," replied the serjeant, "we
have never yet tried." "What's that?" asked the other.
"Why, sir, we have never tried forgiving him." The
plan was adopted, and the soldier became one of the best
in the regiment.
He was conquered by love.

And so are insects. I heard of a public lecturer giving a "bee demonstration" in Hertfordshire recently, who brought his hives before the audience, separating them by a green gauze curtain, through which all that was going on could be seen. The bees crawled all over the lecturer, recognizing him when flying over and upon his head; and the only inconvenience, he said, he experienced, was when they got down his neck.

Let us, then, imitate the lower orders of animals in the law of kindness, for, "in the intercourse of social life, it is by little acts of kindness recurring daily and hourly—and opportunities of doing kindnesses, if sought for, are ever starting up—it is by words, by tones, by gestures, by looks, that affection is won and preserved. He who neglects these trifles, yet boasts that whenever a great sacrifice is called for he will be ready to make it, will rarely be loved. The likelihood is, he will not make it; and if he does, it will be much rather for his own sake than for his neighbours'. Many persons, indeed, are said to be penny-wise and pound-foolish; but they who are penny-foolish will hardly be pound-wise, although selfish vanity may now and then for a moment get the better of selfish indolence; for wisdom will always have a microscope in her hand" (Sala).

"Be kind to each other,
The night's coming on,
When friend and when brother
Perchance may be gone!
Then 'midst our dejection,
How sweet to have earned
The best recollection
Of kindness returned!"

It would appear that the kindness which ants exhibit towards other animals is sometimes attended with selfishness; but when we reflect, do we not find selfishness
concealed in almost everything we do? The greatest earthly pleasure I believe to be that which enables us to give pleasure to another; *that* is the highest and purest of sentiments, but it is nevertheless selfish. So is it with the ants; truly they bestow the greatest attention and kindness upon the aphis, but do they not suck the sweet from them?

I have been told by an African traveller that one day, in wandering through the jungle with his native guides and his gun, their attention was attracted to the peculiar noise made by a small bird. The Caffres told the master it was the "honey-bird," and if they followed its direction it would bring them to a store of honey. This was done, and, to the astonishment of my friend, at the bottom of an old gnarled tree, the bird hovering over it significantly meanwhile, there was discovered a store of honey enough to satisfy the appetite of all, including the bird, who was patiently waiting his share when the comb should be thrown away. Let us learn from these little facts that even selfishness is not to be despised when it shows itself in so interesting a manner; but we may say, perhaps, "There is selfishness, and selfishness."

According to Sir John Lubbock, some ants take pity upon a family of small blind beetles, keeping them as domestic servants; feeding another description of beetle for the sake of the sweet juice it secretes. Here again is selfishness, but it is beautified with kindness, and that gives it the right colour. Let us honestly examine our motives, and we shall soon understand the apostle's words, "conscience bearing witness, and thoughts the meanwhile accusing or else excusing one another."

I do not know of a more interesting instance of instinct than that which happens in the life of the honey bee. If the hives be removed into the neighbourhood where the Death's-head Hawk Moth is found, they are ready for the contingency. They may have been born and bred in a
country in which the moth, the largest of British species, never comes, and yet they know it is one of their greatest enemies; stealing into the hive, it not only robs them of their honey, of which it is fond, but its strange squeaking sound frightens the bees, so that they look upon the intruder with horror. You would have imagined that nothing could have been easier than to fall upon such an enemy and lodge a few barbed and poisoned stings in his body. You would. But two difficulties, you will see, present themselves: first, the body of the moth is so well protected with scales, that the little sting of the bee would fail to reach the vital part; and, secondly, what could the bees do with the dead body? The hieroglyphic of a human skull on the body of the moth, a symbol of the death that preceded its wondrous change, would surely foreshadow the doom of the bees. So when they find themselves brought into such objectionable society, they narrow the entrance to their hive, leaving it sufficiently wide for one bee to pass in or out, but too small to admit the enemy, who is kept waiting at the door indulging in the sweet smell which he cannot get at.

Similarly the ants. In the work already referred to on Mind in the lower animals many references are to be found to other authors, whose experience contributes to the extraordinary stock of illustrations with which the book abounds. Here we learn how the black ants in the Mauritius send messengers for help when an alliance is necessary to attack a common enemy. Sometimes a combined attack is made; at others a division of forces is decided upon, one party forming the front army and the other the rear; pitfalls, ambuscades, or other means of entrapping the enemy are constructed.

On the return of ants from a military or marauding expedition, their slaves, who have remained at home, at once recognize the signs of success or non-success, and act accordingly. If their masters come back as conquerors
they are received with flattery, compliment, and attention; the victors are relieved of their prisoners, offered food, and otherwise respectfully waited upon. But in the opposite event of failure, of return as conquered instead of conquerors, the reception is characterized by sulkiness and indifference; and although ants work, like bees, in the dark, they rest during their wars at night, renewing the battle in the morning.

One author declares that in their military marches they do not slay the weary or leave them to die, as the Romans did, but help or drag them along; volunteers actually enter the ranks and make sacrifices for the rest. And if I were to extend the story of insect battles, I should repeat the “Bombardier Beetle,” who actually discharges a mimic pistol at his adversary from his abdomen, not charged with vile gunpowder, but such an abominable acid as, when directed at the head of the adversary, so stupefies it, that while it is cleansing itself the other has time to escape.

Is there not more of romance in Nature, now, than in fiction?

Comparing again the ant with the dog, and reflecting upon their difference in size, let us think of the “infinite riches in the little room” of one when viewed by the side of the other.

We had a favourite spaniel, who died not long ago; it was afflicted with a tumour which we knew must end fatally. We consigned it to the care of a friend who was famous for nursing and kindness. Now the dog, like many of its race, had a terrible aversion to cats; one of the latter abode in the little home our favourite was taken to. Accepting the philosophy in the proverb that “what can’t be cured must be endured,” the dog became reconciled to the cat; but as it grew weaker and weaker, the death of the former was evidently approaching; and one night, never having done so before, the cat stole up in the dark into the bedroom where our friend was sleeping, and
patting her cheek with the soft cushion of its foot awoke her, and by gesture and cry the attention was arrested, and on coming downstairs to see what it was all about there lay our poor pet a-dying.

Similarly, ant watchmen will awaken sleepy ants in the morning by strokes with their antennae, following this up, if ineffectual, with a bite; so, as reported in "Chambers's Journal," a regimental dog during the Crimean war would visit the sleeping sentinels at night, apprising them of any threatened danger, while if they were awake and ready he passed on to the next.

Observe in these stories how nearly the "little people" come up to the big in the matter of mind, and learn from the lesson it teaches to reach up higher and higher in life. The common honey bee knows how to convert a worker larva into a royal imago, and the secret of all is simply the food it takes: "go then and do likewise," for we too grow by the food we eat, metaphorically and literally, spiritually and physically. Ants will invariably come to each others help: let us learn the luxury of doing good. It is no uncommon sight in the country to witness one ant who, having discovered a dead stag-beetle about a hundred times its own size and weight, is trying with all its might to get the monster home for the family food; then failing, and leaving the meal to ask another ant to come to its help, when, with united strength, the object is accomplished.

In how many ways may this be suggestive? The case of a rat is recorded who, in order to convey a potato to the general store, stretched himself on his back on the floor, secured the potato on his chest, and kept it firmly there with his paws, waiting the arrival of a companion, who, placing his companion's tail in his own mouth, dragged him along to a hole in the floor, thus making a wheelbarrow in which to convey the desired food to the family. Even rival ants will sink their family differences when
a common enemy has to be attacked. Would that both in the world and the Church the "lord of creation" would take a lesson from the little people in this respect! Feeling that "union is strength," they unite in a common cause, and concentrate all their wisdom and strength in what they have to do. Go to the ant, thou "obstructionist," consider her ways and be wise.

It would be wrong for you to suppose that these good qualities alone characterize the family of the little people. It is with them as with ourselves. "Knowledge is power." The ant that makes use of its tiny brain most fares the best; perhaps, as with man, the more the brain is used in reason the bigger and stronger it becomes. Difference in intelligence displays itself often in the same family, and diversities of gifts frequently are seen where all have been under the same home influence and educated at the same school. So is it both with ants and bees. Sir John Lubbock calls this, "interesting illustrations of the individual differences existing between ants;" adding that "there are priests, Levites, and good Samaritans among them, as among men. It is remarkable," he says, "how much individual ants appear to differ from one another in character."

Wisdom is not represented by bulk amongst the little people any more than the big. Very often it is just the contrary; small ants will overcome large ones in battle, because they quickly comprehend the language of their tribe, are quick in action, and decided in their manner, and determined in their purpose; and often while the smallest are the habitual masters, the largest are the habitual slaves.

Do we not see this in every-day life? How truly it is said, "The ants are a people."

Every animal has its parasite. Our bodies, I suppose, could they be microscopically examined in their interior parts, would present a combination of the Botanical and Zoological Gardens in miniature, with the addition of a
Chemical Museum. It is so with insects; the house-fly is pestered with a fungoid plant which frequently ends the life of the insect, bursting through its body and surrounding it with a halo of microscopic vegetables on our window-panes, where the poor fly, making one final struggle for life, is fastened by its own marvellous sucking tongue. The golden fish is also the prey of a beautiful fungoid plant, which, unless removed, is sure to prove fatal; bees are the prey of smaller insects, both inside and out. The stylops, if allowed to insinuate her ovipositor into the body of the bee, will there deposit one or more eggs which will become both caterpillar and chrysalis and imago before producing the death of the bee, from whose dead body it ultimately escapes. One of my bees similarly "possessed" is a choice specimen of what it is possible for you or me to become in another sense, not literally being eaten alive—though that is quite possible though exceedingly exceptional—but symbolically. Everything has its parasite, and we know not, therefore, where the last link in Creation is to be found, nor yet to what the highest may lead.

"The larger fleas have lesser fleas
Upon their backs to bite 'em,
And lesser fleas have smaller fleas,
And so ad infinitum."

But, curiously enough, the parasite of one in insect life becomes the food of another. Ants feed on the parasites found on the bodies of bees, but, strange to say, these parasites are only found on wild bees, not on those whose lives are spent at home amongst the great and united family in the hive. Ants also carefully attend their wounded friends, licking their battered limbs, and sometimes even restoring animation where, as in the case of a half-drowned fellow, ant life appeared to be extinct. How different this to the singular and suffering instinct displayed by an animal so constitutionally different to the ant, the
common spider, who, if his enemy has bitten half off either of its eight long legs, will quietly retire into some corner and perform its own operation by amputation at the joint, from which a new limb soon begins to make an appearance!

It is no uncommon thing for animals to perform surgical operations both upon themselves and each other.

Dr. Lindsay, quoting Mr. Wood, tells the story of a dog who performed a surgical operation on a cat—excision of its tail, which had nearly been cut in two by a tin kettle tied to it. The end portion of the tail was simply bitten off by the dog, to the cat's immediate relief, and a loving companionship was the result.

The same dog, when a kitten that he was in the habit of teasing got scalded, and had her sores dressed, gently licked them—a common but effectual mode of treating sores by and among the lower animals. By and by a tumour, which ultimately proved fatal, appeared on the kitten's neck; she got the dog to lick it as he had done her sores, touching him with her paw when she wished to be licked, and again when she wished him to desist, holding up her head in order that he might reach her neck.

If the lower animals in Creation give to each other in their troubles such important aid and sympathy, why do we not take more lessons from their book? "Ask now the beasts, and they shall teach thee."

Surely, from the splendour of the ruins we may reflect upon our own Divine beginning—what may not the restoration be!

Amongst the ants there is a regular caste of nurses: those who are only indisposed are carefully tended inside the nest, whilst those who are amongst the "incurables" are carried elsewhere to die.

You may have observed two horses in the field licking each other's necks, and you may have wondered at the "Reason why;" and as you would not find an explanation to
that mystery in that very useful volume, let me tell you here, in the hope that you will accept the hint on the very first opportunity.

There is an insect called the Bot, or Gad-fly: the female lays her eggs just where the horse is likely to take them with its food into the stomach; they produce great irritation in the skin, and when one horse is troubled with an irritation on the neck it licks another horse on the place where its trouble lies, who, immediately obeying the signal, does the same with his friend, giving the desired relief.

Here is another illustration of the proverb that "one good turn deserves another," and it will match with the care bestowed upon a wounded ant by a passing fellow-ant. A dog in Leeds, some years ago, run over by the wheel of a carriage, was taken by a gentleman into a surgeon's, who dressed the leg and the dog recovered from the accident. Some time after, the same dog, in passing through the same district, saw another dog suffering from a similar accident—his leg was broken. He was seen to take him by the neck and drag him into the doctor's, having, we must presume, a grateful recollection of his former visit.

"All work and no play
Makes Jack a dull boy."

This would appear to be an ant's motto. We know that insects amuse as well as instruct each other. Mister Cricket plays the musical instrument which he carries with him wherever he goes to please his wife; house-flies dance a quadrille round our heads in graceful delight; the merry hum of the bees has become a proverb; and the solemn hymn of the insects in the woods, how delightful to hear!

Some animals are fond of fun. I knew of a parrot who, mimicking her master's voice, would call the dog, and then, when the dog appeared, angrily scold him, seemingly enjoying the joke, while the dog slunk away apparently conscious that he had been made a fool of. Wood describes
a practical joke played on a cat by swallows, who "set up a laugh at the disappointed enemy very like the laugh of a young child when tickled." There is the laughing hyena, and the laughing kingfisher, and laughing monkeys, who enjoy a romp with each other—as we may see any day in the Zoological Gardens—and I have read of a laughing jackass. Livingstone mentions an African ibis whose cry is "a loud ha—ha—ha!"

After describing a colony of fallow ants whose proceedings were highly remarkable, the great French naturalist, Huber, tells us that one sunshiny day, upon careful examination of this happy family, a large number having been tempted out by the brightness and serenity of the weather were found to be passing away their time, not in work, but in play; their chief amusements were gymnastic exercises and hide-and-seek. Two ants would approach one another, gently pat each other on the cheek, and then resting themselves on their hind-legs, would wrestle with each other. They embraced, struggled with, and overthrew each other with the greatest possible goodwill, never using any violence in their actions, nor discharging their venom as in the more serious affrays. Some one, more playful than the rest, would overturn three or four individuals, one after another, and getting finally an overthrow itself, would resume a more steady behaviour for a time! Taking up a position on each side of a blade of grass, some would be found gambolling with each other, by dodging to and fro, now attacking, now retreating, now pursuing, now flying. After a vigorous somersault given to a wrestler, one would run away and hide itself in one of the galleries. Sometimes they would amuse themselves by riding upon one another's backs!

We could devote a long chapter to insect gambols, amusements, and employment, but we must conclude this with an amusing burlesque of ant-life in the Black Forest, where the little people lead a merry, undisturbed life, by
Evening Amusements.
an author whose chief work it is to turn all he sees into fun, teaching us how differently—like ants and other animals, from which the learned Darwinians would teach us we lords of the Creation have sprung—how differently we, too, are constituted, some men being all their lifetime in mental mourning and others in continual merriment.

"The Black Forest—one cannot describe those noble woods, nor the feeling with which they inspire him. A feature of the feeling, however, is a deep sense of contentment; another feature of it is a buoyant boyish gladness; and a third and very conspicuous feature of it is one's sense of the remoteness of the work-day world, and his entire emancipation from it and its affairs." So writes "Mark Twain," in his charmingly ridiculous "Tramp Abroad."

To this we can truly say "Amen;" but had we not discovered that amongst insects as among men there are singular differences of mental attainments, to which we referred in our last chapter, we should scarcely have ventured to repeat his amusing description of some Black Forest ants.

An explanation of the picture illustrating the parable of the Wise and Foolish Virgins by a foreigner in broken English, already mentioned, may however, make Mark Twain's entomological experience reconcilable. Pointing to the foolish virgins you remember he said, "Zem is ze stoopids"! So if we indulge in a laugh as other animals do, at the expense of some of the ants of the Black Forest, while one of the funniest of our American cousins expresses his opinion, let us say of his little people, "Zem is ze stoopids."

"Now and then," he writes, "while we rested we watched the laborious ant at his work. I found nothing new in him—certainly nothing to change my opinion of him. It seems to me that in the matter of intellect the
Solomon’s Little People.

ant must be a strangely overrated thing. During many summers now I have watched him, and I have not yet come across a living ant that seemed to have any more sense than a dead one. I refer to the ordinary ant, of course” (“Ze stoopid?”). “I have had no experience of those wonderful Swiss and African ones, which vote, keep drilled armies, hold slaves, and dispute about religion.

“Those particular ants may be all that the naturalist paints them, but I am persuaded that the average ant is a sham. I admit his industry, of course; he is the hardest-working creature in the world—when anybody is looking—but his leather-headedness is the point I make against him. He goes out foraging, he makes a capture, and then what does he do? Go home? No; he goes anywhere but home. He doesn’t know where home is. His home may be only three feet away; no matter, he can’t find it. He makes his capture, as I have said; it is generally something which can be of no sort of use to himself or anybody else; it is usually seven times bigger than it ought to be. He hunts out the awkwardest place to take hold of it; he lifts it bodily up in the air by main force, and starts, not towards home, but in the opposite direction, not calmly and wisely, but with a frantic haste which is wasteful of his strength. He fetches up against a pebble, and instead of going around it, he climbs over it backwards, dragging his booty after him, tumbles down on the other side, jumps up in a passion, kicks the dust off his clothes, moistens his hands, grabs his property viciously, yanks it this way, then that, shoves it ahead of him a moment, turns tail and lugs it after him another moment, gets madder and madder, then presently hoists it into the air, and goes tearing away in an entirely new direction, comes to a weed; it never occurs to him to go around it. No; he must climb it, and he does climb it, dragging his worthless property to the top, which is as bright a thing to do as it would be for me to carry a sack of
flour from Heidelberg to Paris by way of Strasburg steeple. When he gets up there he finds that that is not the place, takes a cursory glance at the scenery, and either climbs down again or tumbles down, and starts off once more, as usual, in a new direction. At the end of half an hour he fetches up within six inches of the place he started from, and lays his burden down. Meantime he has been over all the ground for two yards around, and climbed all the weeds and pebbles he came across. Now he wipes the sweat from his brow, strokes his limbs, and then marches aimlessly off, in as violent a hurry as ever. He traverses a good deal of zigzag country, and by and by stumbles on his same booty again. He does not remember to have ever seen it before; he looks around to see which is not the way home, grabs his bundle and starts. He goes through the same adventures he had before; finally stops to rest, and a friend comes along. Evidently the friend remarks that a last year's grasshopper's leg is a very noble acquisition, and inquires where he got it. Evidently the proprietor does not remember exactly where he did get it, but thinks he got it "around here somewhere." Evidently the friend contracts to help him freight it home. Then with a judgment peculiar antic (pun not intentional), they take hold of opposite ends of that grasshopper's leg and begin to tug it with all their might in opposite directions. Presently they take a rest and confer together. They decide that something is wrong, they can't make out what. Then they go at it again, just as before. Same result. Mutual recriminations follow. Evidently each accuses the other of being obstructionist. They warm up, and the dispute ends in a fight. They lock themselves together and chew each other's jaws for a while, then they roll and tumble on the ground till one loses a horn or a leg, and has to haul off for repairs. They make up now, and go to work again in the same old insane way, but the crippled ant is at a dis-
advantage; tug as he may, the other one drags off the booty, and him at the end of it. Instead of giving up, he hangs on, and gets his shins bruised against every obstruction that comes in his way.

"By and by, when that grasshopper's leg has been dragged all over the same old ground once more, it is finally dumped at about the spot where it originally lay. The two perspiring ants inspect it thoughtfully, and decide that dried grasshoppers' legs are a poor sort of property after all, and then each starts off in a different direction to see if he can't find an old nail, or something else that is heavy enough to afford entertainment, and at the same time valueless enough to make an ant want to own it.

"There, in the Black Forest, on the mountain side, I saw an ant go through such a performance as this with a dead spider of fully ten times his own weight. The spider was not quite dead, but too far gone to resist. He had a round body the size of a pea. The little ant—observing I was noticing—turned him on his back, sunk his fangs into his throat, lifted him into the air, and started vigorously off with him, stumbling over little pebbles, stepping on the spider's legs and tripping himself up, dragging him backwards and forwards, shoving him bodily ahead, dragging him up stones six inches high instead of going round them, climbing weeds twenty times his own height and jumping from their summits, and finally leaving him in the middle of the road to be confiscated by any fool of an ant that wanted him. I measured the ground which this ass traversed, and arrived at the conclusion that what he had accomplished inside of twenty minutes would constitute some such job as this—relatively speaking—for a man; to wit: to strap two eight hundred pound horses together, carry them eighteen hundred feet, mainly over (not round) boulders averaging six feet high, and in the course of the journey climb up and jump from the top of one precipice like Niagara and three steeples, each a
Ant with a Beetle's Leg.

In this charmingly ridiculous sketch there are the same differences to remember in ants that the clever author shows in the other parts of his amusing book to exist among men, and of such an ant as he declares he spent twenty minutes in watching, we may say as the foreign guide said of the foolish virgins, "Zem is ze stoopids."

I have known many men in life who have gone about their worldly affairs in much about the same manner as Mark Twain's Black Forest ants, making a great fuss about nothing, and, after a deal of show and bother, ending just where they began; like a caged squirrel I saw for sale the other day in a London shop, running as fast as ever his legs would carry him, and turning round a wire cylinder in the form of which his prison-house was built, and never gaining an inch.

Mark Twain's story of a stupid ant shows us he takes a partial view only of insect life. I am afraid he has made
up a good deal, admirable as it is, for amusement's sake, and that he did not stay so long on that mountain side merely to gratify a love for natural history.

Let me, in concluding this short chapter, give you a verbatim copy of a letter I received, while writing this story, from a dear boy who sees the other side of Mark Twain's picture, but who will enjoy his fun, nevertheless, as only a boy can.

"June 25, 1881.

"My very dear Mr. Crowther,

"I have read the book you so kindly sent me with the greatest interest, and am always especially delighted when I can get something about insects or animals.

"In addition to the animalculæ I told you of in my miniature aquarium, I have added as many again, as well as some lively water-beetles and water-mites. I have also two or three molluscs, which are just like blue-rayed limpets, but much smaller; one has a numerous progeny in my globe too. Also some little animals which look like semi-transparent stalks, only poking their heads out of their shells—for such they seem to be—to eat or to swim, which they do in a very rapid manner by means of four or more little appendages, which they move so fast that you can with difficulty see them when swimming. And worms nearly three inches long I have, and other little extra-ordinaries which for a time unfolded their beauties to my eyes almost every day. These feed on duckweed and other curious coloured vegetation growing on the side of the glass.

"But the caterpillars are by far the most consequence. Yes, caterpillars! Would you believe that a schoolboy could make pets of such things? Well, there is one in the world who does, and very interesting he thinks them too.

"But to give a description of them.

"If ever such a great treat did happen that you should
come down here in the course of next week—which of course is very improbable—and went upstairs to a little mite of a room at the top of the house, you would see on a shelf in front of the window the globe spoken of above, and a box with three partitions. In one of these partitions are several large beautifully coloured caterpillars, which will most likely reach the length of two inches and a half—their full size when walking—found in a particular kind of grass growing under hedges, very difficult to distinguish from another species, which they will not eat even when starving.

"In another, a few of those hairy caterpillars which London children, myself included, call 'woolly bears;' not the dirty, brown, smoky, black gormandizers of a London garden, but lively, very pretty-looking little things, with hairs nearly as long as their bodies, of a jet black, or rich reddish-brown colour, and very silky, which make long journeys across the grass-plot or up the garden path with astonishing rapidity. They are evidently aware that the gigantic form of Fred Robertson or a bird is near and is about to seize hold of them, and then no more liberty for them, poor things! They will either go into the latter's stomach or the former's box with some more of their woolly companions, who eat an almost incredible quantity of nearly everything they come across, including even hazel and laurel leaves. People in this village have a superstitious notion that if one of these caterpillars gets on their hand it will wring their fingers off, in consequence of which they are called 'wring-fingers.'

"In the next partition I have two caterpillars which look like dead twigs, and another of a variegated grey and white, spotted with black, which feeds on laurel leaves, and gets all the bits of rubbish he can to stick over his cocoon, even tearing the bits of skin off the sticks put for him to walk on.

"In another box there is a portion of a brood of vapourer-
moth caterpillars which came into existence under my protection; also some caterpillars of the nettle butterfly, with some other green caterpillars, which also feed on nettles.

"In addition to these boxes I have two glasses, one with some black velvety-looking ones, which weave a web where about fifty or sixty live together, and when they have eaten off all the hawthorn leaves surrounding the web, they make another somewhere else; if you touch one they all wriggle out of their home in a very curious manner. The other glass contains a brood of about two hundred, only a few days old, I think, from their hairy appearance, and the fabulous quantity of currant leaves they eat; they are 'woolly bears,' they have issued from pale yellow round eggs, evidently of some large caterpillar.

"Besides these glasses I have several boxes for chrysalids, and the different kinds of eggs. Directly a caterpillar shows any sign of making a cocoon, I wrap him up in a cone of paper where he has no chance of escaping.

"I love the country if possible more than ever, and always as a matter of course go out armed with a box for birds' eggs and caterpillars, for some of Nature's greatest beauties lie in insects, birds, and other forms of animal life. But I must say I do not appreciate having one of a pair of swallows living in my chimney in my bedroom, making an excursion into the room, not alive, but dead, as one did yesterday; but his skeleton shall go into my cabinet as soon as the ants have got it ready.

"But now dear Mr. Crowther, I have written such a long letter, that I really must close, and remain,

"Yours affectionately,

"Fred Robertson."

My readers will, I think, be struck with the power of observation in Mark Twain's story and my young friend's letter; but the lesson both teach is what a rich volume
Bible truths in Nature: an illustration of Rom. i. 20, and Job xi. 6. Transformation of the Gnat, showing in the water larva and pupa, and escape of the imago, or perfect insect; in the air the male and female.
is afforded in that of Nature; how everywhere, especially amidst country scenes, there is abundant matter to interest and delight those who have eyes to see and ears to take in the sweet sight of flowers and insects and the delightful songs of birds.

"The leaf-tongues of the forest, the flower-lips of the sod,
The happy birds that hymn their rapture in the ear of God,
The summer wind that bringeth music over land and sea,
Have each a voice that singeth this song of songs to me—
The world is full of beauty, like other worlds above,
And if we do our duty, it might be full of love."
CHAPTER XI.

PERSEVERANCE.

"All the performances of human art, at which we look with praise and wonder, are instances of the resistless force of perseverance. It is by this that the quarry becomes a pyramid, and that distant countries are united by canals. If a man was to compare the effect of a single stroke of a pickaxe, or of one impression of the spade, with the general design and last result, he would be overwhelmed by the sense of their disproportion. Yet those petty operations incessantly continued, in time surmount the greatest difficulties, and mountains are levelled and oceans bounded by the slender force of human beings."—Johnson.

Did you observe that my young friend had discovered that the ants are good anatomists?

"His skeleton shall go into my cabinet as soon as the ants have got it ready," he writes. You cannot have a cleaner nor a more perfect specimen of a mouse than that which may be had in the neighbourhood where ants abound. Only place the animal in a pasteboard box, then bury it, and go and look for it a month afterwards.

Perseverance is the ant's motto. If the bee is a model of industry, the ant is of perseverance. I have heard of one making seventy different attempts to remove its pupa—
that is, the baby-ant in its charge—and never giving up till it was accomplished. And, amongst the many lessons the little people teach us, none is more striking than the necessity for determination and decision in the affairs of life, a resolution to accept the advice given in the grand old Bible, "Whatsoever thy hand findeth to do, do it with thy might."

Here is one of the lessons I have learned from the little people, and so much good has it done me, Mark Twain notwithstanding, that I recommend it to you.

"Never give up! it is wiser and better
Always to hope than once to despair;
Fling off the load of Doubt's heavy fetter,
And break the dark spell of tyrannical care.

"Never give up! or the burden will sink you,
Providence wisely has mingled the cup;
And in all trials and troubles bethink you,
The watchword of life must be, 'Never give up!!

"Never give up! There are changes and chances,
Helping the hopeful, a hundred to one;
And through the chaos High Wisdom arranges
Certain success, if you'll only hope on.

"Never give up! for the wisest is boldest,
Showing that goodness has mingled the cup
And, of all maxims, the best and the oldest
Is the true watchword of—'Never give up!'"

"Perseverando."
In no respect is the virtue of perseverance shown in ant-life more than in the construction of the nest. You may observe the multitude of building materials employed; much has been brought from a distance. Hannibal crossed the Alps, so did Napoleon, but the difficulties of the little people are far greater than either of those great generals, in proportion.

The turf-ant's nest, one of the most common of our native species, is the most simple of any of the family; it is usually found under a flat stone, and consists chiefly of hollow cells with galleries communicating with each other. But "what is worth doing at all is worth doing well," appears to be an ant's motto generally, although, as Mark Twain discovered, there are "stupids" among ants quite as much as among men. All men are not "Mark Twains," and all ants are not equally wise. I think among the little people the stupid ant is the exception, and I will leave you to suppose what I think of bigger "people."

The turf-ant sometimes selects a tuft of grass for a beginning, and piles around it a considerable quantity of bits of stick and dead leaves. It almost always chooses a southern aspect, as freer from the wind, and there it builds chamber after chamber and gallery after gallery with an amount of perseverance under difficulty which in its proportion would dishearten many a man.

Preliminary failure is necessary to ultimate success in human affairs: we used to sing—

"'Tis a lesson you should heed,  
'Try again!'  
If at once you don't succeed,  
'Try again!'"

This is the philosophy of life, and the ants practise it in a wonderful degree.

Both ants and spiders, bees and wasps, as well as other insects, in less degree, learn from experience and teach us lessons in perseverance. The spider wishing to pass over a
path constructs a bridge in a line of web patiently waiting till the wind conveys the glutinous thread in the direction it wishes to go; and when the thread adheres, the spider tests its strength and tension before venturing, and when it *does* cross over, it takes care to construct a supplementary bridge by which to return in case of the breaking down of the other. What skill and perseverance is exhibited in the construction of the beautiful web of the common garden spider, who in less than three-quarters of an hour will construct a net of fourteen or sixteen inches in diameter, covered with 120,000 viscid globes, upon which unwary flies are to be secured!

Bees, too, exhibit the most extraordinary instances of perseverance under difficulties, merrily singing with their burden at the end of a long day’s work as they return to the hive.

Look at the curiously-worked nest of the paper-making wasp—what a lesson of perseverance it teaches; how admirably adapted to resist the rain, fold over fold enveloping the outside of the house, while *inside* the numerous cells, all made to pattern and exact in size, and formed out of masticated wood, again remind us of the
old saying, "Ask now the beasts, and they shall teach thee."

Did the paper-making wasp suggest the invention of papier-maché, I wonder?

Sir John Lubbock has shown us how even a wasp can be tamed. He has given an interesting account of his experience with his ants in the matter of perseverance, and says: "In industry ants are not surpassed even by bees and wasps. They work all day, and in warm weather, if need be, even at night too. I once watched an ant from six in the morning, and she worked without intermission till a quarter to ten at night. I had put her to a saucer containing larvæ, and in this time she carried off no less than a hundred and eighty-seven to the nest. I once had another ant, which I employed in my experiments, under observation several days. When I came up to London in the morning and went to bed at night, I used to put her into a small bottle, but the moment she was let out she began to work again. On one occasion I was away from home for a week. On my return I let her out of the bottle, placing her on a little heap of larvæ about three feet from the nest. Under these circumstances I certainly did not expect her to return. However, though she had thus been six days in confinement, the brave little creature immediately picked up a larva, carried it off to the nest, and after half an hour's rest returned for another."

That is, as if one who had endured six days' solitary confinement, without food, immediately returned to the work assigned him without sulking or grumbling.

"Go to the ant, thou sluggard; consider her ways, and be wise."

Amongst the wonders of the nineteenth century may be mentioned that one of the most important departments of our Government is superintended and controlled by a blind man. Everybody knows, or ought to know, that Mr. Fawcett, the Postmaster-General, has entirely lost his
sight, and yet in all the varied duties and difficulties and pleasures of life he takes a daily interest, fulfilling his part either in the great council of the nation or the office in a most admirable manner.

Indomitable energy and inflexibility of will alone could bring such a man into such a position.

Have you ever read the equally interesting story of the French naturalist, Franz Huber? He was born at Geneva in 1750, and became blind at an early age through excess of study.

Having a love for Nature, he set about studying the habits of bees after losing his sight, making his servant, Franz Burnens, his assistant, just as the Postmaster has his deputy.

Huber, like Fawcett, was a model of perseverance; and our little ant story would be incomplete without this brief reference both to him and his work. Here is his experience respecting the perseverance of the little people:

He had been watching the wood ant, and to convey an idea of how the straw or stubble roof of the nest is formed, he has written as follows:

"Let us take a view of the ant-hill at its origin, when it is simply a cavity in the earth. Some of its future inhabitants are seen wandering about in search of materials for the exterior work, with which, though rather irregularly, they cover up the entrance; whilst others are employed in mixing the earth, thrown up in hollowing the interior, with fragments of wood and leaves, which are every moment brought in by their fellow-assistants; and this gives a certain consistence to the edifice, which increases in size daily. Our little architects leave here and there cavities where they intend constructing the galleries which are to lead to the exterior; and as they remove in the morning the barriers placed at the entrance of their nest the preceding evening, the passages are kept open during the time of its construction. I soon observed
Wood Ant's Nest; nurses with their infant charge, and workers with the food.
the roof to become convex; but we should be greatly deceived did we consider it solid. This roof is destined
to include many apartments or stories.

"Having observed the motions of these little builders" (a blind man always writes in this way) "through a pane
of glass adjusted against one of their habitations, I am
thence enabled to speak with some degree of certainty
upon the manner in which they are constructed. I
ascertained that it is by excavating, or mining the under
portion of their edifice, that they form their spacious
halls, low indeed, and of heavy construction, yet suffi-
ciently convenient for the use to which they are appro-
priated—that of receiving, at certain hours of the day, the
larvae and pupae.

These halls have a free communication by galleries
made in the same manner. If the materials of which the
ant-hill is composed were only interlaced, they would fall
into a confused heap every time the ants attempted to
bring them into regular order. This, however, is obviated
by their tempering the earth with rain-water, which after-
wards, hardened in the sun, so completely and effectually
binds together the several substances, as to permit the
removal of certain fragments from the ant-hill, without
any injury to the rest; it, moreover, strongly opposes the
introduction of the rain. I never found, even after long
and violent rains, the interior of the nest wetted to more
than a quarter of an inch from the surface, provided it
had not been previously out of repair or deserted by its
inhabitants."

Here are two illustrations of perseverance in one, first
that of the ants, second of the writer, who, notwithstanding
loss of sight, could pursue his study under such
adverse circumstances. It is this determinedness of cha-
acter that makes the difference between a wise man and
a fool. Should any of our readers feel inclined to follow up
this subject, in which, probably, their success and happi-
ness in this world and the next is involved, let him or her read John Foster’s admirable essay on “Decision of Character,” and remember the promise, “If any of you lack wisdom, let him ask of God, who giveth to all liberally and upbraideth not.”

But our story has almost reached its end; all stories do: our own will some day, and we shall have read these pages in vain if we do not find one lesson in it among many others, that the little people open to us one of the secrets of wisdom, as suggesting the necessity of preparation for the future.

As there are varieties of government amongst men, so there are amongst ants. Amongst the thirty species in this country, scarcely two are identical in habits. In warmer countries more than seven hundred kinds are
known. Sir John Lubbock, who has kindly supplied us with this fact, says he has kept in captivity nearly half of our British ants, having in his room more than thirty nests of different species.

Amongst the varieties may briefly be mentioned the same as those which exist amongst bees; although perhaps the difference between the two is in favour of the bee. There are carpenter bees, and carpenter ants,
that of the carpenter ant's; so is the mason's. The former consists of three or four apartments cut in the soft part of some tree vertically, one room above another, with a front entrance and back door to each; the ceiling of the one forms the flooring to the compartment over it, and the waste sawdust from the basement ceiling, when kneaded into a hard substance, resembles pasteboard, and forms a solid foundation for the first story. The carpenter ant chooses another model for its habitation, and, unlike the carpenter bee, which prefers living alone, selects a spot where the whole family can dwell together in company.

In like manner, while the mason bee constructs its solitary house in shape like an oil flask, and built in a compact manner of grains of sand and earth so hard as to resist a hard blow, and suspends it outside a brick wall, the mason ant constructs its dwelling in subterranean chambers, with strongly-made tunnels and galleries leading to safe retreats in case of an attack from without.

There is not a species, nor a colony, nor a family of the little people, even amongst the slave-dealers, whether red, black, yellow, or white ants, but deserves a volume to itself. It is probably about 3,500 years since Job's friend said, "Ask now the beasts, and they shall teach thee," and nearly 3,000 since Solomon's friend said the ants were "a people not strong, but exceeding wise," and it is about 1,800 years since Pliny, the Roman naturalist, who was buried in the ruins of Pompeii A.D. 79, said of them—

"In these beings so minute, and as it were
Such nonentities, what wisdom is displayed,
What power, what unfathomable perfection!"

**NOTE.**

This chapter is all about Perseverance. Since it was written I have received from my friend in Oxfordshire, to whom I am greatly indebted for many interesting facts in natural history, one of the most remarkable instances of perseverance, which he himself witnessed with
his bees. Observing a strange commotion last summer in one of his hives, he found a portion of the comb had fallen from the partition to which it was attached: the house was, in fact, falling down. Some of the bees were busily engaged tying it up with strips of wax from the top, whilst others were busily employed shoring up the basement. Does not this suggest to us something of the possibilities which may belong to a spiritual body?

Would the bee in either of its former stages of life have exhibited such reasoning power? Shall there be such an advance in the final state of an insect, and not a corresponding advance in the final state of the human soul?
"God has given thee, thou sayest, an abiding-place in the midst of pestilential swamps. If thou hast courage to banish by persevering toil the putrid waters, the swamps will change into fertile and beautiful fields, the deadly fever will depart, and thou wilt rejoice as a strong man in thy health. But, moreover, the curtain of vapours which was ever around thee will be rent asunder, and night after night thy eye will be gladdened and taught by the glory of the stars."—Carlyle.

Of the seven hundred kinds of tropical and foreign ants we may only give a passing remark.

This little work would be incomplete without some reference to a few of the species, the chief of which are the white ants. They have been associated with the little people in the history of the insect from the near resemblance they bear in their habits to that of the true ants. As the spider is not an insect, but is always classed with insects, so is the Termite, or white ant, though not a true ant, reckoned with it.

The Termites, then, or white ants, are found in large quantities both in the East and West Indies, in Africa and South America. But for their work as acting scavengers
White Ant (Termes) magnified: a, Male Worker; b, Soldier; c, same more magnified (the lines represent the natural size); d, distended female surrounded with body-guard of workers—natural size, but only a portion of the body shown in the cut.
in the African desert, Dr. Livingstone says there would be constant pestilence, which the winds would waft in all directions.

One nest of the white ants has been said to yield half a bushel of eggs, which both in shape and colour very much resemble grains of rice; they are really not eggs, but the larvæ of the insect—life "number one." These larvæ are much sought after by the Hottentots in times of scarcity: they wash them and boil them in water, and they are considered a delicacy, just as the Romans considered stewed caterpillars.

The white ants have their queen; the workers are the most wonderful engineers, architects, and builders in the world, for so high do they erect their buildings that wild animals stand upon their summit, and in the desert they resemble high hills; but their interior is very remarkable as displaying an amount of instinct rarely surpassed by intelligence.

The royal chamber is always placed in the centre of the building; then there are nurseries for the larvæ and pupæ, the babies in their first and second stages of life; then there are magazines or storehouses where the food is carefully preserved by the workers, the nurseries and storehouses being entirely different in their structure, as they are in their uses.

The number of eggs laid in one season by the queen of the white ants is almost incredible: she has been known to deposit sixty in a minute, or 80,000 and upwards in twenty-four hours, the number of nurseries being accommodated by the industrious workers to the number of eggs laid by their queen. These persevering labourers are continually occupied in pulling down, repairing, or rebuilding the apartments, performing these operations with wonderful sagacity, regularity, and foresight.

Then there are the Chasseur ants of the West Indies, who much resemble the insects mentioned by the prophet
Nest of White Ant in Central Africa: 1, Male (winged); 2, 4, 5, Neuters (workers); 3, the Queen, or distended female. The nest (in section) showing royal apartments, nurseries, and storehouses, with subterranean connection.
Joel, marching in military order, sending out scouts to ascertain the wants of a village, returning with their experience, when a combined attack is made by the little people upon the cockroaches in the house, and finally an onslaught in the cellars upon the larger vermin, rats and mice, never leaving the house till the clearance is complete. Of such one author writes: "These would march in troops, as if they were busy in seeking somewhat; they were always in haste, and always followed their leaders, let them go where they would. They had no beaten path to go in, but rambled about like hunters. Sometimes a band of these ants would happen to march through our huts, over our beds, or into our pavilions—nay, very often into our chests, and there ransack every part; and wherever the foremost went, the rest all came after. We never disturbed them, but gave them free liberty to search where they pleased, and they would all march off before night. They were so very numerous that they would sometimes occupy two or three hours in passing the house, though they went very fast."

Wherever there are big people to notice there are the little people to be seen, all busily and differently occupied, but all alike teaching the splendid lessons of perseverance, sagacity, courage, love, harmony, and amusement.

We think we have sufficiently shown the wisdom of the Book where we read, "Ask now the beasts, and they shall teach thee; and the fowls of the air, and they shall tell thee; or speak to the earth, and it shall teach thee; and the fishes of the sea shall declare unto thee." In each, in all of these, the patriarch Job said, could be found an answer to his friend's desire that God would show to him the secrets of wisdom; and hence we learn that a knowledge of the works of God should convince us of that wisdom which is not only from above, but which is above all earthly wisdom, and which is promised to be liberally given to
“any of you” that may ask it, and you will find with the poet Tennyson that

“Each moss,
Each shell, each crawling insect, holds a rank
Important in the plan of Him who framed
This scale of beings; holds a rank which, lost,
Would break the chain, and leave behind a gap
Which Nature’s self would rue.”

And remember that “the exception proves the rule;” the “blunders” of the atheist only show the truth of Pascal’s wise saying, that “Nature has perfection in order to show that she is the image of God, and defects in order to show that she is only His image.”

Among the various kinds of usefulness attributed to the white ant may be mentioned that of affording food to the inhabitants of the country where it is abundant. Dr. Livingstone once gave a chief who came to visit him a piece of bread with preserved apricots, for his lunch. As he seemed to relish it, the Doctor asked him if his country produced any food equal to it.

“Ah,” said the chief, “did you ever taste white ant?”

On his replying that he had not, he said, “Well, if you had, you never could have desired to eat anything better.”

Pliny, the great Roman naturalist, tells us that his fellow countrymen considered a preparation of caterpillars, when served up in a paste, a great delicacy.

In Sweden ants are distilled along with rye, to give a flavour to the inferior kinds of brandy; and in Ceylon, “an ungrateful return for their honey and wax,” says Kirby, bees are eaten as food; and he adds, “Ants—I speak from experience—have no unpleasant flavour; they are very agreeably acid, and the taste of the trunk and abdomen is different.”

Even the polished Greeks esteemed the worm (larva) of the common cricket “most delicious;” and we know that the locust, to which family the cricket belongs, was
permitted to be eaten as food. "Of these may ye eat; the locust after his kind, and the bald locust after his kind, and the beetle after his kind, and the grasshopper after his kind" (Lev. xi. 22).

Nests of White Ant in Central Africa.

Indeed, in many countries insects, ants particularly, are served up in various ways, parched, or made into a cake
with flour. Who would think of scrunching up a big spider as he would a nut? and yet some have enjoyed such a delicacy, declaring the one very much resembled the other. Did this occasion the saying, "There is no accounting for taste"?

I remember some few years ago observing a choice dish on the dinner-table in Austria which I believed to contain a conserve of preserved flies; and at Constantinople, remarking upon the corpulence of the ladies who were privileged to promenade on the shores of the Bosphorus on the Sabbath-day, which in that city is on the Friday, I was informed that corpulence among ladies was considered a mark of female beauty, and it was produced by their indulgence in confectionary compounded of black-beetles.

After this I think little apology is necessary to believe in the report that the white ants of Africa, parched, or made into a cake with flour, may be preferred to bread and apricots for lunch.

Before we bring our story of the little people to a close, we may refer to the fact that those who read the Bible only to find fault with it have seen a difficulty in the words which we have followed, saying the passage is not true, because it is a well-ascertained fact that ants do not lay up a store of food gathered in summer for winter use, when generally they are torpid. But it never once says in the book that they do. It simply says, "They prepare their meat in the summer," and "provideth her meat in the summer, and gathereth her food in the harvest."

The Hebrew word in the phrase "provideth her meat" means the same as prepare, and signifies "to dispose in order," then "to collect, to gather together." We have the same word in Deuteronomy xxviii. 39, and Proverbs x. 5, where the gathering in the vintage and the summer fruits is referred to. "Thou shalt plant vineyards and dress them, but shalt neither drink of the wine, nor gather the
grapes.” Then Solomon’s own words, “He that gathereth in summer is a wise son.”

But the objector’s difficulty, just like so many other objectors’ difficulties, is entirely gratuitous. Solomon in neither case affirms that the ant laid up in her storehouse stores of grain against winter, but that, with considerable prudence and foresight, she takes seasonable advantage of her opportunities to collect a supply of provision against a time when such opportunities may not occur. This is the lesson the king would teach, and he sends us to one of the humblest of creatures for his illustration.

Some very interesting additional evidence, however, has recently been published, showing that amongst the great variety of ants of which we have already learned something, there are, amongst the agricultural ants of Texas, some species who actually do store up a quantity of food for future use, and indeed, in Dr. Thompson’s very valuable work, “The Land and the Book,” the disposition of ants in the land over which Solomon ruled to store up grains of corn is clearly shown. Their habits are exactly the same in our day that they were when he said they provided their food in the summer. Solomon clearly referred to the species generally, but still might have observed the harvesting ant of Palestine, and if so he referred to it.

But a work to which we may just refer* abounds with evidence that in America there are ants who, in a remarkable manner, make it the great business of their lives to provide their food in the summer, and in which work all the patient and industrious habits of our European species appear to be completely eclipsed; for, in nursing, cleansing, feeding, and sleeping, in sympathizing, marrying, protecting, and helping; in playing and amusing, in

* "The Natural History of the Agricultural Ant of Texas," by H. C. McCook, of the Presbyterian Church, Philadelphia. Published by J. P. Lippincot, Philadelphia, 1880. An invaluable work on the life of the insect.
working, road-making, tunnelling, and excavating, building and constructing and mining, fetching and carrying, weeding and gleaning, foraging, harvesting, preserving and storing, plundering, enslaving, scavengering, fighting, stinging, destroying, colonizing, migrating, living and burying, the ants of Texas generally, and the agricultural ants particularly, as completely out-Herod every other species as every other species out-Herod almost every other animal, big or little.

Some slight reference has already been made in our story to this species of American ants, a fuller description of which will conclude the little people's story.

These remarkable insects, then, are here said to form one of the best representatives of the emmet family in all its most striking instincts. Although the book consists of about two hundred pages, illustrated with upwards of one hundred and twenty cuts, the history in it, confined almost exclusively to one species, is like a romance, and the author, who has devoted much of his time to the study of the insect, has united philosophy to divinity in a manner peculiarly pleasing and suggestive.

His observations are almost exclusively confined to the highlands of the great Colorado river of Texas, where ant formicaries are scattered about in vast numbers. In the streets and by the highway, in the trodden side-walks, in gardens and yards, even in the open courtyards of the hotels these humble little insects teach their lessons of every-day life; and though the hotel yard was paved solidly with stone, and cement joined the slabs together, all the day long the persevering "people" were observed at their curious work.

Following precisely the plan which colonists adopt in clearing the ground before they begin to build their habitations, the stubble and grass, their forest and jungle, are first uprooted and removed; then when the ground is cleared, tunnels leading to the subterranean storehouses
and galleries, diverging in every direction towards the outside road are constructed, which roads are carefully and constantly kept in repair, and used as avenues for communicating with the harvesting grounds.

Grass seed seems to be a favourite kind of food with the Texas ants. Stalks bearing seed are allowed to remain, and the insects patiently wait till the ripened seed falls to the earth, when one after another, "an exceeding large army," remove the grains into the storehouse below.

Here is a comparison with Mark Twain's experience in the Black Forest by his fellow-countryman, who, in describing from his personal observation, notices the doings of one of the ants of Texas, where the ground was cleared and the roads regularly formed, starting with a multitude of little followers in search of food, in the shape of grass or other seeds, to stow away for future use in the warehouses underground. The writer says: "At last a satisfactory seed is found. It is simply lifted from the ground, or, as it often happens, has to be pulled across the soil, into which it has been slightly pressed by the rain or by passing feet. Now follows a movement which I thought to be a testing of the seed, and which indeed may be partially that, but finally I concluded that it was the adjusting of the burden for safe and convenient carriage. The ant pulls at the seed-husk with its mandibles, turning and pinching or feeling it on all sides. If this does not satisfy, and commonly it does not, the body is raised by stiffening out the legs, the abdomen is curved underneath, and the apex applied to the seed. I suppose this to be simply a mechanical action for the better adjusting the load. Now the worker starts homeward. It has not lost itself in the mazes of the grass forest, but turns directly to the road with an unerring judgment. There are many obstacles to overcome. Pebbles, pellets of earth, bits of wood, obtruding rootlets, or bent-down spears of grass block up or hinder the way. These were scarcely noticed
when the ant was empty-handed, but they are troublesome barriers now that she is burdened with a seed quite as thick, twice as wide, and half as long as herself.

"It is most interesting to see the skill, strength, and rapidity with which the little harvester swings the treasure over or around or pushes it beneath these obstacles. Now the seed has caught against the herbage as the porter dodges under a too-narrow opening. Then the ant backs out and tries another passage. Now the sharp points of the husk are entangled in the grass. The insect then pulls or jerks the burden till it is loosened, and then it hurries homeward. The road is reached at length, and then progress is comparatively easy. Holding the grain in her mandibles, well above the surface, she breaks into what I may describe, with sufficient accuracy, as a 'trot,' and with little further interruption reaches the disc (that is, the entrance to the subterranean galleries), and disappears within the gate."

These Texas ants exhibit extraordinary powers of strength, endurance, and perseverance in carrying building material. They have a strange fancy for adopting the Egyptian style of constructing pyramids for dwelling houses, some of which rise to the height of nearly three feet, and nearly six feet in diameter at the base. These pyramid-like habitations are built of little fragments of stone, some of which they carry to the very top, any one of which would weigh more than twenty-five times the weight of the insect, besides being nine times its bulk. The muscular power of the little people generally is almost incredible, being equal to a man, whose weight may be 160 lbs., carrying twenty-five times as much, or equal to 4000 lbs., say from the bottom of an English coal-mine up to the top of the Pyramid of Cheops, that is about 450 feet, or nearly fifty feet higher than our cathedral church of St. Paul's.

The little people of Texas exhibit all the method which
characterizes the most advanced agriculturist or mechanic, and in nothing are they more remarkable than in their division of labour; for, while some clear the ground, others are employed cutting at the roots of obstructing plants which come in the way of their progress; some being observed to climb the sprays of grass, bending them to the ground ready for the workers below: each branch of the busy family exhibiting all the characteristics of the most highly civilized community. Some work as our miners used to do, sometimes on their backs, sometimes on tip-toe and erect; and when the rains long continue, they do all in their power to dam up the roads and thus prevent their stores of food getting damaged. But when, notwithstanding all their efforts, the seed does get injured by the wet, then the industrious little creatures avail themselves of the first sunny day to bring out the moistened seed to get dried; and after a day or two's exposure to the air, it is again restored to the nests, except that which may have begun to sprout, which being useless and unfit for storing is invariably left out.

Of this sprouting seed the author reckoned an entire quart could be gathered up from one place.

Their care and discrimination is particularly observable in their search for food, one very remarkable instance of which is most agreeably related. Some ants one day were found bringing home some oats; as none grew in the neighbourhood the wonder was where the oats came from. Following one of the ants after one grain had been safely brought home, after pacing about 450 feet a parcel of trampled straw was reached; here some travellers had recently rested, who had fed their horses with oats, the scattered grains of which the ants had fortunately discovered.

The ant, who was patiently watched, plunged amid the straw, and soon finding a loosened grain, immediately seized it, turning it from side to side with what the author
describes as "manifest satisfaction," walking around it, lifting it a number of times from the ground as if to try its weight, and to balance it for more easy removal; and, at length, having satisfactorily adjusted the load, the ant set out on her return journey, accomplishing the entire distance without once stopping to rest, or even to change the position of the burden. On the way home from the oat straw many other labourers were met, en route for the traveller's camp, all of whom had in some way, the author says, received intelligence of the prize and its whereabouts.

Our chapter on antennal communication will, we think, leave no doubt on our reader's mind that the "some way" was by means of these very remarkable organs articulating directly in the insect's brain.

On the following day to that in which the above observation was made, the nest was revisited; all the chaff was thrown outside, and at least a pint of oats were found to have been brought home by the persevering creatures; and, as no more workers were observed to pass to or from the straw, it was inferred that the fortunate harvest had been finally gathered in.

What would the fellow author and countryman, Mark Twain, say to this, we wonder?

This harvesting habit does not so much apply to English ants, remarkable as we have seen them to be in their provident habits, but it does to other tribes, and to several species of ants in Eastern lands. Very interesting is the author's chapter on the ancient belief in the harvesting habits of some ants. Horace (b.c. 30) tells us that "the little ant, of great industry, bears away in her mandibles whatever she can, and adds it to the store which she is accumulating, not unmindful nor improvident of the future. But then, as soon as Aquarius saddens the ended year, she ceases to creep forth from her nest, and wisely uses those stores which she has gathered beforehand."

Virgil, too, the friend of Horace (b.c. 40), observing the
order of an army of ants in search of food, likens them to an invading army, and we have the following interesting translation from this close observer of natural phenomena:

"Thus in battaliæ march embodied ants, 
Fearful of winter and of future wants, 
T' invade the corn, and to their cells convey 
The plundered forage of their yellow prey; 
The sable troops along the narrow tracks, 
Scarcé bear the weighty burden on their backs; 
Some set their shoulders to the ponderous grain, 
Some guard the spoil, some lash the lagging train; *
All ply their several tasks, and equal toil sustain."

This ancient belief in the harvesting nature of some species of ants is found in the Hebrew name for ant, Nemalah, from the verb Namal, to cut off, an instance of which may be found in the book of Job (chap. xxiv. 6), in

* As an interesting comparison of the wisdom of the ant against that of an elephant, I copy the following anecdote from the letter of a correspondent to the Standard newspaper of September 3, 1879, on the subject of instinct: "I have been told," he writes, "that three elephants were engaged in taking a heavy gun up a steep acclivity; two were harnessed to the carriage, the third pushed, as I believe is usual. The wheels got into a deep rut, and presently the third elephant trotted off into the jungle, and it was thought he had run away; but he presently returned with a huge branch of a tree, and at once proceeded to belabour the harnessed elephants to make them mend their pace. I have no reason to doubt the accuracy of this from the source I received it, and if true, is it not characteristic of reason?"

But what must we say of the reason of our "Jumbo:" he who excited so much sympathy in the spring of this memorable year, 1882! The story of his history must be fresh in the memory of all our readers. His fondness for his old home in the "Zoo;" his affection for his little wife "Alice;" his obedience to his keepers; his humble appeal, on his knees, to be let alone; and finally his philosophy, when he perceived the power of mind over matter, to adopt the old maxim, that "what can't be cured must be endured." What an illustration of the words of Job: "Ask now the beasts, and they shall teach thee." If only the intelligence of our antediluvian forefather had equalled the instinct of this antediluvian brute, how
our English translation rendered, "They reap every one his corn in the fields;" translated by Dr. Mason Good, "In the field they cut down his corn," an allusion to the propensity of Arabian robbers who live by depredations on others; a passage thus rendered by Jerome (A.D. 380). "They break in upon the fields of others and rob them of their grain, instead of cultivating the earth themselves."

In the original Hebrew word, then, Nemalah, and in the Arabic word still used for ant, Nimul, there is reference to one of the most remarkable traits of intelligence exhibited by ants, as well of other lands as of our own, namely, that act of cutting from off the seed the head or germ, to keep it from growing or sprouting.

Sixteen hundred years ago Ælian gave a graphic account of the gleaning operation of ants around a threshing-floor. Writing in the second century we read, "When the crops are gathered the ants assemble to the threshing, bustling up and down upon the threshing-floors singly, in pairs, in triplets; leaving their own home and accustomed roof, they seize the wheat and barley and return with them upon a common path. Some choose out the grains, others fall-to bearing burdens, and with high honour and courtesy they yield the path to each other, particularly the unburdened to those who are carrying loads. When they have returned to their caves, they pile up the grain in separate heaps and gnaw through each grain in the middle. The gnawing they convert into food. The rest of the seed, because thus gnawed, is sterile. In this manner these most noble and much of suffering and sorrow would the human race have been spared! No; Jumbo refused to listen to the voice of the charmer, his wife being used as the instrument to decoy him into his trap, upon which the sensible brute would not so much as set his foot. And when at last he was, like Sampson, bound, what commiseration was felt by the 16,000 visitors who visited him in one day, as, lifting up his chains and showing them to the crowd, his look of tenderness reminded one of the exclamation of the patriarch: "Pity me, oh my friends!"
watchful housekeepers contrive within their caves lest, being wet by the inflowing rains, the perfect seed should sprout and shoot above the ground; a result which would leave them to scarcity of food and hunger, and the loss of all their toil and confidence.” (McCook.)

Returning to the American ants, as great injury was done in some districts to the grain by the encroachments of the insects, an attempt was made to destroy them by putting in their way bread mixed with arsenic. This very soon destroyed numbers, but the survivors, as soon as they touched the poisoned food abandoned it, having somehow detected the arsenic. The same poison was then mixed with meal and put into their nests, and what happened then? Why the wise creatures separated the sound from the poisoned meal, removing the one and avoiding the other, though an ordinary observer could not tell the good from the bad. Subsequently the arsenic was mixed with molasses and given to the ants; but after a few were killed by it the others, taught by sad experience, would not touch the mixture, and avoided it altogether.

These agricultural ants are said to be, like all the branches of the extensive family, amongst the cleanest of creatures in their personal habits. The whole body of each insect is frequently and thoroughly cleansed, the tongue combining all the qualities of comb, and brush, and towel; and it was observed that this act of cleansing was invariably performed after eating and sleeping, and in this constant act of personal cleansing it was a common thing to see one ant assisting another.

The author of “The Agricultural Ants of Texas” gives an amusing description of how this act is performed, and illustrates the story with diagrams; and his curious account reminds the English reader of the periodical “tub night” of some parochial establishment or nursery, that part of the foot which somewhat resembles the spider’s “hand,” and which is literally, as well as metaphorically,
a _comb_, being used for the same purpose as we use a comb.

The ants of Texas have the most singular aversion to the sight of a dead ant, and the bodies of their defunct relatives are quickly buried out of sight; sometimes the dead carcase is exhumed, as if the rite of burial had been carelessly or improperly performed, and the lifeless insect is in such case removed to another spot.

It is very well known that in all the States of America, until general freedom was recently established, the burial ground in which a white man was entombed was much too holy for a slave to repose alongside. Has man learned this unbrotherly custom from the Texas ants, or have the Texas ants learned it from man? Solomon called the ants "a people;" in nothing do they more resemble a "people" than in this exclusive act in the burial of the dead, for the red slave-making ants never deposit their own dead brethren's carcases, we are assured, by the dead bodies of their black slaves, but always lay them by themselves, not in groups, but separately, and are careful to take them a considerable distance from the nest.

Death levels all distinctions, and as it closes and concludes all earthly things, so may the wise saying of an old writer on equality in death appropriately close our story. "Death," he says, "comes equally to us all, and makes us all equal when it comes. The ashes of an oak in a chimney are no epitaph of that, to tell one how high or how large it was; it tells one not what flocks it sheltered while it stood, nor what men it hârt when it fell. The dust of great persons' graves is speechless, too; it says nothing, it distinguishes nothing. As soon the dust of a wretch whom thou wouldest not, or of a prince whom thou couldst not look upon, will trouble thine eyes if the wind blow it thither; and when a whirlwind hath blown the dust of the churchyard into the church, and the man sweeps out the dust of the church into the churchyard, who will undertake to sift those dusts again,
and to pronounce, 'This is the patrician, this is the noble flower, this the yeoman, and this the plebeian?'
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