

Glimpses of Nature.

III.—A BEAST OF PREY.

BY GRANT ALLEN.

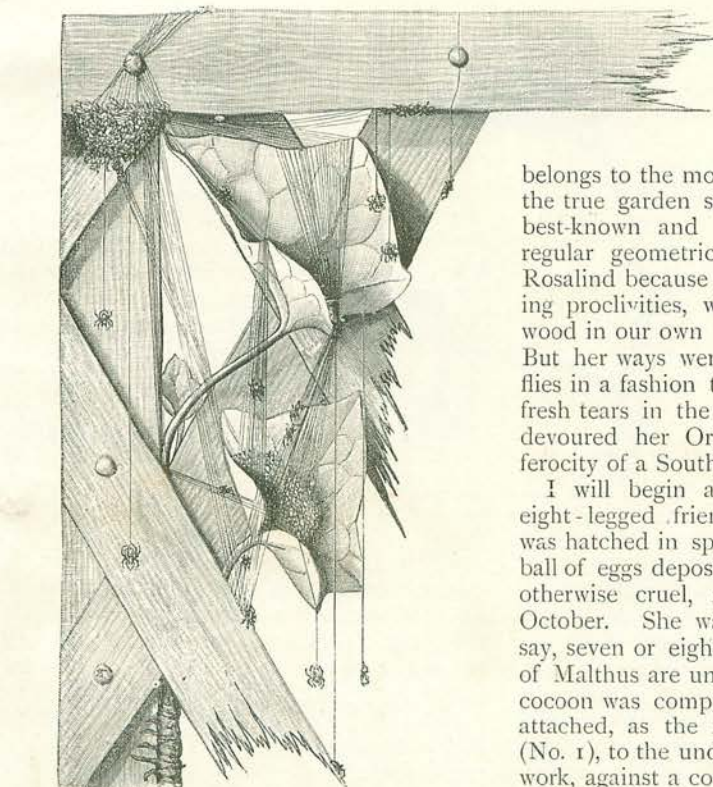
THE lion, we all know, is the king of beasts; a Tippoo Sahib of the desert, he treats his subjects with the simple and unaffected cruelty of an Oriental monarch. The tiger is also a somewhat ruthless animal; he prefers to eat his dinner living. But for sheer ferocity and lust of blood, perhaps no creature on earth can equal that uncanny brute, the common garden spider. He is small, but he is savage. Lions and tigers are credited at least with the domestic virtues; if we object to the king of beasts that (as Thersites said of Agamemnon) he devours his people, we may be told in extenua-

tion, and then eat, her prey, but she also often kills and makes a meal upon her own lawful spouse, the father of her children. In selecting a garden spider of my acquaintance, therefore, as a theme for a short biography, I do not desire to hold her up to the young, the gay, the giddy, and the thoughtless as a pattern for imitation. She does not point a moral with the ant. On the contrary, she must rank with Semiramis and the famous queen who dwelt in the Tour de Nesle as a shining example of abandoned and shameless wickedness.

Spiders are not all alike. They are of many kinds, and of various families. So I shall begin by remarking that Rosalind, the particular lady whose portrait I have here presented to you in words, and whose life-history my colleague, Mr. Enock, has drawn for you from nature,

belongs to the most familiar race of her kind, the true garden spider, which constructs the best-known and most perfect examples of regular geometrical webs. We called her Rosalind because she was a maiden of hunting proclivities, who lived under the green-wood in our own particular Forest of Arden. But her ways were not lovable. She killed flies in a fashion that would have brought up fresh tears in the eyes of Jacques; and she devoured her Orlando with all the callous ferocity of a South Sea Islander.

I will begin at the beginning with my eight-legged friend's biography. Rosalind was hatched in spring from a cosy cocoon or ball of eggs deposited by her affectionate, but otherwise cruel, mamma in the preceding October. She was one of a large family—say, seven or eight hundred. The principles of Malthus are unknown in spiderdom. The cocoon was composed of yellowish silk, and attached, as the first illustration shows you (No. 1), to the under side of a piece of trellis-work, against a cottage wall, partly overgrown with ivy. Within this snug abode the tiny eggs, each wrapped in its own internal coverlet, escaped the cold of winter, and hatched out in early spring with the first burst of warm sunshine. It was a bright May morning when they ventured abroad. The tiny spiders, just freed from their shell, with its outer great-coat, let themselves down by short webs



NO. 1.—COCOON OF YOUNG SPIDERS HATCHING, AND SWARMING OF THE CLAN ON AN IVY-LEAF.

tion that, like Charles I., he is a good husband and a model father. No such plea can be urged in mitigation of the misdeeds of that bloodthirsty wretch, the female spider. Not only does this Messalina among small deer

to an ivy-leaf below, where they clustered for a while, after the queer fashion of their species, in a sort of close-knit crèche or communal nursery. Gathering together in a compact ball or mass, like bees when they swarm, the wee creatures began by spinning in common a covering of thin silk, in whose midst they lay rolled up in an apparently inextricable tangle of legs and bodies. That is the universal fashion of young spiders of this kind. But if you touch them with a straw, a strange commotion takes place all at once in the crowded home. The mass unrolls itself. The six or eight hundred small beasts within wake all together to a sense of their responsibilities; the ball, which looks at first like a cherry-stone, divides as if by magic into so many eager and frightened animals; and the spiderlings disperse like the nations at Babel. Each goes his or her own way helter-skelter, in search of a suitable place to commence operations as a general fly-catcher; and in two minutes the space around is fairly colonized by spiders, who set their snares at once with exemplary industry. I am glad to be able to give them credit for the one good quality they do really possess; though I am aware that in their case industry is often only another name for consummate greediness.

From the general gathering of the clan in which our Rosalind thus took part she was rudely roused by the touch of such a straw; and, emerging in haste into the open world, the great, cruel world, amidst whose temptations henceforth she was to earn her dishonest livelihood, she cast about her for a favouring breeze to waft her first-spun threads to some lucky position. It was a delicate operation. Balancing herself with her eight legs on the edge of an ivy-leaf beside her native corner (as you see her graphically represented in No. 2), she span, to begin with, a few short ends of silk, which she exposed to a passing current of air by tilting her back up in her most persuasive manner. Where the silk came from, and how she managed to spin

it, we will inquire hereafter; for the moment, it must suffice to say that the wind was polite enough to fall in with her wishes, and to waft one of her threads to a secure position. There it gummed itself automatically by its own stickiness. Mr. Enock, who timed her, reports the interval she took in fixing this first thread as thirty-six seconds. The cable itself was drawn out from Rosalind's spinnerets by the force of the wind, as she stood with her head down and her body protruding; in little more than half a minute she was climbing up a line 15in. long, which had caught and glued itself on the edge of a jasmine leaf. For the silk is sticky and viscid, like the glue of a mistletoe, when first produced; it only hardens as it dries, so that it can be readily moored in its first state to whatever it touches. You may compare it in this respect to hot sealing-wax, or to the early pulled stage in toffee-making.

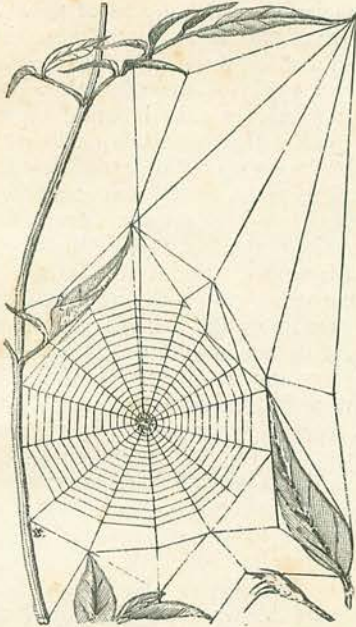
In No. 3, again, we see Rosalind's first snare, constructed neatly, with the usual architectural and geometrical skill of her race, between the twigs of the jasmine bush. In the centre she sits, as is her wont, head downward. The method of making this snare is so interesting and curious, however, that I shall describe it at some length, with needful explanations.

Rosalind began by letting the wind fix an original base thread, pretty much by accident. As soon as she was satisfied with the lie of this, she formed a few others about it irregularly in a rough pentagon, as you see in the outer part of the web, merely to serve as a scaffolding for her future operations. But as soon as she had formed a careless angular figure all round the sphere of her projected snare, she let down a perpendicular thread from the top of her base, through the centre of her predestined home, and fastened it off at the bottom by gliding down it as she span it. Then, walking up this first ray-line again, she set to work once more a little to the right, spinning again as she walked, and fastened a second ray from the centre of



NO. 2.—YOUNG SPIDERLINGS CASTING THEIR FIRST THREADS TO CATCH THE WIND.

the first to one of her outer cables. Next, time after time, she walked back to the centre, ran along the last ray made, trailing a thread as she went, and fastened each new line taut to one of the outer scaffoldings. So at



NO. 3.—A BABY SPIDER IN ITS FIRST SNARE.

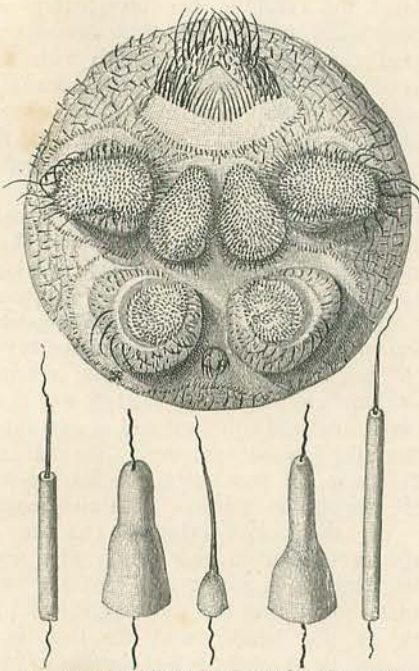
last she had formed a regular set of rays like the spokes of a wheel, but as yet without any spiral connecting threads or mesh-like cross-pieces. The rays of this first framework were stout and thick, composed of several distinct strands, but very little viscid; they were built up of many threads each, in a manner to be hereafter described; and they hardened quickly on exposure to the air, for they were intended mainly to serve as beams, not as nets or insect-catchers.

Her ground-plan being thus complete, Rosalind next proceeded with great deliberation to add the meshes of the web (which are the practical insect-catchers) by connecting the rays with the spiral network. In doing this, she followed a regular method. Beginning at the centre, she fastened a thinner cord to one of the spokes, and worked slowly outward, fixing the line to each ray as she went by the aid of her hind legs, which are almost hand-like. Then, reversing the process, she fastened another thread to one of the outer cables, and carried it back through the spokes in a similar spiral to the hub or centre. These two spiral threads are the ones which she specially

designed for catching her prey; they are thinner than the spokes, but are closely studded through all their length with tiny drops of sticky stuff like bird-lime, admirably adapted for snaring insects. You can see the drops, if you look close, even with the naked eye; and they are very clearly visible by the aid of a pocket-lens.

How is the web itself manufactured and produced? What is its raw material? Well, to answer that question I must give you here some brief description of the personal appearance of Rosalind and her sisters. The garden spider, you know (and as you can see her in No. 6), is a great, soft, eight-legged creature, about half an inch long, though her comparatively insignificant husband is very much smaller and less conspicuous. She consists, in the main, of two parts, the foremost of which, though it rejoices in the scientific title of the cephalothorax (science is always so careful to give things nice easy names while it is about it!), may be more popularly described for most practical purposes as the head; and to this large compound head are attached the eight long-jointed, hairy legs, with the muscles that move them. The other half of the spider consists of the abdomen or stomach, a soft, round bag, quaintly marked like a quail's head, and very squashy in appearance. With this last part of herself, the garden spider spins her snare or web out of the manufactured material of her own body. She spins it of her own digested contents. And as she has frequently to mend the web after various mishaps, which occur in the natural course of business—as when it is broken by the wind, brushed against by passers-by, or torn and mangled by a big fly or wasp—you can readily understand that she must eat in proportion; which is, no doubt, the true cause of her almost incredible voracity. In point of fact, a healthy female spider spends all her time in catching prey and eating it.

In No. 4 we have a greatly enlarged back view of the spinnerets from which the threads are produced, and a still more enlarged side-view below of the separate little ducts from which the component strands issue. According to circumstances, she makes her threads simple or compound. The sticky fluid of which they are formed is secreted by powerful glands in the abdomen; it is then squeezed out through numerous minute tubes, of different calibres, and hardens in most cases when exposed to the air, though the spiral threads with the insect-catching drops on them maintain their viscid nature much

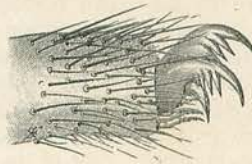


NO. 4.—BACK VIEW OF ROSALIND'S SPINNERETS.

longer, so as to gum the flies down, rather than entangle them in meshes, as with the common house-spider.

No. 5 shows us further details of some other interesting features in Rosalind's anatomy. The upper figure represents three distinct varieties of the viscid threads, each with its own peculiar type of beads, adapted for catching larger or smaller insects. Every kind has its own beads spread for it. The flies get entangled in these, according to their size; and then, tearing the web to free themselves, find the coils only double round their legs and bodies.

But the spider does not content herself with merely catching insects; she poisons them as well. We had not watched Rosalind long in her chosen lair before we discovered that she did not live in her geometrical web; that was merely her hunting-net; her private residence consisted of a snug little cell



NO. 5.—VISCID THREADS, WITH STICKY BEADS: FOOT AND CLAWS OF SPIDER: SPIDER'S FACE, WITH JAWS AND POISON-FANGS.

or nest, under shelter of a rose-leaf, at a few inches' distance from the centre of the snare; and in this quiet home it was her habit to rest unseen, under cover of the shady leaf, until prey came within measurable distance of her sphere of practical politics. But she kept up communications with the seat of war. From the centre of the snare to the nest she had stretched a stout, thick line, along which she could run easily on the slightest indication of a prospective victim looming up in the background. Moreover, this cable or thread seemed to be connected by its different strands with various parts of the snare; at any rate, it acted as a telegraphic communicator between the home, strictly so-called, and the place of business. For Rosalind used always to recline at her ease with one hand-like claw placed steadily on the line of communication; thus seated, she would watch with cat-like stealth for any chance of a victim. The moment a fly touched the snare, however lightly, it would set up a slight tremor of movement in the indicating thread; and, quick as lightning, informed by touch of its whereabouts, out Rosalind would dart, ready to go straight to the spot and suck that luckless creature's life-blood.

Besides, the bigger the fly or bee, the harder it was likely to struggle; and Rosalind noted well, before starting, the comparative extent to which the line was convulsed, and governed herself accordingly. If a big bumble-bee or wasp fell peradventure into her coils, he plunged exceedingly; and Rosalind, prudently aware of the expected sting, approached the dangerous prey with marked reserve and caution. But when it was only a harmless small fly that struggled in the net, she rushed forth from her lair as bold as brass, seized the body with claws and jaws, and sucked the poor thing dry in less than a minute. Then she flung away its empty skin, or cut it contemptuously out of the web it had injured.

A glance at the second figure in No. 5 will show how admirably the spider's foot is adapted for all these various purposes. Adaptation could hardly go

further. The spider has claws with which she can hold her web like a hand; and she has also sharp nails which aid her not a little in manipulating her prey and her web. But she has more than all these: the claws themselves, you will note, are provided with toothed or comb-like edges; and these curious saw-teeth are useful to the spider both in arranging her webs, in weaving them tight or loose, and in feeling the line of communication, when at rest, for indications of a captured insect. If you remember that the spider has no less than eight legs, each somewhat differently provided with special claws and combs, you will understand how formidable a beast she really is to creatures of her own size or smaller.

But beneath the foot in No. 5 are represented those still more terrible organs, the mouth and poison fang. The face is shown, end on—a full-face portrait; and the little knobs above are the eight sharp eyes with which the spider looks out for its prey when captured. Below lie the jaws, with their two movable poison fangs, one of which is open, while the other is folded back into its groove or receptacle like a kitten's claw. This poison fang is supplied with venom from a gland in the head. When the spider catches an insect and desires to eat him at once (as she generally does if he is not very large) she poisons him outright, and proceeds to devour him. So she often does with a wasp or other dangerous insect. But if she wishes to preserve him for future use, she quietly envelops him in a network of web, and keeps him in durance vile, as I shall show you later—a prisoner awaiting his turn to be killed and eaten. Taking her as a whole, therefore, the mother spider is about as fiercely equipped a beast as creation can produce: a monster armed like the tiger and cobra combined; with the claws of a lion and the poison fangs of a serpent; both which she supplements by a treacherous snare, itself a union of the net and the bird-lime trap. No wonder with such an armoury that she has prospered exceedingly in the struggle for existence. And, indeed, you will find garden spiders wherever you go. They are one of the most successful types in creation.

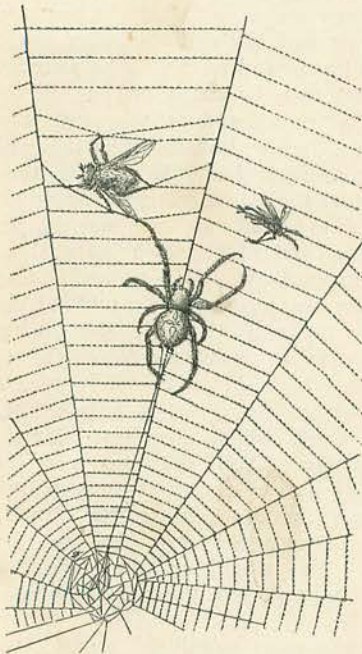
We watched our Rosalind closely through the whole of a season. It was a curious drama of blood and treachery. For the most part she lay concealed like a secret assassin in her nest behind the rose-leaf, seldom spreading her net in the sight of the victim; but sometimes, assuming the rôle of

highway robber, she would boldly rest in the very centre of her snare, with her head downward, waiting for the approach of casual small insects. At such times, we noticed the larger and more intelligent flies usually gave her a wide berth; she seldom caught bluebottles or bees on these occasions of open display; but tiny gnats and midges, less careful or less wise, would get entangled in her web, and at these she would rush out viciously, sucking them dry then and there, and rejecting their empty skeletons with lordly unconcern. Her appetite was unbounded; but she grew so quick, she had so often to remake or repair her broken snare, and she was laying by so constantly for her maternal functions and her eight hundred eggs, that this did not surprise us. The web, indeed, was often torn by wasps or large flies out of all recognition; and at other times it was destroyed by the housemaid or the gardener. On an average, I should say, Rosalind had to rebuild the whole concern about once in three days; and as she was obliged to spin it all out of her own body, this came very expensive. We noticed, however, that she was economically minded, for she wasted no web; I think she ate up all loose ends or remnants: and the central portion, where she occasionally reposed on the look-out for prey, was free from the viscid beads which elsewhere adorned the cross-pieces. You see, this part of the structure was of comparatively small service as a snare, while the sticky stuff would have interfered with her own freedom of movement. She usually avoided the beaded spiral, and only ran along the stouter spokes or cables.

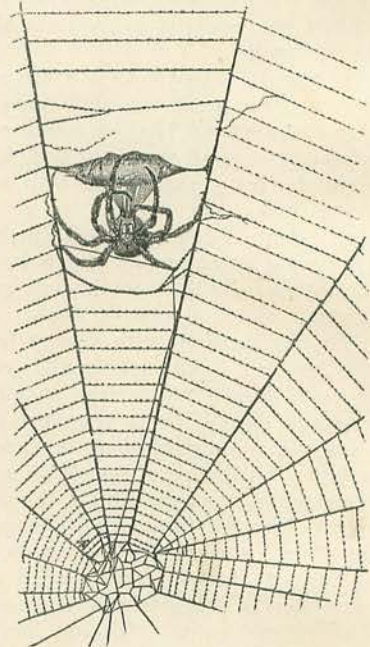
But the most wonderful scene of all was witnessed when Rosalind found in her net a large wasp or a blow-fly. On such occasions, she was generally resting in her nest under the rose-leaf, with one foot held firmly on the cord of communication. If a light pull only came, she would rush wildly forth, and seize in a frenzy the small fly that caused it. She seemed as if drunk with lust of carnage. But when the strength of the pull showed her that a large bee or wasp was struggling in the web, she would act in various ways according to the needs of the moment. Wasps she approached, we noticed, with considerable fear; she knew their dangerous nature. But she was seldom afraid, even so, of tackling them; though at times, if a very large and truculent specimen got entangled in the web, she seemed to despair of landing him. In such cases, she would cut him

out bodily, by biting the threads, and let him drop at once, thankful, like Dogberry, to be rid of a knave. A moderate-sized wasp, however, she would rush out and attack in that frenzy of rage and hunger, a sort of mad, blind rage, which one often notices in fierce carnivorous animals. She would begin her onslaught near the victim's head, avoiding his sting, and envelop him in web, till his wings were pinioned; then she would cautiously approach nearer and nearer to the tail, but give the actual sting a wide berth till the conclusion of operations. The wasp, meanwhile,

at once to envelop him. In this case, however, her intention is not to devour him on the spot; she means to store her larder with provisions for future use, and is as careless as ever of the feelings of her victim. No. 7 shows with what bands she proceeds to swathe him. She catches him firmly as fast as she can, so as to prevent his furious struggles from unnecessarily destroying her precious web; then she trundles and bundles him rapidly in a sort of treadmill or merry-go-round, with her front pair of legs; holds on to the web and steadies herself with her two middle pairs; and uses her hind pair, with her comb-



NO. 6.—ROSALIND ON HER WAY TO SECURE A BLOW-FLY.



NO. 7.—ROSALIND TRUNDLING THE BLOW-FLY, AND ENVELOPING HIM IN SILK FROM HER SPINNERETS.

would keep protruding his poisoned lance in evident fury, striking wildly at the air; while the spider continued to suck him dry quietly, from the head backward, without the slightest consideration for his feelings as a living animal. I may add (to anticipate an obvious criticism) that I am aware the sting-bearing wasp is a female; I have only treated her here to a masculine pronoun because it helps to discriminate her better in each sentence from my friend Rosalind.

In No. 6, our intrepid Rosalind is represented in the act of attacking a blow-fly which has buzzed noisily into the web. The moment her delicate foot on the line informs her that a large insect has got entangled in her toils, she rushes angrily out, and begins

like claws, to distribute the silk which she winds in coils about his wings and body. You can see now how useful are her eight legs to her. Each fulfils its own function. In about a minute she has twirled him round and round, and swaddled him firmly in a strong silken covering. I regret to say she does not then proceed to eat him at once, but keeps him imprisoned in torture for an indefinite period, tightly bound in silken cords, till she desires to dine off him. The unhappy fly is bound hand and foot—or, rather, wing and leg—till it is absolutely incapable of the least resistance; it is then kept in its close prison with a cruelty more than mediæval, and at last devoured alive piecemeal by its ruthless

captor. The morals of spiders are scarcely better than those of Chinamen.

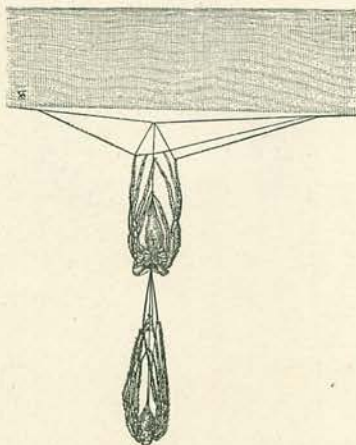
Rosalind's changes of costume were also most theatrical and interesting. Like her namesake in the play, she appeared every now and again in a different suit of clothes, and rejected her old ones. The manner of making the new suit, however, and of shuffling off the old, was extremely interesting. She moulted periodically; but at each moult the whole external skeleton was sloughed off, like a snake's skin or a lobster's coat, entire; and a new one grew under it.

In No. 8 Mr. Enock has luckily caught our heroine just at the moment of such a moult. She is dropping out of her old skin, by means of her threads; beneath it, the new one has grown, the animal being thus quite literally accommodated with a fresh suit "while you wait." The way the old skin hangs up is curious and typical. At first the new outer coat is soft and yielding, like the freshly moulted skeleton or armour of a crab or lobster; but it soon hardens, and not infrequently advantage is taken of the moult to replace parts that have been accidentally lost or broken off, such as a leg or a feeler. The economical spider, however, never wastes anything: she does not throw away the old suit; as soon as her jaws have grown hard enough, it is eaten up by the owner, and thus used over again in the production of web or body material. If thrift be a virtue, no beast on earth possesses it more than a spider.

I have left to the last the delicate question of the domestic relations of spiders, which are certainly *not* of a sort to be commended for imitation. The lady spider, indeed, too closely resembles the late Mr. Deeming and the natives of Fiji in her unsatisfactory notions of conjugal affection. I regret to say it is her reprehensible habit to devour alive her unsuccessful suitors, and sometimes also the father of her own children. These are unamiable traits, but I must not conceal them. You will observe, no doubt, that throughout I have said comparatively little of the masculine spider, and much of his lady; and I have done this of set purpose; for spiders are a group in which the

dominance of the females is marked and undeniable. The matriarchate prevails; the females are the race, and the males exist only as lazy drones, mere idle fathers of future generations. This being so, the mother spider, true to her thrifty ideas, regards them in the light of necessary evils; and being always economical, she thinks it well to utilize them for the purposes of the race by eating them up the moment they have fulfilled their sole and single marital function.

This peculiar habit makes the courtship of spiders a grim tragi-comedy, well worth observing. In No. 9 Mr. Enock has represented one salient scene in the painful drama. And this is the interpretation thereof. Two male spiders have come to pay their court to the supercilious Rosalind. She, good lady, sits unconcerned but watchful in the centre or hub of her snare, apparently careless of the two eager postulants for her hand and heart, but in reality observing them with critical eyes, and ready to rush out and devour them if they fail to please her. The gentlemen, accordingly, have to be very artful. They go through strange antics. Now they approach her cautiously, very much on the alert, ready to pull the string and advertise her of their presence, but also prepared to turn and run, or to cut the line and drop, if she does not regard their advances with favour. Now again they



NO. 8.—A SPIDER CHANGING ITS SUIT OF CLOTHES.

retreat, alarmed at her aspect. Rosalind sulks in her web, and waits to see which of the two she prefers, if either. Should the fit so seize her, she will accept one or other of her ardent suitors; but should she happen to be more hungry than amorous, or else to be disappointed, or in an ill-humour, she may dart out upon them at once, and make meat of her devoted admirer.

Even the successful suitor himself is by no means safe; for it is Rosalind's way, when she tires of a lover, not to nag and quarrel, but to devour him outright, and look out for another. This saves time and trouble, and is better in the end for the temper of the species.

When autumn comes, Rosalind lays her eggs in a cocoon, and fastens them on the under side of a stone or piece of wood, where

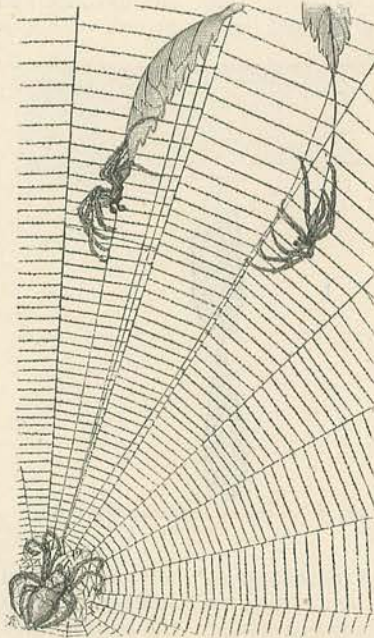
they hatch out in spring, and so the whole story of her life begins over again. She herself, meanwhile, retires to winter quarters, where she passes the cold months under shelter in a state of more or less torpidity. It is not known exactly how long a spider lives; but they continue for at least two or three years, and probably much longer. We had Rosalind under examination for two successive summers.

The family to which Rosalind belongs, that of the geometrical spiders, may be placed at the very head of the whole spider order. Its webs are the most perfect in architecture, are the best planned as snares, and have a strict monopoly of the sticky beads, which help to entangle the prey, and which are also, under the microscope, most beautiful objects, decked in prismatic colours, and looking like so many iridescent opals. In shape and markings these spiders are also superior to the common run of eight-legged beasts, though they are certainly less beautiful than some of the lovely green and variegated semi-transparent field-spiders. It would not be going too far to say that the geometrical web-makers are the most advanced and civilized members of the entire group. For there are degrees of evolution among these hunting carnivores. Some of the least advanced kinds merely stalk or hunt down their prey on the open. These lower savages among the spider tribe lurk under stones or in the crevices of bark, and rush out at their victims, or spring upon them unawares. One may compare them to such low hunting human races as the natives of New Guinea or the North American Indians. Others, again, construct tubes, with or without trap doors, and catch their prey more or less cunningly near the entrance. Yet others, once more, weave irregular webs, among leaves and twigs, or in the corners of rooms, and trust rather to mere meshes than to sticky substances. But the geometrical web-weavers,

the most advanced of their kind, have learned by the experience of ages how to construct a regular snare, on a fixed ground-plan, and to supplement it by a singular trick of beady bird-lime. It is thus quite clear that there is progress among spiders as among human races, and that some species have progressed much further than others.

Even among the geometrical web-weavers themselves, again, there are marked varieties of progress and culture. For some kinds have only three claws to each foot, while others have more; and there are certain species which possess in addition a sort of opposable thumb, so that they can catch things as with a hand, feeling them all round, and grasping their threads as a sailor grasps a cable. Such opposable thumbs are always accompanied by high intelligence, as one sees in man, in the monkeys, in the opossum, and in the parrot.

Indeed, all round, it may be safely said that the spiders as a group stand at the head of the animals with jointed bodies; and that the geometrical tribe in particular stand at the head of all the spiders. Nor must we consider that their cruelty and ferocity put them out of court in this connection; for man himself, taking him in the mass, is one of the most ruthless of animals; and the bees, which by universal consent rank among the highest insects, are the group which most universally slaughter their own brothers, the drones, as soon as the community



NO. 9.—ROSALIND WATCHING HER TWO SUITORS, IN DOUBT WHETHER TO ACCEPT OR DEVOUR THEM.

has no further use for them. The fact is that Nature as a whole is intensely utilitarian; each kind fights for its own hand alone, and regards as little the feelings of other kinds as the fisherman regards the feelings of herrings, or as the fishmonger minds the objection of lobsters to be boiled alive for our human convenience. A race that skins living eels at Billingsgate, and decks its hats with egrets in Hyde Park, has no just ground of complaint, after all, against my poor, misguided, husband-eating Rosalind.