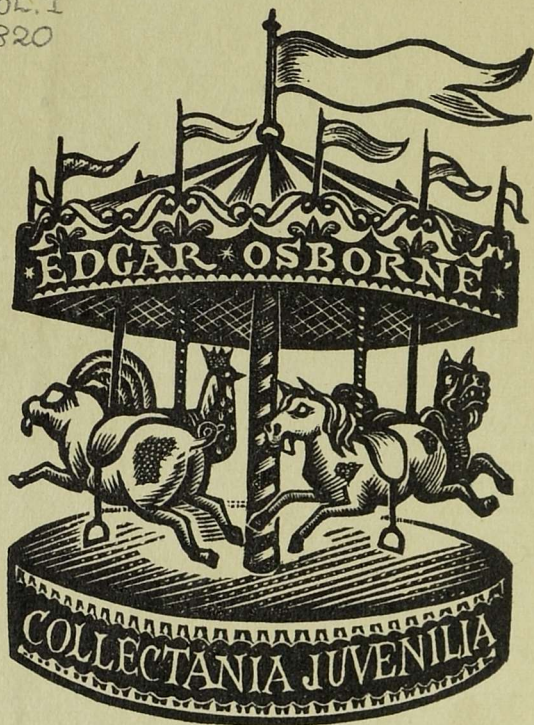




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E. M. A. Tilleard  
with her  
Aunt Almira's  
kind Love

Sept. 5<sup>th</sup> 1828-



Maria. *O, mamma, is not this a nest of Ants?  
I never saw so many together before: will  
they hurt me, if I take a nearer view of them?*  
pa. 1.

*Published by Darton & Co. Gracechurch Street, & T. Baker, Finsbury Place.*

*W. Freeman*  
CONVERSATIONS

ON

NATURAL HISTORY.

—♦—  
“He who is so happy as to have acquired a relish for knowledge, has always at hand an innocent and irreproachable amusement for his leisure hours.”---*Blair*.

“Every faculty, every object of every faculty, demonstrates a Deity.”---*Balguy*.

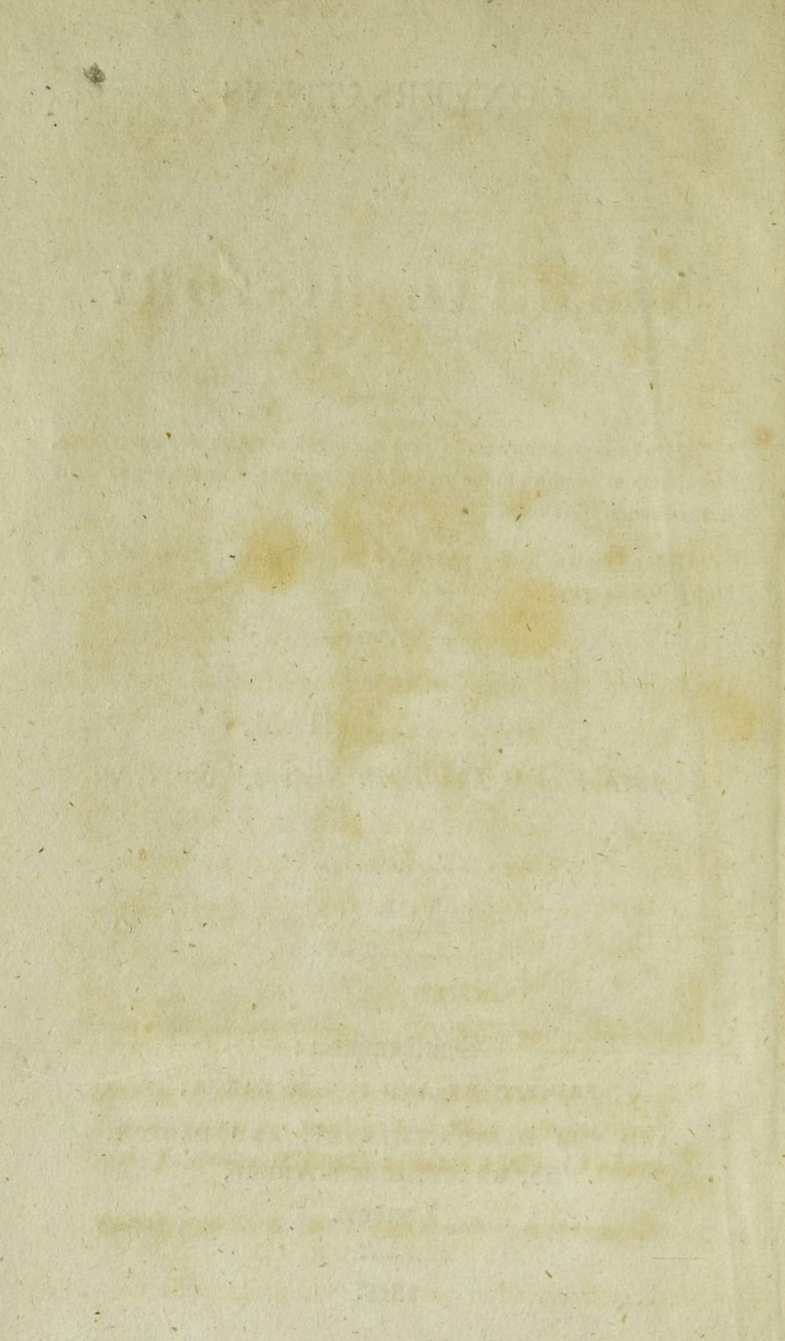
—♦—  
By E. SANDHAM,  
*Author of “The Twin Sisters,” &c. &c.*

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CONVERSATIONS  
ON  
NATURAL HISTORY.

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CONVERSATION I.

*Of Ants ; the Formica-leo, or Lion Pismire ;  
and the Dragon Fly.*

**MARIA.** O, mamma, is not this a nest of ants ? I never saw so many together before : will they hurt me, if I take a nearer view of them ?

**Mrs. Smith.** Not unless you hurt them : and I would by all means advise you to consider them attentively. You are not the most industrious girl, I know ; and these little insects may teach you a lesson that you much need : for, in the Holy Scriptures, they are

mentioned by Solomon, as a pattern for the sluggard:\* he has also placed them among the four things which, though they are little upon the earth, are exceedingly wise.†

*Maria.* Am I a sluggard, mamma? I am sure I rise early enough.

*Mrs. Smith.* But what do you do when you are up, Maria? If conscience does its office, you have no room to justify yourself in this particular. But when we commenced our walk this morning, I did not mean that reproof should have any share in our conversation; we will reserve that till another opportunity: every thing around us looks so bright and shining, that I should not like to see my child's countenance the only thing clouded.

*Maria.* Thank you, dear mamma: but tell me something about the ants. The fineness of the day, and this warm sunshine, have, I dare say, brought them out. What can they all be so busy about? surely, they are only at play!

*Mrs. Smith.* Very far from that, I will

\* Proverbs vi. 6.

† Proverbs xxx. 25.

venture to say. None of this society are allowed to go out, without some purpose in view; and all are obliged to work for the good of the community. These little insects form a republic very similar to that of the bees, and are governed by as strict a law; except, as an ingenious author observes, that “bees employ their industry for the benefit of mankind, and ants will rather rob than serve them.” You are not unacquainted with bees; your good old nurse has often given you an account of those which she keeps in her garden.

*Maria.* Yes, mamma; but that written paper, which you read to me a few weeks ago, explained their nature and their mode of living much better than my nurse’s stories: at least, I did not understand her so well; though she has told me a great deal about them.

*Mrs. Smith.* You mean that her account was not so methodical as that which I read to you: thus you see it is not only necessary to know things well, but also to be able to describe them perfectly, and to adjust our



ideas properly, so as to render them intelligible to others. Ants live together in large societies, and build their cities underground; which consist of various long and straight streets. It is with great labour and pains that they draw small splinters of wood over the tops of these streets, so as to prevent the earth from falling in and burying them: and not only this precaution is taken, but in these they lay another rank of splinters, sloping them each way, like the roof of a house, that the water, should any penetrate so low as their building, may run off: and these are again covered with a heap of dry rubbish, hay, and straw. All these streets are full of little cells, and they terminate in a magazine: in some of these cells they deposit the provision which they lay up, and, in others, their eggs, and the worms which proceed from them.

I am rather giving you an account of the habitations of ants in warmer climates, and in the south of Europe, than as they are seen in England: for here they are not built with such regularity, neither are the ants themselves nearly so large or so numerous. In

Africa, they are of such size and strength, that they are not afraid to attack even sheep, hens, and rats ; which are often devoured by these merciless insects : and in that country they assemble in such numbers, that their train is said often to be a mile long, and a quarter of a mile broad. It is there also, where the winters are short, that they may be said to live during that time on the provision laid up in the summer ; but with us they pass the cold weather in a torpid state.

*Maria.* The ants which we have in England, then, are sadly degenerated, mamma : but, however, we need not wish them otherwise, if they have it in their power to do so much mischief where they are larger and stronger. It will satisfy me, if you will give me an account of those which are natives with us.

*Mrs. Smith.* There is nothing which our ants will not eat, if they can get to it, and are not prevented by insects of a larger growth ; and what is too large to be carried home, the whole community are called together to share upon the spot. For this purpose, some are



sent out as scouts ; and, having found a rich pear or plum, they do not pretend to touch it, till they have acquainted the whole band : then all march in regular order ; and, having eaten as much as they can, they return again, and again, till it is all gone. They do not bring home any thing but what will keep in their store-room ; such as the kernels of fruit, and the carcasses of flies and gnats. In the time of harvest, they heap together a store of corn and other grain ; and, lest the moisture and warmth of their cells should make it shoot up, we are told, for a certainty, that they gnaw off the buds which grow at the point of the root.

*Maria.* But how should they know that corn is of that nature, I wonder ! I can hardly believe this instance of their sagacity.

*Mrs. Smith.* It is surprising, that instinct should have taught them this : but I am not the less inclined to credit it ; because, the more I have seen of nature, the more I have been astonished at the instances which are daily to be observed. Man, though possessed of reason, will often eat of things which are



hurtful to him, and sometimes without knowing the effect which they will produce: but no animal, however pressed with hunger, will eat of that which is injurious.

*Maria.* It must be very hard work for the ant to carry a grain of corn, or barley, mamma, which is so much larger than itself.

*Mrs. Smith.* It is, indeed: but industry will perform the hardest things. They assist each other in pushing it before them; and sometimes seven or eight are seen bending under the same burden.

*Maria.* I remember hearing my nurse's husband say, that the ants do a great deal of mischief to the fruit trees, and destroy their leaves.

*Mrs. Smith.* But I believe he is mistaken: it is a number of little green insects that occasion that waste, and make the leaves look as if they were burned. These are surrounded by a sort of gum, which is very attractive to the ants; and they mount the trees in order to regale themselves with it: but the vermin themselves, or the leaves on which they are, they do not care for. Ants

are like the ancient Lacedemonians, of whom you were reading an account last evening : the care of their young devolves on the whole state ; and it is not every mother which tends her own offspring, but this important work devolves equally upon all. When they leave the egg, they are not larger than a small grain of sand ; and, in this state, after they have for some time received their food, which is brought to them in just proportions, they spin a thread, in which they wrap themselves up, and thus each becomes a chrysalis or aurelia, (for both these words mean the same thing ; ) and, while such, though they do not eat, the attendance which is paid to them by the older ones is very fatiguing ; as they then have to remove them from the common magazine, to the apartments that they wish to people ; and, when the weather is mild and warm, they bring them up so near the surface of the earth, that they may receive the benefit of the sun's rays : but, at the approach of night, or the appearance of a shower, again descend with their charge. In this manner are the aurelias taken care of by the whole



community, till they burst from their confinement, and come forth perfect ants, able to assist the others in all their necessary avocations. If any of them die, they are instantly removed ; and, when attacked by an enemy, the whole number draw up their forces, and evidently show themselves not ignorant of the art of war.

*Maria.* Have they wings, mamma ?

*Mrs. Smith.* Some authors affirm, that these are granted only to the males, and to them only when arrived at a certain age. Others say, that all ants are supplied with them, though they seldom or ever use them, except when they mean to quit their subterraneous abode.

*Maria.* What are the chief enemies of the ants, mamma ?

*Mrs. Smith* O, they have many : and in those countries where they are themselves so formidable, their destroyers are so in proportion. Birds of every kind make them their prey in our kingdom : but the most to be dreaded by them is the formica-leo, or lion pismire ; so called, because it is as a lion to



the ants. This is a very extraordinary and curious insect.

*Maria.* Do tell me about it, mamma, if you please?

*Mrs. Smith.* It is long, like the palmer worm, but something thicker; but the body grows round, towards the tail, and is formed of several rings, or scales, which slide over each other. Though it has six legs, it is incapable of marching in pursuit of its prey, as it has only the power of moving backward: its head is small and long, and, from its utmost extremity, two little horns shoot out, each furnished with eyes at the end; by which it sees the smallest object, and darts backwards from any thing likely to hurt it, with surprising rapidity.

*Maria.* How can this creature be injurious to the ants, mamma? for, as it cannot go after them, it can always be avoided.

*Mrs. Smith.* This little insect remedies this defect by its art and cunning: for the Great Creator of all things has given to every creature that instinct which supplies it with food and nourishment; though to us it may

appear helpless. In the first place : as, from its going only backward, it cannot see the path which it is taking, it seldom happens that this formidable *lion* moves from the place he is in, and he never stirs a step after his prey : but he is possessed of a secret, by which he forms an ambuscade, and makes the insect fall into it. A bed of dry sand is all he works with ; and this he chooses beneath a wall, or under some shelter, that the rain may not discompose his plan of operations. In this sand, going backward, and in repeated rings, he ploughs it up with his body ; and, throwing it over the edge, makes a circular furrow, whose diameter (or extreme width) is always equal to the depth he intends to make the place in which he is to lie concealed. He then forms a second and a third furrow, smaller and smaller, sinking himself deeper in the sand each time ; and so continues, till he has thrown it all out, which he is enabled to do to a considerable distance : and thus, with the utmost labour and patience, he gradually scoops out a place of retreat for himself ; of which I can give you no better



idea, than by saying, it is like the inside of a funnel. He draws out a perfect circle at the top; and the best geometrician cannot excel the regularity of his lines: at the bottom he forms a round hole, so contrived, that his horns exactly wind round the point in which the funnel terminates: and here this indefatigable little labourer sometimes lies, for weeks and months together, without motion, and without food; watching the approach of some incautious ant, or gnat, or fly, which may happen to play around this precipice, and where the declivity of the sand, rolling from under their feet, may occasion their fall: it is this motion of the sand, which gives notice to its wary inhabitant that some prey is near; while he, shrinking back, causes the sand still further to give way; and down falls the poor unthinking insect into the very jaws of death.

*Maria.* But suppose they have wings, mamma.

*Mrs. Smith.* Our engineer is not at a loss then, for he is aware that they may by this means escape him; he therefore throws up a



shower of sand, above the height of the flying insect, which descends like a volley of stones on the tender body of a gnat, or fly ; and it is again ingulphed within this dreadful vortex : then is the enemy sure of his prey ; he drags it into his den ; and feasts upon his victim, by sucking all the blood from its body ; and, when nothing but the bare carcass is left, he is particularly careful to remove it out of sight ; as such an appearance would deter a future visiter. By a sudden spring, he throws it over the bounds of his territories ; and then sets to work immediately, to repair the breaches which the late event may have made in his cunning work : the circle is again adjusted with the same exactness as before, the cavity is cleared, and again he lies in wait for a new prey.

*Maria.* O, mamma, I can easily suppose how long the time must appear to him, while he lies there : I dare say he often wishes to mount to the top ; or, at least, to raise his horns so high, as to see whether any object is approaching : but that would spoil all his work and labour.

*Mrs. Smith.* I can easily suppose that you, Maria, would feel all that impatience, were you in the insect's place: but these creatures are not possessed of such a nature as we are. They perform the functions for which they were created, and for which their instinct was given to them, and they have no wish beyond this; neither do they ever depart from the line or order they were first placed in. But this cannot be said of man; nothing is more changeable than he is; and, though so often turning in a wrong direction, he seldom or never turns from that, unless directed by a wisdom superior to his own, except to turn in another equally improper. But we must not leave the subject of our conversation here: this insect is not always the malignant creature which I have now described him to be. After arriving at a certain age, he is to undergo a complete change, in order to appear in another form. He is now no longer anxious to preserve the exactness of his trench, but he begins to work in the sand, striking out a variety of irregular paths: and this he does to throw himself into



a heat and perspiration. When this purpose is effected, he plunges into the sand ; while the glutinous moisture which flows from every part of his body fixes and unites each grain he touches, and thus forms the shell, or crust, with which he is encompassed, about the size of a very small ball, yet leaving room for the animal to work within : for he is not satisfied with this bare wall, but spins from his bowels a thread much finer than that of a silkworm ; and, fastening it from place to place, and crossing it one over the other, he hangs his apartment with a warm and beautiful tapestry ; and, while nothing is seen without, but a little sand, which incorporates itself with the surrounding earth, he lies concealed from every enemy ; and, from the outward plainness of his habitation, secure from the injury which any curious naturalist (such as you and I, for instance) might do him, by endeavouring to find out what is within this rugged wall ; which, unless the pismire has been kept in a box, where sand has been previously provided for him, and all his operations attended to, is easily overlooked.



*Maria.* I should like to do that, mamma: let us get one for this purpose, if we can. I would now and then place an insect upon the edge of the sand, just to see how it would manage. But what does it become after this confinement? how long does it lie thus wrapped up?

*Mrs. Smith.* About six weeks, or two months; but in its first state it is said to live nearly two years. During its confinement, it divests itself of its skin, its horns, its eyes, and its paws; these all sink to the bottom like a rag: and it then appears almost in its winged state, except that it is still enclosed within a nutrimental liquor, that gradually dries around it. It has new eyes and paws, other entrails, and wings: and, when it has acquired sufficient strength in all its limbs, it breaks through this enclosure, tears down the tapestry of its apartment, and pierces through the outward wall: for which purpose it is furnished with a couple of teeth, not unlike the grasshopper's. By repeated efforts it enlarges the opening, and at last thrusts out its whole body, of a long and slender form;

which is turned like a screw, and appears at first not more than half the size that it is when unfolded: the wings also, which are four in number, are of the most delicate texture, and presently extend themselves to a much greater length than the whole body. And thus the sanguinary pismire, that we before contemplated, becomes a large and beautiful dragon fly; which, after it has stood for some time immovable, as if to admire and rejoice in the glorious prospect of nature, which now meets its eye, flutters its wings, and enjoys a liberty before unknown.

*Maria.* O, mamma, how I envy it! what a pleasure must it be, after leading such a solitary and confined life, to have new powers, and, as it were, a new existence!

*Mrs. Smith.* I hope, my dear, you need not envy this or any other creature: for, if you are in favour with the Almighty, the change you will experience, after lying in the silent tomb, to which place death must inevitably bring us all, will be far more wonderful and transporting. What joy! to find ourselves divested of a sinful nature, free from



every evil, and from every propensity to do evil; to find ourselves in the society of a loving and beloved God and Saviour, and to join with "the spirits of just men made perfect," in singing his praises. But I am soaring above your present feelings, and the subject on which we were conversing.

It has been said by some, that the transformation of a worm to the fly which it afterwards becomes, is a lively emblem of the resurrection: but, in my opinion, it falls exceedingly short of this; as it is not probable that the insect would remember its former state; while we shall be able to trace back every part of ours; nor, till then, is it in our power to form a just conception of it. The fly, of whatever kind it is, after it has fluttered about, and enjoyed itself one summer, is no more; but we shall live for ever, and "know even as we are known."

I have but little more to relate of the dragon fly; and then our conversation must be finished, as it will be time for you to look over your French lesson, before madame comes. It is in this state that the insect lays



its eggs ; but it always takes care to deposit them in the sand, as that is the place in which nature has designed that the formica-leo should first live : not that the sand itself affords it any nourishment, but it is that alone which enables it to seize upon its prey. Here, when the young one forsakes its egg, it becomes as cunning an artificer as any of its species ; and, though it has received no preliminary instructions, arranges its plans, and forms its trench, with the same exactness as its predecessors.

There is another dragon fly, which is often seen on the surface of ponds and standing water. These always lay their eggs in this element ; and, though in form apparently like those which I have been describing, their original is very different : the latter live in the water in their first state, and afterwards on the earth as aurelias, from which they are transformed into flies.

But it is time to enter the house : and, I fancy, if you are not tired of being out of doors, you are of the long histories which I have been relating.

*Maria.* No, indeed I am not, mamma : and I hope, the next time you have an opportunity, you will tell me of some other insects. You cannot think how many things I have to ask you about.

*Mrs. Smith.* I shall be ready to tell you all I know respecting them : the study of these things was my chief amusement when I was young ; and various were the experiments and observations I then made, and now I find a double pleasure from them ; since I am in some measure enabled to satisfy your curiosity, which is so like what my own was, at your age.

*Maria.* Thank you, mamma ; you are very good. I will not forget that the first part of our conversation was upon ants ; and will endeavour to imitate their industry, and the assiduity of the lion pismire, in what I have to perform.

## CONVERSATION II.

*The Beaver, the Field Mouse, and the Mole.*

**MRS. SMITH.** Well, my dear Maria, I have some reason to praise you, for your adherence to the promise you gave me, when last we walked together: for you have been more attentive to your employment, and, in that respect, have imitated the ant and the lion pismire.

*Maria.* As you think so, mamma, will you not reward me, by relating to me what you know of some other insect, or animal?

*Mrs. Smith.* What shall it be? shall we still confine ourselves to the earth and the reptile tribe; or shall we mount up a little higher?

*Maria.* What you please, mamma: yet I think I should like to hear more of the subterraneous inhabitants of the earth.



*Mrs. Smith.* So let it be, then; but we may still rise higher in the species, though the place of their abode is the same. There are many animals which live underground; particularly the beaver, the mole, and the fieldmouse.

*Maria.* Beavers, mamma, I have often heard, are very sagacious. I should like to hear of them; especially as you have just bought me a new hat, for which, in all probability, I am indebted to them.

*Mrs. Smith.* It is but justice, then, that you should become acquainted with these animals; and I will tell you what I have read of them. Your hat was probably brought from far, or rather the materials of which it is made: for we have now no beavers in England, or even in Europe, except towards the northern parts of it: it is in North America that these animals are chiefly found.

*Maria.* So far off as that! I shall set more value on my hat than I did before, now I know from what a distance it was brought.

*Mrs. Smith.* The fore feet of this creature

serve him for hands; and he uses them as the squirrel and ape use theirs, to hold what he is eating: with these also he digs, softens, and moulds the clay, of which he forms his habitation; and, as he is an amphibious animal, his hind legs are like those of a duck, or other water-fowl: while his tail is flat and broad, and covered with scales; with which, as a rudder, he steers his course through the water, and also uses it as a conveyance for what he may want: this is always kept smooth and moist, with an oily liquid; which is contained in four bags, and which both the male and female have under their belly. Their skins are generally black, or bordering on brown; and they have two sorts of hair that grow on them; one long and coarse, the other soft and downy; and it is of this last that our hats and furs are made. The skins of the beavers are thought more valuable, after the natives of America have slept on them for some time; as then the long coarse hair is worn off, and that only remains which is fit for use.

*Maria.* But will you not tell me about



their habitation, mamma? What are the instruments these creatures use in building?

*Mrs. Smith.* They carry them all about them; their teeth, their fore feet, and their tails: the former are very sharp and strong, and they even cut down large trees with them. Their habitation is always by the water-side; and, if they are obliged to build higher up, they sink trenches or ditches five or six feet deep, by which they descend at pleasure into the river. If their building is on the side of a lake, or standing water, they omit forming a dam or causey; which, in a river, is necessary, to prevent their houses from being carried away by the violence of the stream.

*Maria.* Dear, mamma, what infinite trouble must it be to them! and how do they manage it?

*Mrs. Smith.* They choose a part of the river which is the shallowest; and, if they are so fortunate as to find a tree growing on its banks, they cut it down with their teeth, and always so contrive that it falls across the river: then, biting off all the uppermost branches, they make it lie close and even:



this is the principal foundation of their fabric, or the first floor of their habitation. This dam is made sloping on that side next the stream, and perpendicular on that within; so that, though at the bottom it is ten or twelve feet in thickness, at the top it is not more than two. If no tree happens to be in the situation I mentioned, they form this dam with strong pieces of wood; some as thick as a man's arm, and some vastly thicker, and from two to five or six feet in length, according to the height of the water: these they drive into the earth, very near each other, and interlace them with other wood more supple and slender. That the water may not penetrate through these, they have recourse to clay; which they work up into a kind of mortar, and bring it to the place where they want it, on their tails; which serve them as a hod to convey it: but, as they are aware that their materials are much more easily conveyed by water than by land, they take the opportunity of its rising; and are often seen swimming from a considerable distance, with the mortar

on their tails, and large stakes of wood between their teeth.

*Maria.* What indefatigable labour! Why, really, mamma, every thing seems more industrious than man. We may learn a lesson even from those animals.

*Mrs. Smith.* Yes, Maria, and almost from every other. But to proceed: the dike or dam being completed, they begin to form their apartments; which are round, or rather oval, and divided into three stories, one above another: the first is at the bottom of the dam, and is generally filled with water; but the other two are above the surface of the stream, that, in case the water should ascend to the second, they may remove to the third. They employ the same materials and industry in building their edifice, as in the causey: the walls are upright, and about two feet in thickness. With their teeth they cut off all the wood that projects from the building, and roughcast both the outside and inside, with the mortar which I have before told you they make of clay.

*Maria.* How I should like to see them



work ! I wish there were beavers still in England, or that some one would bring over a society of them, that they might again be found here.

*Mrs. Smith.* I think we are much better without them : the course of our streams would be greatly impeded by them ; and, indeed, now that our rivers are mostly made navigable, they could not live in them ; besides that, our woods and fruits would suffer much from their depredations, were they to come in great numbers. I fancy it is as well for us to be satisfied that we have all the benefit of them in our hats and furs, without the disadvantages of such troublesome companions : for, being often disturbed, they would get unmanageable and tumultuous ; particularly if, as I have heard, they sometimes form a company of two or three hundred ; but I believe it is not often that more than ten or twelve associate together ; but, if the number increases, they enlarge the place accordingly. Twelve feet in length, and ten in breadth, will contain eight or ten beavers. If they find any little island near their reser-



voir, they fix their dwelling there ; which is then more solid, and they are less incommoded by the water. They also drive stakes into the earth, round their habitation, with their teeth, to preserve it from the winds ; and, at the bottom of their houses, they strike out two openings into the stream ; one conducts them to the place in which they bathe, and this passage they keep very neat and clean ; the other is used to carry out whatever would soil or injure the upper apartments. There is also a third aperture, much higher up ; which is made to prevent their being shut up, when the ice has closed the lower openings. All these works are begun in June or July, and finished in about two months ; and then they begin to lay in their store of provisions.

*Maria.* Ah, I have never thought of that ! What do they eat, mamma ? There must be a magazine for their food also, and a pretty large one too : we are not now talking of little ants, or insects like them. Animals so large as beavers must want a good store.

*Mrs. Smith.* Wood is their chief provi-

sion, and what they lay up for the winter ; but in summer they regale themselves with the choicest fruits and plants, that the country they are in affords. In winter they eat the wood of the ash, the plane, and the birch tree ; which they steep in water, and lay up in proportion to their numbers. It is said, that the provision of wood for ten beavers comprehends thirty feet in a square surface, and about ten in depth. They are supplied with a double stomach, to help the digestion of such solid food, at two operations. They bite off twigs and branches from these trees, from three to six feet in length : the largest are conveyed by several beavers to the magazine ; the smaller by single ones : but each individual has his separate walk assigned him, that they may not interrupt each other in their operations. These pieces of wood are not laid up in one continued heap, but placed across each other, so that they may the better draw out the quantity that they want ; which is always taken from the bottom, as that has been longer in the water : and this, after being cut or bitten into small particles, is



conveyed to their cells, and distributed impartially to all the inhabitants. Sometimes they make an excursion into the woods, and regale their young with a collation of fresh wood : while the hunters, knowing that green wood is more acceptable to them than that they have in store, often place a quantity of it around their dwelling : this induces them to come out and partake of it : but the gratification of their appetites in this way generally proves fatal to them, as, in returning, they are taken in snares, and soon destroyed. Another way of seizing on them is in winter : when the frost is very severe, and their reservoir covered with ice, the hunters break a large hole in it, and set nets all around it ; and when the beavers hasten to this hole for the benefit of fresh air, they overturn their whole fabric ; and the poor inhabitants, thinking to save themselves by flying to the water, are taken in the nets, and thus secured.

*Maria.* What a pity ! after all their labours, that they should so soon have their comfortable home destroyed.



*Mrs. Smith.* But were they not taken, and that in great numbers also, we should want our comfortable furs, and warm bonnets and hats, which we find so necessary in the winter.

*Maria.* True, mamma: I do not know what to say to it. As these creatures have no reasoning faculties, they anticipate nothing but their want of provisions, of which instinct teaches them to lay up a sufficient stock: they therefore have no dread of the future, and doubtless enjoy life while they have it. But now, mamma, tell me of the fieldmouse, another animal that you mentioned as living under the earth.

*Mrs. Smith.* There are several of this kind that build their nests in the ground: such as the dormouse; which sleeps all the winter, except on some very warm morning, when sunny, it just rouses itself sufficiently to eat a little of the provision that it has stored up within its cell. There are also the long-tailed, and the short-tailed fieldmouse. These little creatures are remarkable for laying up provisions; and some-

times they hoard as much as a bushel will contain. Their habitations are very commodious ; consisting of several cells adjoining each other ; and to all these there is a free communication : in some of them are stored the provisions for the family, each particular sort by itself ; such as nuts in one place, ears of corn in another ; and in other cells, which are warmly lined with moss and flue, are disposed the young ones, each lying on separate beds of wool. At the furthest end of this lodge is a magazine ; out of which the whole family are furnished with that food which will not allow of being hoarded, and whatever they may want to make their little apartments more comfortable.

*Maria.* I think it was to one of these animals, that Burns, the Scotch ploughman, addressed that pretty poem, which I have read in some work for young people : I believe it was in Mrs. Charlotte Smith's " Rural Walks, or Rambles Farther."

*Mrs. Smith.* I have it at home, among



his poems, and will show it you when we return.

*Maria.* Thank you, mamma : how often must the labours of these little creatures be destroyed by the plough. In short, every thing seems no sooner to have made itself a home, than something comes to interrupt its comfort. But, perhaps, those animals which live upon the earth, rather than within it, are less liable to such disasters ; birds, at least, must be free from them. I think, mamma, the next time we talk of the productions of nature, these shall be the subject of our conversation.

*Mrs. Smith.* As you please : and we will see whether the inhabitants of the air have not their evils attendant on them, as well as the animals I have mentioned. But you must not imagine that you are acquainted with one quarter of those animals which conceal themselves below the earth : rabbits, ferrets, badgers, and polecats, are known in England ; and, I believe, the hedgehog also : but abroad are many others. The mole, being one of our own country, and



most unlike all the rest, I will endeavour to describe to you. This creature seems formed wholly to live under the earth : it has short legs, a short neck, and a short tail ; it appears to have neither eyes nor ears ; and, by some authors, they have been said to be totally blind ; but, by a microscope, every part of the eye has been discovered, though it is entirely covered with hair, as a preventive of the injury the earth might do it. It digs its way underground with great force and rapidity, throwing the earth backwards with its fore feet. Its smell is very acute : neither is it deficient in hearing, as, at the approach of danger, it hastens to its retreat.

*Maria.* But, mamma, you said it had no ears.

*Mrs. Smith.* Apparently it has not ; but it has two holes in the sides of its head, which admit the sense of hearing. It is seldom seen above the earth, to be buried in which seems its natural element : and air, which is so necessary to other animals, is rarely wanted by this. It chiefly inhabits

the soft light ground ; where it finds plenty of worms and other insects, which are its principal food. It casts up the earth before rain, but in dry weather digs deeper after its prey. An inundation is their greatest calamity : and then, notwithstanding their utmost efforts to reach the higher ground, they often perish in their holes.

The farmer thinks them very troublesome natives of his grounds, and rejoices when they are thus got rid of : for, as they bring forth four or five young ones at a time, and are so expert in making their escape, through the many subterraneous passages which they dig around their habitation, it is seldom that the whole family are thus destroyed at once, unless many men are employed to dig up the earth at the same time ; though, by repeatedly setting traps for them, which are so commonly seen upon the cultivated grounds that are infested with these animals, their numbers are greatly decreased. It is about the month of May that they bring forth their young ; and then the mole-hill, as it is called, is visibly increased ; the



female begins to make her apartment more spacious, before their birth, and supports it by partitions; while to prevent the roof from falling in, she beats the earth very hard and firm: and all around this middle apartment, in which are beds of dry grass and leaves to receive her young, are holes in every direction; through which she makes a passage, sometimes fourteen or fifteen feet in length, and by which, on the least sound of danger, she and all her family may escape.

*Maria.* Poor thing! I think this little creature, though deprived of many advantages which others have, and particularly of air and daylight, seems to enjoy some above them; and at least, unless they get into some busy farmer's land, they are suffered to live in quiet; as I do not find they do any other harm than just turning up the ground, and there is nothing about them to induce men to hunt them solely for their own use.

*Mrs. Smith.* One animal you are, then, at least, satisfied about; and think that a comfortable habitation may be found for it under the earth. One would think that this,



of all others, was the place of safety ; but few find it so. In the uncultivated parts of America and Africa, these subterraneous animals may live more at ease, though, no doubt, they are there found to prey upon each other. But I must not attempt to speak of these : and there are, doubtless, many, of whose very names I am ignorant. But it is now time for us to relinquish our conversation, and turn to some other employment.

## CONVERSATION III.

*The Gnat, Flea, Bug, and Louse.*

**MARIA.** What do you think my uncle will bring me to-day, mamma? He did not tell me their names; but he said that three or four of them should be some of the ugliest things in nature, and what I should be sadly afraid of.

*Mrs. Smith.* Had you told him what had been our conversation lately?

*Maria.* Yes, mamma: and then he said he would join his forces to yours, and furnish me with matter of wonder for two or three mornings. It cannot be any very large animal, for I don't know how he could procure it: I only hope it will not be a monkey; for, of all things, I detest them, they are such nasty grinning creatures, and seem only to rejoice in doing mischief. But here he is; I know his tap.

*Mrs. Smith.* Now, then, Maria, call up all your courage.

*Mr. Manning* enters: and, after the usual compliments, Maria, seeing nothing in his hands, asks if he has left the frightful things he had talked of bringing her, in the hall.

*Mr. Manning.* No; I have them all in my pocket; and will produce them when I have made my apology for introducing such disagreeable things to your notice.

*Maria.* O, Sir, no apology is necessary. Pray let me see them: I am all impatience; nor do I think I shall be much alarmed, if they are so small as to be conveyed into your pocket.

*Mr. Manning.* I have brought that with me which will make them large enough, and give them all the terrific appearance I spoke of. Here is a microscope, which I will put together, and then produce some of my formidable collection, which, even in their natural size, would, I believe, hasten you to get out of their way.

After adjusting the microscope, he takes out a box or two. And now, says he, to



give you a catalogue of my curiosities : the first, as being in name less grating to the ear, shall be a gnat ; and then prepare yourself for something still more contemptible. What think you of a flea, a bug, a spider, and a louse ?

*Maria, laughing.* O, what nasty things ! Certainly none but my uncle could think of making such a collection.

*Mr. Manning.* None but myself would venture to produce them before a lady, you should rather say. But, as you said you wished to have an insight into all nature, I thought I could not make a more acceptable selection for you, particularly as most others would endeavour to hide them from your view : nor are you likely to form any true idea of what they really are, but by the help of the microscope.

*Maria.* Thank you, Sir : nothing should be below my notice which is formed by the same hand which made myself ; and I am obliged to you for thinking so. Indeed, I have felt the bite both of a flea and a bug, and in that sense, as you say, am afraid of

them. But the microscope I have long wished to see: pray, Sir, begin your exhibition.

*Mr. Manning.* The gnat, then, shall be the first. Here it is; but not a little injured, I am afraid, by its close confinement. Its form is so delicate, that the least touch obliterates some of its beauties.

*Maria.* Is it alive, Sir? I have felt its sting also, and am rather afraid of that.

*Mr. Manning.* No; I killed it before I put it into the box. But I will begin my account methodically, and tell you, that this little creature always lays her eggs on the surface of some standing water; which she first prepares to receive them by a kind of glue, or oil, emitted from her body: this prevents their sinking to the bottom. With this glue also she forms a thread, to fasten her little receptacle to the banks of the water, or to some stump of a tree which may grow by its sides; and this secures them from being carried away by the winds: they are also fastened to each other, in the same way. Sometimes there are such vast quantities of



these eggs, that the very water appears tinged with their hue: often, in summer, are the gnats to be seen, flying over it, as if to guard and watch their beloved progeny. From each of these eggs, which are by far too numerous to be counted, proceeds a small worm, that immediately sinks to the bottom of the water. Here they form for themselves little lodgments of glue, which they fix to some solid body; unless they happen to meet with a bed of chalk, into which they sink a retreat, and are defended from every enemy except the crayfish; for, even there, its claws can molest them: and this is the first state of the gnat, wholly aquatic.

It afterwards is divested of this frame; and has a large head; a tail shagged with hair and moistened with an oily fluid, which enables it to swim upon the water like a cork, and move from place to place with its head upwards: when the moisture in her tail wants replenishing, she discharges it from her mouth, and soon restores it to its proper use. In this state she is amphibious, sometimes living on the water and sometimes on land.



This form being the second state of the gnat, she becomes what is not improperly called a nymph; which is her entrance into a new life, with another form and other powers. I think a nymph may be distinguished from a chrysalis or aurelia, by its being able to move itself in that situation, which the latter does not: and she remains no longer such than is necessary to complete her metamorphosis. After having disrobed herself of her skin, and laying down the eyes, horns, and tail, which she had as a worm, she breaks from her confinement, a little winged insect, no longer to float upon the water, but to fly wherever her fancy leads her. Her limbs are of the finest texture, and she moves with the utmost agility; her head is ornamented with a beautiful plumage, which you may see by looking through the microscope.

*Maria.* So I do, indeed; why, it appears all feathers: what a size the insect seems! I could have no idea of what it was from seeing it, unassisted by glasses. Indeed, Sir, I am very much obliged to you for pro-

curing me such a sight as this. Pray go on with your account of it, that I may understand every part of what I am surveying.

*Mr. Manning.* You see that the body is covered with hair and scales, to preserve it from moisture and dust. But nothing is more curious in the formation of a gnat, than her trunk, which has often been called one of the greatest wonders in nature: you may perceive the sheath of it proceeding from under her throat; but it is so very fine and delicate, that the best microscopes hardly afford a view of it. It is with this she pierces the skin so effectually, and which causes such extreme irritation. For a considerable time, it was not known that this case contained more than one dart; which, fine as it is, is only the covering to three more, whose sides are sharpened like a two-edged sword, and thick set with cutting teeth towards the point, which turns upwards: the fineness of these darts or stings is inexpressible. When all these darts are inserted in the flesh, and make their wounds sometimes all at once, and at



others one after the other, the pain is exquisite. Where the waters stagnate, and the climate is warm, as in America, and other parts of the torrid zone, these little insects are produced in myriads of myriads; and the inhabitants are kept in perpetual alarm by them, particularly the Europeans: for the natives defend themselves, by smearing their bodies over with grease and oil, which prevent the entrance of their darts.

*Maria.* Oh, dear! if such is the case, I believe I shall give up my desire of going abroad: for you must know, that I have often wished myself a man, that I might visit other countries, and indeed every quarter of the globe.

*Mr. Manning.* Insects of all kinds are most numerous in warm countries; besides thousands of noxious animals of all sizes, from which England is happily exempted. I am told, that in those places abroad, where the gnats abound, they are seen in large numbers, especially towards the evening; and that, when the doors and windows of the houses are left open to admit the air, they



enter in such shoals, being attracted by the light of the candle, as soon to extinguish it : to prevent this disaster, the inhabitants are obliged to burn their lights in lanterns, that the gnats may not get at them. One of our English poets seems to have had some idea of its ferocity, when he concludes a short poem addressed to the gnat with these lines :

“ Now near, and nearer, rush thy whizzing wings,  
Thy dragon scales still wet with human gore,  
Hark, thy shrill horn its fearful larum flings :  
I wake in horror, and dare sleep no more !

ROGERS.

*Maria.* Well, England is best after all : I will rejoice that I am an inhabitant of it. But pray, Sir, proceed in your description : is there nothing else you have to tell me of this little insect ?

*Mr. Manning.* With these little darts it is she procures her food, which is only the juices of flesh, or fruits. The sheath serves her instead of a tongue, and if she finds any liquor, she sucks it up through this without ejecting her lancets ; but if it be any solid body, such as fruit or flesh, she is obliged to

sting very severely, to make an orifice for the juices or blood to flow through, and which, after returning her weapons to their sheath, she sucks up with her trunk. This is the way in which she is supported during summer: but in winter she passes away the time in a torpid state, wherever she can find a convenient retreat; and, at the return of summer, takes her flight again, in quest of some standing water, where she may lay her eggs; but she avoids doing this in a running stream, as its force would carry away her young brood. After having deposited her eggs in a proper place, and carefully secured them in the way I mentioned at the first, she flutters about a few weeks longer, and then expires, having fulfilled the purpose for which she was designed, that is, of propagating her species.

*Maria.* I was going to say, if she was not to do that, it appears as if it would be no subject of regret to us; but I believe I am wrong in thinking so: no doubt, whatever the Author of nature has made, it is necessary that their species should be preserved.



*Mr. Manning.* Doubtless, it is so; and though there are many things in nature which you and I may think useless, yet those who have studied their properties more profoundly than we have, have discovered that they are all necessary to each other,—if not for assistance, yet for the destruction of those creatures which, if not thus assailed and lessened in their numbers, would be still more injurious to man than they now are. Who can tell, but that the very blood which is extracted from our veins by the gnat, though in such a small quantity, might be of that nature, which, if suffered to remain, would produce disease. The same may be said of the flea, which is equally the object of our dread, and from the same cause, which I shall now introduce to your notice, as these are also very curious in their formation.

*Maria.* Ah, the very name makes me jump! I have felt so much from its bite. But pray let me see it: will you place it in the microscope, Sir? Dear, dear! it is nearly as large as a lobster; and, I declare, it is not unlike one either.



*Mr. Manning.* It has a very small head : but do not you see its large eyes, and those three points which dart from its head ? The middle one is the trunk, through which it sucks the blood, and of which you appear to have a feeling sense.

*Maria.* And is it with that little instrument alone, that it is enabled to give such a sharp pain ?

*Mr. Manning.* Yes ; this is the only offensive weapon it has : and, after sinking it into the flesh, it will lie for some time sucking up the blood, unless disturbed. The other two points are its horns, or feelers. The legs, you see, are all in the fore part of the body ; and so formed and jointed, that it can, as it were, fold them all up one within another ; and, in leaping, these all spring at once : and, by this elastic bound, the body is raised above two hundred times its own height ; and advances to such a distance, that it is out of sight in an instant ; and you may hunt for some time, before you find the little creature again : but this is only when it exerts its whole strength. At other times it

only hops from place to place ; and, by its nimble activity, eludes our endeavours to catch it.

*Maria.* Its body seems entirely clothed in armour, and full of prickles.

*Mr. Manning.* These are scales, so small, as to be imperceptible to the naked eye, exquisitely jointed, and folding over each other. These insects, in their first state, are a sort of nits or eggs, round and smooth ; and from these proceed a small shining worm : but neither are at first perceptible, without the aid of the microscope. In a fortnight they are of a tolerable size, and very active ; but, if touched, they roll themselves up into a ball. Soon after they begin to crawl, they seek a place to hide in, where they spin a silken thread from their mouths, and with this enclose themselves ; where they continue for about a fortnight, and then burst from their confinement, perfectly formed, and in the shape you see. They are in much greater numbers in France and Italy, than in England ; and are the enemies, not only of mankind, but also of the cat, the



dog, and other animals. I will now proceed to the bug; which is said to be the most effectual destroyer of these pernicious insects.

*Maria.* The remedy, in my opinion, Sir, is as bad as the disease, or rather worse; for, if they will not let the fleas bite us, I am sure they do not fail tormenting us themselves, to the utmost of their power: but let me see if its appearance in the microscope, is as alarming as that of the flea. Why, Sir, it appears quite different, to what it does when seen without it; and seems divided into three parts.

*Mr. Manning.* Yes; there is the head, the breast, and the belly. It has but two eyes, which you see are rather projecting; but with these their sight is exquisite: they have also two horns; underneath which is their trunk, somewhat crooked, and which lies upon the breast, when not in action.

*Maria.* I see it, Sir; and it has eight legs, has it not?

*Mr. Manning.* Yes; the first two pair are in the breast, and this has the appearance of a ring. The belly consists of nine other



rings, or circles, enclosing each other; and under these are two other pair of legs. Each leg has three joints, and is armed with a crooked claw like a hook. Their motion is very slow: but, as they avoid the light with the greatest cunning, and contrive their habitation so artfully, within the wainscot, or floors, of old houses, and in the furniture, particularly about the bedsteads, they are seldom discovered but by the smell; which is very offensive, and still more so when they are crushed, to be destroyed. Its body is smooth, except a few short hairs, which you may discover on the two last rings. There are, it is said, nearly forty kinds of the bug species, some smaller and some larger than others, and of a different colour.

They change their skin during the summer; and it is generally thought, that but few of the old ones survive the cold of the winter: but they are so prolific that the breed is seldom destroyed, each female depositing above one hundred and fifty eggs, which continue for some months; and the hardness of the shell is such, that neither

heat nor cold, moisture nor fumigation, can destroy the young within them. In the spring the new brood appears ; and then it is, that a person sleeping, I should rather say lying, on a bed infested with them, can get neither rest nor refreshment. These troublesome vermin are also much more numerous on the continent than with us ; where also they are larger, and bite more severely.

*Maria.* I shall be more afraid than ever of bugs and fleas, now that I have seen them through the microscope, and beheld what formidable creatures they are. It is well for us that we do not see them as they are seen through a microscope ; for how dreadful would be the sight of such numberless insects : I should never think of lying down on a bed infested with them. But now for the louse, Sir ; which is, I believe, the last of your collection. I think I may truly say I never before saw so complete a set of frightful things.

*Mr. Manning.* You will be ashamed to confess to your young acquaintance, the knowledge which you have acquired this



morning. The gnat perhaps you may speak of; and perhaps also just hint at the bug, it being an insect so well known in the metropolis: but as for the flea and the louse, particularly the latter, a young lady ought not even to know that there are such things in nature.

*Maria.* Ah! Now you are laughing at me, Sir. However, I think I know some, to whom I may mention the discoveries you have assisted me in making; at least, I may talk of them to my mother; for she has left us some time, intending, I suppose, to hear the whole account from me, some other day.

*Mr. Manning.* And I must leave you soon; as I find, by my watch, it is very near the hour I am engaged to meet a gentleman in business. I must therefore leave the spider, which I promised you at the first, to be inspected to-morrow morning: and, perhaps, I may then bring with me two or three other curiosities, which may not be so disgusting as these I have now furnished you with.

*Maria.* I am very much obliged to you, I



am sure, Sir, for taking the trouble thus to provide entertainment for me, and at the same time blending it with instruction.

*Mr. Manning.* With the louse I expect you to be offended, and therefore have reserved it till the last, as through the microscope it appears full of deformity.

*Maria.* So it does, indeed. This is really the ugliest creature you have shown me yet. Each part seems divided, and different from the rest: the head towards the back part round, and in the front rather long. But here I see the horns, and the trunk also, like the rest of the blood-sucking insects: but the horns are multiplied here; as there appears two on each side, and these jointed, and covered with hair. How very short the neck is, and the breast is divided into three parts.

*Mr. Manning.* Very true: and do not you see the six legs, on either side? each of these has six joints, and all are covered with hair, and armed with claws at the end: it is by these they catch hold of objects. The end of the body terminates in a cloven tail; and the skin resembles parchment, and when

pressed makes a cracking noise. On a closer view, you may discern its veins and internal parts, through the transparency of its covering; and, when the louse is feeding, the blood, which is drawn up through its sucker, may be seen rushing like a torrent into the stomach, which at the same time is emptied at the other end, to make room for this new food. When it is empty the louse is without colour; but, according to the quantity of blood it has taken into its stomach, it becomes more or less of a dark brown. Such is its greediness, that when it has found a pore, from which it can draw the blood, it remains in that situation till it has not power to move, and the slightest touch will at that time kill it. Scarcely any thing multiplies more than this unwelcome intruder, laying fifty or sixty eggs at a time, and the moment the nits have thrown off their shell, they begin to breed in their turn.

Some authors affirm, that the head and body lice are of the same kind: but, in our country, these seldom make their appearance but where the greatest sloth and penury pre-



vail. There is scarcely an animal, or a plant, which is not infested with its own peculiar louse; so that to number the various species is impossible. It is that which is called the leaf louse, that is so destructive to our gardens and fruit trees: sometimes we may see whole plants covered with them; and on these the ant often endeavours to make a meal, and not unsuccessfully, though she is too frequently driven back by her numerous foes.

*Maria.* I remember my mother told me of this insect, when we were the other day speaking of ants.

*Mr. Manning.* The fire fly, and a worm that proceeds from a beetle, as well as the ichneumon fly, are the most formidable enemies to this kind of louse.

*Maria.* What, Sir, is there a fly of that name, as well as the animal which destroys the crocodile's eggs?

*Mr. Manning.* Yes; and this fly may probably bear the same name, from the similitude they bear to each other in their usefulness; as they as effectually destroy these



pernicious vermin, as the animal does the crocodile's eggs. It seizes on one of the largest females, and laying its eggs upon her back, a worm proceeds from this, which effectually destroys the insect from which it sprung. Thus ends my exhibition for to-day; my time is quite expired: but, if you are not tired of what you have now heard, you may expect me again to-morrow, with a fresh assortment.

*Maria.* I assure you I am not tired, Sir; and am particularly obliged to you for the sight of the microscope; you will not doubt its being taken care of, till we see you to-morrow. But I fear I shall be too much engaged the rest of the day, to avail myself of the opportunity of examining any other insect with it, in the company of my mother, who I dare say will be making new discoveries all the afternoon.

*Mr. Manning.* Adieu, then, till we meet again; and then prepare for further wonders.

## CONVERSATION IV.

*Spiders, Caterpillars, Ichneumon Fly, Butterflies, Moths, Cricket, Grasshopper, and Mole Cricket.*

**MR. Manning.** I will first exhibit the promised spider, and then produce something more agreeable. This, at least, you will have nothing to complain of, as it does not hurt you, unless by its disagreeable appearance. Yet it is not without its offensive weapons, as I shall show you : and these are very formidable also ; though it ventures not to attack the human race with them. There are five sorts of spiders : the house spider ; the garden spider, which hangs her web in the open air ; the black spider, to be found in cellars and old walls ; the wandering spider, so named because it has no settled habitation ; and the field spider, known by its long legs, and which, as a child, I dare

say, you used to call "old father long legs." These have all something in common with each other, and something that distinguishes them. In Africa and America, where all insects acquire their largest growth, it is, that a spider appears in perfection; some being as large as a hen's egg, as some authors affirm, but I will not vouch for the truth of it. Let it suffice us to see them through the microscope, though then not magnified to so vast a size.

*Maria.* Indeed, Sir, I had much rather view them there: but, surely, ladies who scream at the sight of a spider may be forgiven their alarm, if they appear so large as that.

*Mr. Manning.* This is never in our country, remember: therefore if we give the ladies in America that license, it is no precedent for ours. But, to return: that which I have brought you is the house spider; and you may often observe the others at work, as you are walking in the garden or fields. Every spider has two parts; of which the fore part, containing the head and breast, is



separated from the hinder part, or belly, by a very slender ligament: the feet are all in the fore part, and covered with scales, as you see here.

*Maria.* O, what an ugly creature! but I think I see its eyes: how many have they, Sir?

*Mr. Manning.* Some have eight, others but six.

*Maria.* I see two in the front of the head, two behind, and some at the sides.

*Mr. Manning.* And all these are covered with a transparent crust, as spiders are not furnished with eyelids. Just below the eyes, in the front, are two claws, or pincers, which are scarcely perceptible: it is with these they sting their prey; and, from a small opening at the point, they eject a poison into the wound, so virulent that it soon destroys whatever they have taken in their snares. Beyond these are what are called the arms, much shorter than the legs, and bending backwards; with these she holds and turns her prey, while she is thus mortally wounding them.

*Maria.* I see them: and she has eight

legs besides; and how curiously are they jointed; at the end of each are two claws, and one still smaller, a little higher up, like a spur.

*Mr. Manning.* It is with the latter that she fastens herself to her thread; and with the two former she is enabled to hang and fix herself where she pleases; or to move downwards, by grasping with these claws whatever comes in her way. If they pass over a smooth body, such as glass or marble, and which will not admit of their hanging to it, they are furnished with two little sponges, such as flies have under their feet, and which enables them to advance with a softer pace. Yet with all this, as her prey consists of flies and other insects that have wings, and she has none, she would not be able to attack them, had not nature given her a large stock of thread, and great industry to weave her web: this she begins to work upon as soon as the flies receive their birth; and then retiring behind her net, she waits with patience, and unseen by the enemy, till it is completely entangled in her snare. To



form this web, she has, at the extremity of her belly, five dugs, covered with others of a lesser size; and these she can open or shut, expand or contract, at pleasure: through these orifices is distilled that clammy gum with which their belly is replenished. After fastening it to some convenient place, generally the corner of some neglected chamber, or near the frame of a window, she descends, and lengthens the thread to the distance that she wants it; but while the openings of her dugs are closed, she remains suspended. Having brought it to the place she wished, she drops a little of the gum upon the wall, and there fastens this end; then fixes another, by returning on the first, to the place where she began. In this manner she passes backwards and forwards, connecting or separating her threads, as she finds best suited to her purpose; the first two serving her as a scaffold, on which to build all the rest: towards the edges the threads are much stronger, and secured from being the sport of the wind, by strong loops or double threads, all around it.



*Maria.* I did not think there had been such ingenuity in a spider's web : I think I shall beg our housemaid not to destroy the next she meets with, till I have seen it.

*Mr. Manning.* Besides these threads which cross each other, and are glued with the utmost exactness one over the other, there are others still finer, and which are drawn from all parts of the web, and terminate like so many rays in the centre, to which she retires, and keeps her secret watch. Here it is she contrives a lodge for herself ; which has two openings, one below and the other above the web : from these she has an opportunity of seeing every thing on either side, while she herself is concealed from view. She is very careful to keep her web free from dust ; and often gives it a shake with her paw : but this is so judiciously done, that she never breaks any of the work by the force of the blow. The moment any fly touches one of these threads, though ever so lightly, she feels the vibration in her secret cell, and is immediately on the alert ; though she is cautious not to appear too soon, or till her prey

is sufficiently entangled ; but, when it is, she darts out ; and, with the pincers I before mentioned, makes the wound and injects the poison, which destroys the helpless insect. She then carries it off in triumph to her hole ; where she feasts upon its mangled body at her leisure ; and then, after putting away whatever might give notice of her barbarity, and inspire other insects with a dread of entering her domains, she repairs her web ; or, if necessary, weaves a new one, and then quietly waits for more.

*Maria.* I wonder, so often as a spider's web is destroyed, that its materials for spinning are not exhausted.

*Mr. Manning.* If they live to be very old, that is the case ; and then the poor insect is in a sad state indeed : yet it does not give up all for lost, but seeks out the web of a younger spider, who will, either out of compassion or respect for old age, or, it may be, the fear of the old one's pincers, resign its place to her, and form itself a new retreat : but, if the old one cannot find one which will thus accommodate her, she must absolutely



perish for want of food.—It would take up too much time, particularly to mention all of these species, which I named at the first; it is enough to say, that they all entangle their prey in much the same manner: for, though the wandering spider spins herself no habitation, having not a sufficient stock of thread, she scatters here and there one or two, which intercepts the passage of the insect she is pursuing. Towards the extremity of her fore paws or arms, she is provided with two tufts of feathers, with which she stops the fluttering of her adversary's wings, and holds it fast till it is destroyed. But nothing is more extraordinary than the care all these creatures take of their eggs, of which each spider lays from nine hundred to a thousand every year; but, as it never lays till it is two years old, and very many are destroyed before they come to that age, we have them not in such abundance as, from their great fecundity, we might expect. They preserve their eggs in a little web or bag, spun five times stronger than that which catches flies; this is lined with a soft down which they



pluck from their breasts : the female sticks this bag to the end of her body, with some of the glutinous liquor forced from her dugs ; in this situation she appears as having one body behind another. If by any accident she is deprived of this bag, she uses the greatest assiduity to recover it, and seldom quits the place till she has regained her treasure.

*Maria.* What affection and care ! All nature informs us of the tenderness a parent feels for its offspring : but I am too apt to forget the attention mine has bestowed upon me.

*Mr. Manning.* When the young ones are come out of the eggs, they are still in confinement, till their mother bites open the bag, and lets them out of their prison : she then carries them all on her back, till they have strength enough to provide for themselves ; when instinctively they begin to spin, and are at first so small as to be scarcely perceivable. Spiders of another kind tie up their eggs in a little purse, which they spin of the thickness of paper ; these they stick on to the walls or wainscots of rooms, and sometimes

to the furniture, such as window-curtains or blinds: but this precious deposit the female never leaves, unless forced to it; but continues near it night and day, often brooding over it, to hatch and warm the eggs. Others place these bags in little openings of an outside wall, and before them they hang a small wisp of dry leaves or straw, which is not attractive to the birds; and, by its swinging backwards and forwards in the wind, the little packet of eggs hidden behind it is not perceived by them. If the spider, from the appearance of danger, is obliged to move her situation, her first care is to pull down this packet, and with it she hastens to a place of more security. These insects are naturally enemies to each other; and are of such a malignant nature, that, instead of their food, they often devour each other.

*Maria.* I did not think that there were such wonders to be related of spiders; and, for the future, instead of shunning the sight of them, I shall be desirous of regarding them with the greatest attention.

*Mr. Manning.* There is no object, how-



ever mean, but will well repay the attention you bestow on it. But now, to make some amends for the ugly venomous creatures I have hitherto presented you with, I will produce the cheerful little cricket, which “chirps on the hearth,” and the delicate winged moth, thus described in the play of Sir Thomas More, written by Hurdis:—

It has wings

Dappled with gray and jet ; and, underneath,  
Sleeps in a suit of scarlet. But beauty's wreck  
Is soon accomplish'd : of created things  
Nothing was finish'd with a wo so sure  
As the moth's wing. 'Tis cover'd with fine art,  
'Tis clothed in feathers, to the quickest eye  
Hardly perceptible, yet one slight touch  
Defaces all. So woman's beauty flies,  
Banish'd by the hand of sorrow or mischance :  
Escapes it these, age will not let it pass ;  
It falls a victim to the shafts of time.”

Here it is : but, as Cecilia says, “has left half the beauties of its wing in dust upon my glove.” This is one of the butterflies of the night.

*Maria.* How, Sir : do these insects fly in the night ?

*Mr. Manning.* Great numbers of them do; in warmer climates than this, indeed, more than are seen by day. They are called moths, and are distinguished from the butterfly by their horns or feelers; those of the butterfly being knobbed at the end, while those of the moths are pointed.

*Maria.* How beautiful and delicate this is! it is indeed a more agreeable sight than those you have hitherto favoured me with, Sir.

*Mr. Manning.* I meant it should be so; but, you must remember, this has *only* beauty to recommend it: for this is the insect which is so destructive to our stuffs and woollen cloth.

*Maria.* Dear, Sir, that which you call dust upon its wings, I now see to be little feathers.

*Mr. Manning.* And such are all those beautiful butterflies adorned with, which you see flying about during the summer; arranged with the utmost nicety, and coloured with a variety of the most radiant tints.



*Maria.* And these, Sir, all spring from different caterpillars : do they not ?

*Mr. Manning.* Nothing is more certain ; these caterpillars are hatched from the eggs of butterflies.

*Maria.* What extraordinary changes there are in nature ! and yet half the world seem to think it beneath them to inquire into them.

*Mr. Manning.* By half the world, I suppose you mean half your acquaintance. But there are a great many learned men in this kingdom, as well as in France and Holland, who have made them their study ; and it is through their researches that we are acquainted with them. Various are the books which have been written on this subject ; so that there are now very few people, who have had any advantages of education, or have read any thing at all, that are not acquainted with the principal occurrences which are daily passing in the animal creation. The caterpillar tribe are so numerous, and so various, that, had they not as great a number of enemies, we should not have a leaf left on our trees and plants : but they are the food of

many animals, and of every sort of bird; and some devour each other. Foes also of different kinds lay their eggs either on or within their bodies; and, as these turn into worms, the caterpillar nourishes a brood of intestine enemies, that must shortly be its destruction; particularly the large cabbage caterpillar, which is frequently seen with a brood of worms within it. The ichneumon fly especially, which I mentioned yesterday, is a sore enemy to them, and indeed it is formidable to insects of every kind: and not without reason; since the whole of this species owe their birth to the destruction of some other insect, upon whose body they have been deposited, and on whose vitals they have preyed. It often lays its eggs in the nest of the wasp; and, as both are produced at the same time, the young ichneumon not only devours the young wasp, but its whole brood of worms: this fly, therefore, is of infinite service to us; and were it not for the millions of insects which it destroys in the summer, very few of the fruits of the earth would fall to our share.



*Maria.* Really I shall quite esteem this little fly, and wish for a closer acquaintance with it, that I may pay it all due respect, when it falls in my way.

*Mr. Manning.* The Egyptians worship the animal of this name, for the service which it does them by destroying the eggs of their pernicious invader the crocodile: will you do the same?

*Maria.* No, Sir, I hope not; only properly esteem it: but will you describe it to me?

*Mr. Manning.* There are many varieties; but the most common has four wings, a slender black body, and a three-forked tail; the outside parts of which are black, and the middle is red: it is with this she destroys her prey and deposits her eggs. The male has no such sting, but the female uses it with great force and skill. The greater number are produced from the backs of caterpillars; and, if it survives the worm state, it changes into a chrysalis enclosed within its own body, and then becomes a fly, in which state it lays its eggs. Even the spi-

der is not free from the depredations of this redoubtable fly ; which despises its web, pursues it to its retreat, and tears it in pieces in its own territories. But, to return to our subject : all butterflies and moths are produced from eggs, from which a small caterpillar proceeds. This increases in size till it spins itself a covering or cone, in which it lies, apparently without life or motion, for some time ; it then bursts from its confinement, and becomes a butterfly : in this state it propagates its species, and lays its eggs for the ensuing summer. Some are in their aurlia state all the winter ; and then come forth those butterflies which are seen in the early part of the year. Some caterpillars remain such all the winter, in secure retreats, where they appear as if actually dead ; but, at the return of warm weather, they recover life and activity. A full-sized caterpillar is very ravenous, and destroys double its own weight of leaves in a day.

*Maria.* What voracious creatures ! for a vast number of leaves must be necessary to subsist a large caterpillar, and a few would,



I should think, in a very short time strip a large plant.

*Mr. Manning.* Yes; it is well known they find but little difficulty in doing this.— Many change their skins five or six times, before they are involved in their cones; and this cast-off covering is so complete, as often to be taken for the real insect. When its principal change is to take place, I mean into an aurelia, it hangs itself to the stalk of the plant it is upon, and either spins a web, or wraps itself up in that which it has already spun. If, from motives of curiosity, it is taken from the web, it appears very weak and languid, and the body is seen to contract and extend itself, as if convulsed. It is probable that all the parts of the butterfly are hidden in the caterpillar: for, as the insect continues to work, it quits the hinder part of its skin; and, being driven up into the fore part, the skull opens, and the first three rings of the body; through which it thrusts its body, and gets entirely free from its caterpillar skin. Every part of the future butterfly is then seen, but so soft and

tender, that the slightest touch would injure it; and the poor insect remains, helpless and without motion, waiting for the air to dry up the moisture with which it is covered, and supply it with a crust for resisting injuries. In about twelve hours it hardens, and its external covering becomes firm; and in twenty-four, the chrysalis may be handled without danger. This is the little pod or cone, so commonly seen sticking to every plant in our gardens, or by the highway side: but this work or operation is not perceived unless removed from the web, under which, for the greater security of the insect, it is performed.

*Maria.* It must be a very curious sight: though I should fear the poor insect would suffer, in its removal from a place which it had itself provided. But how long do they they lie in this enclosure, Sir?

*Mr. Manning.* Some much longer than others: those of one kind a month, others a year, and some only a few days. And these are content with the covering afforded by a tender leaf; which they make to curl around



them, by a kind of glue which they diffuse from their bodies. But the moth that you now have before you pursues a different method: the butterfly from which it proceeds, always takes care to lay her eggs on a piece of stuff or cloth, well dressed, and fit for the reception of her young, when they come out of their shells. This little creature is no sooner hatched, than it gnaws and feeds upon the stuff; and also builds itself a habitation with it, very like a muff, with an opening at each end, through which it puts its head, and devours all around it. This is well fastened to the ground of the stuff, with several strings and a little glue: but, what is most remarkable, the tent or covering that this little creature makes, is always of the same colour as the stuff it is upon; and if, after she has cleared the place she at first settled in, she should remove her habitation, to another cloth or stuff of a different colour from the first, though it was red or green before, it now becomes of the same hue as that in which she fixes herself a second time. I do not mean that she builds herself a new one of

that colour; for she moves with her old one wrapped around her. After she has continued some time in this state, and satiated herself with the food she thus obtains at our expense, she also spins a web, and becomes a chrysalis; from which proceeds the little aërial insect you now see.

*Maria.* It is in her worm or caterpillar state, then, that she does us all the mischief?

*Mr. Manning.* Yes; but, as I said before, she takes care to deposit her eggs in the place where her young may continue the mischief. There are a variety of entertaining particulars respecting caterpillars and butterflies: but I will not, by relating them to you, anticipate the pleasure you will have in reading of those things, when you begin to study natural history more than you have hitherto done. In the mean time, I will conclude my exhibition for to-day with the merry cricket, that is so enlivening to a country fire. This little insect greatly resembles the grasshopper in its make and its manner of feeding, in propagating its species, in leaping, and in singing, except that the colour of



the one is green, and that of the other a rusty brown; and the former is found in fields and lives on grass, while the cricket eats crumbs of bread, flour, meat, and sugar, or any thing that the family may leave in its way; and wherever it once takes up its abode, it is sure to remain. It is of a very chilly nature, and, if undisturbed, is often seen to come out from its retreat to warm itself, and chirp at the blaze; but, as it lives chiefly in the dark, if surprised by a candle held towards it, it is dazzled, and cannot find its way home again till the light is removed. It has wings like the grasshopper: but neither of these insects is often seen to fly, though they both hop to a considerable distance. By some authors, their singing is thought to be occasioned by a fine membrane, which covers a little hole at the base of their wings, and which may be compared to a drum. Except in very cold weather, the cricket is never silent: but it is the male only of both kinds that is vocal.—Both the grasshopper and the cricket have three stomachs, and may be called ruminating insects, as they chew the cud, like the larger

animals of that kind, and by this means eat their food over again, which at first they swallow too hastily to digest. Towards the end of the summer, they lay their eggs; for which they bore a hole in the ground, with an instrument that lies sheathed under their tails, not unlike a piercer. In the spring these eggs are hatched, when the insects they produce are at first as small as a flea; but, as they increase in size, they appear like their parents, except that they are without wings, these being hidden in four little bunches, that seem only to add deformity to their sides. About twenty days after its exclusion from the egg, the little insect ceases to eat, and, having found a convenient spot, it undergoes the same laborious writhings and workings as others of the same nature; it bursts its skin, and comes forth in the same shape, but larger and better formed. Spent with its labour, it shows no sign of life for nearly an hour after its emancipation; but, as it recovers its fatigue, and the body dries in the air, its wings unfold, and at last are longer than its body. This is an account of the change in the grass-



hopper: that of the cricket is the same; but, being more closely hidden from the view, it has not been so often observed.—There are also the wood-cricket and the mole-cricket; the latter of which is much larger, and is the detestation of the gardeners, as it does much mischief in ground which is newly sown, and devours every seed it comes near. It lives under the earth, where it burrows like a mole; and works even faster than that animal, as its legs are so formed that it can penetrate the earth in every direction. The female lays nearly a hundred and fifty eggs, about the size of a caraway, and forms a cell, of clammy earth, the size of a hen's egg, in which she encloses all her eggs; and, raising a fortification, with entrenchments and avenues all around it, she stands before it herself as sentinel, and, when the black beetle, which is the largest and the most dangerous of her insect foes, approaches to devour the eggs, she seizes him behind, and bites him in two. As winter draws near she sinks her nest deeper in the earth, and at the return of warm weather brings it again near the surface, where it may

receive the genial influence of the sun, without being exposed to view. Thus I have finished my second morning's lecture: and here comes your mother, as if to put an end to it, or to inquire what I have been taking up your time about. She begins to think I have engrossed too much of it.

*Mrs. Smith.* No, indeed, Sir; on the contrary, I am obliged to you for giving up so much of your own to her amusement and instruction: and she is, I hope, equally sensible of the favour you are doing her. I, last evening, received a particular account, from herself, of all the wonders you had made her acquainted with, and expect the same to-night, unless you will favour us with your company for the rest of the day.

*Maria.* Do, Sir: I shall then convince you that I am not tired with your dissertations, by asking you to continue them, in answering a variety of inquiries which I still have to make.

*Mr. Manning.* Another time I shall be ready to reply to them; but I am particularly engaged to-day and to-morrow. I am



going up to London, where I am not certain how long I shall remain : on my return, I shall hope to find you perfectly acquainted with all I have told you, as well as many other particulars. At present, I would recommend to you to digest what you already know, by repeating it to your mother. You must take a lesson from the ruminating cricket and grasshopper, and “chew the cud of contemplation :” thus the recollection of what you have heard will imprint it on your memory, and render it not so liable to be forgotten, when you receive a fresh supply of information.

*Mrs. Smith.* This is very good advice, Sir; and what, I hope, Maria will be careful to attend to.

*Mr. Manning.* I must also take away the instrument by which I have been enabled to make my exhibition so entertaining, as I have only borrowed it from a friend, for a few days. I wish you health and happiness, till I see you again.

*Mrs. Smith.* Thank you, Sir; the same to you.

*Maria.* Accept my good wishes also, Sir; and believe me very much obliged to you. I shall wait your return with some impatience: though, when I think you are enjoying the society of your friends in town, I will endeavour to restrain it.



## CONVERSATION V.

*Ostrich, Humming Bird, Nightingale,  
Eagle, Vulture, Falcon, Hawk, Kite,  
Magpie, Lapwing, and Pelican.*

**MARIA.** I shall now remind you of the account you promised to give me of birds, mamma. It will be doubly agreeable after the creatures of my uncle's exhibition; which were, some of them, so hideous, and so malignant, that nothing but blood will satisfy them.

*Mrs. Smith.* And among the various species of birds, there are some not without this sanguinary character: but, perhaps, you would have me mention only those which are the most harmless.

*Maria.* O, no, mamma; all, from the largest to the smallest, I should wish to hear of.

*Mrs. Smith.* You must, then, go to one

of much greater knowledge than myself. I am not acquainted with them all. I believe the ostrich is the largest, and the humming bird the smallest : but the varieties between are too numerous for me to mention even one tenth part of those I have heard or read of.

*Maria.* Be so good as to tell me what you can recollect of those you do know, my dear mamma, particularly the two you have mentioned ; that at least I may be acquainted with the two extremities : that will be knowing something.

*Mrs. Smith.* I have read very different accounts of the ostrich : some authors say, that she leaves her eggs in the sand, and, unlike all other parents, attends to them no more ; others affirm, that she broods over them ; and others, that she is careful to place them where she knows that her young, when hatched, will find a sufficient quantity of worms and insects to nourish them. But I am inclined to believe the first account ; because we have the authority of Scripture for it : where this creature, (if the translators have made no mistake in the name,) is men-



tioned as "leaving her eggs in the earth, and warming them in the dust, and forgetting that the foot may crush them, or that the wild beast may break them. She is hardened against her young ones, as though they were not hers." Her great speed also, is mentioned in the same chapter: "what time she lifteth up herself on high, she scorneth the horse and his rider."\* Her eggs are as large as an infant's head; and some say that one of these will suffice eight men for a meal, though I doubt whether it would not be a scanty one. When at her full size, the ostrich is as tall as a man on horseback; her neck is like a swan's, but much longer; and her head and bill resemble those of a duck. This species of bird is most numerous in Africa; where the wandering Arabs often call it the camel bird, from its similarity to that beast, having a long neck and a rising back. Her legs resemble those of a heron, each foot resting on three claws, armed with horn to help her in her march. Her wings are very strong;

\* Job xxxix. 14, and following verses.

but not large enough to raise her from the ground; but serve her as oars or sails, with which she cuts through the air as she runs along. When pursued by the hunters, she is so silly as to think that if she hides her head she is not seen, (as some little children fancy, that if they cover their eyes they shall not be found,) and this makes her an easy prey. She does not often do this, till she has exhausted her strength in running; which she is enabled to do, so long, and so swiftly, sometimes for three or four days together, that the hunters are worn out, (though often relieving each other,) long before she is; her flight also is generally in circles, and not in a straight line. This animal has two stomachs; the first considerably larger than the second, and somewhat resembling the crop of other birds. It is said that they will eat iron; and, it is certain, that their digestion is very good; and probably they swallow small pieces of this metal to assist it, though it is never supposed that they receive any nourishment from such hard food: vegetables are what they generally eat; but they



are so voracious, that they will devour any thing that is given to them. As for the feathers of the ostrich, you are not acquainted with their beauty, and what necessary articles of dress they are sometimes thought.

*Maria.* And certainly, mamma, they are a very great ornament to whoever wears them: though I do not know whether they are not too common at present.

*Mrs. Smith.* As we are not going to have a dissertation on dress, at the present, I will not venture an opinion on this important subject, but proceed to the humming bird: and let the lovers of ornaments wear whatever they will, they cannot exceed those which nature has given to this delicate and beautiful little bird. It is a native of America, and it may justly be called one of the wonders of the world; for its beauty, its manner of living, and its smallness of size, being not bigger than a large fly, or a humble bee: yet some are seen of the size of a wren. The Indians call them rays or hairs of the sun, as they seem confined to that part of the earth where it shines the hottest.

They sport in the fields, and extract the sweets of various flowers with their little tongues, that serve them as a trunk, through which they suck the juices. Their bill is not larger than a fine needle, and within this the tongue is sheathed.

*Maria.* What can they have to defend themselves with, mamma? I should fear that so small a creature would often fall a prey to birds of a larger size.

*Mrs. Smith.* Their bills are a very proper weapon; and with these they attack the bird called the grosbec, which often endeavours to surprise the young of the humming bird in their nest; but no sooner does the mother appear, than it flies off, with many cries, as knowing what a formidable weapon she has to defend them. The plumage of this little bird has all the vivid colours of the rainbow; and its neck is decked with such a glowing red, that one might take it for a ruby. The belly and under parts are of the colour of gold; the upper parts of the legs are green as an emerald, while the feet and bill are as black as jet, and polished as



ebony. Its eyes shine like diamonds; and on the head of the male, which is green mingled with gold of the brightest lustre, rises a little tuft of feathers, which shines and sparkles in the sun, and is an assemblage of all the bright tints which adorn its body. They fly so exceeding swiftly that the motion of their wings cannot be perceived; and it is supposed that this rapidity in their flight occasions the humming noise which gives them a name. When dead and dried, they are stuffed with cotton, and often placed in the cabinets of the curious: formerly they were worn as ornaments in the ears of the ladies of Mexico, who, perhaps, loved dress as well those of England.

*Maria.* I wonder whether they are easily caught!

*Mrs. Smith.* Yes; with small rings smeared with birdlime; which sometimes the children hold in their hands, and intercept them in their flight, or hang them on the twigs of flowers: in these they are soon entangled, and cannot disengage themselves. It is said that impatience is their general

character, as whatever they do appears to be the result of it; and they have been seen to tear a flower, whose sweets they have found exhausted. They suspend their nests at the point of a twig of the orange or citron tree; and sometimes in houses, if they find a convenient entrance, and a fit place for the purpose. The nest is about the size of a hen's egg, and it is made by the female while her mate brings her materials, such as cotton, fine moss, and the smallest fibres of a few leaves. They never lay more than two eggs, and these are not bigger than a pea, as white as snow, with here and there a spot of yellow. The female never quits the nest, except at morning and evening, when the dews are on the flowers, and then only for a few minutes, when the male takes her place: for, so small as the eggs are, the least exposure to the air would injure them. In about twelve days the young appear; at first quite bare, and not larger than a fly, but by degrees they are covered with down, and then with feathers.

*Maria.* I should like very much to see



them: if I were to go to America, they would be the first animals that I should look after.

*Mrs. Smith.* But remember the gnats and the flies, your uncle told you of; you would perhaps be obliged to attend to these first.

*Maria.* Very true. And now, mamma, relate to me what you know of the eagle.

*Mrs. Smith.* We fly excursively, I am sure; we go from the large to the small birds, and return again, just as your fancy leads us. This is not proceeding philosophically. But I do not pretend to any method in my account, and therefore shall not attend to it. Yet before I speak of the eagle, let me remind you of the nightingale; which, if the humming bird is remarkable for the beauty of its plumage, is equally so for the harmony and variety of its song; "most musical, most melancholy." This bird visits us in England only: in Scotland and Ireland it is never known. It comes to us in April or May, and leaves us in August; but it is rarely seen. Its notes are soft and

plaintive, though sometimes, (as if to convince us that the whole scale of music is within the compass of its little throat,) they are loud and sprightly, and rise from one to the other in such a charming variety, that we are never tired of listening to its song; to which the silence of the night, the only time in which it is heard, gives an inexpressible charm.

*Maria.* Ah, mamma, when living in the country, you had often an opportunity of hearing it; but so near London as we now are, we are not favoured with its company: I have often regretted it

*Mrs. Smith.* Not very much, I hope: for, when you visit our friends in Devonshire, I dare say you will often hear them. They are found both in Persia and China, and in all ages have been noted and admired for their voice: but there is nothing else attractive about them, as they have no variety of plumage; and if they live many years, they turn gray with age. They make their nests near the bottom of the hedges, in the thickest part; and lay four or five eggs,



though it is seldom that in our cold climate all these come to maturity. The female sits about eighteen days, during which time the male sings unweariedly, as if to cheer the tedious hours.

But now we will turn to the eagle, according to your desire; which is a bird of a far different kind, and has been often styled the king of the feathered tribe. This, as well as the vulture, is a bird of prey; often seizing on lambs, kids, geese, and hares; and even calves and fawns cannot always escape it. If the animal they seize is too large to be taken away, they drink the blood, and carry part of its flesh to their nests; which are always built on the tops of lofty cliffs and inaccessible rocks: and the same habitation serves them for life. They are known in many parts of the continent; and some of the inhabitants, who live near the mountains, are rather pleased than otherwise, at having one of these rapacious birds in their neighbourhood; as, by climbing to the nest, when the old ones are away, they often get a plentiful supply for

their tables, by robbing the young eaglets of what their parents had brought them for food. This retards the growth of the young ones; and, by frequently clipping their wings, they are prevented from flying so soon as others in quest of provision. But it has been remarked, that the old ones, finding them require to be fed so long after the usual time, and that they are still weak and sickly, will either kill them, or leave them to perish with hunger.

*Maria.* It would then be a good thing to take the young eagles themselves, mamma; and either bring them up tame, or kill them, to prevent their parents forsaking the nest.

*Mrs. Smith.* As for taming them, I should be much afraid to try the experiment, as I should think their sanguinary nature would never quit them. But I have heard of some that have been brought to be attached to their feeders; and thus rendered highly serviceable in hunting wolves and other beasts of rapine, as well as procuring game and food for the family. They are very long lived, and in time their feathers



grow white with age; such also is their colour when young; though, when come to maturity, they are either yellow or a light brown. They are known to live a hundred years, and it is said they do not then die of old age; but, from their beaks turning inwards, they are unable to eat, and so perish with hunger. They are very powerful in flight, and mount to a great height. Their sight is exquisite; and they disdain small plunder, or to share in what another has taken. The female seldom lays more than three eggs, which are thirty days in hatching. Some authors affirm that there is a vast variety of eagles; though Buffon has reckoned but three; the golden, the common, and the little eagle.

*Maria.* And vultures are of much the same nature: are they not, mamma?

*Mrs. Smith.* So far as being very rapacious, and birds of prey, they are; but very different in their shape, and method of flying; as the latter are very indolent, and after eating are often unable to move. Their scent is very acute; and in Egypt they are

thought of great service in devouring the carrion and other flesh, which would otherwise corrupt the air: they are protected there for that purpose. They are also of great use in destroying the eggs of the crocodile.

But the falcon and hawk are the only birds of prey which I can at present think of, in the account of which there is any thing amusing. These, in former times, were a necessary appendage to a gentleman of large estate; with whom falconry and hawking were as favourite amusements as hunting with dogs is now. The way in which these birds are trained, I remember to have read, and thought it entertaining. Some are taken from the nest, and are as you may suppose, the easiest tamed; these are called nias; but those which are caught full grown and wild are haggards, and are kept without food, and in the company of the falconer, till they become tractable. His principal care is, to teach them to settle on his wrist, to fly off when he gives it a peculiar motion, and to return to this station at his call. They are



taught to know his voice, his singing, or any other signal he may make use of. When first the ability of one of these birds is tried in the field, it is tied to his arm with a string of considerable length, that it may not fly away when recalled : nor is it released from this confinement till completely disciplined. To induce it to return the sooner, the falconer is furnished with a lure or drawer : this is a piece of red cloth ; to which are fastened the bill, talons, and wings, of some other bird, as well as a piece of that flesh on which the hawk has been accustomed to feed ; and this, with the call of their master, easily brings them back.

The falcon, to tame which the same means are used, is made to fly at larger game, and even on hares and rabbits. After a month's exercise in this way, in a garden or enclosed ground, it is carried to a more open field, and suffered to fly at liberty without the string : but then it has little bells tied to its feet, which, by their sound, inform its master of its motions in its flight. As soon as the dogs have started the game they are in quest

of, the falconer takes off the cap of leather with which the bird is hood-winked, to prevent its seeing any other object than that he would have him discover, and throws the bird into the air; and then the amusement is, to see the variety in his flight, till at length he soars far above his prey; which, deluded by the distance of its enemy, imagines itself in safety; till at last he darts upon it with the rapidity of an arrow, and brings it to his master; by whom he is at that moment recalled, and who repays him in these his first essays, with the neck and entrails of the bird he has caught. This reward, and the caresses he meets with from his hands, and those around him, prevents him from “bearing away the bells,” as it is termed, when they do not attend to the recall, but fly off with the game; which is sometimes the case, if they are allowed to fly unconfined too soon. When taught to pursue hares, or rabbits, it is said to “fly at the fur;” and this is taught them by having the stuffed skin of one of these creatures tied, at a proper distance, to the girth of a horse, on



which a man rides at full speed ; when the bird, supposing it to be in flight, pursues it : and, to attract it still more, a piece of chicken's flesh is affixed to the skin of the animal.

*Maria.* I dare say, the expression which we often hear of such a one, who is handsomer or better dressed than others, "bearing the bell amongst them," is taken from this of the falcon and hawk : do not you think so, mamma ?

*Mrs. Smith.* Very likely ; as it is certainly used when the persons alluded to are far above their companions, in whatever they possess.

*Maria.* The kite, mamma, is a bird of prey.

*Mrs. Smith.* Yes, indeed ; our poultry often find it so ; though there are not many instances of its depredations around us. But to enumerate all the different species of birds would be endless. They are commonly divided into birds of prey ; birds of passage, that is, such as migrate from one country to another ; birds of the poultry kind ; singing birds ; and those which are amphibious :

there are also birds of the night, such as the owl and the bat. Of the smaller kind one may read many interesting particulars, in almost every book of natural history. But, among the natives of our island, I know of none so remarkable for its vanity and mischievousness, as the magpie : it will seize on smaller birds, and even on a little chicken if separate from its mother : nothing seems amiss to it, as it will share with ravens in their carrion, and with rooks in their grain. It is continually restless, chirping, and stretching out its neck, as if wishing for combat. It may be taught to speak, and is often tamed and kept in a cage for that purpose. But its nest when wild is the most curious, as it is composed of branches from the hawthorn tree, the thorns sticking outward, but well united, and nicely plastered with mud and clay : the inside is lined with roots and wool ; and its shape is round, with only a little hole that serves for an entrance to its owners. They are very careful of their eggs ; and if they perceive that in their absence any one has handled them,



they are said to remove them in their claws to some other place of safety.

*Maria.* All creatures have this peculiar tenderness for their young, even before they appear, except the ostrich, which we were at first speaking of.

*Mrs. Smith.* Yes : and that of the little lapwing, which is also a bird of passage, is not the least remarkable. Her art to allure men or dogs from her nest, which is made on the ground, and without much trouble, consisting only of a few leaves or some long grass, is very amusing. She boldly runs to meet her enemy ; and, when near, darts upwards, with a loud scream, as if just disturbed from her nest ; but which she has left at a considerable distance ; and thus she flies round her invader, whining and fluttering, apparently in great anxiety, till she has drawn him from the spot where her treasure is. If attacked by dogs, she flies heavily before them, as if maimed or wounded, but never towards the quarter her nest is in. The dog pursues, hoping to seize the parent ; and, when she has by her feigned imbecility drawn him to a proper distance,

she puts forth all her power, and flies off, far above the reach of her astonished pursuer; which is thus disappointed of his aim, in both the old and the young.

*Maria.* Poor thing! I am glad of it. But, if you are not quite tired, mamma, before we give up the subject of birds, be so good as to tell me if it is true that the pelican feeds her young with the blood drawn from her own breast.

*Mrs. Smith.* It has been so affirmed; but this is not the case. The pelican is one of the largest of the water birds. It has an enormous bill, under which is a large pouch, which when it is empty is not seen, as the bird has the power of gathering it up within the under chap of its bill; which is so formed as to open, and admit whatever is to be put in this bag. When the bird has fished with success, this is extended to a great size, and it is said to be capable of holding twenty quarts of water. When filled, this pouch or bag hangs down; and in this it carries home fresh food for its young; and pressing it on its breast, the blood of whatever it



contains flows through the bag : from hence arises the story you have heard. It is asserted that the pelican will hide as many fish as will serve sixty hungry men for a meal, in this pouch. Vast numbers of them are killed in America for the sake of their bags, which are converted into purses and other things ; while the Spanish ladies adorn them with gold and embroidery for work-bags.

*Maria.* I should like much to have one of these work-bags, and should esteem it a great curiosity. But I see some one coming to interrupt our conversation : it is one of your acquaintance, mamma ; I hope you are not so tired of talking to me, as not to enjoy her company.

*Mrs. Smith.* No, my dear : but I shall not be sorry to change the subject of our conversation, and to let another bear the greatest part in what is to come, as I have done in this. Let us go to meet our visiter.

## CONVERSATION VI.

*Elephant, Camel, and Lama. Conclusion.*

**MARIA.** Do you not remember you were to give me some account of the elephant and camel, mamma; those two remarkable beasts of burden, and which are so useful in the countries they inhabit?

*Mrs. Smith.* I don't know that you are right in calling the elephant a beast of burden, though it is often used in carrying such; and, when completely tamed, becomes gentle and obedient: it also grows extremely attached to its master, often caresses him, and receives his commendation with pleasure; and every service in its power it performs with the utmost willingness for those who have thus gained its affections. At first view the elephant appears only an enormous mass of flesh, covered with a hard skin, and without



hair; its eyes are small, its ears large, and its trunk is immensely long. If the elephant is fourteen or fifteen feet high, which it often is, his trunk is eight feet, and of proportionable thickness. His tail is short, and has a tuft of hair at the end. This beast has the appearance of great stupidity; though, where its powers and abilities are known, it is justly celebrated for its sagacity, which is very striking. Though larger than any other animal he is neither fierce nor formidable; but will permit a little child to play with him, or guide him, without injury. It never exerts its strength but when attacked by an enemy.

*Maria.* I have read many instances in which they have resented an affront, yet without putting forth their whole strength so as to do the person any real injury; in particular that of the tailor, who used to notice one elephant more than the others as they were led by his house to the water side; and often gave him fruit, or other nice things, when the animal put his trunk in to receive it: but, one day, the tailor, from idleness I suppose, and having nothing to give him,

pricked his trunk with the needle with which he was at work. The elephant felt the injury; and, as he returned, he threw a quantity of water, which he had collected into his trunk, entirely over the tailor, his work, and his shop, and completely revenged himself, by wetting him through.

*Mrs. Smith.* And a very good way of revenging himself it was, as it did not materially hurt the tailor; though, I have no doubt, it made him careful for the future, how he played with the feelings of one so much stronger than himself; and, I dare say, the elephant from that time took no further notice of him.

*Maria.* I believe it is said so at the conclusion of the story. But I have interrupted your account: pray, mamma, proceed.

*Mrs. Smith.* It is remarkable for its sense of hearing, smelling, and feeling, all of which are exquisite; especially the latter, which lies wholly in the trunk, and which your story fully illustrated. It can carry on its back three or four thousand weight; and on its tusks alone, which proceed from its upper



jaw, and are its weapons of defence, sometimes five or six feet in length, it can support nearly a thousand: but, when these animals are old, their tusks are such a burden to them, that they are obliged to make holes in the walls of their stables to support their weight. At the extremity of its trunk, which has a partition running through it, like other nostrils, and two holes at the end, it has, between these holes, an extension of skin, about five inches long, in the form of a finger; and with this it can take up a pin, unlock a door, untie a knot, and has even been taught to write. By sucking up its breath through its trunk, it is enabled to lift and sustain a weight; and through this it drinks, smells, and breathes, and will grasp things of the largest size with it. In their wild state, they are said even to pull up trees by the roots with this extraordinary weapon; which, though so strong, is likewise very pliant, and capable of being shortened or lengthened at the pleasure of the animal, which twists and turns it into a thousand forms, and when tame will allow others to do so also. It takes up its food

with the finger I have before mentioned, and bending it under its trunk, puts it into its mouth: with this also it gathers flowers one by one, forms them into a nosegay, and seems charmed with their perfume, especially that of the orange flowers.

*Maria.* But this is from imitation, mamma: don't you think so?—from having seen its owner do it. It would never think of making a nosegay in its wild state.

*Mrs. Smith.* Very likely not; but as we see monkeys are capable of performing many things which they have seen men do, so, also the elephant acquires the same ability; not but what in itself it is far superior to the monkey tribe; and its pursuits, amusements, and habits, are so likewise. It appears also delighted with music, and readily learns to move in measure, to beat time, and even to join its voice to the drum or trumpet. Formerly, the Africans used them in war; and they supported towers on their backs, full of armed men; who from thence discharged their arrows on the foe. They gather up a quantity of water into their trunks, and often



keep it there for some time, either to cool themselves, or for their own diversion, by throwing it into the air as a fountain. It cannot live far from water, or be long without drinking. It travels sixty miles a day with great ease, and its ordinary pace is as fast as a horse can trot, though, when pushed, it equals one at a full gallop. While young it kneels down to receive its rider, and executes his orders with eagerness and attention, though without a precipitate haste; and appears pleased with the trappings with which it is adorned. It never breeds when in a state of servitude.

*Maria.* How then do they tame a sufficient quantity of these animals, mamma? for I should think, when at their full size, and in their wild state, it must be very difficult as well as dangerous to take them.

*Mrs. Smith.* This is done by driving the female into a strong enclosure, made in the midst of the forest, where she is taught to cry to the males, which are attracted by her voice, and easily entrapped in the snare which was laid for them: here they are kept

till their anger subsides ; and in a fortnight's time they are so far tamed as to be approached without danger and taken to the stalls.

*Maria.* In India, mamma, the ladies ride upon elephants, do they not ?

*Mrs Smith.* Yes ; they are borne in their palanquins on their backs ; and often move from one place to another by their means : though, if their journeys are but short, they are more frequently performed on the shoulders of their slaves.

*Maria.* I think I should prefer the elephant, if I were sure it was completely tamed, as a conveyance. It would be repugnant to my feelings to make my fellow-creatures toil through the heat and sand of that country with me and my appendages as a burden.

*Mrs. Smith.* Were you there, no doubt you would soon be reconciled to it, as others are. But I will now tell you what I know of the camel ; which is a still more useful animal, as being not so unwieldy, and more easily procured. The dromedary and camel are alike, except that the former has two humps upon its back, and the latter only one.



The camel also is by far the strongest, the largest, and the most numerous in its kind. It is spread over the desarts of Arabia, Africa, Tartary, and a great part of the East Indies; and seems formed for countries where the shrubs are plenty and water scarce. Its feet are proper for travelling sandy desarts, but quite unfit for marshy places, where it would continually slip, and inevitably die beneath its burden. It is by the assistance of these animals, that the Arabs pass those desarts which without them would be impassable, neither could they subsist or traffic without them. Their milk and flesh yield them food; their hair, which is shed once a year, supplies them with clothing; and, if in danger from an enemy, their camels convey them a hundred miles in a day; and it would be in vain for a whole army of the invaders to pursue the flying troops. Camels are easily instructed how to take up and support a burden, which is increased every day till the animal is come to its full size, when it is nearly six feet high. Its neck and tail are long, with slender legs, and small hoofs. In

Turkey, Barbary, Persia, and Egypt, all commerce is carried by camels. The merchants unite in a body for security, and this is called a caravan, sometimes consisting of ten thousand persons, and a still greater number of camels.

*Maria.* Dear, what a number! two or three such would quite enliven the desarts, I should think.

*Mrs. Smith.* O! you forget the vast extent these desarts are of, and how many days they are in passing over them; during which, perhaps, they see no other party but their own; except they are attacked by the wandering Arabs, who live upon the plunder they take from the caravans: but it is to be protected from them that they travel in such numbers, and often escape their depredations from that cause. But, to continue my account, when a camel feels itself loaded beyond its strength, it refuses to rise from the ground till part of its burden is taken off: the largest will carry one thousand pounds weight, and sometimes twelve hundred; but a dromedary cannot sustain more than six or seven hundred. In these long journeys they



go between thirty and forty miles a day. They are the most temperate of all animals, and travel long without water. Every evening they stop at some place of verdure; where they are allowed to feed at liberty, and will eat as much in one hour, as will suffice them till the next evening. They prefer the coarsest vegetables; but their drivers feed them with balls of meal, or barley, as affording them more nourishment. They are very sagacious, and frequently recollect the tract they have been used to travel in, when their guides are at a loss to find the road; and when they are within a few miles of their baiting place, will increase their pace to get to it. They discover water at the distance of a mile and a half, and will hasten towards it long before their drivers perceive it is near. Like the elephant, it is fond of music, and appears enlivened by the pipe; for which reason, this instrument always makes part of their driver's equipage.

*Maria.* How long does this useful animal live, mamma?

*Mrs. Smith.* From forty to fifty years, about half the age of the elephant. Their humps grow larger in proportion as they are well fed. The female goes with young about a year, and produces only one at a time. There is another kind of swift dromedary, used only to ride on, and to carry couriers; who will travel over barren sands at the rate of a hundred miles a day, for nine days together. The lama also, which is every way smaller, may be considered as the camel of the new world, it being known only in America; where, in the provinces of Peru, they form the chief riches of their owners. Their flesh is excellent, and their hair, or rather wool, is made into clothing. They are very sure-footed, but heavy, and will carry burdens of a hundred pounds with great safety, over the most rugged roads, descending precipices, or mounting craggy rocks where it is impossible their drivers should accompany them: this has given them an affinity to the goat; and by some authors they are placed among that kind; but they have the faces of camels, and are about the size of an ass.



Their head is small, and their neck long. It exceeds even the camel in temperance, and of all animals requires the least water. They are chiefly used in carrying the riches of the mines; and it is said that above three hundred thousand are constantly employed in this service. The only weapon it has to defend itself, is its saliva, which it spits out on every occasion; and whenever it falls on the skin it causes an itching. In their wild state they are seen in flocks of two or three hundred: on perceiving a stranger they seem to regard him with astonishment; and then, with one consent, snuffing up the air, they speed away to the tops of the mountains, and are soon beyond the reach of any pursuer. There are other animals of this kind in America, still smaller and weaker: but I shall forbear acquainting you with more, as, in a few days, I mean to furnish you with books, in which you may search for yourself, and take a more accurate survey of the animal creation than I am able to give you from memory. I only wished to excite your curi-

osity, and shall leave more able delineators than myself to satisfy it.

*Maria.* You are very kind, my dear mamma: and instead of regretting that I have not been encouraged to read the books you mention at an earlier age, as many of my young companions have done, I think I shall find reason to thank you for the deprivation, as I shall enter into them more fully and understand them better; particularly after these preliminary conversations with you, as you are pleased to call them, I shall likewise be more likely to remember them.

*Mrs. Smith.* Which, I dare say half your young acquaintance do not: but having read these books as children, they think it quite sufficient to say they have done so; and though perhaps not one third of the information they then hurried over is imprinted on their memories, they feel an aversion to the *task* of reading them again; for as such they in general consider it. Thus the very design of their parents in placing them in their hands so early, is frustrated: for, instead of giving them a taste for the enjoyment of na-



ture and its works, they are tired of it before they understand it. Thus it is also in many other instances: children are in general brought so forward, and have so much knowledge *thrust* into them, if I may use the expression, and such a variety of things are taught them, that the mind is not capable of receiving and arranging all as it ought, or the memory of retaining it. They are therefore properly acquainted with no one branch of their education; unless that one has gained the ascendancy over the rest, by the learner's having a natural bent of genius towards it, such as music, drawing, or the study of history. But as multitudes of our race are not distinguished by any particular taste, they remain, as I said before, with a little knowledge of all, and an accurate acquaintance with none.

This is not the way I have pursued in your education; and though you are now nearly fifteen years of age, I am not ashamed to acknowledge that you are ignorant of natural history; except as you have learned it from common observation, and what you have

lately heard from me. But you are not without a more perfect knowledge of other things, and which I thought necessary to be acquired first: and in the course of a few months, by attending to what you read, and which, at your age, you will have no difficulty in understanding, you will be thoroughly acquainted with all that is requisite for you to know on that subject. I have also compiled a little *DICTIONARY*, without much time or trouble, of those words which you will propably often meet with in the course of your studies, and which will save you the trouble of searching for the meaning of them in larger ones.

*Maria.* Thank you, dear mamma. I shall be impatient till I receive the books; and you will give me leave to read them to you, will you not?

*Mrs. Smith.* Sometimes; and to yourself also: and be sure to inform me if you discover that in any thing I have related to you, I have made a mistake, or been inaccurate. And now for my dictionary.



*Quadrupeds*, animals having four legs.

*Bipeds*, animals having two legs.

*Gregarious*, feeding in herds.

*Erratic*, wandering.

*Ruminating*, chewing the cud.

*Cartilaginous*, tough, consisting of gristles.

*Torpid*, a sleeping state.

*Ornithology*, an account of birds.

*Oviparous*, bringing forth by eggs.

*Viviparous*, bringing forth the young alive.

*Antennæ*, horns or feelers.

*Aurelia* or *Chrysalis*, the covering in which all worms produced from flying insects wrap themselves, before they come to have wings themselves.

## CONVERSATION VII.

*Stones, common and in quarries; and precious Stones.*

**MARIA.** I shall be very glad, my dear mamma, when summer comes again, that we may once more enjoy our walks; and among the various objects which attract our attention find subject for inquiry.

*Mrs. Smith.* We need not go abroad for subjects, Maria. There are many things of which you are ignorant, and a cursory view taken in a walk would not make you less so. Let us try if we cannot find something from which you may gain information without leaving the fire-side; and the chimney-piece has already given me a subject. You have often heard people remark how very stony our ground is, and wonder that we have such good crops as the land about us gene-



rally produces; while the farmer will tell you that those very stones, which others think so hurtful, are of use to the corn: for the earth is so light, that, were it not for the weight of the stones among it, it would spring too fast, and expend its strength before it came to its full growth, besides the danger of being blown away by the wind, or the earth washed from it on the sides of the hills. In both these instances the stones are of use, to stop the earth in its progress when a heavy rain comes, or to hold it more together when the sun has dried it almost to powder; and, were it not for the many stones, the roots of the corn would often be bare. Tell me, therefore, if you know the nature of stones, how they came there, and, though so often picked off the land, yet more and more continually appear.

*Maria.* No, indeed, mamma, I cannot say that I have ever thought about it; and yet, now you mention it, it is extraordinary that so many should remain after such constant picking as poor old neighbours William and Sarah, and I dare say twenty

others, are engaged in. I have remarked too, a great many lying on the very top of the downs on the turf, as if they were brought there: but surely no one would take that trouble!

*Mrs. Smith.* I should think not: but it is because they do not take the trouble of bringing them away, that so many are seen there. They are there as in cultivated grounds, just within the surface of the earth, and are washed out of it by the rain, where they lay, and the turf grows round them: moles and ferrets also, and other animals who live under the earth, cast up the smaller ones when they are making their subterraneous abode.

*Maria.* But do, mamma, tell me something of their nature: do they grow?

*Mrs. Smith.* Yes, there is little doubt of it; and several authors assert, from observations which they have made, that they vegetate and grow like plants, at least those which are loose in the ground do; whilst others, which are found in quarries, are fed



and enlarged by the different strata running through them.

*Maria.* What do you mean by strata, mamma?

*Mrs. Smith.* Strata are those layers, or rows of earth, of which the quarries are formed. You know that the earth is not all alike: some is of a clayey nature, some darker than other, some fenny, and some sandy; while other, like ours, is dry and light; and this, as you may suppose, makes a difference in the stones; and often in the same quarry you may find them vary both in grain and colour. The stone which is generally used for building, and of which there are numerous quarries in different parts of the kingdom, while in the quarry may be cut with ease, and made smooth and fit for use; but as soon as it is brought into the air it hardens, and gains that stability which makes the houses built with it durable. This is a proof of the kindness and wisdom of Providence, who has formed all things to our use and advantage; as, did it not acquire the hardness it does in the air, it would

not be fit for building; and was it as hard in the quarry, we should not be able to cut it and form it for that purpose. There is also a freestone, brown and sandy; the lime or chalk stone, which can easily be powdered; the whetstone, which is a harder kind of freestone; and the flint, which can never be cut smooth, and emits sparks of fire when struck against another flint, or a piece of steel. The slate is a stone composed of thin lamina, or scales spread one over the other; and the pumice stone is so light as to swim upon the water, and is generally found near volcanoes, and supposed to be formed of calcined earth, caused by the subterraneous fires which occasion those dreadful eruptions. Besides these, there are stones more highly valued; such as marble, alabaster, porphyry, and the granite.

*Maria.* I beg your pardon for interrupting you; but I think I have been told that the touchstone used by goldsmiths, to prove the reality of gold, is a kind of marble.

*Mrs. Smith.* It is the Lydian or black marble. But it would be endless to recount



all the variety of stones : they are without number ; and I have not yet done with our first subject, the loose stones in the fields. Much as you may wonder at the hypothesis,\* it is generally imagined that these were scattered over the earth, and brought to the tops of the mountains by the great influence of the waters at the deluge, or flood, mentioned in the seventh chapter of Genesis ; by which the whole universe was covered, and its several parts shaken and disjointed, as we may call it. It can no otherwise be accounted for, that a variety of sea shells and other marine productions, have been found on the highest hills, and in places where the sea could never come, unless brought here by that great and terrible display of God's wrath. These stones then were first scattered over the earth ; and as they grow either by vegetation, or by the mixture of the earth by which they are fed, they must naturally increase. It is no where doubted that the shells of fish grow by means of a nutritious juice, conveyed through the

\* A system founded on supposition.

narrow channels of these hard bodies: and why should not the stones grow in like manner? With these, called boulders, it is customary to build rough walls; and lately we have seen very pretty houses erected with them, aided by a few bricks where they are wanted. This enhances the value of these common stones, and makes our old friends William and Sarah get more for their daily work than they formerly did, as they now sell them to the builders at so much a load.

*Maria.* These stones then you think have been there from the flood; or rather, if there had been no flood, the ground would have been without them.

*Mrs. Smith.* I cannot tell, nor can the most correct naturalist determine; but on the tops of high hills, whose soil seems very unfit for stones, it is thought probable that they would not have been but for that cause: and it is observable by every one, that notwithstanding the fields about us are so often picked, yet as soon as the first hard shower comes, there are as many stones as ever; which gives room to suppose that they grow



and vegetate, though in a manner unknown to us.

*Maria.* Proceed now to tell me something of quarries, if you please, mamma; how can they be formed in the earth?

*Mrs. Smith.* I have heard it is by petrification, and that in three kinds of ways: as, first, by statactites, or spars in the form of icicles; which are formed by the sandy or other matter which drains through the strata, in little chasms or fissures of vaults and caves, and as these statactites or grains are continued; though stones gradually increase in size, as they are covered with fresh matter. You may have remarked, that water will, in time, leave a sort of incrustation on the sides of the pipes through which it passes; and in like manner does some water as it drains through the cavities of the earth, and in time forms quarries.

*Maria.* But are not these quarries often dug out, mamma, and no more found in them?

*Mrs. Smith.* Very true: and this I should suppose is when they are expended

faster than the stones can be formed and increase. The third way of petrification is by penetration or insertion, and this is the most common; as, for instance, a bed of sand, clay, or other earth, may be petrified by the entrance of those salts and particles of earth which the water collects in its passage: and though it may with these ingredients pass through a body of gravel or sand, yet when it comes to a more compact earth, it will fix those, and link the several parts of this earth together. Thus a bed of fine sand may be transformed into a mass of freestone, and one of earth and sand together may be changed into a stone more or less hard; and in time form the quarries from which they are dug in such quantities.

*Maria.* What are the ingredients which you talk of, mamma, as mixed with water to compose the first sort of petrification; or that formed by statactites, or drops which drain through the earth, and enlarge the stone as the drops increase?

*Mrs. Smith.* Water, oily juices, salt, (with which the whole air is in a manner im-



pregnated,) and sand, loam, and clay; though the water is properly only a vehicle to convey the other articles. All stones are formed much as our houses are constructed: our walls are composed of hard masses and cement, such as mortar, which of itself would not form a wall; neither would bricks or stones laid one upon another be of any duration; whereas the cement, by filling up the interstices or void places, keeps them fixed; and, by insinuating itself into the pores of the bricks, or stones, it incorporates with them, and forms a solid wall: and thus are stones formed according to the first kind of petrification, except that the materials are considerably smaller. Sometimes particles of sand, clay, or loam are cemented together by salt and bitumen, and sometimes salt and clay serve as a cement to the sand. Some clay or loam will of itself congeal and harden; so that there is no giving an exact account of the formation of the many different stones which are continually to be met with, and vary as the different ingredients are differently mixed. The second sort of petrification is composed of thick glutinous matter,

in single particles or in clusters; and most precious stones are supposed to be formed in this way. They are found in deep cavities of certain rocks, where the water can convey scarcely any other matter than these little lumps, composed of salt, sand, and a drop or two of bitumen: these coalesce and harden, and thus form stones of different colours and texture: dark or opake, when the clay is predominant; spotted or veined, as it chances other particles mix with it; and transparent, when bitumen or the finest sulphur is predominant. When these salts cement together those grains of sand which are most brilliant, pure, and uniform; and when these sands are so placed that the finer grains of one exactly fill up the void places of the other; the stone or diamond thus formed is without imperfection, and is called of the first water: but when it is irregular, and any void place left between, it is accounted as a flaw in the diamond.

*Maria.* Are diamonds and other precious stones made of sand then, mamma? you astonish me!

*Mrs. Smith.* Naturalists tell us so; and



that sand, if seen through a microscope, is of different colours; which accounts for that variety seen in precious stones. Flints, with other irregular hard stones, appear to be formed in the same way. The water, as it passes over strata of marl, chalk, clay, or rock, finds different cavities, in which it deposits the salts, oils, and fine sand, which it brings with it. These harden, as in a mould, and assume the shape of the cavity in which it lies: where there is a greater proportion of salt, or sulphur, which, you know, are substances abounding with fire, in the composition, the stone formed is flint.

*Maria.* I begin to see more wonders in stones than I expected: I have been used to look at them without examination, and indeed without a thought; but for the future I shall bestow some reflection on them, and I hope recollect what you have told me concerning their formation.

*Mrs. Smith.* I am glad to hear you say so. I will now proceed to stones which are of more value, and yet do not rank as precious ones, though by far more useful than

they are. Marble is one of them ; and this is dug out of pits or quarries, and though of so hard a nature, will take the most beautiful polish ; for which reason it is used for ornamenting our houses. There are marble quarries in Derbyshire, as well as in other parts of England ; besides many in France, Sicily, and in various places abroad.

*Maria.* But if marble is so hard, mamma, how can it be cut and formed into busts, statues, and the ornaments of our chimney-pieces ?

*Mrs. Smith.* Some of these are made of a kind of artificial marble ; which is marble pulverized or beat in a large mortar, and mixed with a proportion of plaister well sifted and worked up with water : it is rubbed with freestone, to polish it, and afterwards with pumice stone, and then with emery. Porphyry is a still harder kind of marble, which the ancients either had the art of softening, or could temper their steel better than we can, to cut it, since it is now esteemed a work of the greatest difficulty. The quarries of porphyry have been long since lost, which makes what is now seen of it more valuable.



It is of incredible hardness ; though it is probable that time and the air have in their measure contributed to make it so. Alabaster is a sort of stone whose basis or foundation is burnt earth, otherwise calcareous earth. This renders it transparent ; and, before the discovery of glass, it was used for windows. I have read, that, very lately, if not at present, a church in Florence was lighted with thin plates of alabaster instead of glass. There are three kinds ; white, which is the best, yellow, and variegated : each of these is soft enough to be cut with a knife, and will admit of a fine polish.

*Maria.* Before we conclude, do say something of the loadstone or magnet, mamma, though it may not properly belong to this subject.

*Mrs. Smith.* No : it rather ranks among metals ; being a stone partaking of the nature of iron, and is usually found in iron mines, sometimes half iron and half magnet, heavier and harder than the iron itself, and often in very large pieces. It has many extraordinary properties ; but the most distin-

guished are, its pointing to the two poles of the world, and its power of attracting iron. It will also communicate these properties to this metal, when it is rubbed with it; from whence arises the mariner's needle, the use of which you are not ignorant of. Its power of attraction was known to the ancients, but its directive power was not discovered till a later date. The chief use the ancients made of it was for the cure of wounds and sore eyes: but we have found out a much more happy way of using it, to direct us on our voyages.

*Maria.* And now, mamma, just rehearse to me the names of the different stones called precious; for I must confess I am acquainted with but very few, not having any in my possession, or been often in the shops where they are sold. I have read an account of them all, but do not perfectly recollect.

*Mrs. Smith.* I think you must require this, my dear Maria, merely to lengthen out the conversation, as surely you must be already informed of all I can relate respecting precious stones. But I shall be very con-



cise in my account, and, as diamonds are ranked among the first, begin with them. Diamonds are found in the kingdoms of Golconda, Vesapour, and Bengal; and in the island of Borneo in the East Indies. They are of considerable hardness, though not so much so as is fabulously reported, that they will bear the stroke of the hardest hammer without breaking: I believe few people who possess them would choose to try the experiment. They are found in two principal mines, and in two rivers. The miners who gather them are obliged to work quite naked, or with a very thin covering; and have overseers constantly inspecting them, lest they should conceal any, which they sometimes effect, by swallowing them when unobserved. The diamond was by the ancients called adamant. Rubies rank next in value, and are found only in two places in the East Indies, the kingdom of Pegu and the island of Ceylon; and also in Bohemia and Hungary, where they are often found in a mine of flint, enclosed within these. Different names are given to the ruby according

to its colour, and if it exceeds twenty carats in weight, it is called a carbuncle, the name of an imaginary stone among the ancients; which they pretended was taken from the dragon's head, and that it gave light in the night. The garnet partakes of the flame colour of the ruby, and is probably a species of that stone; and the hyacinth or jacinth is of the same nature: this stone has the reputation of being useful in medicine, and it bears cutting or graving for seals remarkably well. The amethyst is of a bright purple colour bordering on red. The emerald is green and transparent, and in hardness next to the ruby: the ancients attributed many wonderful virtues to this stone also, but we value it only for its beauty. The beryl is of a sea-green and the sapphire of a sky-blue colour, both beautiful in their kind: the latter is mentioned in Scripture, and is used to represent the utmost purity; it is exceedingly hard and transparent. The topaz or chrysolite is of a deep yellow colour, like gold, and ranks among the third order of gems; it is found in the Indies, Bohemia, Ethi-



opia, Arabia, and Peru, and will take a high polish. The opal seems possessed of all the various colours to be found in other stones, and is much valued. Pearls are ranked among the number of precious stones, though found in the body of a testaceous or shell fish resembling an oyster: it is much larger, and is by naturalists called *pinna marina*. Each fish commonly yields ten or twelve pearls; which are thought by some to be formed like other stones in animals, or those in the bladder and kidneys of men; and that they are apparently the effect of a disease in the fish, formed from an extravasated juice overflowing the vessels in which it circulates, to form, thicken, and extend the shells. They are caught in the East Indies, on the coast of Persia, and in the American sea, as well as in some parts of Europe, and on the coast of Scotland. The fish adhere strongly to the rocks on which they grow; and men dive into the water for them at two seasons of the year, Spring and Autumn. Most of the transparent stones are ranked under the classes of agate and jasper; which are

thought to be of the same nature, except that the former is harder and more transparent: these both vary their colours without end; and there are often found on them sketches of flowers, trees, and other natural figures, which the hand of art easily perfects. Of transparent stones, the chrystal is the most common, some of which come near to the diamond in lustre and clearness: it is produced in several mountains of Europe and Asia, and valued in proportion to its transparency. The cornelian is opaque, or only half transparent, of a pale red colour, and sometimes bordering on orange. The onyx is also of this kind, and of a grey colour; and the turquois, inclining sometimes to green and at others to blue. The lapis lazuli is studded with gold on a blue ground; and the aventurine, which has the same specks on a brown ground. And now I have given you all the information I can respecting stones: it is but small, I own, yet more than you seem to have known before.

*Maria.* That it certainly is: and I find the saying true, that the more we know, we



see there is still more to be known; and my curiosity is now excited to ask a thousand other questions.

*Mrs. Smith.* You must defer them then, my dear girl, till another time; for I am going to be busily engaged the rest of the morning. Let me just add, that our great Creator has made nothing in vain; and even those things which we think hurtful are proved to be the contrary: as, for instance, in the stones scattered over the fields; and those holes and cavities that make the earth look so frightful in many places, serve for pipes or strainers to convey the water and other ingredients over the different strata which form the stones; without which we should have no quarries, whose various natures I have attempted to describe. Even the smaller holes occasioned by the moles and ferrets, and of which the farmer complains, are of use as inlets for the water, with salt and oily juices, to those smaller masses of strata from which no doubt a continual succession of those stones is formed, which are daily turned up by the plough and other instruments of husbandry.

## CONVERSATION VIII.

*Fossils, Sulphur, Gunpowder, Salts, Sand, Clay, and Loam.*

**MARIA.** Are you at leisure now, mamma, to answer a few more inquiries, which I feel inclined to make?

*Mrs. Smith.* Yes, my dear, and quite willing; and while we pursue our work, or lay it down, if our conversation gets more interesting than our needles, I shall be ready to answer all your questions, as far as in my power.

*Maria.* I will thank you then to tell me something more of fossils: I know that whatever is dug out of the earth is called by that name; consequently, we were on that subject when we last conversed, and you described to me the nature of stones. But I want to know about many others; such as sulphur and naphtha, of which they tell me those



beautiful fireworks we saw lately are made ; and camphire, alum, and nitre.

*Mrs. Smith.* Hold, my dear. Camphire is not dug out of the earth ; but is the gum of a particular tree of the same name, and which grows in China and the isles of Ceylon and Borneo. It is found in little grains at the foot of the tree ; and, adhering together, forms masses of different sizes, which are easily crumbled to pieces : it is sublimated before it comes to us ; that is, refined by fire, and melted with a gentle heat ; after which they run it into moulds of what form they please. It will burn in water, and is accounted good as a medicine, to promote perspiration. But if you wish to know of fossils, you must let me proceed in my account methodically. These, such as stones, metals, and a hundred other materials intended for our use, are, by the wise providence of the Almighty, placed under the earth, sufficiently low so as not to hurt the soil on which we sow our seeds, and yet not below the depth to which we can dig when we want to find them. The oils and juices, whether liquid

or formed into a consistency, which are found underground, are sulphur, bitumen, naphtha, and others ; all nearly allied to each other in nature, but varying in form, colour, and substance, according to the different matters incorporated with them. Sulphur is the most powerful of these consistencies, and is found in great quantities near the volcanoes ; though it is to be met with in almost every place. It is of two kinds, vivium and common, very inflammable, and cannot be dissolved in water : the vivium is gathered near the volcanoes, but the best of this sort is from Quito and Nicaragua in America : the common is used in gunpowder, of which it is the chief ingredient, mixed with saltpetre ; this common sort is found in Holland, Venice, and several other parts of Europe. Bitumen, another species of sulphur, is sometimes gathered underground in brittle masses, very inflammable, and will burn upon the water. Others are found floating on lakes, and some will bubble up out of the earth like a fountain : this is often seen at Pitchford in Shropshire, where, it is probable, are large



mines of it. Some bitumen is so glutinous as formerly to serve instead of mortar; and it is said that the walls of ancient Babylon were built with it. Another sort is so liquid as to burn in lamps instead of oil. Coal may be accounted as a kind of bitumen, and that of England is of great repute in foreign countries. Petroly or petroleum, and naphtha, are oils which run from the bottom of certain rocks, and are only different kinds of sulphur or bitumen, used both in varnishing and medicine: both these will burn on the water, and are often used in Sicily for lamps. Arsenic and orpiment are also ranked as sulphur; they are sometimes found in copper mines, and are often taken from a mineral stone called cobalt: they are both, as you have heard, a deadly poison, against which the best antidote is any thing of an oily nature, or butter and milk in large quantities.

*Maria.* I have listened to your account till my head is filled with combustibles, poison, and instruments of death, mamma. However, now we are on this subject, let me know how gunpowder is made: I have

heard of the powder mills at Battle, in Sussex : who invented it ?

*Mrs. Smith.* I believe it is not known : it is by some said to have been discovered by accident, by a chemist, who had put some of the composition, sulphur, and nitre or saltpetre together with some charcoal, into a mortar ; it chanced to take fire and blow up, which gave him the first idea of it. These are the three ingredients : which must be properly proportioned ; and, when reduced to a powder, mixed with spirits of wine and water, in a mortar, in which it is pounded for twenty-four hours, often being wetted, for fear it should take fire. It is then pressed through a sieve, by which it becomes formed into grains, and when dry the powder is complete. It is the power which is in it, when lighted or set on fire, which forces out the ball or shot from the instruments of death, which you say your head is so full of. But we will return to things more harmless, such as amber and jet, which are also species of bitumen or sulphur ; as you may perceive by the smell, and the power which amber has of at-



tracting light bodies when heated by friction. Amber is found at the bottom of the sea as well as under the earth ; and was formerly a great part of the revenue of the king of Prussia, who was the sole proprietor of it. Jet is famous for its beautiful blackness, and the high polish it will take : this is supposed to be a species of black bitumen, mixed with chalybeate particles, and hardened by petrification.

*Maria.* What do you think of ambergris, mamma ? does it come from amber ? but the smell is very different.

*Mrs. Smith.* I do not know ; some authors suppose it does, as there are some kinds of bitumen which have a very fragrant smell. It is not improbable that the water, as it pursues its course under the rocks, may meet with certain sweet oils which it incorporates with it : some naturalists are of this opinion. While others take it to be of the nature of musk and civet, and that it comes from an amphibious animal, in the same manner as musk does from the antelope, and civet from the civet cat : but the great quantity of ambergris which is often found together, seems to make this opinion doubtful.

*Maria.* I think I see a great kindness in Providence in giving us those odoriferous oils and juices which you have just described: they mix with the waters, and are exhaled with the vapour; they sweeten the air, descend with the rain, and regale our senses by the sweet smell they give to fruits and flowers.

*Mrs. Smith.* Now, my dear, you do indeed talk like a natural philosopher. I am glad to find you have such a view of nature's production: but you must also remember that it is their uniting with the different salts which they find in the earth, and in all bodies produced from it, that arranges and diversifies their smell according to the several plants and flowers they belong to.

*Maria.* Do give me some account of these salts, mamma; I know of none but that which is in common use.

*Mrs. Smith.* Salt is an ingredient in the composition of all bodies, and seems to be the general cement of the whole system. It is of a hard, inflexible nature, having seven sides or flat surfaces, their extremities ending in points. This is in its natural state, and it does



not entirely lose this figure when broken into the smallest grains. Nitre, which is another name for saltpetre, salgemmel, or mineral salt, well salt, and sea salt, are all originally of the same nature, but vary in colour and quality by being mixed with other matters. Our common salt is obtained either from salt springs, or salt marshes; which are low marshy grounds near the sea, so disposed as to receive the salt water at the swelling of the tide, and provided with banks to retain the same. These marshes are divided into several pits or basins, in which the water remains from the middle of May till the end of August; during which time the sun's rays raise and crystallise the salt. The water is at first warmed by means of reservoirs without the works, but the wind and sun does all the rest; by whose power the briny water first becomes covered over with a slight crust, and afterwards hardens till it is wholly converted to salt. Eight, ten, or fifteen days having thus perfected the salt, it is thrown out, and left in little heaps, to receive its last

state of hardness, while the sluices are open for a fresh supply of salt water. It is of a brownish grey colour when first taken out of the pit; and it goes through a process of washing, boiling, and filtering, before it is fit for use: that which is white or basket salt is purified by fire.

*Maria.* There are a variety of common salts, are there not? such as bay salt, and rock salt: I have read of the salt mines at Cracow in Poland, and should like to visit them; it must be a wonderful place.

*Mrs. Smith.* And very beautiful likewise; as the lofty vaults and high pillars which support them, are all cut out of the salt rock, and by the light of the flambeaux, which are continually burning, appear like so many diamonds and precious stones of different colours. Here many are born, and perhaps never have stirred out all their lives. It has many inhabitants, who form quite a republic among themselves. Generally the people are all healthy, which is not the case in other mines; and must proceed, I should imagine, from their imbibing the air



penetrated with the salt; whose great property is, that it is incapable of corruption, and preserves meat, and every thing placed in it. It gives fertility to lands, and endures the fire and even comes purer out of it. To the nature of salt therefore, and to a stream of fresh water which runs through the middle of the mine, sufficient to supply all the inhabitants, and which is accounted one of the wonders of the place, and certainly is a great blessing, we must attribute their good state of health.

*Maria.* You spoke of salt springs, mamma; where are they?

*Mrs. Smith.* In Cheshire, Worcestershire, Hampshire, and Northumberland, they are found in great abundance, and also in other counties in England: these are fountains flowing with salt water instead of fresh. At Droitwich, in Worcestershire, the salt produced from a spring there supplies all that part of the country, and it is exported from Bristol into other countries. The brine of these pits commonly produces four ounces of salt from a pound of brine.

A saltern or boiling-house is where the brine of these fountains is boiled so as to yield the salt, and also where they prepare the salt brought from the marshes for use. Next to this common salt, nitre or saltpetre is of most general use: that which is natural is drawn from the walls of old buildings, vaulted caves, and cellars, where it is found sticking to the walls. It is supposed to be occasioned by the sulphureous air enclosed within these places. It is also found on the waters of a dead lake in Egypt, called Nitrian Waters. But the most that we have is artificial, that is, drawn from mineral earths. It is allowed by philosophers, that the air is impregnated with a volatile nitre or saltpetre, which is thus communicated to plaister and mortar. It is probable this nitrous air is derived from soot and smoke, which are found to abound with this volatile salt. Dew and rain are supposed to fertilize the earth by bringing down this nitre. It is hence that the gunpowder derives its force; it being computed that saltpetre, when inflamed, takes up ten thousand times the room it did before. Alum



is of three sorts; the common, the feathered, and the Roman. It is clear and transparent, and found in large masses naturally crystallized; though that which we have is mostly artificially prepared. The feathered alum is very scarce, and its name imports its nature; it being in small fibres, white and brilliant, in the form of a feather or tuft. The Roman alum is found among red transparent stones, as the rock alum is among white ones; from which it is gathered in the same way as saltpetre is from old buildings. Alum is of a very astringent nature, and therefore of great use in dying, to fasten the colours; and in the composition of ink, to prevent its sinking into the paper. Vitriol, though commonly ranked as a salt, is more properly a semi-metal, being a mineral substance, whose basis is salt mixed with something metalline: it is of the nature of copper, and found in masses at the bottom of copper and other mines. There is blue, white, and green vitriol, all drawn from a sort of marcasite found in mines, and called pyrites; these are, by boiling and evapora-

there are different kinds of each, but all useful in their degrees and places. The sand, for instance, serves to prevent the water from sinking too deep into the porous earth, which would soon prevent its passage; it also prevents the best soils from hardening, and is of great use in masonry: although loose and incapable of cohering as it is in itself, yet, by a proper mixture with lime, it gives a firmness and stability to our bridges and other noble edifices, which far exceed common mortar, which is now used only for mud walls; while the lime is to be considered as a kind of loam hardened into a stone and burnt in the fire, which reduces it to powder. This composition, which is at first rendered soft and pliable by the water, so as to be spread under the stone, and bear the pressure of the workman's trowel, will dry and harden in the air; which in time ejects the water from it, and incorporates those salts with which the air abounds in its place: these cause it to petrify, and time still adds to its strength and impenetrability. It is sand also which gives strength and consistency to earthen ware,



which is made of clay; but unless mixed with sand would crack if exposed to the heat of the fire or sun. In canals and trenches for water it is of use, as, when mixed with clay, the banks formed of it are lasting and impenetrable: it is also used in sawing stones and marbles, polishing hard bodies, and giving a lustre to the dullest, as well as in making, polishing, and cutting, glass. Thus we see sand is not the least useful part of the earth, though it will not admit any vegetable to grow in it. There are also chalk, ochre, red lead, a variety of boles or different kinds of earth used in medicine, and marl, which produces the finest chalk, and is of infinite use in husbandry. The clay, of which there are various sorts known to naturalists and chemists, is not less useful; some is used to stop bleeding, and sold for that purpose; another, called fullers' earth, is used in the fulling mills to prepare the wool for the cloth; and by the hand of man clay is formed into a variety of ware, as the china porcelain, and delft: these are all made of clay of a superior quality, and in foreign manufactories;

but that which our own country produces, and is more in common use, is not less valuable to us for being more serviceable. The clay, of which all our common utensils are formed that add so much to the comfort and cleanliness of our meals, is found in almost every country, and easily come at. Of loam, or the common earth, I can give you its greatest recommendation, by saying that it feeds us; and this it does by affording nourishment to plants and vegetables, both for ourselves and the animals which serve for our food.

*Maria.* O, mamma, how much these researches exalt our great Creator, in my idea, whose goodness is so variously and yet so uniformly displayed. Each sort of earth, as well as every thing else, is made subservient to the other, and without either of them the rest would not be so useful. I see that I cannot have too enlarged a notion of his Almighty goodness.

*Mrs. Smith.* Too enlarged, Maria, did you say? rather say, not enlarged enough. How should a poor finite creature like you



and I be able to comprehend even a part of his goodness, and this but a very small part too ! Were our lives extended to the end of time, new wonders and new proofs of his bounty, would appear. But these, my dear, which we have been examining, tend only to the preservation and support of our bodies. Could you see or understand even in a small measure what He has done for the souls of men, you would have to deplore how far short you are in gratitude : but this is a subject far above nature or natural history. If the things of nature astonish you, how much more would those of heaven ; and if those are too numerous and extensive for you to comprehend the whole, even of a single branch of it, judge from this what the other must be. None but God himself can acquaint you with these things, so as for your soul to be benefited by them. Your knowledge may be increased, and your mind informed, by study ; but your immortal part will still remain in ignorance as to the best things, except enlightened by Him.

## CONVERSATION IX.

*Mines, Metals, Semi-Metals, and Reflections  
on the whole.*

**MRS. SMITH.** We have not yet explored all the wonders beneath the earth, Maria; for as there are various quarries for stones and different strata of earth, so also are there mines: some of which perhaps you are better acquainted with than with what we have lately examined; for gold and silver, being at the head of them, they are in too general estimation not to be known.

*Maria.* Yet, mamma, as you say you like to be methodical in your account, you surely will not give up our subterraneous researches till we have gone through these also; which, though I may have heard and read of before, a repetition would not be useless to me, who am very apt to forget what at the time greatly interests me.



*Mrs. Smith.* We will begin with gold then ; but as you are already acquainted with the way in which it is found and wrought, I shall only refresh your memory, or rather give you an opportunity of recollecting what you already know of it. It is found in mines, chiefly in America, though there is no quarter of the globe entirely without it ; but Europe has the least of any. It is found either in grains or metalline stones, but chiefly in the latter ; from which it is separated by breaking the stones into small pieces, and then grinding them in a mill : this powder is sifted through several sieves, and soaked in water with a sufficient quantity of Mercury, which absorbs the gold ; the water is then drained off, and the gold again separated from the mercury by distillation, or the evaporation caused by fire. It is afterwards melted and cast into ingots.

*Maria.* And after this I think it is refined by antimony ; is it not, mamma ?

*Mrs. Smith.* There are four ways of refining it ; by antimony, by sublimate, by aquafortis, and also by lead : the two latter

are the most common, as both antimony and sublimate are species of poison, the fumes of which are hurtful to the workmen.

*Maria.* What are they, mamma?

*Mrs. Smith.* Antimony is a metalline stone the colour of lead, and sublimate is composed of mercury and the spirits of sea salt; while aquafortis is a liquor distilled from nitre and vitriol. The use of lead is now more common, as it is done with less expense and trouble: they melt a certain quantity of lead with a less quantity of gold or silver, and the lead absorbs all the impurities of the more perfect metal.

*Maria.* This is certainly an easier way: and as gold is of that quality that the more it has of the fire the brighter and more refined it is, we need not fear that it will mix with such a dull heavy metal as lead; which, by its absorbing all its impurities, puts me in mind of the envious person who is always gathering up the faults of those who shine brighter than himself.

*Mrs. Smith.* Your comparison, my dear, is not unjust: there are such characters in the world; and they, like the lead, are sent



to refine and try the most worthy. But, to proceed in our dissertation, you are not unacquainted with the extreme ductility of gold; how it will stretch and extend itself to an almost incredible length under the gold-beater's hammer, or from the frames of the gold wire drawers. The coin which is highest in value of our kingdom is made of it, though at present little of it is to be seen, owing, as it is said, to its being carried abroad, where more money is given for it than its current value.—I will now proceed to silver, of which I suppose an account equally concise will satisfy you. This is also to be found in every quarter of the globe, and more commonly than gold; nay, we are told that England is not without silver mines, though they are not of consequence enough to be worked. In separating it from the ore, and refining it, the process is much the same with that of gold, and its qualities are nearly the same as to its hardness and extension, which gives it the second place in the rank of metals; of which most authors count six sorts; gold, silver, lead,

wise : this is next in hardness to iron, and is as remarkable for its ductility as gold. It may be drawn out to a very fine wire, or beaten in leaves as gold is, though not quite so fine. No metal is so liable to rust as copper, and this is called verdigris. When it is put over the fire to melt, it is dangerous for the least drop of water to touch it, as it will scatter the melted copper like shot from a gun. Brass is a composition of copper and lapis caliminarus ; bell metal is copper melted with fine tin ; and brass and copper melted together makes what is called bronze. Tin is next in the rank of metals, with which the mines in Cornwall and Devonshire supply the greatest part of Europe ; it is found also in lead and in silver mines, and has been supposed by some to be a mixture of these two metals. Pewter is made by melting tin, brass, and lead together. When speaking of iron, I should have said that steel was a kind of iron purified and refined with fire and other ingredients. Mercury, if properly defined, may be said to be a dry white mineral water : it is found in mines, both in Eu-



rope and America, and has no cohesion with its own parts, or that of other metals. It will not dissolve by fire, nor can it be beat out or fixed; and in whatever manner it is divided, it still retains its fluidity. It has the power of attracting gold and silver; and is therefore much used in refining and preparing these metals; and though it will adhere to them, it is easily separated again. It is also used with tin, to spread over the backs of our looking-glasses.

Zinc is a semi or half metal, not sufficiently ductile to be ranked as a metal; but hard, white, and brilliant; used to purify tin, and to give copper a fine gold colour, which, however, is not very lasting: by some it is called spelter, and is found in the mines of Saxony. Bismuth is another half metal, and is supposed to be tin while yet in an imperfect state: it contains an arsenical salt, very dangerous to take inwardly. There is also an artificial bismuth, made with a mixture of other things; but the real is found both in silver and in tin mines. It is by some called marcasite; but this name, when properly applied, means every or any mineral

body that has metallic particles within it, though not enough to make it worth working it, in which case they are called marcasites : when fully perfected, it is ore. There are marcasites of gold, silver, and copper ; and the loadstone has been reckoned as the marcasite of iron. Tambaque is supposed to be a mixture of gold and copper, though it is said to be found in mines peculiar to itself, and by the people of Siam it is valued above gold.

I can think of no other production of the earth to entertain you with at present, except black lead and ochre, which by some are ranked among the semi-metals : the former is found in stones, black and shining, and chiefly in the lead mines ; it is used for pencils and crayons, besides various other purposes when mixed with other things : it is difficult to melt. Both red and yellow ochre are the same, the former being prepared from the yellow by the fire. There is much dug in England, and it is found both in lead and copper mines, as well as in mines of its own, where it is dug out from beds nearly two hundred feet deep : it is said to consist of a pecu-



liar kind of earth and a metal, particularly iron, mixed together. Its chief use is in painting. Thus have we gone under the earth, and in some measure laid it open to our view : and what, my dear Maria, do you now think of it ?

*Maria.* O, mamma, I can but ill describe my thoughts ; but it appears as if one great first Cause, as the Creator of the world, is made known to us by these various productions.

*Mrs. Smith.* You should rather say that the being of a God is evidently set forth ; but as to the nature of that God, it is perfectly incomprehensible to us : his wisdom, his power, and his goodness, are hereby made known as far as our weak capacities can understand ; but He himself is hid in infinity, which no human mind can penetrate. The Scriptures negatively ask this question, “ Can man by searching find out the Almighty ! ” and it is presumption in those who endeavour at it. The same sacred records inform us that all was made by his power ; and the majesty, the greatness, the uniformity, and

yet the variety, in the work, all conspire to convince us that the same Almighty hand which first formed the world can alone keep it in being, and in the regular order in which it continues.

*Maria.* Do you think it wrong then, mamma, to inquire into these things, and how and wherefore they are made.

*Mrs. Smith.* Not if our inquiries are properly regulated, and to a right end ; if, for instance, we understand by them the nature and use of what is created, though but imperfectly so ; for the Almighty has in every instance stamped that upon his own work which declares it fully known only to himself ; and if this is properly felt and understood by us, we shall be so far from being exalted by what we *do* know, that we shall duly appreciate our own ignorance and incapacity ; and if, instead of being discontented that we are not capable of understanding all, we are thankful that so much is made known to us as is for our benefit, we may hope that our researches have not been in vain.

*Maria.* The psalmist says that all things



declare the glory of God ; and he calls upon every thing in nature, whether animate or inanimate, to praise God : but man seems most of all to fall short in this duty.

*Mrs. Smith.* This proceeds from the fall of man, my dear, and the entrance of sin into the world by the disobedience of Adam, which occasioned every thing in it to take a wrong bias and direct to a wrong end : and yet it is certain that every thing formed does set forth the glory of the great Creator, though since the fall it is but imperfectly seen, and therefore felt by those who most of all ought to acknowledge it. No doubt, the more we observe of these things, the more our minds are bent to admire their wonderful use and construction ; and every man, even the most ignorant and unthinking, is thankful for what he has known the want of : but to them many of the productions of nature are quite unknown, and others are of no value in their estimation, because they do not know the *use* of them ; yet to those who have properly inquired into their use and dependance upon each other, they afford a source of pleasing

wonder; which, in a mind any ways reflecting on the benefits derived from them, must produce gratitude, though far short of what it ought to be. Even in things apparently hurtful, the goodness of God is no less conspicuous, since an antidote to each is readily found; and those insects and animals by which our property is sometimes injured, or destroyed, make way for a fresh assortment; without which the various materials of which they are made would be useless, and the people unemployed: did nothing about us ever wear out, how many people would have nothing to do. And this brings to my mind an observation, which struck me on hearing some old people say, "it was not when they were young as it is now; the fashion of things did not alter so, but that one set of furniture or clothes would last through a man's life, and do for their children after them;" I thought that, if it really were so, (for I know I must allow something for the prejudices of old people, in favour of old customs,) that as the world grew older population increased, and employment must be found for the vari-



ous inhabitants of the earth ; and therefore the wisdom of Providence has allowed this changeable fashion to prevail, to give life and activity to those who are employed about them : and thus every thing may, to a thinking mind, give proof of the goodness of God. War also, which is reprobated as the cause of destruction to many, though often entered into by man for wrong purposes, is appointed by God, and not one more is killed than he has numbered to that end ; perhaps to thin the world, which would be otherwise overstocked with inhabitants ; and for many other reasons which we cannot know or search into.

*Maria.* Too curious an inquiry into the ways of God, either in natural or moral affairs, as they are called, you do not think right then, mamma.

*Mrs. Smith.* No, my dear : I believe we may be too curious, and puzzle ourselves with what it was never designed we should understand ; and, in so doing, lose the benefits and pleasure arising from less abstracted inquiries, as well as the opportunity of a

more useful employment. I once thought I could never seek to know too much of any thing ; but I am now convinced, that it is not necessary that we should pry into the reasons why the great Creator has appointed them : we are informed by an inspired penman, that all things are, and were, created for the pleasure of the Almighty. Too much curiosity tends to discontent at not knowing more, or to presumptuous scepticism that we are not capable of it ; and while we are thus employed, we neglect the blessings daily offered to us in the things we can enjoy. Let us, my child, acknowledge ourselves ignorant ; and learn, that whatever God does is right, is performed in the best possible way that it can be performed, and that his goodness and mercy are over all his works.



## CONVERSATION X.

*Hedgehog, Porcupine, Sea Urchin, Star Fish, Sea Anemone, Sponge, Moss, Nautilus, Soldier Crab, Cod Herring, Mackarel, Sturgeon, Auso, and Narval.*

**MARIA.** As I passed through the yard just now, mamma, what do you think I saw? Tom the stable boy had something rolled up under his arm, which I can compare to nothing but an immense large chesnut. "Miss would like to see *un*, I dare say," said he. And I, supposing it was some great natural curiosity, asked what it was; and he told me a hedgehog. Would you like to see it, mamma? it is very curious.

**Mrs. Smith.** Yes: you may tell him to bring it here; or, on second thoughts, I will go to the stable; for perhaps it may not be a very pleasant parlour guest. Is it alive? for, when they are, and are frightened, or

made angry, I am told they emit a most disagreeable smell.

*Maria*, (as they proceed to the stable.) It is in a torpid state, I think ; do not they remain so all the winter ?

*Mrs. Smith*. Well, Tom ; I am come to see your new-found curiosity : where did you meet with it ?

*Tom*. It is only a hedgehog, ma'am ; I found it in a hollow tree, fast asleep, and rolled up as it is now : it had got a few nuts by him, but I think it has not eat any a great while.

*Mrs. Smith*. Had it been awake you would not have been able to touch it ; for I have been told, that, when attacked, they erect their quills, which are above an inch and a half long, and so sharp and prickly, that the dogs which hunt them cannot stand against these weapons.

*Maria*. What a round ball it is, mamma : you cannot see any head it has.

*Tom*. If you please, miss, I'll wake it : shall I ?

*Maria*. O, no, Tom : for the cold and



the fright would probably kill it. Perhaps it would be better to carry it back again from whence you took it.

*Groom.* I have been thinking, ma'am, if you have no objection, to make him a cage in the stable: foxes, you know, are very good for the horses; and why should not a hedgehog? for they smell pretty much alike, I think.

*Mrs. Smith.* If you have a mind to try the experiment, pray make its habitation very secure, Stephen; or as the summer comes on it will get into the garden, and do mischief there; I am told it has a snout like a hog, with which it turns up the ground, and generally makes its abode under it; that I rather wonder Tom found it where he did.

*Tom.* It was quite at the bottom, ma'am, and covered by a deal of earth. I believe that it got in somewhere at the bottom, for I am sure there was no hole at the top.

*Mrs. Smith.* Very likely: and it is said that, when he finds apples, grapes, or any other fruit, under the trees, he rolls himself

into a ball, as he is now ; and erecting his quills, he rolls himself over them, till they stick upon the points ; and he carries them off in that way to his habitation, where he eats what will not keep, or would take up too much room, and keeps the rest by him as a store.

*Tom.* That is curious, however : I should like to see him do that.

*Groom.* And perhaps when he was overloaded you would be apt to help him off with a little of his burden.

*Mrs. Smith.* You have my liberty to keep him, Stephen, only now you know what a thief he is likely to be, pray let him be strongly guarded ; and if you keep him properly fed, he will not need to cater for himself. Here, Thomas, is something for you : and be sure you take care of this new comer.

*Maria, (as they return to the parlour.)* I should like to have seen it in a more active state ; but if it lives I probably shall. I shall often enquire after this new stable inhabitant.

*Mrs. Smith* The porcupine is of the same nature, but considerably larger, and



sometimes exceeding two feet in length ; his hairs or quills are very unequal, some being two or three inches, and some twelve inches long : this animal is still more formidable to his enemies than the hedgehog, darting the sharp points of his long quills with such force into the body of whatever attacks him, that they are often left there ; while the vacancy in his own is in time filled up by others, which grow to the size of the former. But I have now three other curiosities to show you, and for which you are likewise indebted to the servants. Kitty, you know, has been to see her mother, at B—, and returned last night ; she has brought some sea productions home with her which she thought you would like to see : they are very beautiful, and she has preserved them in water for you.

*Maria.* I am very much obliged to her : what are they, and where ?

*Mrs. Smith.* In the other parlour, in a basin : bring it here.

*Maria.* O, here is the star fish, I can see ; but what are the others ?

*Mrs. Smith.* From what I have read of

them they appear to be the sea anemone and the sea urchin.

*Maria.* Why, surely, this is more like a button than any thing else.

*Mrs. Smith.* For that reason it is called the button fish by some naturalists, and by others the sea urchin. The mouth of it is on the under side and touches the ground; it has five teeth, which all meet in a point: some of these fish have sharp bristles like our hedgehog, which they extend or draw in at their pleasure, and through which it is supposed by some they receive their nourishment; while others are, as you see this is, only covered with a thin shell. The star fish is a very good contrast to this round button, extending five long arms or claws: some have more than these, and branching out into several divisions, but all end in a point as these do. This fish sometimes creeps and sometimes swims; it has a mouth and teeth in the centre of its body, besides several little trunks of a fleshy substance, which it darts into the mud, and through which it sucks in its food. Thus you see both these little creatures have



two ways of feeling and devouring their provision, which supplies their want of sight. The sea anemone, which is the greatest curiosity of the three, and the most beautiful, looks like a mushroom, in the state it is now, though when open it resembles the flower by whose name it is called. They are found sticking on the rocks; from whence they never remove unless taken by force; and, if kept in water, they will fix themselves again to any thing calculated to hold them. They are of various colours; and cannot be made to open against their will, though, when pressed hard, several young ones of different sizes will burst from them. From its having so much the appearance of a flower, some authors have been inclined to rank it among the sea plants; though the production of its young sufficiently proves it an animal, and what they have taken for its leaves are only so many tubes through which it draws its nourishment.

*Maria.* I should like much to see it open: I hope it will not die before it has satisfied my curiosity. But, now I think of

it, mamma, do tell me what sponge is : till very lately I thought it was a sea plant, but I have since found that it is by some authors affirmed to be a species of the polypus.

*Mrs. Smith.* Most naturalists are, I believe, undecided about it, though some affirm it to be what you say. It is found sticking on large sea shells, on rocks, and is valued according to its fineness. The greatest part of what we have is brought from an island in the Mediterranean called Mecaria, where the diving for it is esteemed the highest qualification in a young man. A French author describes it as formed from the slaver or juices of four different worms which inhabit it, and which forms four sorts.

*Maria.* It is a very extraordinary substance ; how it expands on the water : I am told that if we were to eat a bit it would kill us.

*Mrs. Smith.* I should not doubt it ; as it would swell in the stomach, and choke up the passages.

*Maria.* And moss, mamma, what is that ?



it appears something of the nature of sponge.

*Mrs. Smith.* I do not see that : it grows on the bark of trees and on old buildings, consequently wants no depth of earth to grow in ; yet it shoots out a number of roots and branches, which, if seen through the microscope, has all the appearance of trees in miniature. It is said to be hurtful to the trees on which it grows, and in time to occasion their death : it harbours also a number of small insects, whose use we can no otherwise ascertain, than as they are for food to others of a larger growth. The moss, though it may hurt the trees on which it grows, makes amends for this by affording a warm and soft bed for birds, squirrels, and numberless other animals, to pass the winter in. There are also sea mosses ; the ashes of which are very good to fertilize the ground, and are useful in making glass. But see, the anemone is going to open, to gratify your wishes.

*Maria.* That is extremely kind of it : and now it looks like a flower indeed, and a

very different thing from what it was before. The outside leaves are like a bladder, and are but two I see, and folded round, as if to confine all the rest. How pretty it looks now, like a flower formed of jelly. But cannot you tell me of some more curiosities of the sea, mamma? I should like to see them all.

*Mrs. Smith.* O, my dear, they are by far too many for me to remember, much less describe them. There is the sailor fish or nautilus, which no doubt you have heard of, whose shell serves him for a boat: he expands a thin membrane, which serves as a sail; and has two arms, or legs, with which he rows his little boat, as with oars. When he is tired of sailing he strikes sail; and, contracting himself within his shell, gives room for the water to come in; which sinks him to the bottom, though he is in no fear of drowning by his sudden descent: when he would ascend he enlarges himself, and thus forces the water out of his shell or boat, which thus becomes lighter, and necessarily rises on the water. The soldier crab, or hermit, is another curious fish, which I recollect read-



ing of. It has no habitation of its own, but enters the first vacant shell it can meet with ; where it resides till it grows too large for its habitation, when it sallies forth and seeks another more convenient : the cause of this is, that the fish itself is covered with so thin a shell, as not to be able to stand against the attack of its enemies without such an additional covering. For fish, like men, are continually preying one upon the other ; and, was it not for their almost incredible fecundity, some of the various species of them would be lost ; but such is their increase, that, though thousands of them are daily devoured by each other, the number daily produced exceeds them. This again shows the goodness and wisdom of God ; that whales, porpoises, sharks, and other destructive fish, are not produced in such numbers, each of these seldom having more than one or two at a birth ; and they frequent those coasts, where, instead of being altogether destructive, they are of use to the inhabitants, and where smaller fish could not live. The cod fish, which are very prolific, are found on the coast of Newfound-

land in great quantities, whither many of our fishermen go to fish for them, and often one man will take three or four hundred a day. When these fish have devoured all the provision they can find there, they make war upon the whiting; who to avoid them fly to our coasts in great shoals, were they are caught for our nourishment and support. As a fish of passage, and for their extreme fecundity, the herrings are very extraordinary: we may suppose their capital to be between the points of Scotland, Denmark, and Norway; from whence they take their course and visit, at different times, the British Channel, the coasts of Holland, Flanders, and part of France, from whence they return by Ireland and the western isles. Their voyages are performed with the utmost regularity, and they all depart at the same time, not one is left behind, or allowed to stray out of the path prescribed them; and notwithstanding they are so numerous, and their voyages long, they are annually performed, and each place visited, in the same order and at the same



time as the year before: their first appearance is towards the winter.

*Maria.* And thus it is then that we are supplied with fish; some come to avoid their enemies, and others come for prey; but, whatever is their motive, we do not let them depart without paying an ample tribute for the shelter our seas afford them. But how do fishermen account for these regular movements of the herrings, mamma?

*Mrs. Smith.* They say that the Channel every year teems with innumerable worms and small fish, on which the herrings come to feed: and as it is the same on the other coasts, they clear as they go, and according as they find their stock of provisions, their stay is prolonged. Their course in the water is often marked with a beautiful lustre on its surface, which in a dark night has the appearance of fire. Mackarel are also fish of passage, and appear in a body as the herrings do; they enter the Channel at the first approach of summer, and are generally caught in the night. In the mackarel season the fishermen are all very busy, and they generally make a

great deal of money of them. It is remarked, that the water these fish are boiled in yields a light when placed in a dark place and stirred. The sturgeon is also extraordinary, and ranked among the royal fish ; and is in this country presented by the lord mayor to the king. In the time of Severus, emperor of Rome, it was brought to the table by servants with coronets on their heads, to denote its superiority. It is accounted as most delicious eating : but it is so clumsy, being without teeth, that, were it not for four long tendrils which hang from the nose over its mouth, it could procure no food : these are several inches long, and much resemble earth worms. He hides his large body among the sea-weeds and mud near the coast, and exposing these tendrils, which the smaller fish and insects approach, taking them for worms, and thus seeking to make them their prey, they are themselves devoured by the sturgeon.

*Maria.* How are fish produced, mamma ?

*Mrs. Smith.* I have read that the females deposit their spawn or eggs in holes dug for that purpose ; which the males, who are very



watchful in observing their motion, immediately impregnate, and thus render prolific. The glue of some particular fish caught in the nothern seas, and called *auso*, is very useful, and of it we make isinglass. The fish called narval, caught on the coast of Denmark, is also very curious; its teeth are white ivory, even preferable to that of the elephant's teeth, as it does not grow yellow by time: from its left jaw there proceeds an ivory horn, fourteen or fifteen feet long; which is sometimes preserved in the cabinets of the curious, and taken for that of the unicorn, an animal unknown to the moderns, and by some accounted entirely fabulous. Of the whale, and the oil it produces, you need not be told: I shall therefore close my conversation this morning, by desiring you to take away your marine curiosities; and be sure you do not forget to thank Kitty for bringing them.

## CONVERSATION XI.

*Parrot, &c.; Lark, Thrush, &c.; Cuckoo,  
and Hoopoe.*

*MARIA.* I called on Mrs. Lucerne this morning, mamma, and was introduced to a new acquaintance of hers, who arrived from town a few days ago.

*Mrs. Smith.* Indeed! I did not know she expected any company: is it a lady or a gentleman? are they likely to stay long?

*Maria.* O, yes; I believe she is come to take up her abode with Mrs. Lucerne. It is a lady whom her brother has greatly recommended to her notice.

*Mrs. Smith.* I hope she will prove agreeable, then, or our friend will not be much pleased with her inmate: it is quite a sudden affair, for I saw no preparation for company the last time I was there. Pray what is her name?

*Maria, (laughing.)* She told me it was



Miss Polly. It is a parrot, mamma: do not you think Mrs. Lucerne will be pleased with such a companion?

*Mrs. Smith.* I suppose her brother pitied her solitary state, and sent the bird to keep her company: is it very entertaining?

*Maria.* O, it talks very perfectly, and seems to be very loquacious. It told me its name, and asked me to come again. I think they are very extraordinary birds, and almost appear to have sense, as well as the organs of speech: this bird seemed to hear and understand all that Mrs. Lucerne said to me of it, and imitated the smacking of the coachman's whip; which Mrs. Lucerne thinks it learned on its journey down.

*Mrs. Smith.* Very likely: some of these birds are very quick in acquiring words and sounds, and have an excellent memory in regard to what they learn; I have heard of one who could repeat a short poem; and almost every naturalist relates instances of their loquacity.

*Maria.* What country do they come from, mamma?

*Mrs. Smith* They are to be found in every quarter of the globe except our own, and live together in flocks, assisting each other against their common enemies. In the warmer climates they are seen in great abundance and variety, and add much to the beauty of the scene by their elegant plumage, though their voice is by no means pleasant in their natural state. The great naturalist Linnæus reckons forty-seven different kinds; and there are probably many more: but those which are most known, and brought to this country are the macaw, which is the largest of the kind; the cockatoo, known by its beautiful crest; parrots, such as you have seen to day; the loris, which is entirely white; and the parroquet, the smallest of the species, which has a very long tail.

*Maria.* Parrots are very oddly made, particularly their beaks and their feet; and their nostrils are very wide, and almost close to their bills.

*Mrs. Smith.* Did you see it eat? The upper part of the bill is hooked over the other, and both move so that they can open their



mouths very wide. Their feet, too, are remarkable; having four toes, two behind and two before: in walking they keep them in this position; but when they use them to bring the food to their bills, they turn the largest of their hind feet forward, so as to take a surer hold.

*Maria.* I will observe that, the next time I go to Mrs. Lucerne's. I think I shall visit her very often, till I get thoroughly acquainted with this new comer. It must be very difficult to teach it to speak.

*Mrs. Smith.* It requires some perseverance to make it attempt it; but after it has learned to imitate a few sounds, it readily learns others.

*Maria.* I believe parrots never breed in this country.

*Mrs. Smith.* No; it is too cold for it: it suffers much in cold weather; and I am inclined to think it would sink into a torpid state if left to itself. Yet, in warmer weather, and under a more congenial climate, it is a very active, lively bird, and with proper care it lives to a great age even with us.

They make their nests rather awkwardly, and in hollow trees; where the Indians are very assiduous in searching them out, not only for sale, but that while young they consider them as very delicate eating. The larger kinds do not lay more than two or three eggs, but the parroquet more: this was the first of the kind which was brought into Europe. The earlier they are taken from the nest, the easier is the task of teaching them to speak, and they are generally the most lively. Its tongue is formed the most like that of the human race; which, as some think, enables it to speak so much like us; though it is concluded by other naturalists that the organs of articulation lie lower down in the throat both in them and ourselves.

*Maria.* Are there any other birds which are taught to speak, mamma?

*Mrs. Smith.* The starling is the next best imitator of the human voice; and the bulfinch, the jay, and the magpie, also attempt it, but in a very inarticulate manner. There is nothing remarkable in the appearance of a starling, except that it is rather larger than a



lark, of a dark colour, and with no variety in its plumage. Sterne's anecdote of this bird is well known, which awakened his compassion by crying, "I cannot get out:" and this celebrated writer has made this bird more noticed by the interesting manner in which he has related the story. I can also tell of one within my own knowledge, which was kept by the ostler of a large inn; and who, as soon as it was light in the morning, would awaken his master by crying, "Six o'clock, John; six o'clock, John;" and so he would keep on till the man appeared. The bulfinch also has been taught to speak as well as to sing.

*Maria.* Dear, mamma, how I should like to get one which could talk. Did you ever hear one?

*Mrs. Smith.* Yes: a man in the town I lived in, when a child, had a favourite tame bulfinch, which he had taught to say, "Poor bully, pretty bully," and "give poor bully some water:" it used to be one of my amusements to visit this man, and hear him and his bird talk together; though, in fact, the bird

was but the echo of its master, and that only in these few words. A blackbird also has been taught to speak.

*Maria.* Both these birds are taught to whistle tunes ; are they not, mamma ?

*Mrs. Smith.* Yes ; and it is not very long since that I heard one of the latter kind whistle the tune of “ God save the king,” very perfectly ; and it even corrected itself or others, if it heard them whistle a wrong note, by saying, “ Not so, not so.”

*Maria.* Is that really true, mamma ?

*Mrs. Smith.* I had it from the person who owned the bird ; and it was thought so great a curiosity, that it was presented to the princess Charlotte of Wales, who had heard of its proficiency : it is said, that, the first evening that it was at her house, when Her Royal Highness came out of the drawing-room, preceded by lights, the bird, which hung upon the staircase, no sooner saw the blaze, than it began to whistle this well-known tune.

*Maria.* This was extraordinary, and I should have liked to have heard it : but their wild notes, mamma, are very pleasing,



though they are heard but a very few months in the year.

*Mrs. Smith.* Thompson notices both in these lines in his charming poem :

“The blackbird whistles from the thorny brake,  
The mellow bulfinch answers from the grove ;”

though the notes of the latter have but little melody till confined in a cage, and “taught the lessons of art.” It is very common on the continent, and its shape and plumage are well known ; having black wings, head, and tail, and a red belly and breast. It builds in bushes, and its eggs are hatched about May ; and it is often seen in orchards and gardens, but is not supposed to do so much mischief as other small birds.

*Maria.* Of all the birds which are kept in cages I think the lark is most to be pitied ; its rising so high in the air, and singing as it mounts, certainly proves what a punishment the want of liberty must be to it.

*Mrs. Smith.* This has been often lamented by poets and others ; and yet, when taken early from the nest, its captivity does not prevent its singing, though it keeps fluttering

its wings all the time, as if to show what it would do, had it but the power. The skylark is justly called the bird of morn, as it begins its song before the dawn, and continues to raise its notes as it soars far beyond our sight, “to heaven’s gates ascending,” as Milton beautifully sings in Adam’s morning hymn.

*Maria.* What is the difference between the skylark and the woodlark, mamma?

*Mrs. Smith.* None, I believe, but that the latter builds its nest in woods and hedges, and near the ground; and the former in the open field or downs, under some little knot of turf: she lays four or five eggs, and commonly produces her young early in May. While she is sitting, the male usually entertains her with his song; and, though he rises to an imperceptible height, he never loses sight of his mate. In winter they are often seen in large flocks, and are quite silent; they are then caught in nets for the sake of eating them, as they are considered a great delicacy.

*Maria.* O, how can any one deprive themselves of so much harmony as awaits them in the spring, by killing these pretty creatures!



*Mrs. Smith.* Alas ! there are many who prefer the gratification of their appetites to the sweetest music of the groves !

*Maria.* We certainly are favoured with a great variety of these aërial musicians, mamma, cold as our climate is : yet when the trees put forth their leaves, and a fine day appears, how many tuneful birds are there to congratulate us on the return of spring.

*Mrs. Smith.* Very true : our country is by no means despicable, though so many are praising a foreign one : and in many respects we are to be envied, as we have fewer noxious animals among us than almost any other country. But to return to our catalogue of birds : the lark, the bulfinch, the thrush, the blackbird, the goldfinch, the linnet, and the nightingale, are all natives of England, not forgetting the little redbreast, whose cheerful modest notes charm us all the winter. These all add to the harmony of our woods, besides many others which join their notes to the general chorus.

*Maria.* And all of these will sing in a cage ; will they not, mamma ?

*Mrs. Smith.* Yes; even the nightingale has been confined, and sings very sweetly, though not so freely or frequently as when at liberty: its notes are so peculiarly bewitching, that they cannot be heard without admiration; and, if it is not disturbed, it will remain on the same tree for days together. There is also another bird which breeds in some parts of this island, called the blackcap, though some have given it the name of the mock nightingale; its notes are very full and sweet, and not unlike those of the bird it is supposed to imitate.

*Maria.* Do not some authors describe the blackbird as a species of the thrush, mamma? I think I have read so.

*Mrs. Smith.* Yes, after Linnæus, who mentions several kinds; such as the missile bird, fieldfare, and the redwing, as well as the blackbird, all of the thrush kind: the thrush is also called the throstle and the song thrush; this is the largest, and the missile bird the smallest, of the kind. All these are our own native birds; and the two last I have mentioned are remarkable for the length and



variety of their notes ; they sit upon the highest branches of the trees while singing, but build their nest nearer the ground. They feed on insects and berries ; and when the ground is covered with snow are seen to scratch up the roots of those plants which are most adapted to the season. As for the goldfinch, you have seen too many of them in cages, to require a description of its form ; and its extreme tameness makes it an agreeable companion, even if it does not entertain us with a song. These birds assemble in flocks towards the winter, and feed on the seed of thistles and other weeds. They often produce two broods in the year, and live to a great age.

*Maria.* The goldfinch and the linnet are, I think, the oftenest seen in cages, and are the favourites of those who cannot afford to purchase canaries ; and their notes are, I think, almost equal to these foreign birds, if they happen to be good singers.

*Mrs. Smith.* It is the beauty of the canary, as well as its being a foreigner, and not able to live in our climate, if suffered to be

at liberty, that makes it so often an ornament to our houses ; besides, its notes are so varied and enlarged, that it excels the nightingale and the lark, and often sings like both : its music also lasts the greatest part of the year. It will breed in a cage, and live from ten to fifteen years. Yet, as you say, I have heard a linnet in a cage which almost equals them in singing ; and the beautiful red breast of this little bird, which is observed to heighten as the summer advances, is almost as pretty as the deep yellow of the canary. And now, before we quite finish our dissertation on birds, let us mention the cuckoo ; for, though it has no other note than that which its name intimates, and which is heard but a very short time with us, yet its voice is heard with the greatest pleasure, as the harbinger of spring : it is but little seen ; and its history, or to what country it migrates when it leaves ours, is what all naturalists are undetermined upon. It has been called a rapacious bird, because it is said to suck the eggs of others. One bad trait in the cuckoo's character is, that it lays its eggs in the nests of other birds,



and leaves to them the trouble of hatching them ; and it is this bird alone, with the ostrich, which resigns the pleasing task of rearing and feeding its young ; that, to all besides themselves, seems such a delightful employment. As for its make and shape, it is nothing extraordinary ; its bill and claws are small, and its round prominent nostrils distinguish it from all other birds. The young ones are often hatched under a hedgesparrow ; and, partaking of the nature of their mother, have been known to drive out those for whom the nest was built.

*Maria.* That is being very cruel to their foster brothers and sisters. But what becomes of the cuckoo in winter ?

*Mrs. Smith.* Some authors affirm that it lies in a torpid state, and others that it migrates into other countries ; which appears to me to be the most likely, as it ceases singing so early, its note being seldom heard with us after the beginning of June. There is also a foreign bird called the hoopoe ; which, like the cuckoo, derives its name from its note : it occasionally visits our island, and is found in

various parts of Europe and Africa. The Turks call it the messenger bird; and in many countries, as well as in our own, its appearance is considered as an omen of war. It is a small bird, distinguished from others only by its crest; which consists of beautiful feathers about an inch and a half long, and which it can raise or depress at pleasure.

*Maria.* I am much obliged to you, mamma, for this account of the feathered tribe. Do not you think it is now time to walk, and try if we cannot hear some of their notes: and as we go along I will repeat to you those pretty lines to the cuckoo which I learned when a child.

*Mrs. Smith.* Do so, my dear: and as the bounteous Creator has produced so many beauties, and in such variety, to charm our every sense, let us beg of him to give us a grateful sense of these favours.

### *To the Cuckoo.*

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“Hail, beauteous stranger of the grove!

Thou messenger of spring;

Now heaven repairs thy rural seat,

And woods thy welcome ring.



What time the daisy decks the green,  
Thy certain voice we hear :  
Hast thou a star to guide thy path,  
Or mark the rolling year !

Delightful visitant ! with thee  
I hail the time of flowers,  
And hear the sound of music sweet  
Of birds among the bowers.

The school-boy wandering in the wood  
To pluck the flowers so gay,  
Starts thy curious voice to hear,  
And imitates thy lay.

What time the pea puts forth her bloom  
Thou fliest the vocal vale ;  
An annual guest in other lands,  
Another spring to hail.

Sweet bird ! thy bower is ever green ;  
Thy sky is ever clear ;  
Thou hast no sorrow in thy song,  
No winter in thy year

Oh ! could I fly, I'd fly with thee !  
We'd make, with joyful wing,  
Our annual visit o'er the globe,  
Companions of the spring."

LOGAN.

## CONVERSATION XII.

*Colours, Vermilion, Cochineal, Carmine, Lake, Kermes, Indigo, Ultramarine, Weld, Saffron, Turmeric, Gamboge, Ochre, India Ink, India Rubber, and Staffordshire and Japan Ware.*

**MARIA.** Mamma, I have been painting this morning; and the variety of colours in my box made me wish to know a little of their nature and origin; can you inform me?

*Mrs. Smith* Very little, Maria; but what knowledge I have, you know you are very welcome to share with me. I have read that there are simple or mother colours, of which all the rest are formed; and red is one, of which there is a great variety. Vermilion is one of the brightest; the best sort, which is found in silver mines, like a red sand, is purified and prepared for use. But that which



is more common is made from cinnabar: this is a red mineral stone, very heavy and brilliant, and is ground up with spirits of wine and urine. The red lead is a preparation of the mineral lead burnt, and coloured with a root called madder, or cochineal: this is a drug brought from the West Indies; some say it is the root of the tree of the same name, and of which there are large plantations in that country; others affirm it is the berry; and others that it is an insect engendered in the fruit of the tree, which, when ripe, resembles a pear, and has a red flower growing from the top of it: this, when full blown, falls on the fruit, and that opening is full of these little red worms; which, if not taken out, would die and rot there; but the Indians, after spreading a cloth under it, shake the tree, and beat it with long poles, till they fall out and are left upon the cloth, where they soon die and are dried: of their dead bodies some say that cochineal is made: but it may be probable that both from the root, the berries, and these insects, different sorts are prepared. Carmine is the most valuable

of all the red colours, and is a bright crimson ; this is the sediment of a water wherein is steeped cochineal and some other red colour. To be good, the powder should be impalpable ; that is, not perceived by the touch.

*Maria.* I have this in little saucers, but lake and vermilion in cakes ; I suppose the former cannot be made in that form.

*Mrs. Smith.* No ; for I have said, to be good it must be in a powder : that sold in saucers is mixed with water to make it stay on, and you add more to it as you use it.

*Maria.* And what is lake, mamma ?

*Mrs. Smith.* This is called lacca abroad, and is a sort of gum or wax, very brittle and transparent, and brought from the East Indies. Some authors say it is caused by a kind of ants, which, fixing in the branches of several trees, leave behind them a red moisture which hardens and becomes lake. Some suppose it to be their comb formed to deposit their young brood in, the same as the bees form of their wax : other writers mention it as a kind of gum distilled from the tree. Kermes again is another red colour, made of a



small maggot; which laying its eggs on the bark of a tree of the oak kind, in Spain, Languedoc, and other hot countries, raises a tumour like the gall nuts on our oaks; which reddens as it becomes ripe, and are picked off and dried: when these are opened there comes out a number of little insects; which, in order to kill, they steep the kermes in vinegar, before it is quite dry.—Blue is another of the primitive colours: that used by dyers is made of woad or glastum, produced from an annual plant, of which a great deal is sown every spring. A deep blue is made from the leaves of this plant, after they are bruised and dried, and afterwards ground to powder. Indigo blue is brought from the East and West Indies, and drawn from the leaves of a tree of the same name: these leaves are steeped in water and beat for some time, till the blue is beat out and sinks to the bottom. This is strained through linen bags, and then laid in the sun to dry and harden, when it is cut in slices and sent to us. For painting it is mixed with white lead, and when mixed with yellow it

makes a green colour. Verditer is a bright blue, bordering on green; and there is also blue bice, though next in value to ultramarine: the latter is prepared from a mineral stone called lapis laxuli, which is a sort of precious stone, called also azure stone. It is found in gold, silver, and copper mines, and also in marble pits.—Yellow is another of the primitive colours; that used in dying is made of weld, a plant, much cultivated in Kent for the use of the London dyers; and saffron, another plant, which produces a flower of the same name: the English saffron is in great repute abroad, and is thought the best. Its root is like that of an onion, bulbous, and it is used both in food and medicine as well as to dye with. Turmeric is also another medicinal root, brought from the East and West Indies, and makes a good yellow for dyers; by whom it is also used to heighten their red colours: but gamboge and ochre are chiefly used by painters. The first is a vegetable juice, partly of the nature of gum and partly of resin. It is mostly brought from the East Indies, in large cakes or rolls, and is sometimes used in medi-



cine. Ochre is a kind of yellow earth, which I described the other day as a semi-metal. Spanish brown is also a colour much used in painting, and is an earth dug out of the ground : it does not require burning but for some purposes.

*Maria.* You have mentioned the primitive or simple colours, mamma; do you reckon this one?

*Mrs. Smith.* I do not know, as it is mixed with no other, whether I should not; but whether I am right or not I cannot tell : some affirm red, yellow, blue, black, and white, to be the five, though it cannot be said that black or white are any colour. Others, from the effect of the prism, will make seven primitive colours, such as red, orange, yellow, green, blue, indigo (which is a deeper blue), and violet; yet if we consider the orange as only arising from a mixture of red and yellow, and the green from yellow and blue, as the violet is from blue and red, these colours are again reduced to three primitive or simple ones : but I am not sufficiently acquainted with the decision of the painters to know

what they account as the five, without taking in black and white. Spanish black is nothing more than burnt cork properly prepared; and umber is produced from a fish of that name, and when burnt is used in painting. Bistre is made of the soot of the chimney boiled and diluted with water. The best black which is used in water colours is the India or Chinese Ink, and which has in vain been attempted to be made in Europe: that only is good which has the Chinese ornaments on it, and is gilt; this is done by the moulds being so curiously wrought into which they put it to dry and harden. It is made with smoke black of different kinds, the best is said to be from fat pork; they mix this with oil to make it smooth, and other odoriferous ingredients to take off the smell; but the exact way of making it is a profound secret. Thus I think I have told you all I know of the contents of your paint box.

*Maria.* Do tell me what you know of India rubber, mamma, before you conclude; is it not produced from a tree?

*Mrs. Smith.* Yes; from the syringe tree,



which grows in South America : it oozes out like a vegetable milk from incisions made in the bark, and flows most in time of rain : but the means which the Indians use to thicken and harden it are not known. They make boots of it which water cannot penetrate ; and it is of that nature that not even the strongest spirits will dissolve it ; only ether will have that effect. Bottles are also made of it ; in the necks of which are fastened long reeds, through which the liquor contained in them is forced out ; and flambeaux, two feet inlength, and an inch and a half round, give a good light, have no bad smell, and burn for twelve hours. The inhabitants of Quito prepare a kind of cloth also from this resin, which they use as we do our oil cloths, to lay on their floors ; and it is likewise formed into a variety of shapes and figures both for use and ornament.

*Maria.* This is indeed an extraordinary substance, I had no idea of its being any thing but a gum. It is so elastic, and yet so pliable, that I remember when first I saw it I thought it must have been alive, and was al-

most afraid to touch it. But I find it is put to much more useful purposes abroad than we use it, just to rub out our pencil marks. But, before we have done with our subject, pray be so good as to tell me whether the figures and flowers on our Staffordshire ware, and the landscapes on the Birmingham ware, are painted in the same way as we colour our drawings.

*Mrs. Smith.* Very nearly; and though the china or porcelain made abroad is by far the most brilliant in colours, ours exceed them in design: not but that the manufactory of china at Chelsea is thought very nearly equal to those of France and Saxony, and that which is made in Worcestershire and Staffordshire it is said only want to be brought five or six thousand leagues, to be thought of equal value with the foreign china. The painting of these is all in water colours, which is distributed among many workmen; some are wholly employed in painting the coloured circles round the edges, and others trace out the flowers which others paint; one man draws the mountains and water only, while another



is employed on birds and beasts, and another is wholly engaged in tracing the human figures alone: all these have their separate painters, who take the ware from their hands and give them to others to finish off. This number of workmen, instead of hindering, as we might be ready to suppose, greatly facilitates the work. The japan ware which is peculiar to Birmingham is done upon tin; while that of Japan in the East Indies, from which the work takes its name, is done upon wood, leather, metal, or paper, properly prepared: leather requires to be strained tight, and paper is made into what is called *papier machée*, before it is japped. The Birmingham goods are now more highly esteemed than the foreign Japan, as being more durable. Their colours are laid on with gum water, and what they wish should excel is tempered with isinglass, size, and honey, instead of the gum water; and which, if laid on smooth, and well varnished, is not inferior to oil colours, which are sometimes used in pieces that are exposed to much violence.

*Maria.* And the painting on the Tun-

bridge ware, mamma, is that done upon the wood ?

*Mrs. Smith.* I believe it is : the wood you know is of a peculiar sort, which grows in the neighbourhood of Tunbridge Wells, and many people are constantly employed in making boxes and a hundred other toys of it. We have now examined a variety of natural productions which are of use to man, and the improvement of them affords a living to numbers ; and which, had they not met with encouragement, would have sunk to nothing, and the materials we have been describing would have been consequently useless. Who then would not wish to encourage industry, even if it is not employed in collecting the very necessaries of life ; since by it are obtained numberless conveniences, comforts, and luxuries ; which, while they add to our accommodation, afford a support to thousands who are employed in producing them : and as the world, or any particular nation, increases in population, employment must be found for the multitude, and food must be had for them, which can only be obtained by industry.



Our mother earth, as it is called, would not admit of such a number of hands being employed in the cultivation of her surface as are supported by her fruits ; it is therefore necessary that her bowels should be opened to support her children : and those are vain reasoners who would conclude every advance in society an innovation of the rights of man ; for were there not different degrees and distinctions in that society, there would be no emulation, and no improvement in the mechanical arts, because there would be no one of consequence enough to encourage them.

## CONVERSATION XIII.

*Sloth, Ant Eater, Stinkard, and Glutton.*

**MRS. SMITH.** I think we have, Maria, never noticed the sloth, in our various researches into nature ; which, though awkward and disgusting, is well worthy your attention, from the peculiarity of its disposition.

*Maria.* I have only heard it described as a very lazy animal, mamma ; and some of my acquaintance who are very indolent have been compared to it. What is its history ?

*Mrs. Smith.* It is a native of America ; which of all countries, I am told, produces the most disagreeable and deformed animals. It is about the size of a badger, has a very short tail, a wide mouth, and small ears ; its legs are so thick and awkward that it can only move one at a time, and is so slow in its



motions, as not to move more than three yards in an hour.

*Maria.* What does the poor creature live upon ?

*Mrs. Smith.* Chiefly on the leaves and bark of trees, which it climbs up with the greatest difficulty ; and, when once mounted, it remains about a fortnight, never moving till it has stripped the tree of all that is eatable ; it then rolls itself up in a ball, and falls to the ground with a horrid scream, to save itself the trouble of descending any other way : it will lie there for an hour or two, in a state of insensibility ; and when recovered from the violent exertion of the fall, it creeps to another tree, which it climbs in the same manner, uttering at every motion so dismal and hideous a cry, that even beasts of prey flee from the sound of it : this noise indeed is its only security, as it has no other way of defending itself.

*Maria.* Poor creature ! it is not without the care of Providence then, though so much the object of contempt or aversion with man. I have heard that it will live many days without food, and never drink any water.

*Mrs. Smith.* Yes, that is one of its peculiar qualities; it is either incapable of procuring drink, or too lazy to seek it. The ant eater is another remarkable animal found only in America, and as helpless and deformed as the other: its tongue is the only instrument it uses in procuring food; which is long and clammy, and lies rolled up within a very small mouth, except when it is extended to catch the ants, on which this creature lives, and which greatly abounds in the country it inhabits: so wisely has Providence ordained every creature to be where its food is most easily found. The ant eater is unable to defend itself from any enemy, and therefore lies concealed under the withered leaves of some thick forest, till compelled by hunger to search for food; and in one hour they are able to procure enough to last them many days. In general they are seen together; and having discovered an ant hill, they approach it very silently; and laying their long tongue (which is covered with a gummy substance,) across the path of the ants, these little creatures, in coming and going to their habitation,



stick fast upon it; and when they have a sufficient quantity sticking there, they draw the tongue into their mouths, and suck them off, and then repeat the same experiment till their appetite is satisfied.

*Maria.* How extraordinary! I should like much to watch their motions: but the poor ants are little aware of such an enemy.

*Mrs. Smith.* Though an enemy to the ants, they are friends to those whose labours or food the ants would destroy: if it were not for them, these reptiles would increase to an alarming degree, in countries where they are much larger than our ants: therefore you may be sure that nothing is made in vain.

*Maria.* Mamma, now we are speaking of the disagreeable objects of creation, far different from a former subject, the pretty birds, do tell me what you know of the stinkard or American polecat: they tell me its smell is ten times worse than the English polecat.

*Mrs. Smith.* I believe so; and this smell is given for its preservation; for it has only to emit some of this horrid stench, and however closely pursued, it will drive the dogs

and beasts of prey away from it : no creature can bear it long but itself. It is about the size of our common polecat, but has longer hair ; and it is marked with stripes of white on a black ground, from the head to the tail. It feeds on poultry and small game ; but except when pursued, or in danger, does not smell so very offensively. It is said, the bags which contain their horrid effluvia, and which are near their tail, can be taken from them, and it has thus been made a domestic animal.

*Maria.* I cannot say that I should much like its company. But the glutton, mamma, is another animal of America which deserves to be ranked among the disagreeables : can you tell me any thing about that ?

*Mrs. Smith.* I have read that it is ranked by Linnæus among the weasel tribe, from its long body and short legs. Its name is derived from its insatiable appetite ; one of them being in captivity, and considered not in very good health, has been known to devour thirteen pounds of flesh at one time, and yet remain unsatisfied.

*Maria.* I should think the quantity it ate



must have made it ill at any time. I have heard that it will destroy deer and other animals much larger than itself: but how can that be?

*Mrs. Smith.* It climbs the thickest trees, and sits among the branches, till one of these animals pass beneath it; then dropping with the surest aim upon its victim, it fastens its claws between the poor animal's shoulders, who finds it impossible to shake it off; and, biting its neck, it sucks the blood till the creature is deprived of life: it afterwards eats so much that its form is quite altered, from the distension so much food occasions; and, like all other gluttons, it eats till it can eat no longer; but remains in a state of lassitude and torpor for two or three days after its meal, close by the animal it has killed. In this state it derives its security, (like the stinkard,) from the horrid stench it emits; few animals choosing to come near so shocking a smell: yet it is often taken for the sake of its fur, which is very fine and much valued.

*Maria.* This is really a worse character than the sloth, mamma. I am quite glad our

island is not infested with such, and hope I am sufficiently disgusted with them as not to follow their example. It certainly would not be amiss to mention these two creatures to any one either inclined to sloth or gluttony: if so disagreeable in the animal creation, how much more so in the human race!

*Mrs. Smith.* And yet, my dear, without care and education, I should think nothing would be more likely for a child to give way to; if never taught to walk, children would not possess the activity they have; and if not regulated in their food, would not be unlikely to imitate the glutton.

*Maria.* Ah, my dear mamma, I am very thankful that I was not left without your care in my infancy. Who can tell, indeed, what the human species would be, if left entirely to itself in such a helpless state.

END OF VOL. I.





